

**MICHIGAN CITY SANITARY DISTRICT  
MICHIGAN CITY, INDIANA**

---

NOTICE TO BIDDERS, INSTRUCTIONS TO BIDDERS, BID FORM,  
AGREEMENT FORM, PERFORMANCE AND PAYMENT BOND FORMS,  
GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS  
AND SPECIFICATIONS

FOR

**KARWICK NATURE PARK CORRECTIVE ACTION**

---

**MAYOR**

RON MEER

**SANITARY DISTRICT BOARD MEMBERS**

GARRY MITCHELL	PRESIDENT
CHARLES G. PELLER, Jr., P.E.	VICE PRESIDENT
HOLT EDINGER	SECRETARY
FRANK HARRIS	MEMBER
TIM SMITH	MEMBER
MICHAEL P. KUSS	GENERAL MANAGER
JAMES B. MEYER	ATTORNEY

---

**CONSULTING ENGINEER**

**WEAVER CONSULTANTS GROUP**

7121 GRAPE ROAD  
GRANGER, INDIANA 46530  
PHONE: 574-271-3447  
FAX: 574-271-3343  
BDEVARONA@WCGRP.COM

MARCH, 2019



SECTION  
00 01 10

KARWICK NATURE PARK CORRECTIVE ACTION  
MICHIGAN CITY SANITARY DISTRICT

TABLE OF CONTENTS

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

Project Title Page	00 01 01
Table of Contents	00 01 10
Bidders Procedure Checklist	00 01 20
Official Notice To Bidders	00 11 13
EEO Packet	00 20 50
Instructions to Bidders	00 21 13
Bid Form	00 41 00
Bid Bond	00 43 00
Notice of Award	00 45 00
Form of Agreement Between Owner and Contractor	00 50 00
Performance Bond	00 61 13
Payment Bond	00 61 16
Notice to Proceed	00 68 00
Standard General Conditions of the Construction Contract	00 72 00
Supplementary Conditions	00 73 00
Public Works Contract Requirements	00 73 43
Application for Payment	00 90 00
Retainage Release Request	00 90 10
Work Change Directive	00 91 10
Change Order	00 92 10
Certificate of Partial Utilization	00 93 10
Certificate of Substantial Completion	00 94 10
Certificate of Final Completion, Approval and Acceptance of Work	00 95 10



## DIVISION 01 - GENERAL REQUIREMENTS

Summary of Work	01 10 00
Measurement and Payments	01 29 01
Coordination and Meetings	01 31 00
Progress Schedule	01 32 50
Submittals	01 33 00
Environmental Protection	01 35 43
Health and Safety Provisions	01 36 00
Quality Control	01 45 00
Field Engineering	01 45 16
Testing Laboratory Services	01 45 23
Inspection Services	01 45 29
Construction Facilities and Temporary Controls	01 50 00
Material and Equipment	01 60 00
Contract Closeout	01 78 90

## DIVISION 26 – ELECTRICAL

Basic Electrical Requirements	26 01 01
-------------------------------	----------

## DIVISION 31 – EARTHWORK

Clearing and Grubbing	31 11 00
Waste Excavation	31 20 01
Excavation	31 23 16
Dewatering	31 23 19
Clean Soil Fill	31 23 23
Compacted Bank Clay	31 23 24
Topsoil	31 23 25
Geotextile	31 32 19
Envirogrid Bank Stabilization	31 35 01

## DIVISION 32 - EXTERIOR IMPROVEMENTS

Seeding	32 92 19
---------	----------

## DIVISION 33 – UTILITIES

HDPE Pipe	33 34 01
-----------	----------

## APPENDICES

Appendix A – ALTA/NSPS Land Title Survey & Topographic Survey  
Appendix B – Site Characterization Report – Karwick Road Nature Park

END OF SECTION



SECTION  
00 01 20

BIDDERS PROCEDURE CHECKLIST FOR CONSTRUCTION SERVICES

- \_\_\_\_1. Bidder has reviewed and understands all bidding documents.
- \_\_\_\_2. Two (2) copies of the Bid Package must be submitted, bound and tabbed in a sealed plain envelope or package, with Bidder's Full Legal Name, Project Name and Bid Opening Date placed on the face of the package. Specifically identify and tab page of Section 00 41 00 that shows the bid amount and tabulation.
- \_\_\_\_3. Bidder has visited and inspected the site where the work is to be performed.
- \_\_\_\_4. Pursuant to IC 5-16-13-10(c), for contracts of at least \$300,000, awarded after June 30, 2016, to be eligible for an award, a contractor has to demonstrate that he/she/it has been certified pursuant to IC 4-13.6-4 and if the contractor will be using either a licensed engineer, architect, or surveyor, the licensee must be certified pursuant to IC 8-23-10.
- \_\_\_\_5. Bidder is and will continue to be in compliance with minimum wage, overtime, and wage payment timing requirements of the federal Fair Labor Standards Act and IC 22-2-2-8.
- \_\_\_\_6. The Bidder and all its subcontractors, shall provide documentation with the bid demonstrating compliance with the requirements for an approved employee drug testing program specified in IC 4-13-18 and required by IC 36-1-12-24.
- \_\_\_\_7. The requirements of IOSHA regulations 29 C.F.R. 1926, Subpart P for any trench of 5 feet or more in depth have been incorporated into the bid price.
- \_\_\_\_8. Bid package includes E-Verify affidavit and certification.
- \_\_\_\_9. Bid package includes No Iranian Investment certification.
- \_\_\_\_10. Bidder has made Owner's representative aware, in writing, of any deficiencies bidder believes exists in the Bidding Documents, including, but not limited to, the plans and specifications.
- \_\_\_\_11. Bidder was provided reasonable opportunity to submit written questions concerning the Bid Documents and received written answers to appropriate questions within the time allowed.



- \_\_\_\_12. This Bidders Procedure Checklist for Construction Services must be completed, signed and submitted as the first page of the Bid Package. The Bid Package must be bound and submitted to the City of Michigan City in the following order:
- a. This signed and dated Bidders Procedure Checklist for Construction Services.
  - b. Completed and executed Indiana Bid Form No. 96 and Bid Form (Section 00 41 00), including all related statements and attachments.
  - c. Required Bid security in the form of a Bid Bond (Section 00 43 00) or Certified Check.
  - d. E-verify Affidavit
  - e. No-Investment in Iran Affidavit
  - f. Agreement
- \_\_\_\_13. The Indiana Bid Form No. 96 and Bid Form (Section 00 41 00) must be read and completed in its entirety, signed and notarized as appropriate, and include all requested attachments, including:
- a.\_\_\_\_ Part I (pages 00 41 00-1 through 00 41 00-2).
  - b.\_\_\_\_ Part II, Section I – Experience Questionnaire (pages 00 41 00-2 through 00 41 00-3).
  - c.\_\_\_\_ Part II, Section II – Plan and Equipment Questionnaire (pages 00 41 00-4 through 00 41 00-5).
  - d.\_\_\_\_ Part II, Section III – Contractor’s Financial Statement (page 00 41 00-5).
  - e.\_\_\_\_ Part II, Section IV – Contractor’s Non-Collusion Affidavit (page 00 41 00-5).
  - f.\_\_\_\_ Part II, Section V – Oath and Affirmation (page 00 41 00-6).
  - g.\_\_\_\_ Bid Form (Pages 00 41 00-7 through 00 41 00-10)
- \_\_\_\_14. Sealed Bids can be turned in at any time up until bids are called to be opened at the public meeting stated in the Official Notice to Bidders (Section 00 11 13). Bids submitted thereafter will be returned unopened.
- \_\_\_\_15. Bid prices should exclude all Federal, State, and Local taxes from which the City is exempted.
- \_\_\_\_16. Bid prices must be itemized on a unit price basis, unless designated otherwise, and the listed quantities are to be multiplied by the unit prices. These amounts are to be totaled, then presented in numbers and words as the Bid amount (see Part I, page 00 41 00-1 and Bid Form, pages 00 41 00-7 through 00 41 00-9, of the Indiana Bid Form No. 96).
- \_\_\_\_17. Each Bid must be accompanied with a Certified Check or Bid Bond (Section 00 43 00) for not less than 5% or 10% of the Bidder's maximum Bid price as follows: For projects less than or equal to \$200,000, a 5% Bid Bond is required. For



projects greater than \$200,000, a Bid Bond in the amount of 10% is required.  
(see Specification Section 00 21 13-5).

- N/A 18. Bidder has read and acknowledged reading the Indiana State Revolving Fund Loan Program DBE requirements (see Specification Section 00 42 00), and has included the required executed SRF forms in its Bid Package. *(this is an option to be used when SRF funding is used)*
- \_\_\_\_\_ 19. Contractor will have to execute the Agreement (Section 00 50 00) contained in the Bidding Documents upon receiving Notice of Award.
- \_\_\_\_\_ 20. Contractor will have to provide performance and payment bonds in name of Owner for at least 100% of contract price upon receiving Notice of Award.
- \_\_\_\_\_ 21. Contractor will have to provide written proof of insurance of the type and in the amounts specified in the Supplementary Conditions (Section 00 73 00) upon receiving Notice of Award.
- \_\_\_\_\_ 22. Owner will withhold retainage in the amount stated in the Agreement from all payments to contractor and contractor will include the same retainage provision in all subcontracts.
- \_\_\_\_\_ 23. Waivers of liens must be provided to Owner with each request for payment for any amount for services or product provided by a subcontractor or vendor.
- \_\_\_\_\_ 24. The Contractor, if applicable, agrees to comply with terms of IC 5-16-13-8 and represents that the project or works shall not be structured other than in the “tier” structure as required by law.
- \_\_\_\_\_ 25. Tier 1 Contractor will perform or provide materials with a combined value of at least 15% of the contract price.
- \_\_\_\_\_ 26. The Contractor, if applicable, shall comply with the requirements of IC 5-16-13-9 through 12.
- \_\_\_\_\_ 27. The Contractor shall comply with IC 5-16-13-13 in all respects, including but not limited to, document preservation and availability for inspection for at least 3 years after Final completion of the work.
- \_\_\_\_\_ 28. Contractor shall pay, and provide to Owner proof of payment, of all subcontractors, laborers, material suppliers, and those performing services relating to this Contract. Absent such proof, pursuant to I.C. 36-1-12-13, Owner will withhold money from the Contract Price in sufficient amount to pay said subcontractors, laborers, material suppliers, and those furnishing services.



- \_\_\_\_29. Contractor will not pay anyone in cash.
- \_\_\_\_30. Contractor is in compliance with worker's compensation insurance requirements of IC 22-3-5-1 and IC 22-3-7-4.
- \_\_\_\_31. Contractor is in compliance with unemployment insurance requirements of IC 22-4-1 through IC 22-4-39.5.
- N/A 32. If required by Bidding Documents (SRF), Bid price is based on paying wages required by the Davis-Bacon Act.
- \_\_\_\_33. Contractors with more than 10 employees must demonstrate compliance with IC 5-16-13-12 regarding providing or participating in a job training program.
- \_\_\_\_34. Bidder has a written anti-discrimination policy and does not discriminate in regards to hiring, contracting, and purchasing on the basis of race, color, creed, sex, national original, age, or, to the extent required by law, handicap, all as required by IC 15-16-6 of the Indiana Code.
- \_\_\_\_35. Bid price includes the cost of using only steel made in the USA in this project.
- \_\_\_\_36. Bid package includes written evidence that the person performing any plumbing work is licensed as a plumber in the State of Indiana.
- \_\_\_\_37. Bid package includes all applicable Local Hiring documents properly completed and signed (Included in Specification Section 00 20 50).
- N/A 38. For federally funded projects (SRF loans and Grants), Contractor has read and will comply with the following SRF requirements as found in Specification Section 00 42 00:  
\_\_\_\_ Davis-Bacon Certification (see Attachment C and D)  
\_\_\_\_ Non-Disbarment Certification (see Attachment E)
- \_\_\_\_39. Bidder received and reviewed Addenda 1, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, to the Bidding Documents and has included any and all costs for compliance therewith in its bid.
- \_\_\_\_40. Bid package includes prices for all specified alternatives and for bidder's proposed alternatives. Determination of lowest bid will be based on base bid price, not including specified alternatives and alternatives proposed by bidder.
- \_\_\_\_41. As required by IC 5-16-13-7, the requirements, terms, and conditions of IC 5-16-13-1, *et seq.* are incorporated into the contract for the project by reference.



- \_\_\_\_\_42. The Contractor is considered the “Controlling Employer” of the job site and is therefore responsible for compliance with all applicable OSHA, local and municipality safety requirements and regulations on the job site. Successful Contractor will submit a copy of its updated and current safety program manual to the Owner with its Notice of Award submitted documents. A copy of this manual will also be placed at the jobsite if a Contractor construction trailer is used.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Company Name



SECTION  
00 11 13

OFFICIAL NOTICE TO BIDDERS

Project: Karwick Nature Park Corrective Action

All Bids for the Michigan City Sanitary District (OWNER) Karwick Nature Park Corrective Action must be received by the OWNER in a sealed envelope at or before **4:00 PM Central Time on Wednesday, March 27, 2019**, addressed to:

Michigan City Sanitary District  
Attn: Karwick Nature Park  
1100 E. 8th Street  
Michigan City, Indiana, 46360-2567

Bids may also be submitted during the District's Board Meeting scheduled to begin at **4:00 PM Central Time on Wednesday, March 27, 2019**, at 1100 E. 8th Street, Michigan City, Indiana, at the time the agenda item for receiving these bids is called by the presiding officer. Thereafter, the time for receiving quotes will be closed and any quote received thereafter will not be considered. When the Project agenda item is called by the Board, the bids will be opened and read aloud at that time and the Board will ultimately make the award to what it determines to be the lowest, responsive and responsible bid.

A MANDATORY PRE-BID MEETING for the Karwick Nature Park Corrective Action will be held at **10:00 AM Central Time on Thursday, March 14, 2019** in the Conference Room of the Administrative Office of the Michigan City Sanitary District, to discuss the Project. At the mandatory Pre-Bid Meeting, the project site will be visited, rules and regulations included in the Contract Documents will be explained and questions regarding the project received and answered, where appropriate. Please contact Bryan de Varona at 574-271-3447 or [bdevarona@wcgrp.com](mailto:bdevarona@wcgrp.com) for information.

Questions must be received on or before **3:00 PM Central Time on Wednesday, March 20, 2019**. Questions may be delivered to the OWNER at the bid address above, or electronically to [bdevarona@wcgrp.com](mailto:bdevarona@wcgrp.com) with a carbon copy (CC) to [sstanford@mcsan.org](mailto:sstanford@mcsan.org).

Electronic copies of the Contract Documents may be obtained by placing an order on [raplanroom.com](http://raplanroom.com) to allow downloading of the electronic documents. There is no cost for downloading the Contract Documents. Plan documents will be available for public review in the Administrative Offices of the Michigan City Sanitary District. Alternatively, the Contract Documents may be requested as a "hard-copy." To obtain hard copy Contract Documents, a fee is required for the cost of printing, shipping and handling and is payable to:

Reprographic Arts  
2824 E Michigan Blvd  
Michigan City, IN 46360  
(219) 872-9111

The Work comprises furnishing all labor, materials, equipment, supplies and services for the construction of the Karwick Nature Park Corrective Action located in Michigan City, Indiana, 46360 and as defined in the Contract Documents.

KARWICK NATURE PARK  
CORRECTIVE ACTION  
1873-356-10-01

00 11 13-1

OFFICIAL NOTICE TO BIDDERS



The Bidding and Contract Documents, including Bidders Procedure Checklist for Construction Services, Official Notice to Bidders, Instructions to Bidders, Bid Form, Form of Bid Bond, Agreement, Form of Performance Bond, Form of Payment Bond, General Conditions, Supplementary Conditions, Specifications, Drawings and Addenda, if any, may be examined at the following locations:

Administrative Office

Michigan City Sanitary District  
1100 E 8<sup>th</sup> St  
Michigan City, Indiana 46360-2567  
www.emichigancity.com

Consulting Engineer Office

Weaver Consultants Group  
7121 Grape Road  
Granger, Indiana 46530  
574-271-3447

Each Bid must be accompanied by a certified or cashier's check on a solvent bank or trust company, drawn to the order of the Michigan City Sanitary District, or an acceptable Bid Bond, in an amount of not less than 5 percent (5%) of the total Bid for the Project. This sum is a guarantee that, if the Bid is accepted, a contract will be entered into and its performance properly secured.

Bid security of all excepting the three lowest, responsive, responsible Bidders will be returned within thirty (30) days after the opening of bids. Any Bidder whose Bid security has been retained may, after thirty (30) days from the opening of Bids, request return of his Bid security provided he has not been notified of acceptance of his Bid. The Bid security of the successful Bidder will not be returned until Bidder delivers the required signed contract documents and Performance and Payment Bond.

Any Bid may be withdrawn prior to the scheduled time for the opening of Bids or authorized postponement thereof. However, no Bid may be withdrawn for sixty (60) days after the scheduled time for opening, unless agreed to by the OWNER.

The award of the contract will be made by the OWNER. In determining who is the lowest, responsive, responsible Bidder, the OWNER will consider the Bid, and all other relevant facts or matters mentioned in the Contract Documents or which the Sanitary District Board may legally consider in determining the lowest, responsive, responsible Bidder.

The Sanitary District Board reserves the right, after all Bids have been examined and tabulated, to waive any informalities and insubstantial defects in any Bid; to accept the Bid which it deems to be the lowest, responsive, and responsible; and to reject any and all of the Bids received. All Bid awards are made subject to an appropriate contract being finalized between the Sanitary District Board and the winning Bidder.

Questions about these Bidding Procedures should be directed to the Michigan City Sanitary District's Attorney, Mr. James B. Meyer, tel. (219) 938-0080, email address: [jmeyer@jimmeyerlaw.com](mailto:jmeyer@jimmeyerlaw.com).

Questions about the drawings and specifications should be directed to the Engineer, Bryan de Varona, at 574-271-3447 or [bdevarona@wcgrp.com](mailto:bdevarona@wcgrp.com).

Mr. Michael P. Kuss, General Manager  
Michigan City Sanitary District  
1100 E. 8<sup>th</sup> Street  
Michigan City, IN 46360



END OF SECTION



SECTION  
00 20 50  
EEO PACKET



MICHIGAN CITY, INDIANA

LOCAL HIRING /EQUAL EMPLOYMENT OPPORTUNITY PROGRAM  
and  
CERTIFICATION OF APPLICABLE LAWS

The documentation required herein should be included with your bid/quote.

A second copy of this package should be made and taken to  
The Michigan City Human Rights Department.

Revised February 2017

CONTRACTOR: \_\_\_\_\_

CITY DEPARTMENT: \_\_\_\_\_

Project Name: \_\_\_\_\_

Construction Cost: \_\_\_\_\_ Under \$5,000.00  
\_\_\_\_\_ Between \$5,000.00 and \$150,000.00  
\_\_\_\_\_ Over \$150,000.00



# CONTENTS

## Foreword by Carl Ridle

Pg. 3

## Procedures and Submissions Applicable to Bidders and Winning Contractors Pg. 4-5

- Equal Employment Opportunity Clause to be Included in Public Contracts Pg. 6-7
- Notice of Non-Discrimination in Employment Pg. 8-9
- Certification of Non-Segregated Facilities Pg. 10
- Certification of Compliance with Applicable Laws Pg. 11-13
- E-Verify Affidavit Pg. 14
- Non-Investment in Iran Certification Pg. 15
- Non-Collusion Affidavit Pg. 16
- Affirmative Action and Equal Employment Opportunity Policy Statement Pg. 17-18
- Michigan City Local Hiring Agreement Pg. 19-22

## Relevant Municipal Code Provisions:

- Contract Compliance/Affirmative Action and Equal Opportunity Program: Municipal Code §66-130; 66-140—§-66-147; and §66-103.
- Local Hiring Program: Municipal Code §66-130 and §66-153—§66-159.

Municipal Code available online at [www.emichigancity.com/cityhall/clerk/municipal.htm](http://www.emichigancity.com/cityhall/clerk/municipal.htm) or in the City Clerk's Office.

## Human Rights Department Website:

- [www.emichigancity.com/cityhall/departments/humanrights/index.htm](http://www.emichigancity.com/cityhall/departments/humanrights/index.htm)



## Foreword by Carl Ridle

Greetings,

As the Executive Director of the Michigan City Human Rights Department, it is my pleasure to promote local hiring and equal opportunity in the areas of employment, public accommodations, education, and housing on behalf of all citizens of Michigan City. Furthermore, the Human Rights Commission advocates anti-discriminatory attitudes, practices, and policies.

This Local Hiring/EEO manual provides clear expectations for recipients of our City contracts to successfully comply with state/federal laws and our Municipal Code including the Michigan City Local Hiring Ordinance. Thank you in advance for your cooperation and efforts to increase the opportunities for all citizens of Michigan City.

Sincerely,

Carl Ridle



**PROCEDURES AND SUBMISSIONS APPLICABLE TO BIDDERS/QUOTERS  
AND WINNING CONTRACTORS**

**I. PROCEDURES TO FOLLOW FOR CITY CONTRACTS.**

- A. TYPES OF CONTRACTS COVERED:
  - 1. Purchase Contracts (Materials, Supplies, and Equipment);
  - 2. Personal and Professional Service Contracts; and
  - 3. Construction Contracts; and
  
- B. ALL APPLICANTS FOR ALL CITY CONTRACTS MUST SIGN AND SUBMIT THE FOLLOWING:
  - 1. Equal Employment Opportunity Clause to be Included in Public Contract (Pg. 6-7);
  - 2. Notice of Non-Discrimination in Employment (Pg. 8-9);
  - 3. Certification of Non-Segregated Facility (Pg. 10);
  - 4. Certification of Compliance with Applicable Laws (pg. 11-13);
  - 5. E-Verify Affidavit (Pg. 14);
  - 6. Non-Investment in Iran Certification (Pg. 15);
  - 7. Non-Collusion Affidavit (Pg. 16).

**II. CONSTRUCTION CONTRACTS BETWEEN \$5,000.00 AND \$150,000.00  
(Municipal Code §66-130 and §66-140—§147).**

- A. ALL APPLICANTS FOR CONSTRUCTION CONTRACTS BETWEEN \$5,000.00 AND \$150,000.00 MUST SIGN AND SUBMIT ALL ITEMS SPECIFIED IN SECTION I(B) ABOVE WITH THEIR BID/QUOTE.
- B. IN ADDITION TO THE DOCUMENTS IDENTIFIED IN SECTION I(B) ABOVE, THE APPLICANTS MUST SUBMIT:
  - 1. Completed and executed Affirmative Action and EEO Policy Statement (Pgs. 17-18); and
  - 2. Such documentation and reports as required by the Human Rights Department demonstrating compliance with the affirmative action and equal employment requirements of Municipal Code §66-142.
- C. COMPLIANCE MONITORING: The winning contractor shall be required to permit periodic access to that part of its/his/her employment books, records, and accounts pertaining to the contract by the contracting agency's (city or department) Compliance Officer and the Human Rights Department for the purpose of verifying compliance with Municipal Code requirements.

**III. LOCAL HIRING PROGRAM APPLIES TO CONSTRUCTION CONTRACTS OVER  
\$150,000.00 PER MUNICIPAL CODE §66-130 and §66-153—§66-159.**

- A. ALL BIDDERS FOR CONSTRUCTION CONTRACTS OVER \$150,000.00 MUST SIGN AND SUBMIT ALL DOCUMENTS CONTAINED IN THIS PACKET.



B. COMPLIANCE MONITORING:

1. In addition, the winning contractor shall submit documentation demonstrating compliance with the affirmative action and reporting requirements of Municipal Code §66-142 and such documentation and reports as required by the Human Rights Department.
2. The winning contractor shall be required to permit periodic access to that part of , its/his/her employment books, records, and accounts pertaining to the contract by the contracting agency's (city or department) Compliance Officer and by the Human Rights Department for the purpose of verifying compliance with the Program.



## **EQUAL EMPLOYMENT OPPORTUNITY CLAUSE TO BE INCLUDED IN PUBLIC CONTRACT**

**EQUAL OPPORTUNITY CLAUSE:** During the performance of this contract, the contractor agrees to do the following:

- (1) The contractor shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, sexual orientation, gender identity, military service, national origin, disability or relationship. The contractor shall take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to their race, religion, color, sex, sexual orientation, gender identity, military service, national origin, disability or relationship. As used herein, the word "treated" shall mean and include, without limitation, the following: recruited, whether by advertising or other means; compensated, whether in the form of rates of pay or other forms of compensation; selected for training, including apprenticeship; promoted; upgraded; demoted; downgraded; transferred; laid off; and terminated. The contractor agrees to and shall post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contractor setting forth the provisions of this nondiscrimination clause.
- (2) The contractor shall, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, military service, national origin, disability, or relationship.
- (3) The contractor shall send to each labor union or representative of workers with whom it/she/he has a collective bargaining agreement or other contact or understanding a notice advising the labor union or workers' representative of the contractor's commitments under the equal employment opportunity requirements of the City, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- (4) The contractor shall furnish all information and reports required by the City's Human Rights Department pursuant to this subdivision and shall permit access to that part of its/her/his employment books, records, and accounts pertaining to the contract by the contracting agency and by the City's Human Rights Department for purposes of verifying compliance with the Program.
- (5) The contractor shall take such action as the City may direct with respect to any subcontractor as a means of enforcing the provisions of paragraphs (1) through (8) herein, including penalties and sanctions for noncompliance; provided, however, that in the event the contractor becomes involved in or is threatened with litigation as the result of such direction by the City, the City will enter into such litigation as is necessary to protect the interests of the City and to effectuate the City's contract compliance/equal employment opportunity program. In the case of contracts receiving federal assistance, the contractor or the City may request the United States to enter into such litigation to protect the interests of the United States.
- (6) The contractor shall file and shall cause his subcontractors, if any, to file compliance reports with the City in the form and to the extent prescribed by the Human Rights Department of the City. Compliance reports, filed at such times as directed, shall contain information as to the employment practices, policies, programs, and statistics of the contractor and his subcontractors.



(7) The contractor shall include the provisions of paragraphs (1) through (8) of this equal employment opportunity clause in every subcontract or purchase order so that such provisions will be binding upon each subcontractor or vendor.

(8) Refusal by the contractor or subcontractor to comply with any portion of this Program as herein stated and described will subject the offending party to any or all of the following penalties for violating its/his/her contract:

- a. Withholding of all future payments to the contractor under the involved public contract until it is determined that the contractor or subcontractor is in compliance with the provisions of the contract.
- b. Being declared to be a non-responsible contractor and rejection for any public contract within the City or any of its departments, agencies, or divisions until such time as the contractor or subcontractor demonstrates that it/she/he has established and shall carry out the policies of the Program as herein outlined.
- c. Cancellation of the public contract and declaration of forfeiture of the performance bond.

In cases in which there is substantial or material violation, or the threat of substantial or material violation, of the Program or compliance procedure as may be provided for by contract, appropriate proceedings may be brought by the City to enforce those provisions, including enjoining, within applicable law, of contractors, subcontractors, or other organizations, individuals, or groups who prevent, directly or indirectly, or seek to prevent, directly or indirectly, compliance with the Program as herein stated.

IN AGREEMENT HEREOF, the Bidder/Quoter has hereunto set its/his/her hand this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

\_\_\_\_\_  
Sole Proprietor Bidder

OR

\_\_\_\_\_  
Company or Partnership Bidder

By: \_\_\_\_\_  
(Company/Partnership Representative)

OR

\_\_\_\_\_  
Corporate Bidder

By: \_\_\_\_\_  
President or Authorized Signatory

ATTEST: \_\_\_\_\_  
Secretary



## **NOTICE OF NONDISCRIMINATION IN EMPLOYMENT**

TO: \_\_\_\_\_

(Employees of contractor, union or organization of workers, employment referral agencies, and training program sponsors.)

The undersigned currently holds, or represents contractors or sub-contractors who currently hold, a contract or subcontract, and may in the future bid on contracts or subcontracts, which are subject to the provisions of Michigan City Municipal Code §66-130 and §66-140—§66-147.

You are advised that, under the provisions of these contracts and in accordance with Indiana law and Municipal Code §66-142(1), contractors and subcontractors are obliged to take Affirmative Action to ensure equal employment opportunities without regard to race, creed, color, sex, sexual orientation, gender identity, military service, national origin, disability, or age. This obligation includes, but is not limited to, the following: **HIRING, PLACEMENT, UPGRADING, TRANSFER, DEMOTION, RECRUITMENT, ADVERTISING OR SOLICITATION FOR EMPLOYMENT, TREATMENT DURING EMPLOYMENT, RATES OF PAY OR OTHER FORMS OF COMPENSATION, SELECTION FOR TRAINING INCLUDING APPRENTICESHIP, LAYOFF, OR TERMINATION.**

This obligation extends, so far as the responsibility of the undersigned is concerned, to any arrangement under which journeymen or apprentices are selected and referred for work on its projects.

Pursuant to IC 5-16-6-1, Contractor agrees as follows:

- (a) That in the hiring of employees for the performance of work under this contract or any subcontract hereunder, no contractor, or subcontractor, nor any person acting on behalf of such contractor or subcontractor, shall, by reason of race, religion, color, sex, national origin or ancestry, discriminate against any citizen of the state of Indiana who is qualified and available to perform the work to which the employment relates;
- (b) That no contractor, subcontractor, nor any person on his behalf shall, in any manner, discriminate against or intimidate any employee hired for the performance of work under this contract on account of race, religion, color, sex, national origin, or ancestry;
- (c) That there may be deducted from the amount payable to the contractor by the State of Indiana or by any municipal corporation thereof, under this contract, a penalty of five dollars (\$5.00) for each person for each calendar day during which such person was discriminated against or intimidated in violation of the provisions of the contract; and



(d) That this contract may be cancelled or terminated by the State of Indiana or by any municipal corporation thereof, and all money due or to become due hereunder may be forfeited, for a second or any subsequent violation of the terms or conditions of this section of the contract.

Signature: \_\_\_\_\_

Contractor Liaison: \_\_\_\_\_

Contractor or Subcontractor: \_\_\_\_\_

Date: \_\_\_\_\_

COPIES OF THIS NOTICE ARE TO BE FURNISHED BY THE CONTRACTOR TO LABOR UNIONS OR OTHER ORGANIZATIONS OF WORKERS, APPRENTICESHIP, AND TRAINING PROGRAM SPONSORS, AND EMPLOYMENT REFERRAL AGENCIES.



**CERTIFICATION OF NON-SEGREGATED FACILITIES**

With his/her bid, each Bidder is required to submit a fully executed Certificate of Non-Segregated Facilities.

***AGREEMENT***

The Bidder/Quoter certifies that he/she/it does not maintain or provide for his/her/its employees any segregated facilities at any of his/her/its establishments, and that he/she/it does not permit his/her/its employees to perform their services at any location under his/her/its control, where segregated facilities are maintained. The Bidder/Quoter certifies further that he/she/it will not maintain or provide for his/her/its employees any segregated facilities at any of his/her/its establishments, and that he/she/it will not permit his/her/its employees to perform their services at any location under his/her/its control where segregated facilities are maintained. The Bidder/Quoter agrees that a breach of this certification will be a violation of the Equal Opportunity clause in any contract resulting from acceptance of this bid/quote. As used in this certification, the term "segregated facilities" means any waiting rooms, work area, restroom and washroom, restaurant and other eating areas, time-clocks, locker rooms and other storage or dressing areas, and transportation and housing facilities provided for employees which are segregated by explicit directives or are in fact segregated on the basis of race, color, religion, or national origin, because of habit, local custom, or otherwise. The Bidder/Quoter agrees that (except where he/she/it has obtained identical certification from proposed subcontractors for specific time periods) he/she/it will obtain identical certification from any proposed subcontractor prior to the award of subcontracts exceeding \$10,000.00 which are not exempt from the provisions of the Equal Opportunity Clause, and that he/she/it will retain such certifications in his/her/its files.

Name of Bidder/Quoter:

---

By: 

---

Title: 

---

Official Mailing Address: 

---



### **CERTIFICATION OF COMPLIANCE WITH APPLICABLE LAWS**

The Undersigned, in consideration of contracting with and/or entering into agreements with the City of Michigan City, Indiana, a governmental entity, including any of its agencies or departments, does hereby make the below certifications and acknowledges that said representations and compliance with applicable law is a requirement of doing business with a governmental entity and is deemed valuable consideration in entering into a contract with the City of Michigan City, Indiana. The Undersigned agrees to be in full compliance with all applicable laws and shall immediately notify the City of Michigan City, Indiana, in the event it has failed to comply with this certification. In such event, the City of Michigan City, Indiana may immediately terminate any and all contracts with the Undersigned. Compliance with all State and Federal laws shall include, but is not limited to, the following:

- a. Execution of Non-Collusion Affidavit(s) to be provided and submitted on a form required by the State Board of Accounts;
- b. Applicable contract provisions pursuant to IC 5-16-13 for public works projects awarded after June 30, 2015, the terms of which are specifically incorporated herein by reference as required by law;
- c. Applicable anti-discrimination provisions as required by law;
- d. E-Verify Affidavit as required by law pursuant to IC 22-5-1.7-11.1;
- e. Non-Investment in Iran Certification pursuant to I.C. 5-22-16.5, et seq.;
- f. The Undersigned, if applicable, agrees to comply with terms of IC 5-16-13-8 and represents that the project or works shall not be structured other than in the “tier” structure as required by law;
- g. Tier 1 contractor must directly contribute at least 15% of total contract price in any combination of work, material, or services (IC 5-16-13-9);
- h. Contractors of any Tier must maintain general liability insurance coverage of at least \$1,000,000.00 per occurrence and \$2,000,000.00 general aggregate and the political subdivision, who is the Owner of the project, shall be named as an additional insured (IC 5-16-13-10(b));
- i. The Undersigned, if applicable, shall comply with the requirements of IC 5-16-13-9 through 12;
- j. If applicable, pursuant to IC 36-1-12-24, which takes effect after June 30, 2015, Contractors and Subcontractors shall drug test employees when the estimated cost of any Public Works project is at least \$150,000.00;
- k. Pursuant to IC 5-16-13-10(c), for contracts awarded after June 30, 2016, to be eligible for an award, a contractor has to demonstrate that he/she/it has been certified pursuant to IC 4-13.6-4 and if the contractor will be using either a licensed engineer, architect, or surveyor, the licensee must be certified pursuant to IC 8-23-10;



- l. If applicable, the Undersigned shall comply with IC 5-16-13-13 in all respects, including but not limited to, document preservation and availability for inspection;
- m. Contractor shall pay, and provide to Owner proof of payment, of all subcontractors, laborers, material suppliers, and those performing services relating to this Contract. Absent such proof, pursuant to I.C. 36-1-12-13, Owner will withhold money from the Contract Price in sufficient amount to pay said subcontractors, laborers, material suppliers, and those furnishing services.;
- n. If five (5) feet or more of any trench is going to be used, pursuant to IC 36-1-12-20, IOSHA regulations 29 C.F.R. 1926, Part P. for trench safety systems are incorporated into this Agreement and the cost of the trench safety system shall be paid for, and shown to be paid, either as a separate pay item or in the pay item of the principal work with which the safety system(s) is/are associated;
- o. Pursuant to IC 25-28.5-1-11, it shall be unlawful for any person to act in the capacity of a plumbing contractor or journeyman plumber within this State without first obtaining a license as a plumbing contractor or journeyman plumber from the commission. If the project includes any plumbing, each bidder must submit with the bid, evidence that the person performing the plumbing is a licensed plumbing contractor in the State of Indiana (IC 36-1-12-21);
- p. Pursuant to IC 5-22-15-25 & IC 5-16-8, et seq., if any steel products are used in the manufacture of the supplies required under the terms of the contract or supplies used in the performance of the services under the contract by the contractor or a subcontractor of the contractor, the steel products must be manufactured in the United States, unless Owner determines, based on documented evidence, that the domestic steel is not reasonably available or that the cost of domestic steel is more than at least 15% higher than imported product;
- q. Pursuant to IC 5-16-13-11(2), a contractor may not pay cash to any individual employed by the contractor for work done by the individual on the public project;
- r. Pursuant to IC 5-16-13-11(3), a contractor must be in compliance with the federal Fair Labor Standards Act of 1938, as amended (29 USC 201-209) and IC 22-2-2-1 through IC 22-2-2-8 regarding employee payment timing, minimum wage, and overtime;
- s. Pursuant to IC 5-16-13-11(4), contractor must be in compliance with requirements of IC 22-3-5-1 and IC 22-3-7-34 regarding worker's compensation insurance;
- t. Pursuant to IC 5-16-13-11(5), contractor must be in compliance with requirements of IC 22-4-1 through IC 22-4-39.5 regarding the unemployment insurance program;
- u. Pursuant to IC 5-16-13-11(6), contractors must demonstrate compliance with requirements of 4-13-18-1 through 4-13-18-7 regarding a drug testing program.
- v. Pursuant to IC 5-16-13-11(7), for contracts awarded after June 30, 2016, contractors with more than 10 employees must demonstrate compliance with IC 5-16-13-12 regarding providing or participating in a job training program;



- w. Pursuant to IC 5-16-13-13, for contracts awarded after June 30, 2016, contractors of any tier must preserve payroll and related records for at least 3 years after completion of the work and those records must be kept confidential pursuant to IC 22-4-19-6(b).

Additionally, the Undersigned certifies that they/it are not aware of any relationships between the City of Michigan City, Indiana and the Undersigned, its agents, employees or assigns which violate Indiana's Anti-Nepotism laws (I.C. 36-1-20.2, et seq.) or Contracting with a Unit laws (I.C. 36-1-21, et seq.).

I hereby affirm, under the penalties for perjury, that the foregoing representations are true to the best of my knowledge and belief. All of which is sworn to this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_  
\_\_\_\_\_.

\_\_\_\_\_  
Signature of Authorized Officer or Agent

\_\_\_\_\_  
Printed name and Title of Authorized Officer or Agent



## E-VERIFY AFFIDAVIT

STATE OF INDIANA )  
 )  
COUNTY OF \_\_\_\_\_)

The Contractor affirms, under the penalties of perjury, that it does not knowingly employ an authorized alien. The Contractor shall enroll in and verify the work eligibility status of all its newly hired employees through the E-Verify program as defined in IC 22-5-1.7-3. The Contractor is not required to participate should the E-Verify program cease to exist. Additionally, the Contractor is not required to participate if the Contractor is self-employed and does not employ any employees.

The Contractor shall not knowingly employ or contract with an unauthorized alien. The Contractor shall not retain an employee or contract with a person that the Contractor subsequently learns is an unauthorized alien.

The Contractor shall require its subcontractors, who perform work under this Contract, to certify to the Contractor that the subcontractors has enrolled and is participating in the E-Verify program. The Contractor agrees to maintain this certification throughout the duration of the term of a contract with a subcontractor.

The City may terminate for default if the Contractor fails to cure a breach of this provision no later than thirty (30) days after being notified by City.

I hereby declare, under the penalties for perjury, that the foregoing is true and correct.

Signature of Authorized Officer or Agent

Printed name and Title of Authorized Officer or Agent



### **NON-INVESTMENT IN IRAN CERTIFICATION**

The Undersigned certifies pursuant to I.C. 5-22-16.5, et seq., that it is not involved in the Iranian Energy Industry and does not do business with Vendors involved in the Iranian Energy Industry. The Undersigned understands that providing a false certification may result in the consequences listed in IC 5-22-16.5-14, including termination of this Contract and denial of future contracts, as well as an imposition of a civil penalty.

I hereby declare, under the penalties for perjury, that the foregoing is true and correct.

---

Signature of Authorized Officer or Agent

---

Printed name and Title of Authorized Officer or Agent



## NON-COLLUSION AFFIDAVIT

STATE OF INDIANA )  
 )  
COUNTY OF \_\_\_\_\_)

The undersigned bidder/Quoter or agent, being duly sworn on oath, says that she/he has not, nor has any other member, representative, or agent of the firm, company, corporation or partnership represented by her/him, entered into any combination, collusion or agreement with any person relative to the price to be bid/quoted by anyone at such letting nor to prevent any person from bidding/quoting nor to include anyone to refrain from bidding/quoting, and that this bid/quote is made without reference to any other bid/quote and without any agreement, understanding or combination with any other person in reference to the such bidding/quoting.

I hereby declare, under the penalties for perjury, that the foregoing is true and correct.

Signature of Authorized Officer or Agent

Printed name and Title of Authorized Officer or Agent



**AFFIRMATIVE ACTION AND EQUAL EMPLOYMENT OPPORTUNITY POLICY STATEMENT**  
**(REQUIRED INFORMATION FOR CONTRACTOR AND SUB-CONTRACTORS)**  
**FOR PROPOSED CITY CONSTRUCTION PROJECTS**

Relevant labor area statistics reflect 28.98% non-white labor force in Michigan City\*

Relevant labor area statistics reflect 51.9% female labor force in Michigan City\*

(Minimum Goal: 5% minorities and/or females for construction projects)

\*U.S. Census Bureau, 2011-2013 American Community Survey

It is the policy of this contractor, \_\_\_\_\_, to provide equal employment opportunities to all persons without regard to race, color, religion, sex, sexual orientation, gender identification, military service, age, national origin, or disability and to promote the full realization of equal employment opportunity through a positive continuing program.

On this City project titled:

\_\_\_\_\_

**We will utilize \_\_\_\_\_ % of our workforce as NON-WHITE MINORITIES for this City project.**

**We will utilize \_\_\_\_\_ % of our workforce as FEMALES for this City project.**

**\*\*Total workforce size for THIS CITY PROJECT \_\_\_\_\_.**

<b>White (Not Hispanic)</b>	
<b>African-American (Not Hispanic)</b>	
<b>Native American (Not Hispanic)</b>	
<b>Asian &amp; Pacific Islander (Not Hispanic)</b>	
<b>Hispanic, All Races</b>	

<b>Male</b>	
<b>Female</b>	



\_\_\_\_\_ is the Contractor's Equal Employment  
Officer.

\_\_\_\_\_ is appointed and shall be responsible for  
submitting monthly manpower utilization and, if applicable, weekly wage requirement reports during  
the contract period.

Prepared by: \_\_\_\_\_ Title: \_\_\_\_\_

Signature: \_\_\_\_\_

**\*\*PLEASE NOTE: THE MALE/FEMALE WORKFORCE TOTAL AND THE RACE WORKFORCE TOTAL MUST  
EQUAL THE TOTAL WORKFORCE SIZE.**

**Copies of this notice will be posted by the Contractor in conspicuous places available to employees  
and applicants for employment.**



**MICHIGAN CITY LOCAL HIRING AGREEMENT**  
**(For construction contracts of \$150,000 or more)**

This Agreement ("Agreement") is made and entered into by and between the \_\_\_\_\_  
 \_\_\_\_\_ (which said political subdivision is hereinafter referred to as "Owner") and  
 \_\_\_\_\_ (hereinafter referred to as "Contractor"). This  
 Agreement has been developed pursuant to the Michigan City Local Hiring Program set forth in §66-130  
 and §66-153—66-159 of the Michigan City Municipal Code. This Agreement will be carried out by the  
 Owner and the Contractor as a term and condition of that certain Contract awarded pursuant to action  
 of the Owner and the Contractor on this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

**WITNESSETH:**

**WHEREAS**, Contractor and Owner, by their signatures below, acknowledge that the provisions of §66-130  
 and §66-153—66-159 of the Michigan City Municipal Code, commonly known as the Local Hiring  
 Program, applies to and is hereby incorporated into this Agreement; and

**WHEREAS**, Contractor and Owner have met and reviewed an inventory of wage-paid positions that  
 Contractor estimates will be filled during the term of the Contract at the site of the Construction Project;  
 and

**WHEREAS**, Contractor and Owner have met and reviewed the job descriptions and skill requirements for  
 those positions.

**NOW, THEREFORE**, Contractor and Owner agree to implement the provisions of the Local Hiring Program  
 as set forth in §66-130 and §66-153—66-159 of the Municipal Code, throughout the duration of the  
 Project by complying with the particulars set forth in the Local Hiring Program and as herein set forth  
 below.

A. Compliance with 50% Resident Hiring Quota.

1. Contractor will meet the Resident Hiring Quota of fifty percent (50%) of the total  
 hourly wages paid for the Project for construction work at the Construction Site.
2. Contractor shall cause to be published a notice in the classified section of a  
 newspaper of general circulation in Michigan City soliciting resident workers for  
 the Construction Project. **The notice shall run for seven consecutive days and the  
 first publication must occur at least ten (10) days prior to the commencement of  
 the Project.** The notice must be substantially as follows:

MICHIGAN CITY LOCAL HIRING PROGRAM NOTICE. In accordance with  
 the Michigan City Local Hiring Program, qualified Michigan City residents



are being afforded an opportunity to work on the [PROVIDE DESCRIPTION] Construction Project. Construction of this Project will commence on or about [PROVIDE DATE]. In order to be considered for hire under this Program, residents need to respond with union affiliation, qualifications, and availability by calling [PROVIDE COMPANY NAME AND CONTACT NUMBER] and the Michigan City Human Rights Department office (219) 873-1429.

B. Monitoring and Reporting Compliance.

1. Contractor will, prior to the commencement of construction activities, designate a specific person who will serve as the "Contractor Liaison" to the Owner through the Owner's "Compliance Officer."
2. Contractor's Liaison will be available to meet in person with the Compliance Officer within thirty-six (36) hours upon request.
3. Contractor's Liaison will provide such information to the Compliance Officer about skilled and unskilled labor positions that are being filled from time-to-time for the Construction Project and clarify the requirements of such positions as requested.
4. Contractor's Liaison shall receive referrals from the Compliance Officer or representative of the Department of Human Rights in a continuing effort to assist the Contractor in meeting the Resident Hiring.
5. Upon request, Contractor's Liaison shall provide detailed information to the Compliance Officer or designated representative of the Human Rights Department regarding the status of the Contractor meeting the requirements herein, as well as the progress/employment status of those individuals referred to and hired by the Contractor in its effort to meet those requirements.
6. Contractor's Liaison shall maintain and produce, upon demand, sufficient documentation demonstrating the Contractor's compliance with all of the requirements of the Local Hiring Program including, but not limited to, a copy of the employees' City and Indiana State-issued driver's license or identification card and at least one of the following in the employee's name:
  - a. utility bill;
  - b. vehicle registration;
  - c. lease agreement;
  - d. property-tax bill;
  - e. voter-registration card.



7. Contractor's Liaison shall provide the Compliance Officer certified payroll records on a recurring basis during the Contract Period at a frequency requested by the Compliance Officer of not less than every two (2) weeks using the Certified Payroll Report — State Form 51454 or such other format agreed to by the Owner and Contractor.
8. Contractor's Liaison shall provide the Compliance Officer Payroll records reflecting the Contractor's name, Construction Project, and payroll period. The payroll records, or a separate document, shall clearly identify which employees the Contractor contends should be credited toward the Contractor's Local Hiring Quota for Residents.
9. The Certified Payroll Report, or agreed to alternative report, shall show the total hourly wages paid under the Construction Project and the total percentage of such wages paid to Michigan City residents.
10. Contractor's Liaison shall provide the Compliance Officer such records identified by the Compliance Officer as will, in the judgment of the Compliance Officer, allow the City to verify complete compliance with this Agreement.
11. For any two-week payroll period in which the Resident Hiring Quota is not met, Contractor's Liaison shall provide the Compliance Officer a written statement addressed to the Michigan City Human Rights Department as to why the Quota has not been met, such as a letter from a union business agent or union subcontractor affirming that no additional Michigan City residents were available to satisfy the Resident Hiring Quota.
12. For any two-week payroll period in which the Resident Hiring Quota is not met, Contractor's Liaison shall secure from the Compliance Officer or Michigan City Human Rights Department, a written statement confirming that no Michigan City residents were available to satisfy the Resident Hiring Quota.

C. Non-Compliance with Local Hiring Program

1. Pursuant to Sec. 66-158 of the Michigan City Code, the unexcused failure of a construction contractor to comply with any of the requirements of the Local Hiring Program or this Agreement pre-award may be considered by a City contracting entity as demonstrating that the Contractor is non-responsive and not eligible for award of the contract.
2. In addition, the unexcused failure of a construction contractor to comply with any of the requirements of the Municipal Code regarding the Program during the term of the contract will result in a fine of \$2,500 for the first offense and \$7,500 for the second and any succeeding offense. Violations in regards to separate construction projects shall be considered to be separate violations regardless of when they occur. In addition to the fine, the Mayor may order that a non-compliant contractor be deemed non-responsive and be barred from being



eligible to receive a contract from the City for a period of time that the Mayor finds to be warranted by the contractor's non-compliance.

**DISCLAIMERS:**

NOTHING IN THIS AGREEMENT SHALL CAUSE THE CONTACTOR TO HIRE AN INDIVIDUAL OR ENTERPRISE INTO A POSITION FOR WHICH THE INDIVIDUAL OR ENTERPRISE IS NOT QUALIFIED.

**NON-DISCRIMINATION:**

THE DISTRICT AND THE CONTRACTOR AGREE THAT THERE SHALL BE NO DISCRIMINATION AGAINST ANY EMPLOYEE OR CANDIDATE FOR EMPLOYMENT BECAUSE OF RACE, COLOR, SEX, SEXUAL ORIENTATION, GENDER IDENTITY, MILITARY SERVICE, RELIGION, NATIONAL ORIGIN, AGE, OR DISABILITY OR ANY OTHER FACTOR SPECIFIED IN TITLE VI OF THE CIVIL RIGHTS ACT OF 1964, SECTION 504 OF THE REHABILITATION ACT OF 1983, AND SUBSEQUENT AMENDMENTS THERETO AND THAT THEY WILL COMPLY WITH ALL OTHER PERTINENT FEDERAL AND STATE LAWS REGARDING DISCRIMINATION.

**INDIANA LAW PREVAILS:**

THE PLACE AND PERFORMANCE OF THIS CONTRACT SHALL BE THE STATE OF INDIANA. THIS AGREEMENT SHALL BE CONSTRUED, INTERPRETED AND ENFORCED ACCORDING TO THE LAWS AND REGULATIONS OF THE STATE OF INDIANA AND THE MICHIGAN CITY MUNICIPAL CODE.

**EFFECTIVE DATE:**

THIS AGREEMENT SHALL TAKE EFFECT ON THE EFFECTIVE DATE OF THE CONSTRUCTION CONTRACT AND SHALL REMAIN IN EFFECT FOR THE DURATION OF THE CONSTRUCTION CONTRACT.

**IN WITNESS WHEREOF**, the Owner and the Contractor have affixed their signatures below.

**CONTRACTOR**

By: \_\_\_\_\_  
(Print Name)

\_\_\_\_\_  
Title

**POLITICAL SUBDIVISION/ OWNER OF PROJECT**

By: \_\_\_\_\_  
(Print Name)

\_\_\_\_\_  
Title



SECTION  
00 21 13

INSTRUCTIONS TO BIDDERS

ARTICLE 1    DEFINED TERMS

- 1.01        Terms used in these Instructions to Bidders will have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below which are applicable to both the singular and plural thereof:
- A.    Bidder - The individual or entity who submits a Bid directly to OWNER.
  - B.    Engineer - Weaver Consultants Group North Central, LLC (ENGINEER)
  - C.    Issuing Office - The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered.
  - D.    Successful Bidder - The lowest, responsible Bidder submitting a responsive Bid to whom OWNER (on the basis of OWNER's evaluation as hereinafter provided) makes an award.

ARTICLE 2    COPIES OF BIDDING DOCUMENTS

- 2.01        Refer to the Official Notice to Bidders for information on how and where copies of the Bidding Documents may be examined or obtained.
- 2.02        Complete sets of Bidding Documents must be used in preparing Bids; neither OWNER nor ENGINEER assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 2.03        OWNER and ENGINEER in making copies of Bidding Documents available do so only for the purpose of obtaining Bids for the Work and do not confer a license or grant for any other use.

ARTICLE 3    QUALIFICATIONS OF BIDDERS

- 3.01        To demonstrate Bidder's qualifications to perform the Work, within five days of OWNER's request, Bidder shall submit written evidence such as additional financial data, previous experience, present commitments, and other such data and information as may be requested.
- 3.02        The object of the request for the additional information of BIDDER is not to discourage bidding or make it difficult for qualified BIDDERS to file Bids. Neither is it intended to discourage beginning contractors. It is intended to make it possible for OWNER to have more exact information on financial ability, equipment, and experience in order to reduce the



hazards involved in awarding contracts to parties who may not have all of the capabilities needed to perform the Work as specified.

3.03 OWNER's decision as to qualification of the Bidders shall be final.

#### ARTICLE 4 EXAMINATION OF CONTRACT DOCUMENTS, OTHER RELATED DATA, AND SITE

##### 4.01 Subsurface and Physical Conditions

A. The Supplementary Conditions Identify:

1. Those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Bidding Documents.
2. Those drawings of physical conditions in or relating to existing surface and subsurface structures at or contiguous to the Site (except Underground Facilities) that ENGINEER has used in preparing the Bidding Documents.

- B. Copies of reports and drawings referenced in Paragraph 4.01.A will be made available by OWNER to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.02 of the General Conditions has been identified and established in Paragraph SC-4.02 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" or any other data, interpretations, opinions or information contained in such reports or shown or indicated in such drawings.

##### 4.02 Underground Facilities

- A. Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to OWNER and ENGINEER by owners of such Underground Facilities, including OWNER, or others.

##### 4.03 Hazardous Environmental Condition

- A. The Supplementary Conditions identify those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that ENGINEER has used in preparing the Bidding Documents.
- B. Copies of reports and drawings referenced in Paragraph 4.03.A will be made available by OWNER to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.06 of the General Conditions has been identified and established in Paragraph 4.06 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.



- 4.04 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions and Underground Facilities and possible changes in the Bidding Documents due to differing or unanticipated conditions appear in Paragraphs 4.02, 4.03, and 4.04 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work appear in Paragraph 4.06 of the General Conditions.
- 4.05 On request, OWNER will provide Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.
- 4.06 Reference is made to Article 7 of the Supplementary Conditions for the identification of the general nature of other work that is to be performed at the Site by OWNER or others (such as utilities and other prime contractors) that relates to the Work for which a Bid is to be submitted. On request, OWNER will provide to each Bidder for examination access to or copies of Contract Documents (other than portions thereof related to price) for such other work.
- 4.07 It is the responsibility of each Bidder before submitting a Bid to:
- A. Examine and carefully study the Bidding Documents, including any Addenda and the other related data identified in the Bidding Documents;
  - B. Visit the Site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
  - C. Become familiar with and satisfy Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, or performance of the Work;
  - D. Carefully study all reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site, and carefully study all reports and drawings of a Hazardous Environmental Condition, if any, at the Site which have been identified in the Supplementary Conditions as provided in Paragraph 4.06 of the General Conditions;
  - E. Obtain and carefully study (or assume responsibility for doing so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including any specific means, methods, techniques, sequences, and procedures of



construction expressly required by the Bidding Documents, and safety precautions and programs incident thereto;

- F. Agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times and in accordance with the other terms and conditions of the Bidding Documents;
- G. Become aware of the general nature of the work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Bidding Documents;
- H. Correlate the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents;
- I. Promptly give ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by ENGINEER is acceptable to Bidder, and
- J. Determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.

4.08 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given ENGINEER written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by ENGINEER are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

#### ARTICLE 5 MANDATORY PRE-BID CONFERENCE

A MANDATORY PRE-BID MEETING will be held at **10:00 AM Central Time on Thursday, March 14, 2019** in the Conference Room of the Michigan City Sanitary District located at 1100 E 8<sup>th</sup> St, Michigan City, Indiana, 46360. Representatives of OWNER and ENGINEER will be present to discuss the Project. Bidders must attend and participate in the conference. ENGINEER will transmit to all prospective Bidders of record such Addenda as ENGINEER considers necessary in response to questions arising at the conference. Oral statements made during the pre-bid conference are not to be relied upon and will not be binding or legally effective.



## ARTICLE 6 SITE AND OTHER AREAS

The Site(s) are identified in the Bidding Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by CONTRACTOR. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by OWNER unless otherwise provided in the Bidding Documents.

## ARTICLE 7 INTERPRETATIONS AND ADDENDA

- 7.01 No interpretation of the meaning of the Plans, Drawings or other Contract Documents will be made to any Bidder orally. All questions about the meaning or intent of the Bidding Documents are to be directed to ENGINEER in writing, addressed to: Weaver Consultants Group, Attn: Bryan de Varona, 7121 Grape Road, Granger, Indiana 46530 (or sent by email to bdevarona@wcgrp.com). Interpretations or clarifications considered necessary by ENGINEER in response to such questions will be issued by Addenda which, if issued, will be sent or delivered to all parties recorded by ENGINEER as having received the Bidding Documents, not later than 5 days prior to the date fixed for the Bid opening. Questions received less than seven days prior to the date for opening of Bids may not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

If requested, a copy of an Addendum will be given to a prospective Bidder's representative at the office of the ENGINEER and receipted for by said Bidder's representative. Failure of any Bidder to receive any addenda does not relieve said Bidder from any obligation under the Bid as submitted. All addenda issued become part of the Contract Documents

- 7.02 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by OWNER or ENGINEER.

## ARTICLE 8 BID SECURITY

- 8.01 Each Bid must be accompanied by Bid Security made payable to OWNER for not less than 5% or 10% of the Bidder's maximum Bid price as follows: For projects less than or equal to \$200,000, a 5% Bid Bond is required. For projects greater than \$200,000, a Bid Bond in the amount of 10% is required. Submit Bid Bond in the form of a certified or bank cashier's check or a Bid Bond, on the form attached, issued by a surety meeting the requirements of paragraphs 5.01 and 5.02 of the General Conditions.
- 8.02 The bid security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within fifteen days after the Notice of Award, OWNER may annul the Notice of Award and the Bid security of that Bidder will be forfeited. The Bid security of other Bidders whom OWNER believes to have a reasonable chance of receiving the award may be retained by OWNER until the earlier of the seventh day after the Effective Date of the Agreement or the



61st day after the Bid opening, whereupon Bid security furnished by such Bidders will be returned.

- 8.03 Bid security of other Bidders whom OWNER believes do not have a reasonable chance of receiving the award will be returned within thirty (30) days after the Bid opening.

#### ARTICLE 9 CONTRACT TIMES

- 9.01 The number of days within which, or the dates by which, the Work is to be (a) Substantially Completed and (b) also completed and ready for final payment are set forth in the Agreement.

#### ARTICLE 10 LIQUIDATED DAMAGES

- 10.01 Provisions for liquidated damages, if any, are set forth in the Agreement.

#### ARTICLE 11 SUBSTITUTE AND "OR-EQUAL" ITEMS

- 11.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute or "or-equal" items. Whenever it is indicated in the Bidding Documents that a substitute or "or-equal" item of material or equipment may be furnished or used by CONTRACTOR if acceptable to ENGINEER and OWNER. The decision regarding substitute items is at the sole discretion of OWNER. After award, the procedure for submission of any such application by CONTRACTOR and consideration by ENGINEER is set forth in the General Conditions and may be supplemented in the General Requirements.

#### ARTICLE 12 SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 12.01 If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, individuals, or entities to be submitted to OWNER in advance of a specified date prior to the Effective Date of the Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to OWNER a list of all such Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, individual, or entity if requested by OWNER. If OWNER or ENGINEER, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, OWNER may, before the Notice of Award is given, request apparent Successful Bidder to submit a substitute without an increase in the Bid.
- 12.02 If apparent Successful Bidder declines to make any such substitution, OWNER may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, individuals, or entities. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which OWNER or ENGINEER makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to OWNER and ENGINEER



subject to revocation of such acceptance after the Effective Date of the Agreement as provided in paragraph 6.06 of the General Conditions.

- 12.03 CONTRACTOR shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom CONTRACTOR has reasonable objection.

#### ARTICLE 13 PREPARATION OF BID

- 13.01 The Bid Form is bound with the Bidding Documents and may be removed to comply with the bid submittal requirements as listed in the Bidders Procedure Checklist for Construction Services. The Bidders Procedure Checklist must be completed, signed, dated and included as the first page of the Bid submittal.
- 13.02 All blanks on the Bid Form shall be completed by printing in black ink and the Bid signed. A Bid price shall be indicated for each Bid item listed therein.
- 13.03 A bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature.
- 13.04 A bid by a partnership shall be executed in the partnership name and signed by a partner, whose title must appear under the signature, accompanied by evidence of authority to sign. The official address of the partnership shall be shown below the signature.
- 13.05 A bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown below the signature.
- 13.06 A bid by an individual shall show the Bidder's name and official address.
- 13.07 A bid by a joint venture shall be executed by each joint venturer in the manner indicated on the Bid form. The official address of the joint venture must be shown below the signature.
- 13.08 Print all names in black ink below the signatures.
- 13.09 Acknowledge receipt of all Addenda (the numbers of which must be filled in) on the Bid Form.
- 13.10 Show the address, telephone and fax numbers, and, if available, email address for communications regarding the Bid.
- 13.11 Provide evidence of authority to conduct business as an out-of-state corporation in Indiana and Michigan City in accordance with Part 3 above. Show state contractor license number, if any.

#### ARTICLE 14 BASIS OF BID, EVALUATION OF BIDS

- 14.01 Lump Sum



- A. Bidders shall submit a Bid on a lump sum basis for the base bid items so indicated and include a separate price for each alternate, if any, described in the Bidding Documents as provided for in the Bid Form. The price for each alternate will be the amount added to or deleted from the base bid if OWNER selects the alternate.
- B. In the evaluation of the Bids, the OWNER will compare the base bids as well as the resulting bids once the value of the alternates selected by the OWNER, if any, have been incorporated.
- C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between words and figures will be resolved in favor of the words.

14.02 Unit Price

- A. Bidders shall submit a Bid on a Unit Price basis for the base bid items so indicated and include a separate price for each alternate, if any, described in the Bidding Documents as provided for in the Bid Form. The price for each alternate will be the amount added to or deleted from the base bid if OWNER selects the alternate.
- B. In the evaluation of the Bids, the OWNER will compare the base bids as well as the resulting bids once the value of the alternates selected by the OWNER, if any, have been incorporated.
- C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between words and figures will be resolved in favor of the words.

- 14.03 The bid price shall include such amounts as the Bidder deems proper for overhead and profit on account of cash allowances, if any, named in the Contract Documents as provided in paragraph 11.02 of the General Conditions.

## ARTICLE 15 SUBMITTAL OF BID

- 15.01 Two (2) copies of the bound and tabbed Bidding Documents and one electronic copy shall be submitted no later than the time and place indicated in the Official Notice to Bidders and shall be enclosed in an opaque sealed envelope, marked with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted) and name and address of Bidder, and accompanied by the Bid security and other required documents. If the Bid is sent through the mail or other delivery system, the sealed envelope containing the Bid must be enclosed in a separate envelope plainly marked on the outside with the notation "BID ENCLOSED". A mailed bid shall be addressed to Michigan City Sanitary District Board, 1100 E 8<sup>th</sup> St, Michigan City, IN, 46360 and sent by Certified Mail. Mailed Bids must be received no later than the time fixed for opening Bids.



## ARTICLE 16 MODIFICATION AND WITHDRAWAL OF BID

- 16.01 A Bid may be modified or withdrawn by an appropriate document duly executed in the manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids.
- 16.02 If, within 24 hours after Bids are opened, any Bidder files a duly signed, written notice with OWNER and promptly thereafter demonstrates to the reasonable satisfaction of OWNER that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid and the Bid security will be returned. Thereafter, that Bidder will be disqualified from further bidding on the Work to be provided under the Contract Documents.

## ARTICLE 17 OPENING OF BIDS

- 17.01 Bids will be opened at the time and place indicated in the Official Notice to Bidders and, unless obviously nonresponsive, read aloud publicly.

## ARTICLE 18 BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 18.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but OWNER may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

## ARTICLE 19 AWARD OF CONTRACT

- 19.01 OWNER reserves the right to reject any or all Bids, including, without limitation, nonconforming, nonresponsive, unbalanced or conditional Bids. OWNER further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to be non-responsive.
- 19.02 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.
- 19.03 In evaluating Bids, OWNER will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.
- 19.04 In evaluating Bidders, OWNER will consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted as provided in the Supplementary Conditions.
- 19.05 OWNER may conduct such investigations as OWNER deems necessary to establish the responsibility, qualifications and financial ability of Bidders to perform the Work in accordance with the Contract Documents.



## ARTICLE 20 CONTRACT SECURITY AND INSURANCE

- 20.01 Article 5 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth OWNER's requirements as to performance and payment Bonds and insurance. When the Successful Bidder delivers the executed Agreement to OWNER, it must be accompanied by such Bonds and Certificate of Insurance (COI).

## ARTICLE 21 SIGNING OF AGREEMENT

- 21.01 When OWNER gives a Notice of Award to the Successful Bidder, it will be accompanied by the required number of unsigned counterparts of the Agreement with the other Contract Documents which are identified in the Agreement as attached thereto. Within 15 days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to OWNER with the required Bonds and COI. Within ten days thereafter OWNER shall deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

## ARTICLE 22 SALES AND USE TAXES

OWNER is exempt from Indiana State Sales and Use Taxes on materials and equipment to be incorporated in the Work (Exemption No. 0031227350-010). Said taxes shall not be included in the Contract Price. Refer to Paragraph SC-6.10 of the Supplementary Conditions for additional information.

## ARTICLE 23 RETAINAGE

Provisions concerning retainage and CONTRACTORS' rights to deposit securities in lieu of retainage are set forth in the Agreement.

## ARTICLE 24 CONTRACTS TO BE ASSIGNED

- 24.01 OWNER has executed contracts with:

---

The materials and equipment provided for in these contracts are to be furnished and delivered to the Project site for installation by CONTRACTOR. The contracts will be assigned by OWNER to CONTRACTOR. Identification of the materials and equipment and the procedures to be followed appear in Article 6 of the General Conditions.

- 24.02 Bidders may examine the contract documents for these contracts at the Michigan City Sanitary District, 1100 E 8<sup>th</sup> St, Michigan City, IN, 46360.

## ARTICLE 25 PROJECT FUNDING

This project will be funded by OWNER.



## ARTICLE 26 STEEL PRODUCTS

Bidders will comply with Indiana Code 5-16-8 which requires public contracts to use domestic steel products in the performance of the Work.

## ARTICLE 27 PLUMBING CONTRACTORS

Bidders will comply with Indiana Code 36-1-12-21 which requires that any plumbing work under a public works contract to be installed by a licensed plumbing contractor under Indiana Code 25-28.5-1.

## ARTICLE 28 TRENCH SAFETY SYSTEMS

Bidders will comply with Indiana Code 36-1-12-20 which states that all trenches at least five (5) feet in depth require trench safety systems which shall be in compliance with Occupational Safety and Health Administration (IOSHA) regulations 29 CFR 1926, Subpart P. A copy of IOSHA regulations 29 CFR 1926, Subpart P may be obtained from the OWNER.

## ARTICLE 29 ANTI-DISCRIMINATION REQUIREMENTS

Bidders must comply with the anti-discrimination provisions of IC 15-15-6.

## ARTICLE 30 COMPLIANCE WITH INDIANA LAW REGARDING PUBLIC WORKS

Bidders must comply with all applicable provisions of Indiana laws, rules, and regulations, including, but not limited to, those contained in IC 5-16-13-1, *et seq.*, all of which are incorporated herein by reference.

END OF SECTION





# CONTRACTOR'S BID FOR PUBLIC WORK - FORM 96

State Form 52414 (R2 / 2-13) / Form 96 (Revised 2013)

Prescribed by State Board of Accounts

## PART I

(To be completed for all bids. Please type or print)

Date (month, day, year): \_\_\_\_\_

1. Governmental Unit (OWNER): Michigan City Sanitary District

2. County : LaPorte

3. Bidder (Firm): \_\_\_\_\_

Address: \_\_\_\_\_

City/State/ZIP code: \_\_\_\_\_

4. Telephone Number: \_\_\_\_\_

5. Agent of Bidder (if applicable): \_\_\_\_\_

Pursuant to notices given, the undersigned offers to furnish labor and/or material necessary to complete the public works project of Michigan City Sanitary District

(Governmental Unit) in accordance with plans and specifications prepared by \_\_\_\_\_

\_\_\_\_\_ and dated \_\_\_\_\_ for the sum of

\_\_\_\_\_ \$ \_\_\_\_\_

The undersigned further agrees to furnish a bond or certified check with this bid for an amount specified in the notice of the letting. If alternative bids apply, the undersigned submits a proposal for each in accordance with the notice. Any addendums attached will be specifically referenced at the applicable page.

If additional units of material included in the contract are needed, the cost of units must be the same as that shown in the original contract if accepted by the governmental unit. If the bid is to be awarded on a unit basis, the itemization of the units shall be shown on a separate attachment.

The contractor and his subcontractors, if any, shall not discriminate against or intimidate any employee, or applicant for employment, to be employed in the performance of this contract, with respect to any matter directly or indirectly related to employment because of race, religion, color, sex, national origin or ancestry. Breach of this covenant may be regarded as a material breach of the contract.

### CERTIFICATION OF USE OF UNITED STATES STEEL PRODUCTS

(If applicable)

I, the undersigned bidder or agent as a contractor on a public works project, understand my statutory obligation to use steel products made in the United States (I.C. 5-16-8-2). I hereby certify that I and all subcontractors employed by me for this project will use U.S. steel products on this project if awarded. I understand that violations hereunder may result in forfeiture of contractual payments.



## ACCEPTANCE

The above bid is accepted this \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_, subject to the following conditions: \_\_\_\_\_

Contracting Authority Members:

_____	_____
_____	_____
_____	_____

## PART II

*(For projects of \$10,000 or more – IC 36-1-12-4)*

Governmental Unit: Michigan City Sanitary District

Bidder (Firm) \_\_\_\_\_

Date (month, day, year): \_\_\_\_\_

These statements to be submitted under oath by each bidder with and as a part of his bid.  
Attach additional pages for each section as needed.

## SECTION I EXPERIENCE QUESTIONNAIRE

1. What public works projects has your organization completed for the period of one (1) year prior to the date of the current bid?

Contract Amount	Class of Work	Completion Date	Name and Address of Owner



2. What public works projects are now in process of construction by your organization?

Contract Amount	Class of Work	Expected Completion Date	Name and Address of Owner

3. Have you ever failed to complete any work awarded to you? \_\_\_\_\_  
If so, where and why?

4. List references from private firms for which you have performed work.



## SECTION II PLAN AND EQUIPMENT QUESTIONNAIRE

1. Explain your plan or layout for performing proposed work. *(Examples could include a narrative of when you could begin work, complete the project, number of workers, etc. and any other information which you believe would enable the governmental unit to consider your bid.)*

---

---

---

---

---

2. Please list the names and addresses of all subcontractors *(i.e. persons or firms outside your own firm who have performed part of the work)* that you have used on public works projects during the past five (5) years along with a brief description of the work done by each subcontractor.

---

---

---

---

3. If you intend to sublet any portion of the work, state the name and address of each subcontractor, equipment to be used by the subcontractor, and whether you will require a bond. However, if you are unable to currently provide a listing, please understand a listing must be provided prior to contract approval. Until the completion of the proposed project, you are under a continuing obligation to immediately notify the governmental unit in the event that you subsequently determine that you will use a subcontractor on the proposed project.

---

---

---

---

---

4. What equipment do you have available to use for the proposed project? Any equipment to be used by subcontractors may also be required to be listed by the governmental unit.

---

---



---

---

---

5. Have you entered into contracts or received offers for all materials which substantiate the prices used in preparing your proposal? If not, please explain the rationale used which would corroborate the prices listed.

---

---

---

---

---

### SECTION III CONTRACTOR'S FINANCIAL STATEMENT

Attachment of bidder's financial statement is mandatory. Any bid submitted without said financial statement as required by statute shall thereby be rendered invalid. The financial statement provided hereunder to the governing body awarding the contract must be specific enough in detail so that said governing body can make a proper determination of the bidder's capability for completing the project if awarded.

### SECTION IV CONTRACTOR'S NON – COLLUSION AFFIDAVIT

The undersigned bidder or agent, being duly sworn on oath, says that he has not, nor has any other member, representative, or agent of the firm, company, corporation or partnership represented by him, entered into any combination, collusion or agreement with any person relative to the price to be bid by anyone at such letting nor to prevent any person from bidding nor to include anyone to refrain from bidding, and that this bid is made without reference to any other bid and without any agreement, understanding or combination with any other person in reference to such bidding.

He further says that no person or persons, firms, or corporation has, have or will receive directly or indirectly, any rebate, fee, gift, commission or thing of value on account of such sale.



SECTION V OATH AND AFFIRMATION

I HEREBY AFFIRM UNDER THE PENALTIES FOR PERJURY THAT THE FACTS AND INFORMATION CONTAINED IN THE FOREGOING BID FOR PUBLIC WORKS ARE TRUE AND CORRECT.

Dated at \_\_\_\_\_ this \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_

\_\_\_\_\_  
(Name of Organization)

By \_\_\_\_\_

\_\_\_\_\_  
(Title of Person Signing)

ACKNOWLEDGEMENT

STATE OF \_\_\_\_\_ )  
 ) ss  
COUNTY OF \_\_\_\_\_ )

Before me, a Notary Public, personally appeared the above-named \_\_\_\_\_ and  
swore that the statements contained in the foregoing document are true and correct.

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_.

\_\_\_\_\_  
Notary Public

My Commission Expires: \_\_\_\_\_

County of Residence: \_\_\_\_\_



## BID FORM

### UNIT PRICE / LUMP SUM WORK:

Unit Price work and Lump Sum work will be performed under Contract Items 1 through 21. Unit price work reflects the work in place, complete to the requirements of the work shown and specified in the Contract Documents. Actual payments to be made to the CONTRACTOR for any unit price work will be based solely on the product of the fixed unit price and the actual quantity of work, as measured in the field regardless if it is more or less than its extension. The extension, made for bid evaluation purposes only, is based on an estimate, and is not a guarantee of the actual amounts of this work that may be required.

Item No.	Description*	Unit	Estimated Quantity		Bid Unit Price	Bid Price
1	Mobilization and Demobilization	LS	1			
2	General Conditions & Storm Water Management	LS	1			
3	Dewatering/Leachate Handling – Off Site	GAL	1,000,000			
4	Clearing & Grubbing	AC	7.5			
5	Tree Clearing and Removal	AC	7.5			
6	Excavation of Bank and Localized Upland Areas	CY	18,910			
7	F&I Leachate Seep Drain Trench	LF	1,320			
8	Grout and Abandon Existing 18" Stormwater Pipe	LS	1			
9	F&I 18" HDPE SDR 17 Stormwater Pipe	LF	490			
10	F&I Stormwater Inlet Structure	EA	1			
11	F&I 3" HDPE SDR 11 Forcemain	LF	1,740			
12	F&I Leachate Lift Station	LS	1			
13	F&I Leachate Forcemain Cleanouts	EA	3			
14	F&I Clean Soil Fill – On Site	CY	1,000			
15	F&I Clean Soil Fill – Off Site	CY	11,030			
16	F&I 24" Compacted Bank Clay	CY	5,600			
17	F&I 6" Topsoil Layer	CY	5,300			
18	F&I 3:1 Bank Slope Erosion Protection (Shoresox or Equal)	SF	50,230			
19	F&I Steep Slope Erosion Protection (Envirogrid or Equal)	SF	5,370			



Item No.	Description*	Unit	Estimated Quantity		Bid Unit Price	Bid Price
20	Establish Vegetation	AC	9			
21	F&I Gravel Road/Paths	SF	15,490			
22	Floodway Tree/Shrub Replacement	AC	3.8			
					<b>TOTAL BID AMOUNT</b>	

**\*\*ALTERNATES:**

Item No.	Description*	Unit	Estimated Quantity		Bid Unit Price	Bid Price
15A1	Install Clean Soil Fill – (Owner Provided)	CY	11,030			
18A1	F&I 3:1 Bank Slope Erosion Protection – 12” – 24” Riprap & 8 oz/sy Nonwoven Geotextile	SF	50,230			

**\*(SEE SECTION 01 29 01 – MEASUREMENT AND PAYMENTS FOR A MORE DETAILED DESCRIPTION)**

**\*\* (DO NOT INCLUDE ALTERNATES (OR ALLOWANCE) IN TOTAL BID AMOUNT)**

**\*\*\* (F&I stands for Furnish and Install)**

**\*\*\*\* (Bidders are required to provide a price for the alternate bid items)**

In the event that the actual quantity required for a particular item of contingent work exceeds the quantity shown in the Bid Form, the CONTRACTOR agrees to furnish and install additional quantities of contingent work at the unit bid price written in the Bid Form. The CONTRACTOR agrees that if the ENGINEER determines that a unit bid price item is not required to be performed, the CONTRACTOR will not be eligible for any credit due to such obliteration.

Moreover, the CONTRACTOR, is advised that the OWNER reserves the right to reduce (or increate) the scope of any Item(s), self-perform all or part of any Item, and to furnish and install any material required under any Item. The CONTRACTOR will not be eligible for any credit for Item(s) self-performed by the OWNER or for materials furnished and installed by the OWNER.

**Furnish all labor, supervision, equipment and materials required for the items listed in Contract Items 1 through 22 above.**



THE TOTAL BID PRICE: (The sum of Contract Items 1 through 21)

\_\_\_\_\_ dollars and  
(Written in Words amount)

\_\_\_\_\_ cents  
(Written in Words amount)

(\$ \_\_\_\_\_ )  
(Written in Figures amount)

**The Total Unit / Lump Sum Price Bid for Contract Items 1 through 22 must be written in words and figures or the bid will be rejected. In the event that there is a discrepancy between the "Written in Words" and the "Written in Figures" amounts, the "Written in Words" amount will govern.**

**Bids must be submitted for Contract Items 1 through 22, and the Total Bid Price or your bid will be considered non-responsive.**

Bidder acknowledges that quantities are not guaranteed and final payment will be based on actual quantities determined as provided in the Contract Documents. Read specifically paragraph 11.03 of the General Conditions and SC-11.03 of the Supplementary Conditions.



---

**BID OF**

---

(Contractor)

---

(Address)

---

**FOR**

**PUBLIC WORKS PROJECTS OF**

Michigan City Sanitary District

Re: Karwick Nature Park Corrective Action

1100 E.8th Street, Michigan City, IN 46360-2567

---

Filed

---

Action taken

---



00 43 00

BID BOND

BIDDER (Name and Address):

\_\_\_\_\_  
\_\_\_\_\_

SURETY (Name and Address of Principal Place of Business):

\_\_\_\_\_  
\_\_\_\_\_

OWNER (Name and Address):

Michigan City Sanitary District, 1100 E.8th Street, Michigan City, IN 46360-2567

BID

BID DUE DATE: Wednesday, March 27, 2019

PROJECT (Brief Description Including Location):

700 South Karwick Road, Michigan City, Indiana 46360. Area bound by Chicago, South Shore,  
and South Bend Railroad to the north; Karwick Road to the east; Pere Marquette Railway to the  
south; and Trail Creek to the west.

\_\_\_\_\_  
\_\_\_\_\_

BOND

BOND NUMBER: \_\_\_\_\_

DATE (Not later than Bid due date): \_\_\_\_\_

PENAL SUM: \_\_\_\_\_  
(Words) (Figures)

IN WITNESS WHEREOF, Surety and Bidder, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Bid Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

BIDDER

SURETY

\_\_\_\_\_(Seal)

Bidder's Name and Corporate Seal

\_\_\_\_\_(Seal)

Surety's Name and Corporate Seal

By: \_\_\_\_\_  
Signature and Title

By: \_\_\_\_\_  
Signature and Title  
(Attach Power of Attorney)

Attest: \_\_\_\_\_  
Signature and Title

Attest: \_\_\_\_\_  
Signature and Title

Note: (1) Above addresses are to be used for giving required notice.  
(2) Any singular reference to Bidder, Surety, OWNER or other party shall be considered plural where applicable

KARWICK NATURE PARK  
CORRECTIVE ACTION  
1873-356-10-01

00 43 00-1

BID BOND



1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to pay to OWNER upon default of Bidder the penal sum set forth on the face of this Bond.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by OWNER) the executed Agreement required by the Bidding Documents and any performance and payment Bonds required by the Bidding Documents.

3. This obligation shall be null and void if:

3.1. OWNER accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by OWNER) the executed Agreement required by the Bidding Documents and any performance and payment Bonds required by the Bidding Documents, or

3.2. All Bids are rejected by OWNER, or

3.3. OWNER fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default by Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from OWNER, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of and any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by OWNER and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.

7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.

8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power or Attorney evidencing the authority of the officer, agent or representative who executed this Bond on behalf of Surety to execute, seal and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer or proposal as applicable.



SECTION  
00 45 00

NOTICE OF AWARD

Dated \_\_\_\_\_

[Certified Mail – Return Receipt Requested]

TO: \_\_\_\_\_

(Bidder)

ADDRESS: \_\_\_\_\_

\_\_\_\_\_

Contract: \_\_\_\_\_

(Insert name of Contract as it appears in the Bidding Documents)

Project: \_\_\_\_\_

OWNER's Contract No. \_\_\_\_\_

You are notified that your Bid dated \_\_\_\_\_ for the above Contract has been considered and determined to be the successful Bid and you have been awarded a Contract for \_\_\_\_\_

\_\_\_\_\_

(Indicate total Work, alternates or sections of Work awarded)

The Contract Price of your Contract is \_\_\_\_\_ Dollars (\$\_\_\_\_\_).

1 copy of each of the proposed Contract Documents (except Drawings and Specifications) accompany this Notice of Award. 1 set of the Drawings and Specifications will be delivered separately or otherwise made available to you immediately.

You must comply with the following conditions precedent within 15 days of the date you receive this Notice of Award.

1. Deliver to the OWNER 1 fully executed counterpart of the Contract Documents. [Each of the Contract Documents must bear your signature where required].
2. Deliver with the executed Contract Documents the Contract security (Bonds) as specified in the Instructions to Bidders (Article 20) and General Conditions (paragraph 5.01).



3. Deliver proof of insurance as required by General Conditions and Supplementary Conditions.
4. List of required documentation to be delivered with executed Agreement:
  - a. Complete and fully executed Agreement (Section 00 50 00)
  - b. Performance Bond (Section 00 61 13)
  - c. Payment Bond (Section 00 62 16)
  - d. Proof of Insurance
  - e. Proof of on the job Safety Program and OSHA Compliance Documentation
  - f. Complete and fully executed EEO/Local Hiring Pamphlet
  - g. A Written Plan for a Program to Test the Contractors Employees for Drugs
  - h. Proof of Employee Training Program required by IC 5-16-13-12
  - i. If contract of \$300,000 or more, proof for contractor listing as qualified to do public works projects by  
Indiana Department of Administration or INDOT
  - j. If plumbing is part of contracted work, proof of state license for plumber, AND all local required permits

Failure to comply with any of these conditions within the time specified will entitle Owner to consider your Bid in default, to annul this Notice of Award, and to declare your Bid security forfeited.

Within ten days after you comply with the above conditions, Owner will return to you one fully executed counterpart of the Contract Documents.

Dated this \_\_\_\_\_ day of \_\_\_\_\_.

MICHIGAN CITY SANITARY DISTRICT

BY: \_\_\_\_\_  
Michael P. Kuss, General Manager

Copy to ENGINEER  
(Use Certified Mail,  
Return Receipt Requested)



SECTION  
00 50 00

FORM OF AGREEMENT

BETWEEN THE MICHIGAN CITY SANITARY DISTRICT  
AND CONTRACTOR  
ON THE BASIS OF A STIPULATED PRICE

THIS AGREEMENT is dated as of the \_\_\_\_\_ day of \_\_\_\_\_ in the year 20\_\_\_\_ by and between \_\_\_\_\_ hereinafter called OWNER) and (hereinafter called CONTRACTOR). OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

**Article 1 - WORK.**

- 1.01 CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

Karwick Nature Park Corrective Action Construction \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Article 2 - THE PROJECT.**

- 2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows: (include project number)

Karwick Nature Park Correction Action – 1873-356-10-01 \_\_\_\_\_  
\_\_\_\_\_

**Article 3 - ENGINEER.**

- 3.01 The Project has been designed by Weaver Consultants Group North Central, LLC who is hereinafter called ENGINEER and who is to act as OWNER's representative, assume all duties and responsibilities and have the rights and authority assigned to ENGINEER in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

**Article 4 - CONTRACT TIMES.**

- 4.01 Time of the Essence

- A. All time limits for Milestones, if any, Substantial Completion and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.



#### 4.02 Dates for Substantial Completion and Final Payment

- A. The Work will be substantially completed within 250 days after the date when the Contract Times commence to run as provided in paragraph 2.03 of the General Conditions, and completed and ready for final payment in accordance with paragraph 14.07 of the General Conditions within 280 days after the date when the Contract Times commence to run (or as provided in Section VII of the Bid Form, page 00 41 00-26).

#### 4.03 Liquidated Damages

- A. CONTRACTOR and OWNER recognize that time is of the essence of this Agreement and that OWNER will suffer financial loss if the Work is not completed within the times specified in paragraph 4.02 above plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. They also recognize the delays, expense and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by OWNER if the Work is not completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) CONTRACTOR shall pay OWNER two hundred dollars (\$200) for each day that expires after the time specified in paragraph 4.02 for Substantial Completion until the Work is substantially complete. After Substantial Completion, if CONTRACTOR shall neglect, refuse or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by OWNER, CONTRACTOR shall pay OWNER two hundred dollars (\$200) for each day that expires after the time specified in paragraph 4.02 for completion and readiness for final payment until the Work is completed and ready for final payment.

### **Article 5 - CONTRACT PRICE.**

- 5.01 OWNER shall pay CONTRACTOR for completion of the Work, in accordance with the Contract Documents, an amount in current funds equal to the sum of the amounts determined pursuant to the BID FORM in Section 00 41 00.



## **Article 6 - PAYMENT PROCEDURES.**

### **6.01 Submittal and Processing of Payments**

- A. CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by ENGINEER as provided in the General Conditions.

### **6.02 Progress Payments; Retainage**

- A. CONTRACTOR's Applications for Payment to the Michigan City Sanitary District should be submitted on a monthly basis during performance of the Work as provided in paragraphs 6.02.A.1, 6.02.A.2 and 6.02.A.3 below. OWNER shall make progress payments on account of the Contract Price on the basis of the CONTRACTOR's Applications for Payment 45 days after the OWNER receives the CONTRACTOR's Application for Payment. All such payments will be measured by the schedule of values established in paragraph 2.07.A of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements:
  - 1. Prior to Substantial Completion, progress payments will be made as follows:
    - a. 90 percent of the work completed, including the cost of materials and equipment, during each progress payment period,
    - b. less such amounts as ENGINEER may determine, or OWNER may withhold, in accordance with paragraph 14.02 of the General Conditions.
    - c. The remaining 10 percent of the work completed, including the cost of materials and equipment, will be withheld as retainage.
  - 2. After the Work is 50 percent complete as determined by ENGINEER, and if the character and progress of the Work have been satisfactory to OWNER and ENGINEER, OWNER, on recommendation of ENGINEER, may determine that as long as the character and progress of the Work remain satisfactory to them, subsequent progress payments will be made as follows:
    - a. 100 percent of the work completed including the cost of material and equipment during each subsequent progress payment period,
    - b. less such amounts as ENGINEER may determine, or OWNER may withhold, in accordance with paragraph 14.02 of the General Conditions.
  - 3. In accordance with paragraph 14.04 of the General Conditions and upon Substantial Completion of the Work by the CONTRACTOR and acceptance of the Work by the OWNER as recommended by ENGINEER, CONTRACTOR shall execute the Certificate of Substantial Completion and a progress payment will be made as follows:



- a. an amount sufficient to increase total payments to CONTRACTOR to 100 percent of the work completed and 100 percent of the cost of materials and equipment not incorporated in the work but delivered, suitably stored and accompanied by documentation satisfactory to OWNER,
- b. less such amounts as ENGINEER may determine, or OWNER may withhold, in accordance with paragraph 14.02 of the General Conditions, and
- c. less 200 percent of ENGINEER's estimate of the value of Work to be completed or corrected as shown on the punch list attached to the Certificate of Substantial Completion,
- d. plus the retainage remaining, if any, after subtraction of the amounts determined in subparagraphs b and c.

#### 6.03 Final Payment

- A. In accordance with paragraph 14.07 of the General Conditions and upon final completion of the Work by the CONTRACTOR and acceptance of the Work by the OWNER as recommended by ENGINEER, CONTRACTOR shall execute the Certificate of Final Completion, Approval and Acceptance of Work and OWNER shall pay the remainder of the Contract Price.

#### **Article 7 - INTEREST.**

- 7.01 All moneys not paid when due as provided in Article 14 of the General Conditions shall bear interest at the rate of 5 percent per annum.

#### **Article 8 - CONTRACTOR'S REPRESENTATIONS.**

- 8.01 In order to induce OWNER to enter into this Agreement CONTRACTOR makes the following representations:
  - A. CONTRACTOR has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.
  - B. CONTRACTOR has visited the Site and become familiar with and is satisfied as to the general, local and Site conditions that may affect cost, progress, and performance of the Work.
  - C. CONTRACTOR is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress, and performance of the Work.
  - D. CONTRACTOR has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 4.02 of the General Conditions, and (2) reports and drawings of a Hazardous Environmental Condition, if any at the



Site which has been identified in the Supplementary Conditions as provided in paragraph 4.06 of the General Conditions. CONTRACTOR accepts the determination set forth in paragraph SC-4.02 of the Supplementary Conditions as to the extent of the "technical data" contained in such reports and drawings upon which CONTRACTOR is entitled to rely as provided in paragraph 4.02B of the General Conditions. CONTRACTOR acknowledges that such reports and drawings are not Contract Documents and may not be complete for CONTRACTOR's purposes. CONTRACTOR acknowledges that OWNER and ENGINEER do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Contract Documents with respect to Underground Facilities at or contiguous to the Site.

- E. CONTRACTOR has obtained and carefully studied (or assumes responsibility for having done so) all such additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by CONTRACTOR, including applying the specific means, methods, techniques, sequences and procedures of construction, if any, expressly required by the Contract Documents to be employed by CONTRACTOR, and safety precautions and programs incident thereto.
- F. CONTRACTOR does not consider that any further examinations, investigations, explorations, tests, studies or data are necessary for the performance of the Work at the Contract Price, within the Contract Times and in accordance with the other terms and conditions of the Contract Documents.
- G. CONTRACTOR is aware of the general nature of work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Contract Documents.
- H. CONTRACTOR has correlated the information known to CONTRACTOR, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents and all additional examinations, investigations, explorations, tests, studies and data with the Contract Documents.
- I. CONTRACTOR has given ENGINEER written notice of all conflicts, errors, ambiguities or discrepancies that CONTRACTOR has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.
- J. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
- K. CONTRACTOR shall pay, and CONTRACTOR shall require all its subcontractors on this project to pay, the wage rates required by I.C. 5-16-13 and as listed in Specification Section 00 73 43.



- L. CONTRACTOR shall comply with Indiana Code 5-16-8 which requires public contracts to use domestic steel products in the performance of the Work.
- M. CONTRACTOR agrees that pursuant to I.C. 5-16-6-1:
1. Neither CONTRACTOR nor any subcontractor, or any person acting on their behalf, in the hiring of employees for the performance of the Work under this Contract, will discriminate against any citizen of the state of Indiana who is qualified and available to perform the work to which the employment relates, on the basis of race, religion, color, sex, national origin or ancestry; nor shall CONTRACTOR, any subcontractor nor any person on their behalf, in any manner discriminate against or intimidate any employee hired for the performance of the Work under this Contract on account of race, religion, color, sex, national origin or ancestry. CONTRACTOR shall use all reasonable efforts to insure compliance with this provision by its subcontractors.
  2. There may be deducted from the amount payable to CONTRACTOR by the Michigan City Sanitary District under this contract, a penalty of five dollars (\$5.00) for each person for each calendar day during which such person was discriminated against or intimidated in violation of these provisions of this Contract.
  3. This Contract may be canceled or terminated by the Michigan City Sanitary District, and all money due or to become due hereunder may be forfeited, for a second or any subsequent violation of the terms or conditions of this section of this Contract.
- N. CONTRACTOR shall pay, and provide to OWNER proof of payment of, all subcontractors, laborers, material suppliers, and those performing services relating to this Contract. Absent such proof, pursuant to I.C. 36-1-12-13, OWNER will withhold money from the Contract Price in sufficient amount to pay said subcontractors, laborers, material suppliers, and those furnishing services.
- O. Pursuant to I.C. 36-1-12-21, any plumbing work under this Contract will be done by a licensed plumbing contractor under I.C. 25-28.5-1.

## **Article 9 - CONTRACT DOCUMENTS.**

### **9.01 Contents**

- A. The Contract Documents consist of the following:
1. This Agreement.
  2. Addenda numbers \_\_\_\_\_to\_\_\_\_\_, inclusive.
  3. Specifications bearing the title "Karwick Nature Park Corrective Action", and consisting of 6 Divisions, as listed in Table of Contents thereof.



4. Construction Drawings consisting of a cover sheet and sheets numbered one through 16; inclusive with each sheet bearing the following general title: Corrective Action – Karwick Nature Park, Engineer Project No. 1873-356.
  5. General Conditions (pages 00 72 00-1 to 00 72 00-58, inclusive).
  6. Supplementary Conditions (pages 00 73 00-1 to 00 73 00-11, inclusive).
  7. CONTRACTOR's Bid Package and Local Forms (EEO/Local Hiring Pamphlet (Contract of \$150,000 or more, EEO/Local Hiring Pamphlet, permits, etc.).
  8. Certification of Non-Segregated Facilities
  9. E-Verify Enrollment Agreement
  10. Certification of denying engagement in Investment in Iran's Energy Sector
  11. Affidavit regarding not employing Unauthorized Aliens
  12. Performance and Payment Bonds.
  13. CONTRACTOR's Bid.
  14. Notice of Award with all required Documentation as listed in the Notice of Award.
  15. Notice to Proceed.
  16. Insurance Documents.
  17. Construction Schedule.
- B. The documents listed in paragraphs 9.01.A above are not attached to this Agreement (except as expressly noted otherwise above) but are incorporated herein by reference.
- C. There are no Contract Documents other than those listed above in this Article 9.
- D. The Contract Documents may only be amended, modified or supplemented as provided in paragraph 3.04 of the General Conditions.
- E. The provisions and requirements of IC 5-16-13-1, *et seq.* are incorporated herein by reference.

#### **Article 10 - MISCELLANEOUS.**

##### **10.01 Terms**



- A. Terms used in this Agreement will have the meanings indicated in the General Conditions.

#### 10.02 Assignment of Contract

- A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

#### 10.03 Successors and Assigns

- A. OWNER and CONTRACTOR each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect to all covenants, agreements and obligations contained in the Contract Documents.

#### 10.04 Severability

- A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon OWNER and CONTRACTOR, who agree that the Contract Documents shall be reformed to replace such stricken provisions or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

#### 10.05 Interpretation

- A. The Contract Documents shall be interpreted and enforced according to Indiana law and any legal proceedings regarding this document shall be initiated in a court of competent jurisdiction in LaPorte County, Indiana.



IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed this Agreement in duplicate. One counterpart each has been delivered to OWNER, and CONTRACTOR. All portions of the Contract Documents have been signed, or identified by OWNER and CONTRACTOR on their behalf.

This Agreement will be effective on \_\_\_\_\_, 20\_\_ (which is the Effective Date of the Agreement).

OWNER  
MICHIGAN CITY SANITARY DISTRICT

CONTRACTOR  
CONTRACTOR NAME

BY: \_\_\_\_\_  
Michael P. Kuss, General Manager

BY: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_  
Address for Giving Notices

(If CONTRACTOR is a corporation, attach  
evidence of authority to sign.)

Address for Giving Notices:  
Attn: General Manager  
Michigan City Sanitary District  
1100 E. 8<sup>th</sup> Street  
Michigan City, Indiana 46360



SECTION  
00 61 13

PERFORMANCE BOND

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

SURETY (Name and Address of Principal Place  
of Business):

\_\_\_\_\_  
\_\_\_\_\_

OWNER (Name and Address):

Michigan City Sanitary District  
1100 E. 8<sup>th</sup> St  
Michigan City, IN 46360

CONTRACT

Date:

Amount:

Description (Name and Location):

BOND

Date (Not earlier than Contract Date):

Amount:

Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms printed on the following two pages, do each cause this Performance Bond to be duly executed on its behalf by its authorized officer, agent or representative.

CONTRACTOR AS PRINCIPAL

Company: (Corp. Seal)

Signature: \_\_\_\_\_  
Name and Title:

SURETY

Company: (Corp. Seal)

Signature: \_\_\_\_\_  
Name and Title:  
(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

CONTRACTOR AS PRINCIPAL

Company: (Corp. Seal)

Signature: \_\_\_\_\_  
Name and Title:

SURETY

Company: (Corp. Seal)

Signature: \_\_\_\_\_  
Name and Title:



1. The CONTRACTOR and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Contract, which is incorporated herein by reference.

2. If the CONTRACTOR performs the Contract, the Surety and the CONTRACTOR have no obligation under this Bond, except to participate in conferences as provided in paragraph 3.1.

3. If there is no OWNER Default, the Surety's obligation under this Bond shall arise after:

3.1. The OWNER has notified the CONTRACTOR and the Surety at the addresses described in paragraph 10 below, that the OWNER is considering declaring a CONTRACTOR Default and has requested and attempted to arrange a conference with the CONTRACTOR and the Surety to be held not later than fifteen days after receipt of such notice to discuss methods of performing the Contract. If the OWNER, the CONTRACTOR and the Surety agree, the CONTRACTOR shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive the OWNER's right, if any, subsequently to declare a CONTRACTOR Default; and

3.2. The OWNER has declared a CONTRACTOR Default and formally terminated the CONTRACTOR's right to complete the Contract. Such CONTRACTOR Default shall not be declared earlier than twenty days after the CONTRACTOR and the Surety have received notice as provided in paragraph 3.1; and

3.3. The OWNER has agreed to pay the Balance of the Contract Price to:

3.3.1. The Surety in accordance with the terms of the Contract;

3.3.2 Another contractor selected pursuant to paragraph 4.3 to perform the Contract.

4. When the OWNER has satisfied the conditions of paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

4.1. Arrange for the CONTRACTOR, with consent of the OWNER, to perform and complete the Contract; or

4.2. Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or

4.3. Obtain bids or negotiated proposals from qualified contractors acceptable to the OWNER for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by the OWNER and the contractor selected with the OWNER's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the Bonds issued on the Contract, and pay to the OWNER the amount of damages as

described in paragraph 6 in excess of the Balance of the Contract Price incurred by the OWNER resulting from the CONTRACTOR Default; or

4.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances;

4.4.1 After investigation, determine the amount for which it may be liable to the OWNER and, as soon as practicable after the amount is determined, tender payment therefor to the OWNER; or

4.4.2 Deny liability in whole or in part and notify the OWNER citing reasons therefor.

5. If the Surety does not proceed as provided in paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond fifteen days after receipt of an additional written notice from the OWNER to the Surety demanding that the Surety perform its obligations under this Bond, and the OWNER shall be entitled to enforce any remedy available to the OWNER. If the Surety proceeds as provided in paragraph 4.4, and the OWNER refuses the payment tendered or the Surety has denied liability, in whole or in part, without further notice the OWNER shall be entitled to enforce any remedy available to the OWNER.

6. After the OWNER has terminated the CONTRACTOR's right to complete the Contract, and if the Surety elects to act under paragraph 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the OWNER shall not be greater than those of the CONTRACTOR under the Contract, and the responsibilities of the OWNER to the Surety shall not be greater than those of the OWNER under the Contract. To a limit of the amount of this Bond, but subject to commitment by the OWNER of the Balance of the Contract Price to mitigation of costs and damages on the Contract, the Surety is obligated without duplication for:

6.1. The responsibilities of the CONTRACTOR for correction of defective Work and completion of the Contract;

6.2. Additional legal, design professional and delay costs resulting from the CONTRACTOR's Default, and resulting from the actions or failure to act of the Surety under paragraph 4; and

6.3. Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of the CONTRACTOR.

7. The Surety shall not be liable to the OWNER or others for obligations of the CONTRACTOR that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the OWNER or its heirs, executors, administrators, or successors.



8. The Surety hereby waives notice of any change, including changes of time, to the Contract or to related subcontracts, purchase orders and other obligations.

9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located and shall be instituted within two years after CONTRACTOR Default or within two years after the CONTRACTOR ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

10. Notice to the Surety, the OWNER or the CONTRACTOR shall be mailed or delivered to the address shown on the signature page.

11. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted here from and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

## 12. Definitions.

12.1 Balance of the Contract Price: The total amount payable by the OWNER to the CONTRACTOR under the Contract after all proper adjustments have been made, including allowance to the CONTRACTOR of any amounts received or to be received by the OWNER in settlement of insurance or other Claims for damages to which the CONTRACTOR is entitled, reduced by all valid and proper payments made to or on behalf of the CONTRACTOR under the Contract.

12.2.Contract: The agreement between the OWNER and the CONTRACTOR identified on the signature page, including all Contract Documents and changes thereto.

12.3.CONTRACTOR Default: Failure of the CONTRACTOR, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.

12.4.OWNER Default: Failure of the OWNER, which has neither been remedied nor waived, to pay the CONTRACTOR as required by the Contract or to perform and complete or comply with the other terms thereof.

(FOR INFORMATION ONLY--Name, Address and Telephone)

AGENT or BROKER: OWNER'S REPRESENTATIVE (ENGINEER or other party):



SECTION  
00 61 16

PAYMENT BOND

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

SURETY (Name and Address of Principal Place  
of Business):

\_\_\_\_\_  
\_\_\_\_\_

OWNER (Name and Address):

Michigan City Sanitary District  
1100 E. 8<sup>th</sup> St  
Michigan City, IN 46360

CONTRACT

Date:

Amount:

Description (Name and Location):

BOND

Date (Not earlier than Contract Date):

Amount:

Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms printed on the following two pages, do each cause this Payment Bond to be duly executed on its behalf by its authorized officer, agent or representative.

CONTRACTOR AS PRINCIPAL

Company: (Corp. Seal)

Signature: \_\_\_\_\_  
Name and Title:

SURETY

Company: (Corp. Seal)

Signature: \_\_\_\_\_  
Name and Title:  
(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

CONTRACTOR AS PRINCIPAL

Company: (Corp. Seal)

Signature: \_\_\_\_\_  
Name and Title:

SURETY

Company: (Corp. Seal)

Signature: \_\_\_\_\_  
Name and Title:



1. The CONTRACTOR and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the OWNER to pay for labor, materials and equipment furnished for use in the performance of the Contract, which is incorporated herein by reference.

2. With respect to the OWNER, this obligation shall be null and void if the CONTRACTOR:

2.1. Promptly makes payment, directly or indirectly, for all sums due Claimants, and

2.2. Defends, indemnifies and holds harmless the OWNER from all claims, demands, liens or suits by any person or entity who furnished labor, materials or equipment for use in the performance of the Contract, provided the OWNER has promptly notified the CONTRACTOR and the Surety (at the addresses described in paragraph 12) of any claims, demands, liens or suits and tendered defense of such claims, demands, liens or suits to the CONTRACTOR and the Surety, and provided there is no OWNER Default.

3. With respect to Claimants, this obligation shall be null and void if the CONTRACTOR promptly makes payment, directly or indirectly, for all sums due.

4. The Surety shall have no obligation to Claimants under this Bond until:

4.1. Claimants who are employed by or have a direct contract with the CONTRACTOR have given notice to the Surety (at the addresses described in paragraph 12) and sent a copy, or notice thereof, to the OWNER, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.

4.2. Claimants who do not have a direct contract with the CONTRACTOR:

1. Have furnished written notice to the CONTRACTOR and sent a copy, or notice thereof, to the OWNER, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials were furnished or supplied or for whom the labor was done or performed; and

2. Have either received a rejection in whole or in part from the CONTRACTOR, or not received within 30 days of furnishing the above notice any communication from the CONTRACTOR by which the CONTRACTOR had indicated the claim will be paid directly or indirectly; and

3. Not having been paid within the above 30 days, have sent a written notice to the Surety and sent a copy, or notice thereof, to the OWNER, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the CONTRACTOR.

5. If a notice required by paragraph 4 is given by the OWNER to the CONTRACTOR or to the Surety, that is sufficient compliance.

6. When the Claimant has satisfied the conditions of paragraph 4, the Surety shall promptly and at the Surety's expense take the following actions:

6.1. Send an answer to the Claimant, with a copy to the OWNER, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.

6.2. Pay or arrange for payment of any undisputed amounts.

7. The Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

8. Amounts owed by the OWNER to the CONTRACTOR under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any Performance Bond. By the CONTRACTOR furnishing and the OWNER accepting this Bond, they agree that all funds earned by the CONTRACTOR in the performance of the Contract are dedicated to satisfy obligations of the CONTRACTOR and the Surety under this Bond, subject to the OWNER's priority to use the funds for the completion of the Work.

9. The Surety shall not be liable to the OWNER, Claimants or others for obligations of the CONTRACTOR that are unrelated to the Contract. The OWNER shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

10. The Surety hereby waives notice of any change, including changes of time, to the Contract or to related Subcontracts, purchase orders and other obligations.

11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by paragraph 4.1 or paragraph 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.



12. Notice to the Surety, the OWNER or the CONTRACTOR shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, the OWNER or the CONTRACTOR, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is, that this Bond shall be construed as a statutory Bond and not as a common law bond.

14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, the CONTRACTOR shall promptly furnish a copy of this Bond or shall permit a copy to be made.

#### 15. DEFINITIONS

15.1.Claimant: An individual or entity having a direct contract with the CONTRACTOR or with a Subcontractor of the CONTRACTOR to furnish labor, materials or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of the CONTRACTOR and the CONTRACTOR's Subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

15.2.Contract: The agreement between the OWNER and the CONTRACTOR identified on the signature page, including all Contract Documents and changes thereto.

15.3.OWNER Default: Failure of the OWNER, which has neither been remedied nor waived, to pay the CONTRACTOR as required by the Contract or to perform and complete or comply with the other terms thereof.

(FOR INFORMATION ONLY--Name, Address and Telephone)

AGENT or BROKER: OWNER'S REPRESENTATIVE (ENGINEER or other party):



SECTION  
00 68 00

NOTICE TO PROCEED

TO: \_\_\_\_\_ Dated \_\_\_\_\_  
(CONTRACTOR)  
ADDRESS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
CONTRACT: \_\_\_\_\_  
(Insert name of contract as it appears in the Bidding Documents)  
PROJECT: \_\_\_\_\_  
OWNER'S CONTRACT NO.: \_\_\_\_\_

You are notified that the Contract Times under the above contract will commence to run on \_\_\_\_\_, 20\_\_\_\_\_. By that date, you are to start performing your obligations under the Contract Documents. In accordance with Article 4 of the Agreement the dates of Substantial Completion and Final Completion and readiness for final payment are \_\_\_\_\_, 20\_\_\_\_\_ and \_\_\_\_\_, 20\_\_\_\_\_, respectively.

Before you may start any Work at the site, paragraph 2.05.C of the General Conditions provides that you and Owner, if provided for, must each deliver to the other (with copies to ENGINEER and other identified additional insureds) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

Also, before you may start any Work at the site, you must:

Comply with all requirements as stated in the Contract Documents.  
\_\_\_\_\_  
\_\_\_\_\_

MICHIGAN CITY SANITARY DISTRICT

BY: \_\_\_\_\_

Copy to ENGINEER

\_\_\_\_\_  
(Use Certified Mail, Return Receipt Requested)

SECTION  
00 72 00

KARWICK NATURE PARK  
CORRECTIVE ACTION  
1873-356-10-01

00 68 00-1

NOTICE TO PROCEED



STANDARD GENERAL CONDITIONS  
OF THE CONSTRUCTION CONTRACT  
MICHIGAN CITY SANITARY DISTRICT



## TABLE OF CONTENTS

	<u>Page</u>
ARTICLE 1 - DEFINITIONS AND TERMINOLOGY .....	7
1.01 <i>Defined Terms</i> .....	7
1.02 <i>Terminology</i> .....	10
ARTICLE 2 - PRELIMINARY MATTERS .....	11
2.01 <i>Delivery of Bonds</i> .....	11
2.02 <i>Copies of Documents</i> .....	11
2.03 <i>Commencement of Contract Times; Notice to Proceed</i> .....	11
2.04 <i>Starting the Work</i> .....	12
2.05 <i>Before Starting Construction</i> .....	12
2.06 <i>Preconstruction Conference</i> .....	12
2.07 <i>Initial Acceptance of Schedules</i> .....	12
ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE .....	13
3.01 <i>Intent</i> .....	13
3.02 <i>Reference Standards</i> .....	13
3.03 <i>Reporting and Resolving Discrepancies</i> .....	14
3.04 <i>Amending and Supplementing Contract Documents</i> .....	14
3.05 <i>Reuse of Documents</i> .....	14
ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS .....	15
4.01 <i>Availability of Lands</i> .....	15
4.02 <i>Subsurface and Physical Conditions</i> .....	15
4.03 <i>Differing Subsurface or Physical Conditions</i> .....	16
4.04 <i>Underground Facilities</i> .....	17
4.05 <i>Reference Points</i> .....	18
4.06 <i>Hazardous Environmental Condition at Site</i> .....	18
ARTICLE 5 - BONDS AND INSURANCE .....	20
5.01 <i>Performance, Payment, and Other Bonds</i> .....	20
5.02 <i>Licensed Sureties and Insurers</i> .....	20
5.03 <i>Certificates of Insurance</i> .....	20
5.04 <i>CONTRACTOR's Liability Insurance</i> .....	20
5.05 <i>OWNER's Liability Insurance</i> .....	22
5.06 <i>Property Insurance</i> .....	22
5.07 <i>Waiver of Rights</i> .....	23
5.08 <i>Receipt and Application of Insurance Proceeds</i> .....	24
5.09 <i>Acceptance of Bonds and Insurance; Option to Replace</i> .....	24
5.10 <i>Partial Utilization, Acknowledgment of Property Insurer</i> .....	24
ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES .....	25
6.01 <i>Supervision and Superintendence</i> .....	25
6.02 <i>Labor; Working Hours</i> .....	25
6.03 <i>Services, Materials, and Equipment</i> .....	25



6.04	<i>Progress Schedule</i> .....	26
6.05	<i>Substitutes and “Or-Equals”</i> .....	26
6.06	<i>Concerning Subcontractors, Suppliers, and Others</i> .....	28
6.07	<i>Patent Fees and Royalties</i> .....	29
6.08	<i>Permits</i> .....	29
6.09	<i>Laws and Regulations</i> .....	30
6.10	<i>Taxes</i> .....	30
6.11	<i>Use of Site and Other Areas</i> .....	30
6.12	<i>Record Documents</i> .....	31
6.13	<i>Safety and Protection</i> .....	31
6.14	<i>Safety Representative</i> .....	32
6.15	<i>Hazard Communication Programs</i> .....	32
6.16	<i>Emergencies</i> .....	32
6.17	<i>Shop Drawings and Samples</i> .....	32
6.18	<i>Continuing the Work</i> .....	34
6.19	<i>CONTRACTOR’s General Warranty and Guarantee</i> .....	34
6.20	<i>Indemnification</i> .....	34
ARTICLE 7 -	<b>OTHER WORK</b> .....	35
7.01	<i>Related Work at Site</i> .....	35
7.02	<i>Coordination</i> .....	36
ARTICLE 8 -	<b>OWNER’S RESPONSIBILITIES</b> .....	36
8.01	<i>Communications to Contractor</i> .....	36
8.02	<i>Replacement of Engineer</i> .....	36
8.03	<i>Furnish Data</i> .....	36
8.04	<i>Pay Promptly When Due</i> .....	36
8.05	<i>Lands and Easements; Reports and Tests</i> .....	37
8.06	<i>Insurance</i> .....	37
8.07	<i>Change Orders</i> .....	37
8.08	<i>Inspections, Tests, and Approvals</i> .....	37
8.09	<i>Limitations on OWNER’s Responsibilities</i> .....	37
8.10	<i>Undisclosed Hazardous Environmental Condition</i> .....	37
8.11	<i>Evidence of Financial Arrangements</i> .....	37
ARTICLE 9 -	<b>ENGINEER’S STATUS DURING CONSTRUCTION</b> .....	37
9.01	<i>OWNER’S Representative</i> .....	37
9.02	<i>Visits to Site</i> .....	37
9.03	<i>Project Representative</i> .....	38
9.04	<i>Clarifications and Interpretations</i> .....	38
9.05	<i>Authorized Variations in Work</i> .....	38
9.06	<i>Rejecting Defective Work</i> .....	38
9.07	<i>Shop Drawings, Change Orders and Payments</i> .....	38
9.08	<i>Determinations for Unit Price Work</i> .....	39
9.09	<i>Decisions on Requirements of Contract Documents and Acceptability of Work</i> .....	39
9.10	<i>Limitations on ENGINEER’s Authority and Responsibilities</i> .....	39
ARTICLE 10 -	<b>CHANGES IN THE WORK; CLAIMS</b> .....	40



10.01	<i>Authorized Changes in the Work</i> .....	40
10.02	<i>Unauthorized Changes in the Work</i> .....	40
10.03	<i>Execution of Change Orders</i> .....	40
10.04	<i>Notification to Surety</i> .....	40
10.05	<i>Claims and Disputes</i> .....	41
ARTICLE 11 - COST OF THE WORK; CASH ALLOWANCES; UNIT PRICE WORK .....		41
11.01	<i>Cost of the Work</i> .....	41
11.02	<i>Cash Allowances</i> .....	44
11.03	<i>Unit Price Work</i> .....	44
ARTICLE 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES .....		45
12.01	<i>Change of Contract Price</i> .....	45
12.02	<i>Change of Contract Times</i> .....	46
12.03	<i>Delays Beyond CONTRACTOR's Control</i> .....	46
12.04	<i>Delays Within CONTRACTOR's Control</i> .....	46
12.05	<i>Delays Beyond OWNER's and CONTRACTOR's Control</i> .....	46
12.06	<i>Delay Damages</i> .....	46
ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK .....		47
13.01	<i>Notice of Defects</i> .....	47
13.02	<i>Access to Work</i> .....	47
13.03	<i>Tests and Inspections</i> .....	47
13.04	<i>Uncovering Work</i> .....	48
13.05	<i>OWNER May Stop the Work</i> .....	48
13.06	<i>Correction or Removal of Defective Work</i> .....	48
13.07	<i>Correction Period</i> .....	48
13.08	<i>Acceptance of Defective Work</i> .....	49
13.09	<i>OWNER May Correct Defective Work</i> .....	49
ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION .....		50
14.01	<i>Schedule of Values</i> .....	50
14.02	<i>Progress Payments</i> .....	50
14.03	<i>CONTRACTOR's Warranty of Title</i> .....	53
14.04	<i>Substantial Completion</i> .....	53
14.05	<i>Partial Utilization</i> .....	53
14.06	<i>Final Inspection</i> .....	54
14.07	<i>Final Payment</i> .....	54
14.08	<i>Final Completion Delayed</i> .....	55
14.09	<i>Waiver of Claims</i> .....	55
ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION .....		56
15.01	<i>OWNER May Suspend Work</i> .....	56
15.02	<i>OWNER May Terminate for Cause</i> .....	56
15.03	<i>OWNER May Terminate For Convenience</i> .....	57
15.04	<i>CONTRACTOR May Stop Work or Terminate</i> .....	57
ARTICLE 16 - DISPUTE RESOLUTION .....		57



16.01	<i>Methods and Procedures</i> .....	57
ARTICLE 17 - MISCELLANEOUS .....		58
17.01	<i>Giving Notice</i> .....	58
17.02	<i>Computation of Times</i> .....	58
17.03	<i>Cumulative Remedies</i> .....	58
17.04	<i>Survival of Obligations</i> .....	58
17.05	<i>Controlling Law</i> .....	58



## GENERAL CONDITIONS

### ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

---

#### 1.01 *Defined Terms*

A. Wherever used in the Contract Documents and printed with initial or all capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof.

1. *Addenda*--Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the Contract Documents.

2. *Agreement*--The written instrument which is evidence of the agreement between OWNER and CONTRACTOR covering the Work.

3. *Application for Payment*--The form acceptable to ENGINEER which is to be used by CONTRACTOR during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Asbestos*--Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

5. *Bid*--The offer or proposal of a bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

6. *Bidding Documents*--The Bidding Requirements and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

7. *Bidding Requirements*--The Advertisement or Invitation to Bid, Instructions to Bidders, Bid security form, if any, and the Bid form with any supplements.

8. *Bonds*--Performance and payment bonds and other instruments of security.

9. *Change Order*--A document recommended by ENGINEER which is signed by CONTRACTOR and OWNER and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

10. *Claim*--A demand or assertion by OWNER or CONTRACTOR seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. *Contract*--The entire and integrated written agreement between the OWNER and CONTRACTOR concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*--The Contract Documents establish the rights and obligations of the parties and include the Agreement, Addenda (which pertain to the Contract Documents), CONTRACTOR's Bid (including documentation accompanying the Bid and any post Bid documentation submitted prior to the Notice of Award), the Notice to Proceed, the Bonds, these General Conditions, the Supplementary Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agreement, together with all Written Amendments, Change Orders, Work Change Directives, Field Orders, and ENGINEER's written interpretations and



clarifications issued on or after the Effective Date of the Agreement. Approved Shop Drawings and the reports and drawings of subsurface and physical conditions are not Contract Documents. Only printed or hard copies of the items listed in this paragraph are Contract Documents. Files in electronic media format of text, data, graphics, and the like that may be furnished by OWNER to CONTRACTOR are not Contract Documents.

13. *Contract Price*--The moneys payable by OWNER to CONTRACTOR for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of paragraph 11.03 in the case of Unit Price Work).

14. *Contract Times*--The number of days or the dates stated in the Agreement to: (i) achieve Substantial Completion; and (ii) complete the Work so that it is ready for final payment as evidenced by ENGINEER's written recommendation of final payment.

15. *CONTRACTOR*--The individual or entity with whom OWNER has entered into the Agreement.

16. *Cost of the Work*--See paragraph 11.01.A for definition.

17. *Drawings*--That part of the Contract Documents prepared or approved by ENGINEER which graphically shows the scope, extent, and character of the Work to be performed by CONTRACTOR. Shop Drawings and other CONTRACTOR submittals are not Drawings as so defined.

18. *Effective Date of the Agreement*--The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

19. *ENGINEER*--The individual or entity named as such in the Agreement.

20. *ENGINEER's Consultant*--An individual or entity having a contract with ENGINEER to furnish services as ENGINEER's independent professional associate or consultant with respect to the Project and who is identified as such in the Supplementary Conditions.

21. *Field Order*--A written order issued by ENGINEER which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

22. *General Requirements*--Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

23. *Hazardous Environmental Condition*--The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

24. *Hazardous Waste*--The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

25. *Laws and Regulations; Laws or Regulations*--Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

26. *Liens*--Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

27. *Milestone*--A principal event specified in the Contract Documents relating to an



intermediate completion date or time prior to Substantial Completion of all the Work.

28. *Notice of Award*--The written notice by OWNER to the apparent successful bidder stating that upon timely compliance by the apparent successful bidder with the conditions precedent listed therein, OWNER will sign and deliver the Agreement.

29. *Notice to Proceed*--A written notice given by OWNER to CONTRACTOR fixing the date on which the Contract Times will commence to run and on which CONTRACTOR shall start to perform the Work under the Contract Documents.

30. *OWNER*--The Michigan City Sanitary District

31. *Partial Utilization*--Use by OWNER of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.

32. *PCBs*--Polychlorinated biphenyls.

33. *Petroleum*--Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

34. *Project*--The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part as may be indicated elsewhere in the Contract Documents.

35. *Project Manual*--The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

36. *Radioactive Material*--Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

37. *Resident Project Representative*--The authorized representative of ENGINEER who may be assigned to the Site or any part thereof.

38. *Samples*--Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

39. *Shop Drawings*--All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for CONTRACTOR and submitted by CONTRACTOR to illustrate some portion of the Work.

40. *Site*--Lands or areas indicated in the Contract Documents as being furnished by OWNER upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by OWNER which are designated for the use of CONTRACTOR.

41. *Specifications*--That part of the Contract Documents consisting of written technical descriptions of materials, equipment, systems, standards, and workmanship as applied to the Work and certain administrative details applicable thereto.

42. *Subcontractor*--An individual or entity having a direct contract with CONTRACTOR or with any other Subcontractor for the performance of a part of the Work at the Site.

43. *Substantial Completion*--The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of ENGINEER, the Work (or a specified part thereof)



is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.

44. *Supplementary Conditions*--That part of the Contract Documents which amends or supplements these General Conditions.

45. *Supplier*--A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with CONTRACTOR or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by CONTRACTOR or any Subcontractor.

46. *Underground Facilities*--All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

47. *Unit Price Work*--Work to be paid for on the basis of unit prices.

48. *Work*--The entire completed construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

49. *Work Change Directive*--A written statement to CONTRACTOR issued on or after the

Effective Date of the Agreement and signed by OWNER and recommended by ENGINEER ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

50. *Written Amendment*--A written statement modifying the Contract Documents, signed by OWNER and CONTRACTOR on or after the Effective Date of the Agreement and normally dealing with the nonengineering or nontechnical rather than strictly construction-related aspects of the Contract Documents.

## 1.02 *Terminology*

### A. *Intent of Certain Terms or Adjectives*

1. Whenever in the Contract Documents the terms “as allowed,” “as approved,” or terms of like effect or import are used, or the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of ENGINEER as to the Work, it is intended that such action or determination will be solely to evaluate, in general, the completed Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective shall not be effective to assign to ENGINEER any duty or authority to supervise



or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 9.10 or any other provision of the Contract Documents.

**B. Day**

1. The word “day” shall constitute a calendar day of 24 hours measured from midnight to the next midnight.

**C. Defective**

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it does not conform to the Contract Documents or does not meet the requirements of any inspection, reference standard, test, or approval referred to in the Contract Documents, or has been damaged prior to ENGINEER’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by OWNER at Substantial Completion in accordance with paragraph 14.04 or 14.05).

**D. Furnish, Install, Perform, Provide**

1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words “perform” or “provide,” when used in connection with services,

materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of CONTRACTOR, “provide” is implied.

E. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

---

**ARTICLE 2 - PRELIMINARY MATTERS**

---

**2.01 Delivery of Bonds**

A. When CONTRACTOR delivers the executed Agreements to OWNER, CONTRACTOR shall also deliver to OWNER such Bonds as CONTRACTOR may be required to furnish.

**2.02 Copies of Documents**

A. OWNER shall furnish to CONTRACTOR up to ten copies of the Contract Documents. Additional copies will be furnished upon request at the cost of reproduction.

**2.03 Commencement of Contract Times; Notice to Proceed**

A. The Contract Times will commence to run on the day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on



the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

#### 2.04 *Starting the Work*

A. CONTRACTOR shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

#### 2.05 *Before Starting Construction*

A. *CONTRACTOR's Review of Contract Documents:* Before undertaking each part of the Work, CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. CONTRACTOR shall promptly report in writing to ENGINEER any conflict, error, ambiguity, or discrepancy which CONTRACTOR may discover and shall obtain a written interpretation or clarification from ENGINEER before proceeding with any Work affected thereby; however, CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless CONTRACTOR knew or reasonably should have known thereof.

B. *Preliminary Schedules:* Within ten days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), CONTRACTOR shall submit to ENGINEER for its timely review:

1. a preliminary progress schedule indicating the times (numbers of days or dates) for starting and completing the various

stages of the Work, including any Milestones specified in the Contract Documents;

2. a preliminary schedule of Shop Drawing and Sample submittals which will list each required submittal and the times for submitting, reviewing, and processing such submittal; and

3. a preliminary schedule of values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

C. *Evidence of Insurance:* Before any Work at the Site is started, CONTRACTOR and OWNER shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which CONTRACTOR and OWNER respectively are required to purchase and maintain in accordance with Article 5.

#### 2.06 *Preconstruction Conference*

A. Within 20 days after the Contract Times start to run, but before any Work at the Site is started, a conference attended by CONTRACTOR, ENGINEER, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in paragraph 2.05.B, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

#### 2.07 *Initial Acceptance of Schedules*



A. Unless otherwise provided in the Contract Documents, at least ten days before submission of the first Application for Payment a conference attended by CONTRACTOR, ENGINEER, and others as appropriate will be held to review for acceptability to ENGINEER as provided below the schedules submitted in accordance with paragraph 2.05.B. CONTRACTOR shall have an additional ten days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to CONTRACTOR until acceptable schedules are submitted to ENGINEER.

1. The progress schedule will be acceptable to ENGINEER if it provides an orderly progression of the Work to completion within any specified Milestones and the Contract Times. Such acceptance will not impose on ENGINEER responsibility for the progress schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve CONTRACTOR from CONTRACTOR's full responsibility therefor.

2. CONTRACTOR's schedule of Shop Drawing and Sample submittals will be acceptable to ENGINEER if it provides a workable arrangement for reviewing and processing the required submittals.

3. CONTRACTOR's schedule of values will be acceptable to ENGINEER as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

### **ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE**

---

#### **3.01 Intent**

A. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to OWNER.

C. Clarifications and interpretations of the Contract Documents shall be issued by ENGINEER as provided in Article 9.

#### **3.02 Reference Standards**

A. *Standards, Specifications, Codes, Laws, and Regulations*

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of OWNER, CONTRACTOR, or ENGINEER, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents, nor shall any such



provision or instruction be effective to assign to OWNER, ENGINEER, or any of Engineer's Consultants, agents, or employees any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

### 3.03 *Reporting and Resolving Discrepancies*

#### A. *Reporting Discrepancies*

1. If, during the performance of the Work, CONTRACTOR discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, CONTRACTOR shall report it to ENGINEER in writing at once. CONTRACTOR shall not proceed with the Work affected thereby (except in an emergency as required by paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in paragraph 3.04; provided, however, that CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any such conflict, error, ambiguity, or discrepancy unless CONTRACTOR knew or reasonably should have known thereof.

#### B. *Resolving Discrepancies*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

a. the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

### 3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways: (i) a Written Amendment; (ii) a Change Order; or (iii) a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways: (i) a Field Order; (ii) ENGINEER's approval of a Shop Drawing or Sample; or (iii) ENGINEER's written interpretation or clarification.

### 3.05 *Reuse of Documents*

A. CONTRACTOR and any Subcontractor or Supplier or other individual or entity performing or furnishing any of the Work under a direct or indirect contract with OWNER: (i) shall not have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of ENGINEER or ENGINEER's Consultant, including electronic media editions; and (ii) shall not reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of OWNER and ENGINEER and specific



written verification or adaption by ENGINEER. This prohibition will survive final payment, completion, and acceptance of the Work, or termination or completion of the Contract. Nothing herein shall preclude CONTRACTOR from retaining copies of the Contract Documents for record purposes.

#### **ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS**

---

##### **4.01 *Availability of Lands***

A. OWNER shall furnish the Site. OWNER shall notify CONTRACTOR of any encumbrances or restrictions not of general application but specifically related to use of the Site with which CONTRACTOR must comply in performing the Work. OWNER will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If CONTRACTOR and OWNER are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in OWNER's furnishing the Site, CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

B. Upon reasonable written request, OWNER shall furnish CONTRACTOR with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and OWNER's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. CONTRACTOR shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

##### **4.02 *Subsurface and Physical Conditions***

A. *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that ENGINEER has used in preparing the Contract Documents; and

2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that ENGINEER has used in preparing the Contract Documents.

B. *Limited Reliance by CONTRACTOR on Technical Data Authorized:* CONTRACTOR may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," CONTRACTOR may not rely upon or make any Claim against OWNER, ENGINEER, or any of Engineer's Consultants with respect to:

1. the completeness of such reports and drawings for CONTRACTOR's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by CONTRACTOR, and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any CONTRACTOR interpretation of or conclusion drawn from any "technical



data" or any such other data, interpretations, opinions, or information.

(with a copy to CONTRACTOR) of ENGINEER's findings and conclusions.

#### 4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If CONTRACTOR believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which CONTRACTOR is entitled to rely as provided in paragraph 4.02 is materially inaccurate; or

2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by paragraph 6.16.A), notify OWNER and ENGINEER in writing about such condition. CONTRACTOR shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *ENGINEER's Review:* After receipt of written notice as required by paragraph 4.03.A, ENGINEER will promptly review the pertinent condition, determine the necessity of OWNER's obtaining additional exploration or tests with respect thereto, and advise OWNER in writing

#### C. *Possible Price and Times Adjustments*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in CONTRACTOR's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. such condition must meet any one or more of the categories described in paragraph 4.03.A; and

- b. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of paragraphs 9.08 and 11.03.

2. CONTRACTOR shall not be entitled to any adjustment in the Contract Price or Contract Times if:

- a. CONTRACTOR knew of the existence of such conditions at the time CONTRACTOR made a final commitment to OWNER in respect of Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

- b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for CONTRACTOR prior to CONTRACTOR's making such final commitment; or



c. CONTRACTOR failed to give the written notice within the time and as required by paragraph 4.03.A.

3. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in paragraph 10.05. However, OWNER, ENGINEER, and Engineer's Consultants shall not be liable to CONTRACTOR for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by CONTRACTOR on or in connection with any other project or anticipated project.

#### 4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to OWNER or ENGINEER by the owners of such Underground Facilities, including OWNER, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. OWNER and ENGINEER shall not be responsible for the accuracy or completeness of any such information or data; and

2. the cost of all of the following will be included in the Contract Price, and CONTRACTOR shall have full responsibility for:

a. reviewing and checking all such information and data,

b. locating all Underground Facilities shown or indicated in the Contract Documents,

c. coordination of the Work with the owners of such Underground Facilities, including OWNER, during construction, and

d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

#### B. *Not Shown or Indicated*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to OWNER and ENGINEER. ENGINEER will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, CONTRACTOR shall be responsible for the safety and protection of such Underground Facility.

2. If ENGINEER concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract



Price of Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that CONTRACTOR did not know of and could not reasonably have been expected to be aware of or to have anticipated. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, OWNER or CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

#### 4.05 *Reference Points*

A. OWNER shall provide engineering surveys to establish reference points for construction which in ENGINEER's judgment are necessary to enable CONTRACTOR to proceed with the Work. CONTRACTOR shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of OWNER. CONTRACTOR shall report to ENGINEER whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

#### 4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the ENGINEER in the preparation of the Contract Documents.

B. *Limited Reliance by CONTRACTOR on Technical Data Authorized:* CONTRACTOR may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," CONTRACTOR may not rely upon or make any Claim against OWNER, ENGINEER or any of Engineer's Consultants with respect to:

1. the completeness of such reports and drawings for CONTRACTOR's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by CONTRACTOR and safety precautions and programs incident thereto; or
2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
3. any CONTRACTOR interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

C. CONTRACTOR shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. CONTRACTOR shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by CONTRACTOR, Subcontractors, Suppliers, or anyone else for whom CONTRACTOR is responsible.

D. If CONTRACTOR encounters a Hazardous Environmental Condition or if CONTRACTOR or anyone for whom CONTRACTOR is responsible creates a Hazardous Environmental Condition, CONTRACTOR shall immediately: (i) secure or



otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by paragraph 6.16); and (iii) notify OWNER and ENGINEER (and promptly thereafter confirm such notice in writing). OWNER shall promptly consult with ENGINEER concerning the necessity for OWNER to retain a qualified expert to evaluate such condition or take corrective action, if any.

E. CONTRACTOR shall not be required to resume Work in connection with such condition or in any affected area until after OWNER has obtained any required permits related thereto and delivered to CONTRACTOR written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If OWNER and CONTRACTOR cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by CONTRACTOR, either party may make a Claim therefor as provided in paragraph 10.05.

F. If after receipt of such written notice CONTRACTOR does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then OWNER may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If OWNER and CONTRACTOR cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in paragraph 10.05. OWNER may have such deleted portion of the Work performed by OWNER's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, OWNER shall indemnify and hold harmless CONTRACTOR, Subcontractors, ENGINEER, Engineer's Consultants and the officers, directors, partners, employees, agents, other consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by CONTRACTOR or by anyone for whom CONTRACTOR is responsible. Nothing in this paragraph 4.06.E shall obligate OWNER to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, Engineer's Consultants, and the officers, directors, partners, employees, agents, other consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by CONTRACTOR or by anyone for whom CONTRACTOR is responsible. Nothing in this paragraph 4.06.F shall obligate CONTRACTOR to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of paragraphs 4.02, 4.03, and 4.04 are not intended to apply to a Hazardous



Environmental Condition uncovered or revealed at the Site.

## **ARTICLE 5 - BONDS AND INSURANCE**

---

### **5.01 *Performance, Payment, and Other Bonds***

A. CONTRACTOR shall furnish performance and payment Bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all CONTRACTOR's obligations under the Contract Documents. These Bonds shall remain in effect at least until one year after the date when final payment becomes due, except as provided otherwise by Laws or Regulations or by the Contract Documents. CONTRACTOR shall also furnish such other Bonds as are required by the Contract Documents.

B. All Bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All Bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.

C. If the surety on any Bond furnished by CONTRACTOR is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of paragraph 5.01.B, CONTRACTOR shall within 20 days thereafter substitute another Bond and surety, both of which shall comply with the requirements of paragraphs 5.01.B and 5.02.

### **5.02 *Licensed Sureties and Insurers***

A. All Bonds and insurance required by the Contract Documents to be purchased and maintained by OWNER or CONTRACTOR shall be obtained from surety or insurance companies that are duly licensed or authorized in Indiana to issue Bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

### **5.03 *Certificates of Insurance***

A. CONTRACTOR shall deliver to OWNER, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by OWNER or any other additional insured) which CONTRACTOR is required to purchase and maintain. OWNER shall deliver to CONTRACTOR, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by CONTRACTOR or any other additional insured) which OWNER is required to purchase and maintain.

### **5.04 *CONTRACTOR's Liability Insurance***

A. CONTRACTOR shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from CONTRACTOR's performance of the Work and CONTRACTOR's other obligations under the Contract Documents, whether it is to be performed by CONTRACTOR, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;



2. claims for damages because of bodily injury, occupational sickness or disease, or death of CONTRACTOR's employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than CONTRACTOR's employees;

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained: (i) by any person as a result of an offense directly or indirectly related to the employment of such person by CONTRACTOR, or (ii) by any other person for any other reason;

5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance so required by this paragraph 5.04 to be purchased and maintained shall:

1. with respect to insurance required by paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insureds (subject to any customary exclusion in respect of professional liability) OWNER, ENGINEER, Engineer's Consultants, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, and

other consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. include completed operations insurance;

4. include contractual liability insurance covering CONTRACTOR's indemnity obligations under paragraphs 6.07, 6.11, and 6.20;

5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least thirty days prior written notice has been given to OWNER and CONTRACTOR and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the CONTRACTOR pursuant to paragraph 5.03 will so provide);

6. remain in effect at least until final payment and at all times thereafter when CONTRACTOR may be correcting, removing, or replacing defective Work in accordance with paragraph 13.07; and

7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment (and CONTRACTOR shall furnish OWNER and each other additional insured identified in the Supplementary



Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to OWNER and any such additional insured of continuation of such insurance at final payment and one year thereafter).

#### 5.05 *OWNER's Liability Insurance*

A. In addition to the insurance required to be provided by CONTRACTOR under paragraph 5.04, OWNER, at OWNER's option, may purchase and maintain at OWNER's expense OWNER's own liability insurance as will protect OWNER against claims which may arise from operations under the Contract Documents.

#### 5.06 *Property Insurance*

A. Unless otherwise provided in the Supplementary Conditions, OWNER may purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, Engineer's Consultants, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an additional insured;

2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and shall

insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by OWNER prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by ENGINEER;

5. allow for partial utilization of the Work by OWNER;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by OWNER, CONTRACTOR, and ENGINEER with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.

B. OWNER shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, Engineer's Consultants, and any other individuals or entities identified in the Supplementary Conditions, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.



C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to OWNER and CONTRACTOR and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with paragraph 5.07.

D. OWNER shall not be responsible for purchasing and maintaining any property insurance specified in this paragraph 5.06 to protect the interests of CONTRACTOR, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by CONTRACTOR, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

E. If CONTRACTOR requests in writing that other special insurance be included in the property insurance policies provided under paragraph 5.06, OWNER shall, if possible, include such insurance, and the cost thereof will be charged to CONTRACTOR by appropriate Change Order or Written Amendment. Prior to commencement of the Work at the Site, OWNER shall in writing advise CONTRACTOR whether or not such other insurance has been procured by OWNER.

#### 5.07 *Waiver of Rights*

A. OWNER and CONTRACTOR intend that all policies purchased in accordance with paragraph 5.06 will protect OWNER, CONTRACTOR, Subcontractors, ENGINEER, Engineer's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be

listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. OWNER and CONTRACTOR waive all rights against each other and their respective officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, ENGINEER, Engineer's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by OWNER as trustee or otherwise payable under any policy so issued.

B. OWNER waives all rights against CONTRACTOR, Subcontractors, ENGINEER, Engineer's Consultants, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to OWNER's property or the Work caused by, arising out of, or resulting from fire or other peril whether or not insured by OWNER; and



2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by OWNER during partial utilization pursuant to paragraph 14.05, after Substantial Completion pursuant to paragraph 14.04, or after final payment pursuant to paragraph 14.07.

C. Any insurance policy maintained by OWNER covering any loss, damage or consequential loss referred to in paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against CONTRACTOR, Subcontractors, ENGINEER, or Engineer's Consultants and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them.

#### *5.08 Receipt and Application of Insurance Proceeds*

A. Any insured loss under the policies of insurance required by paragraph 5.06 will be adjusted with OWNER and made payable to OWNER as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of paragraph 5.08.B. OWNER shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order or Written Amendment.

B. OWNER as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing

within 15 days after the occurrence of loss to OWNER's exercise of this power. If such objection be made, OWNER as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, OWNER as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, OWNER as fiduciary shall give bond for the proper performance of such duties.

#### *5.09 Acceptance of Bonds and Insurance; Option to Replace*

A. If either OWNER or CONTRACTOR has any objection to the coverage afforded by or other provisions of the Bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by paragraph 2.05.C. OWNER and CONTRACTOR shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the Bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent Bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

#### *5.10 Partial Utilization, Acknowledgment of Property Insurer*



A. If OWNER finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

## **ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES**

---

### **6.01 *Supervision and Superintendence***

A. CONTRACTOR shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction, but CONTRACTOR shall not be responsible for the negligence of OWNER or ENGINEER in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents. CONTRACTOR shall be responsible to see that the completed Work complies accurately with the Contract Documents.

B. At all times during the progress of the Work, CONTRACTOR shall assign a competent resident superintendent thereto who shall not be replaced without written notice to OWNER and ENGINEER except under extraordinary circumstances. The superintendent will be

CONTRACTOR's representative at the Site and shall have authority to act on behalf of CONTRACTOR. All communications given to or received from the superintendent shall be binding on CONTRACTOR.

### **6.02 *Labor; Working Hours***

A. CONTRACTOR shall provide competent, suitably qualified personnel to survey, lay out, and construct the Work as required by the Contract Documents. CONTRACTOR shall at all times maintain good discipline and order at the Site.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, and CONTRACTOR will not permit overtime work or the performance of Work on Saturday, Sunday, or any legal holiday without OWNER's written consent (which will not be unreasonably withheld) given after prior written notice to ENGINEER.

### **6.03 *Services, Materials, and Equipment***

A. Unless otherwise specified in the General Requirements, CONTRACTOR shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All warranties and guarantees specifically called for by the Specifications shall expressly run to the benefit of OWNER. If required by ENGINEER, CONTRACTOR shall furnish satisfactory evidence



(including reports of required tests) as to the source, kind, and quality of materials and equipment. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

#### 6.04 *Progress Schedule*

A. CONTRACTOR shall adhere to the progress schedule established in accordance with paragraph 2.07 as it may be adjusted from time to time as provided below.

1. CONTRACTOR shall submit to ENGINEER for acceptance (to the extent indicated in paragraph 2.07) proposed adjustments in the progress schedule that will not result in changing the Contract Times (or Milestones). Such adjustments will conform generally to the progress schedule then in effect and additionally will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the progress schedule that will change the Contract Times (or Milestones) shall be submitted in accordance with the requirements of Article 12. Such adjustments may only be made by a Change Order or Written Amendment in accordance with Article 12.

#### 6.05 *Substitutes and "Or-Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent,

or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to ENGINEER for review under the circumstances described below.

1. *"Or-Equal" Items:* If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by ENGINEER as an "or-equal" item, in which case review and approval of the proposed item may, in ENGINEER's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment ENGINEER determines that: (i) it is at least equal in quality, durability, appearance, strength, and design characteristics; (ii) it will reliably perform at least equally well the function imposed by the design concept of the completed Project as a functioning whole, and;

b. CONTRACTOR certifies that: (i) there is no increase in cost to the OWNER; and (ii) it will conform substantially, even with deviations, to the detailed requirements of the item named in the Contract Documents.

#### 2. *Substitute Items*

a. If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR does not qualify as an "or-equal" item under



paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. CONTRACTOR shall submit sufficient information as provided below to allow ENGINEER to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by ENGINEER from anyone other than CONTRACTOR.

c. The procedure for review by ENGINEER will be as set forth in paragraph 6.05.A.2.d, as supplemented in the General Requirements and as ENGINEER may decide is appropriate under the circumstances.

d. CONTRACTOR shall first make written application to ENGINEER for review of a proposed substitute item of material or equipment that CONTRACTOR seeks to furnish or use. The application shall certify that the proposed substitute item will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified, and be suited to the same use as that specified. The application will state the extent, if any, to which the use of the proposed substitute item will prejudice CONTRACTOR's achievement of Substantial Completion on time, whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) to adapt the design to the proposed substitute item and whether or not incorporation or use of the proposed

substitute item in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute item from that specified will be identified in the application, and available engineering, sales, maintenance, repair, and replacement services will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change, all of which will be considered by ENGINEER in evaluating the proposed substitute item. ENGINEER may require CONTRACTOR to furnish additional data about the proposed substitute item.

*B. Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is shown or indicated in and expressly required by the Contract Documents, CONTRACTOR may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by ENGINEER. CONTRACTOR shall submit sufficient information to allow ENGINEER, in ENGINEER's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by ENGINEER will be similar to that provided in subparagraph 6.05.A.2.

*C. Engineer's Evaluation:* ENGINEER will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to paragraphs 6.05.A and 6.05.B. ENGINEER will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized until ENGINEER's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal."



ENGINEER will advise CONTRACTOR in writing of any negative determination.

D. *Special Guarantee:* OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guarantee or other surety with respect to any substitute.

E. *ENGINEER's Cost Reimbursement:* ENGINEER will record time required by ENGINEER and Engineer's Consultants in evaluating substitute proposed or submitted by CONTRACTOR pursuant to paragraphs 6.05.A.2 and 6.05.B and in making changes in the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) occasioned thereby. Whether or not ENGINEER approves a substitute item so proposed or submitted by CONTRACTOR, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and Engineer's Consultants for evaluating each such proposed substitute.

F. *CONTRACTOR's Expense:* CONTRACTOR shall provide all data in support of any proposed substitute or "or-equal" at CONTRACTOR's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. CONTRACTOR shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to OWNER as indicated in paragraph 6.06.B), whether initially or as a replacement, against whom OWNER may have reasonable objection. CONTRACTOR shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom CONTRACTOR has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to OWNER in advance for acceptance by OWNER by

a specified date prior to the Effective Date of the Agreement, and if CONTRACTOR has submitted a list thereof in accordance with the Supplementary Conditions, OWNER's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. CONTRACTOR shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued or Written Amendment signed. No acceptance by OWNER of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of OWNER or ENGINEER to reject defective Work.

C. CONTRACTOR shall be fully responsible to OWNER and ENGINEER for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as CONTRACTOR is responsible for CONTRACTOR's own acts and omissions. Nothing in the Contract Documents shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between OWNER or ENGINEER and any such Subcontractor, Supplier or other individual or entity, nor shall it create any obligation on the part of OWNER or ENGINEER to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

D. CONTRACTOR shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any



of the Work under a direct or indirect contract with CONTRACTOR.

E. CONTRACTOR shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with ENGINEER through CONTRACTOR.

F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control CONTRACTOR in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

G. All Work performed for CONTRACTOR by a Subcontractor or Supplier will be pursuant to an appropriate agreement between CONTRACTOR and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of OWNER and ENGINEER. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in paragraph 5.06, the agreement between the CONTRACTOR and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against OWNER, CONTRACTOR, ENGINEER, Engineer's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, CONTRACTOR will obtain the same.

#### 6.07 *Patent Fees and Royalties*

A. CONTRACTOR shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of OWNER or ENGINEER its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by OWNER in the Contract Documents. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, Engineer's Consultants, and the officers, directors, partners, employees or agents, and other consultants of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

#### 6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, CONTRACTOR shall obtain and pay for all construction permits and licenses. OWNER shall assist CONTRACTOR, when necessary, in obtaining such permits and licenses. CONTRACTOR shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. CONTRACTOR shall pay all charges of utility owners for connections to the Work, and OWNER shall pay all charges of such utility



owners for capital costs related thereto, such as plant investment fees.

#### 6.09 *Laws and Regulations*

A. CONTRACTOR shall give all notices and comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither OWNER nor ENGINEER shall be responsible for monitoring CONTRACTOR's compliance with any Laws or Regulations.

B. If CONTRACTOR performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, CONTRACTOR shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work; however, it shall not be CONTRACTOR's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve CONTRACTOR of CONTRACTOR's obligations under paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work may be the subject of an adjustment in Contract Price or Contract Times. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in paragraph 10.05.

#### 6.10 *Taxes*

A. CONTRACTOR shall pay all sales, consumer, use, and other similar taxes required to be paid by CONTRACTOR in accordance with the

Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

#### 6.11 *Use of Site and Other Areas*

##### A. *Limitation on Use of Site and Other Areas*

1. CONTRACTOR shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. CONTRACTOR shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, CONTRACTOR shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultant, and the officers, directors, partners, employees, agents, and other consultants of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against OWNER, ENGINEER, or any other party indemnified hereunder to the extent



caused by or based upon CONTRACTOR's performance of the Work.

B. *Removal of Debris During Performance of the Work:* During the progress of the Work CONTRACTOR shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. *Cleaning:* Prior to Substantial Completion of the Work CONTRACTOR shall clean the Site and make it ready for utilization by OWNER. At the completion of the Work CONTRACTOR shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading Structures:* CONTRACTOR shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall CONTRACTOR subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

#### 6.12 *Record Documents*

A. CONTRACTOR shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Written Amendments, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to ENGINEER for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to ENGINEER for OWNER.

#### 6.13 *Safety and Protection*

A. CONTRACTOR shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. CONTRACTOR shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Site or who may be affected by the Work;
2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. CONTRACTOR shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. CONTRACTOR shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property. All damage, injury, or loss to any property referred to in paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by CONTRACTOR, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by CONTRACTOR (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of OWNER or ENGINEER or ENGINEER's



Consultant, or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of CONTRACTOR or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them). CONTRACTOR's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and ENGINEER has issued a notice to OWNER and CONTRACTOR in accordance with paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

#### 6.14 *Safety Representative*

A. CONTRACTOR shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

#### 6.15 *Hazard Communication Programs*

A. CONTRACTOR shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

#### 6.16 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, CONTRACTOR is obligated to act to prevent threatened damage, injury, or loss. CONTRACTOR shall give ENGINEER prompt written notice if CONTRACTOR believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If ENGINEER determines that a change in the Contract

Documents is required because of the action taken by CONTRACTOR in response to such an emergency, a Work Change Directive or Change Order will be issued.

#### 6.17 *Shop Drawings and Samples*

A. CONTRACTOR shall submit Shop Drawings to ENGINEER for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals. All submittals will be identified as ENGINEER may require and in the number of copies specified in the General Requirements. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show ENGINEER the services, materials, and equipment CONTRACTOR proposes to provide and to enable ENGINEER to review the information for the limited purposes required by paragraph 6.17.E.

B. CONTRACTOR shall also submit Samples to ENGINEER for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals. Each Sample will be identified clearly as to material, Supplier, pertinent data such as catalog numbers, and the use for which intended and otherwise as ENGINEER may require to enable ENGINEER to review the submittal for the limited purposes required by paragraph 6.17.E. The numbers of each Sample to be submitted will be as specified in the Specifications.

C. Where a Shop Drawing or Sample is required by the Contract Documents or the schedule of Shop Drawings and Sample submittals acceptable to ENGINEER as required by paragraph 2.07, any related Work performed prior to ENGINEER's review and approval of the pertinent submittal will be at the sole expense and responsibility of CONTRACTOR.



#### D. *Submittal Procedures*

1. Before submitting each Shop Drawing or Sample, CONTRACTOR shall have determined and verified:

a. all field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

b. all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;

c. all information relative to means, methods, techniques, sequences, and procedures of construction and safety precautions and programs incident thereto; and

d. CONTRACTOR shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

2. Each submittal shall bear a stamp or specific written indication that CONTRACTOR has satisfied CONTRACTOR's obligations under the Contract Documents with respect to CONTRACTOR's review and approval of that submittal.

3. At the time of each submittal, CONTRACTOR shall give ENGINEER specific written notice of such variations, if any, that the Shop Drawing or Sample submitted may have from the requirements of the Contract Documents, such notice to be in a written communication separate from the

submittal; and, in addition, shall cause a specific notation to be made on each Shop Drawing and Sample submitted to ENGINEER for review and approval of each such variation.

#### E. *ENGINEER's Review*

1. ENGINEER will timely review and approve Shop Drawings and Samples in accordance with the schedule of Shop Drawings and Sample submittals acceptable to ENGINEER. ENGINEER's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. ENGINEER's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. ENGINEER's review and approval of Shop Drawings or Samples shall not relieve CONTRACTOR from responsibility for any variation from the requirements of the Contract Documents unless CONTRACTOR has in writing called ENGINEER's attention to each such variation at the time of each submittal as required by paragraph 6.17.D.3 and ENGINEER has given written approval of each such variation by specific written



notation thereof incorporated in or accompanying the Shop Drawing or Sample approval; nor will any approval by ENGINEER relieve CONTRACTOR from responsibility for complying with the requirements of paragraph 6.17.D.1.

#### F. *Resubmittal Procedures*

1. CONTRACTOR shall make corrections required by ENGINEER and shall return the required number of corrected copies of Shop Drawings and submit as required new Samples for review and approval. CONTRACTOR shall direct specific attention in writing to revisions other than the corrections called for by ENGINEER on previous submittals.

#### 6.18 *Continuing the Work*

A. CONTRACTOR shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with OWNER. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by paragraph 15.04 or as OWNER and CONTRACTOR may otherwise agree in writing.

#### 6.19 *CONTRACTOR's General Warranty and Guarantee*

A. CONTRACTOR warrants and guarantees to OWNER, ENGINEER, and Engineer's Consultants that all Work will be in accordance with the Contract Documents and will not be defective. CONTRACTOR's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than CONTRACTOR, Subcontractors, Suppliers, or any other individual or entity for whom CONTRACTOR is responsible; or

2. normal wear and tear under normal usage.

B. CONTRACTOR's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of CONTRACTOR's obligation to perform the Work in accordance with the Contract Documents:

1. observations by ENGINEER;

2. recommendation by ENGINEER or payment by OWNER of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by ENGINEER or any payment related thereto by OWNER;

4. use or occupancy of the Work or any part thereof by OWNER;

5. any acceptance by OWNER or any failure to do so;

6. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by ENGINEER;

7. any inspection, test, or approval by others; or

8. any correction of defective Work by OWNER.

#### 6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, Engineer's Consultants, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them from and



against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage:

1. is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom; and

2. is caused in whole or in part by any negligent act or omission of CONTRACTOR, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable, regardless of whether or not caused in part by any negligence or omission of an individual or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws and Regulations regardless of the negligence of any such individual or entity.

B. In any and all claims against OWNER or ENGINEER or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of CONTRACTOR, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for CONTRACTOR or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of CONTRACTOR under paragraph 6.20.A shall not extend to the liability of ENGINEER and Engineer's Consultants or to the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them arising out of:

1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

## **ARTICLE 7 - OTHER WORK**

---

### *7.01 Related Work at Site*

A. OWNER may perform other work related to the Project at the Site by OWNER's employees, or let other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to CONTRACTOR prior to starting any such other work; and

2. if OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefore as provided in paragraph 10.05.

B. CONTRACTOR shall afford each other contractor who is a party to such a direct contract and each utility owner (and OWNER, if OWNER is performing the other work with OWNER's



employees) proper and safe access to the Site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work and shall properly coordinate the Work with theirs. Unless otherwise provided in the Contract Documents, CONTRACTOR shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. CONTRACTOR shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of ENGINEER and the others whose work will be affected. The duties and responsibilities of CONTRACTOR under this paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of CONTRACTOR in said direct contracts between OWNER and such utility owners and other contractors.

C. If the proper execution or results of any part of CONTRACTOR's Work depends upon work performed by others under this Article 7, CONTRACTOR shall inspect such other work and promptly report to ENGINEER in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of CONTRACTOR's Work. CONTRACTOR's failure to so report will constitute an acceptance of such other work as fit and proper for integration with CONTRACTOR's Work except for latent defects and deficiencies in such other work.

#### 7.02 *Coordination*

A. If OWNER intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for

coordination of the activities among the various contractors will be identified;

2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.

B. Unless otherwise provided in the Supplementary Conditions, OWNER shall have sole authority and responsibility for such coordination.

### **ARTICLE 8 - OWNER'S RESPONSIBILITIES**

---

#### 8.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, OWNER shall issue all communications to CONTRACTOR through ENGINEER.

#### 8.02 *Replacement of Engineer*

A. In case of termination of the employment of ENGINEER, OWNER shall appoint an engineer to whom CONTRACTOR makes no reasonable objection, whose status under the Contract Documents shall be that of the former ENGINEER.

#### 8.03 *Furnish Data*

A. OWNER shall promptly furnish the data required of OWNER under the Contract Documents.

#### 8.04 *Pay Promptly When Due*

A. OWNER shall make payments to CONTRACTOR promptly when they are due as provided in paragraphs 14.02.C and 14.07.C.



#### 8.05 *Lands and Easements; Reports and Tests*

A. OWNER's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in paragraphs 4.01 and 4.05. Paragraph 4.02 refers to OWNER's identifying and making available to CONTRACTOR copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by ENGINEER in preparing the Contract Documents.

#### 8.06 *Insurance*

A. OWNER's responsibilities, if any, in respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

#### 8.07 *Change Orders*

A. OWNER is obligated to execute Change Orders as indicated in paragraph 10.03.

#### 8.08 *Inspections, Tests, and Approvals*

A. OWNER's responsibility in respect to certain inspections, tests, and approvals is set forth in paragraph 13.03.B.

#### 8.09 *Limitations on OWNER's Responsibilities*

A. The OWNER shall not supervise, direct, or have control or authority over, nor be responsible for, CONTRACTOR's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the performance of the Work. OWNER will not be responsible for CONTRACTOR's failure to perform the Work in accordance with the Contract Documents.

#### 8.10 *Undisclosed Hazardous Environmental Condition*

A. OWNER's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in paragraph 4.06.

#### 8.11 *Evidence of Financial Arrangements*

A. If and to the extent OWNER has agreed to furnish CONTRACTOR reasonable evidence that financial arrangements have been made to satisfy OWNER's obligations under the Contract Documents, OWNER's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

### **ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION**

---

#### 9.01 *OWNER'S Representative*

A. ENGINEER will be OWNER's representative during the construction period. The duties and responsibilities and the limitations of authority of ENGINEER as OWNER's representative during construction are set forth in the Contract Documents and will not be changed without written consent of OWNER and ENGINEER.

#### 9.02 *Visits to Site*

A. ENGINEER will make visits to the Site at intervals appropriate to the various stages of construction as ENGINEER deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of CONTRACTOR's executed Work. Based on information obtained during such visits and observations, ENGINEER, for the benefit of OWNER, will determine, in general, if the Work is proceeding in accordance with the Contract



Documents. ENGINEER will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. ENGINEER's efforts will be directed toward providing for OWNER a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, ENGINEER will keep OWNER informed of the progress of the Work and will endeavor to guard OWNER against defective Work.

B. ENGINEER's visits and observations are subject to all the limitations on ENGINEER's authority and responsibility set forth in paragraph 9.10, and particularly, but without limitation, during or as a result of ENGINEER's visits or observations of CONTRACTOR's Work ENGINEER will not supervise, direct, control, or have authority over or be responsible for CONTRACTOR's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the performance of the Work.

#### 9.03 *Project Representative*

A. If OWNER and ENGINEER agree, ENGINEER will furnish a Resident Project Representative to assist ENGINEER in providing more extensive observation of the Work. The responsibilities and authority and limitations thereon of any such Resident Project Representative and assistants will be as provided in paragraph 9.10 and in the Supplementary Conditions. If OWNER designates another representative or agent to represent OWNER at the Site who is not ENGINEER's Consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

#### 9.04 *Clarifications and Interpretations*

A. ENGINEER will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents as ENGINEER may determine necessary, which shall be consistent with the intent of and reasonably inferable from the Contract Documents. Such written clarifications and interpretations will be binding on OWNER and CONTRACTOR. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a written clarification or interpretation, a Claim may be made therefor as provided in paragraph 10.05.

#### 9.05 *Authorized Variations in Work*

A. ENGINEER may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on OWNER and also on CONTRACTOR, who shall perform the Work involved promptly.

#### 9.06 *Rejecting Defective Work*

A. ENGINEER will have authority to disapprove or reject Work which ENGINEER believes to be defective, or that ENGINEER believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. ENGINEER will also have authority to require special inspection or testing of the Work as provided in paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

#### 9.07 *Shop Drawings, Change Orders and*



### *Payments*

A. In connection with ENGINEER's authority as to Shop Drawings and Samples, see paragraph 6.17.

B. In connection with ENGINEER's authority as to Change Orders, see Articles 10, 11, and 12.

C. In connection with ENGINEER's authority as to Applications for Payment, see Article 14.

### *9.08 Determinations for Unit Price Work*

A. ENGINEER will determine the actual quantities and classifications of Unit Price Work performed by CONTRACTOR. ENGINEER will review with CONTRACTOR the ENGINEER's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). ENGINEER's written decision thereon will be final and binding (except as modified by ENGINEER to reflect changed factual conditions or more accurate data) upon CONTRACTOR, subject to the provisions of paragraph 10.05.

### *9.09 Decisions on Requirements of Contract Documents and Acceptability of Work*

A. ENGINEER will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. Claims, disputes and other matters relating to the acceptability of the Work, the quantities and classifications of Unit Price Work, the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, and Claims seeking changes in the Contract Price or Contract Times will be referred initially to ENGINEER in writing, in accordance with the provisions of paragraph 10.05, with a request for a formal decision.

B. The rendering of a decision by ENGINEER pursuant to this paragraph 9.09 with respect to any

such Claim, dispute, or other matter (except any which have been waived by the making or acceptance of final payment as provided in paragraph 14.07) will be a condition precedent to any exercise by CONTRACTOR of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such Claim, dispute, or other matter.

### *9.10 Limitations on ENGINEER's Authority and Responsibilities*

A. Neither ENGINEER's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by ENGINEER in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by ENGINEER shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by ENGINEER to CONTRACTOR, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. ENGINEER will not supervise, direct, control, or have authority over or be responsible for CONTRACTOR's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the performance of the Work. ENGINEER will not be responsible for CONTRACTOR's failure to perform the Work in accordance with the Contract Documents.

C. ENGINEER will not be responsible for the acts or omissions of CONTRACTOR or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. ENGINEER's review of the final Application for Payment and accompanying documentation and all maintenance and operating



instructions, schedules, guarantees, Bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.

E. The limitations upon authority and responsibility set forth in this paragraph 9.10 shall also apply to Engineer's Consultants, Resident Project Representative, and assistants.

## **ARTICLE 10 - CHANGES IN THE WORK; CLAIMS**

---

### *10.01 Authorized Changes in the Work*

A. Without invalidating the Agreement and without notice to any surety, OWNER may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Written Amendment, a Change Order, or a Work Change Directive. Upon receipt of any such document, CONTRACTOR shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If OWNER and CONTRACTOR are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in paragraph 10.05.

### *10.02 Unauthorized Changes in the Work*

A. CONTRACTOR shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed

that is not required by the Contract Documents as amended, modified, or supplemented as provided in paragraph 3.04, except in the case of an emergency as provided in paragraph 6.16 or in the case of uncovering Work as provided in paragraph 13.04.B.

### *10.03 Execution of Change Orders*

A. OWNER and CONTRACTOR shall execute appropriate Change Orders recommended by ENGINEER (or Written Amendments) covering:

1. changes in the Work which are: (i) ordered by OWNER pursuant to paragraph 10.01.A, (ii) required because of acceptance of defective Work under paragraph 13.08.A or OWNER's correction of defective Work under paragraph 13.09, or (iii) agreed to by the parties;

2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by ENGINEER pursuant to paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, CONTRACTOR shall carry on the Work and adhere to the progress schedule as provided in paragraph 6.18.A.

### *10.04 Notification to Surety*

A. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to,



Contract Price or Contract Times) is required by the provisions of any Bond to be given to a surety, the giving of any such notice will be CONTRACTOR's responsibility. The amount of each applicable Bond will be adjusted to reflect the effect of any such change.

#### 10.05 *Claims and Disputes*

A. *Notice:* Written notice stating the general nature of each Claim, dispute, or other matter shall be delivered by the CONTRACTOR to ENGINEER and OWNER promptly (but in no event later than 30 days) after the start of the event giving rise thereto. Notice of the amount or extent of the Claim, dispute, or other matter with supporting data shall be delivered to the ENGINEER and OWNER within 60 days after the start of such event. A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of paragraph 12.01.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The OWNER shall submit any response to ENGINEER and the CONTRACTOR within 30 days after receipt of the claimant's last submittal.

B. *ENGINEER's Decision:* ENGINEER will render a formal decision in writing within 30 days after receipt of the last submittal of the CONTRACTOR or the last submittal of the OWNER, if any. ENGINEER's written decision on such Claim, dispute, or other matter will be final and binding upon CONTRACTOR unless:

1. an appeal from ENGINEER's decision is taken within the time limits and in accordance with the dispute resolution procedures set forth in Article 16; or
2. if no such dispute resolution procedures have been set forth in Article 16,

a written notice of intention to appeal from ENGINEER's written decision is delivered by CONTRACTOR to OWNER and to ENGINEER within 30 days after the date of such decision, and a formal proceeding is instituted by the CONTRACTOR in a forum of competent jurisdiction within 60 days after the date of such decision or within 60 days after Substantial Completion, whichever is later (unless otherwise agreed in writing by OWNER and CONTRACTOR), to exercise such rights or remedies as the CONTRACTOR may have with respect to such Claim, dispute, or other matter in accordance with applicable Laws and Regulations.

C. If ENGINEER does not render a formal decision in writing within the time stated in paragraph 10.05.B, a decision denying the Claim in its entirety shall be deemed to have been issued 31 days after receipt of the last submittal of the CONTRACTOR or the last submittal of the OWNER, if any.

D. No Claim by CONTRACTOR for an adjustment in Contract Price or Contract Times (or Milestones) will be valid if not submitted in accordance with this paragraph 10.05.

### **ARTICLE 11 - COST OF THE WORK; CASH ALLOWANCES; UNIT PRICE WORK**

---

#### 11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs necessarily incurred and paid by CONTRACTOR in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to CONTRACTOR will be only those additional or incremental costs required because of the change in the Work or because of the event



giving rise to the Claim. Except as otherwise may be agreed to in writing by OWNER, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in paragraph 11.01.B.

1. Payroll costs for employees in the direct employ of CONTRACTOR in the performance of the Work under schedules of job classifications agreed upon by OWNER and CONTRACTOR. Such employees shall include without limitation superintendents, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by OWNER.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to CONTRACTOR unless OWNER deposits funds with CONTRACTOR with which to make payments, in which case the cash discounts shall accrue to OWNER. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to OWNER, and CONTRACTOR shall make provisions so that they may be obtained.

3. Payments made by CONTRACTOR to Subcontractors for Work performed by Subcontractors. If required by OWNER, CONTRACTOR shall obtain competitive bids from subcontractors acceptable to OWNER and CONTRACTOR and shall deliver such bids to OWNER, who will then determine, with the advice of ENGINEER, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as CONTRACTOR's Cost of the Work and fee as provided in this paragraph 11.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

a. The proportion of necessary transportation, travel, and subsistence expenses of CONTRACTOR's employees incurred in discharge of duties connected with the Work.

b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of CONTRACTOR.

c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from CONTRACTOR or others in accordance



with rental agreements approved by OWNER with the advice of ENGINEER, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which CONTRACTOR is liable, imposed by Laws and Regulations.

e. Deposits lost for causes other than negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by CONTRACTOR in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of OWNER. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining CONTRACTOR's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expressage, and similar petty cash items in connection with the Work.

i. When the Cost of the Work is used to determine the value of a Change Order or of a Claim, the cost of premiums for additional Bonds and insurance required because of the changes in the Work or caused by the event giving rise to the Claim.

j. When all the Work is performed on the basis of cost-plus, the costs of premiums for all Bonds and insurance CONTRACTOR is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of CONTRACTOR's officers, executives, principals (of partnerships and sole proprietorships), general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by CONTRACTOR, whether at the Site or in CONTRACTOR's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 11.01.A.1 or specifically covered by paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the CONTRACTOR's fee.

2. Expenses of CONTRACTOR's principal and branch offices other than CONTRACTOR's office at the Site.



3. Any part of CONTRACTOR's capital expenses, including interest on CONTRACTOR's capital employed for the Work and charges against CONTRACTOR for delinquent payments.

4. Costs due to the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraphs 11.01.A and 11.01.B.

C. *CONTRACTOR's Fee*: When all the Work is performed on the basis of cost-plus, CONTRACTOR's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, CONTRACTOR's fee shall be determined as set forth in paragraph 12.01.C.

D. *Documentation*: Whenever the Cost of the Work for any purpose is to be determined pursuant to paragraphs 11.01.A and 11.01.B, CONTRACTOR will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to ENGINEER an itemized cost breakdown together with supporting data.

#### 11.02 *Cash Allowances*

A. It is understood that CONTRACTOR has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums

as may be acceptable to OWNER and ENGINEER. CONTRACTOR agrees that:

1. the allowances include the cost to CONTRACTOR (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

2. CONTRACTOR's costs for unloading and handling on the Site, labor, installation costs, overhead, profit, and other expenses contemplated for the allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

B. Prior to final payment, an appropriate Change Order will be issued as recommended by ENGINEER to reflect actual amounts due CONTRACTOR on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

#### 11.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by CONTRACTOR will be made by ENGINEER subject to the provisions of paragraph 9.08.

B. Each unit price will be deemed to include an amount considered by CONTRACTOR to be



adequate to cover CONTRACTOR's overhead and profit for each separately identified item.

C. CONTRACTOR may make a Claim for an adjustment in the Contract Price in accordance with paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by CONTRACTOR differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

2. there is no corresponding adjustment with respect any other item of Work; and

3. if CONTRACTOR believes that CONTRACTOR is entitled to an increase in Contract Price as a result of having incurred additional expense and the parties are unable to agree as to the amount of any such increase or decrease.

## **ARTICLE 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES**

---

### **12.01 *Change of Contract Price***

A. The Contract Price may only be changed by a Change Order or by a Written Amendment. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by CONTRACTOR to the ENGINEER and OWNER in accordance with the provisions of paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such

unit prices to the quantities of the items involved (subject to the provisions of paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in paragraph 11.01) plus a CONTRACTOR's fee for overhead and profit (determined as provided in paragraph 12.01.C).

C. *CONTRACTOR's Fee:* The CONTRACTOR's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a. for costs incurred under paragraphs 11.01.A.1 and 11.01.A.2, the CONTRACTOR's fee shall be 15 percent;

b. for costs incurred under paragraph 11.01.A.3, the CONTRACTOR's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of paragraph



12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and CONTRACTOR will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

d. no fee shall be payable on the basis of costs itemized under paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

e. the amount of credit to be allowed by CONTRACTOR to OWNER for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in CONTRACTOR's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in CONTRACTOR's fee shall be computed on the basis of the net change in accordance with paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

#### 12.02 *Change of Contract Times*

A. The Contract Times (or Milestones) may only be changed by a Change Order or by a Written Amendment. Any Claim for an adjustment in the Contract Times (or Milestones) shall be based on written notice submitted by the CONTRACTOR to the ENGINEER and the OWNER in accordance with the provisions of paragraph 10.05.

B. Any adjustment of the Contract Times (or Milestones) covered by a Change Order or of any Claim for an adjustment in the Contract Times (or

Milestones) will be determined in accordance with the provisions of this Article 12.

#### 12.03 *Delays Beyond CONTRACTOR's Control*

A. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of CONTRACTOR, the Contract Times (or Milestones) will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in paragraph 12.02.A. Delays beyond the control of CONTRACTOR shall include, but not be limited to, acts or neglect by OWNER, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

#### 12.04 *Delays Within CONTRACTOR's Control*

A. The Contract Times (or Milestones) will not be extended due to delays within the control of CONTRACTOR. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of CONTRACTOR.

#### 12.05 *Delays Beyond OWNER's and CONTRACTOR's Control*

A. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of both OWNER and CONTRACTOR, an extension of the Contract Times (or Milestones) in an amount equal to the time lost due to such delay shall be CONTRACTOR's sole and exclusive remedy for such delay.

#### 12.06 *Delay Damages*

A. In no event shall OWNER or ENGINEER be liable to CONTRACTOR, any Subcontractor,



any Supplier, or any other person or organization, or to any surety for or employee or agent of any of them, for damages arising out of or resulting from:

1. delays caused by or within the control of CONTRACTOR; or

2. delays beyond the control of both OWNER and CONTRACTOR including but not limited to fires, floods, epidemics, abnormal weather conditions, acts of God, or acts or neglect by utility owners or other contractors performing other work as contemplated by Article 7.

B. Nothing in this paragraph 12.06 bars a change in Contract Price pursuant to this Article 12 to compensate CONTRACTOR due to delay, interference, or disruption directly attributable to actions or inactions of OWNER or anyone for whom OWNER is responsible.

### **ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK**

---

#### *13.01 Notice of Defects*

A. Prompt notice of all defective Work of which OWNER or ENGINEER has actual knowledge will be given to CONTRACTOR. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

#### *13.02 Access to Work*

A. OWNER, ENGINEER, Engineer's Consultants, other representatives and personnel of OWNER, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. CONTRACTOR shall provide them proper and safe conditions for such access and

advise them of CONTRACTOR's Site safety procedures and programs so that they may comply therewith as applicable.

#### *13.03 Tests and Inspections*

A. CONTRACTOR shall give ENGINEER timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. OWNER shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to paragraph 13.04.B shall be paid as provided in said paragraph 13.04.B; and

3. as otherwise specifically provided in the Contract Documents.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, CONTRACTOR shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish ENGINEER the required certificates of inspection or approval.

D. CONTRACTOR shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for OWNER's and ENGINEER's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for



approval prior to CONTRACTOR's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to OWNER and ENGINEER.

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by CONTRACTOR without written concurrence of ENGINEER, it must, if requested by ENGINEER, be uncovered for observation.

F. Uncovering Work as provided in paragraph 13.03.E shall be at CONTRACTOR's expense unless CONTRACTOR has given ENGINEER timely notice of CONTRACTOR's intention to cover the same and ENGINEER has not acted with reasonable promptness in response to such notice.

#### 13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of ENGINEER, it must, if requested by ENGINEER, be uncovered for ENGINEER's observation and replaced at CONTRACTOR's expense.

B. If ENGINEER considers it necessary or advisable that covered Work be observed by ENGINEER or inspected or tested by others, CONTRACTOR, at ENGINEER's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as ENGINEER may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment. If it is found that such Work is defective, CONTRACTOR shall pay all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and OWNER shall

be entitled to an appropriate decrease in the Contract Price. If, however, such Work is not found to be defective, CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Times (or Milestones), or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

#### 13.05 *OWNER May Stop the Work*

A. If the Work is defective, or CONTRACTOR fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, OWNER may order CONTRACTOR to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of OWNER to stop the Work shall not give rise to any duty on the part of OWNER to exercise this right for the benefit of CONTRACTOR, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

#### 13.06 *Correction or Removal of Defective Work*

A. CONTRACTOR shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by ENGINEER, remove it from the Project and replace it with Work that is not defective. CONTRACTOR shall pay all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

#### 13.07 *Correction Period*



A. If within one year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for CONTRACTOR's use by OWNER or permitted by Laws and Regulations as contemplated in paragraph 6.11.A is found to be defective, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER's written instructions: (i) repair such defective land or areas, or (ii) correct such defective Work or, if the defective Work has been rejected by OWNER, remove it from the Project and replace it with Work that is not defective, and (iii) satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom. If CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, OWNER may have the defective Work corrected or repaired or may have the rejected Work removed and replaced, and all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by CONTRACTOR.

B. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications or by Written Amendment.

C. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph

13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

D. CONTRACTOR's obligations under this paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

#### 13.08 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, OWNER (and, prior to ENGINEER's recommendation of final payment, ENGINEER) prefers to accept it, OWNER may do so. CONTRACTOR shall pay all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to OWNER's evaluation of and determination to accept such defective Work (such costs to be approved by ENGINEER as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by CONTRACTOR pursuant to this sentence. If any such acceptance occurs prior to ENGINEER's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and OWNER shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the acceptance occurs after such recommendation, an appropriate amount will be paid by CONTRACTOR to OWNER.

#### 13.09 *OWNER May Correct Defective Work*

A. If CONTRACTOR fails within a reasonable time after written notice from ENGINEER to correct defective Work or to remove and replace rejected Work as required by



ENGINEER in accordance with paragraph 13.06.A, or if CONTRACTOR fails to perform the Work in accordance with the Contract Documents, or if CONTRACTOR fails to comply with any other provision of the Contract Documents, OWNER may, after seven days written notice to CONTRACTOR, correct and remedy any such deficiency.

B. In exercising the rights and remedies under this paragraph, OWNER shall proceed expeditiously. In connection with such corrective and remedial action, OWNER may exclude CONTRACTOR from all or part of the Site, take possession of all or part of the Work and suspend CONTRACTOR's services related thereto, take possession of CONTRACTOR's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which OWNER has paid CONTRACTOR but which are stored elsewhere. CONTRACTOR shall allow OWNER, OWNER's representatives, agents and employees, OWNER's other contractors, and ENGINEER and Engineer's Consultants access to the Site to enable OWNER to exercise the rights and remedies under this paragraph.

C. All Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by OWNER in exercising the rights and remedies under this paragraph 13.09 will be charged against CONTRACTOR, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of CONTRACTOR's defective Work.

D. CONTRACTOR shall not be allowed an extension of the Contract Times (or Milestones) because of any delay in the performance of the Work attributable to the exercise by OWNER of OWNER's rights and remedies under this paragraph 13.09.

## **ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION**

---

### *14.01 Schedule of Values*

A. The schedule of values established as provided in paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to ENGINEER. Progress payments on account of Unit Price Work will be based on the number of units completed.

### *14.02 Progress Payments*

#### *A. Applications for Payments*

1. At least 20 days before the date established for each progress payment (but not more often than once a month), CONTRACTOR shall submit to ENGINEER for review an Application for Payment filled out and signed by CONTRACTOR covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that OWNER has received the materials and equipment free and clear of all Liens and evidence that the materials and



equipment are covered by appropriate property insurance or other arrangements to protect OWNER's interest therein, all of which must be satisfactory to OWNER.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of CONTRACTOR stating that all previous progress payments received on account of the Work have been applied on account to discharge CONTRACTOR's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

#### B. *Review of Applications*

1. ENGINEER will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to OWNER or return the Application to CONTRACTOR indicating in writing ENGINEER's reasons for refusing to recommend payment. In the latter case, CONTRACTOR may make the necessary corrections and resubmit the Application.

2. ENGINEER's recommendation of any payment requested in an Application for Payment will constitute a representation by ENGINEER to OWNER, based on ENGINEER's observations on the Site of the executed Work as an experienced and qualified design professional and on ENGINEER's review of the Application for Payment and the accompanying data and schedules, that to the best of ENGINEER's knowledge, information and belief:

a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under paragraph 9.08, and to any other qualifications stated in the recommendation); and

c. the conditions precedent to CONTRACTOR's being entitled to such payment appear to have been fulfilled in so far as it is ENGINEER's responsibility to observe the Work.

3. By recommending any such payment ENGINEER will not thereby be deemed to have represented that: (i) inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to ENGINEER in the Contract Documents; or (ii) that there may not be other matters or issues between the parties that might entitle CONTRACTOR to be paid additionally by OWNER or entitle OWNER to withhold payment to CONTRACTOR.

4. Neither ENGINEER's review of CONTRACTOR's Work for the purposes of recommending payments nor ENGINEER's recommendation of any payment, including final payment, will impose responsibility on ENGINEER to supervise, direct, or control the Work or for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for



CONTRACTOR's failure to comply with Laws and Regulations applicable to CONTRACTOR's performance of the Work. Additionally, said review or recommendation will not impose responsibility on ENGINEER to make any examination to ascertain how or for what purposes CONTRACTOR has used the moneys paid on account of the Contract Price, or to determine that title to any of the Work, materials, or equipment has passed to OWNER free and clear of any Liens.

5. ENGINEER may refuse to recommend the whole or any part of any payment if, in ENGINEER's opinion, it would be incorrect to make the representations to OWNER referred to in paragraph 14.02.B.2. ENGINEER may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in ENGINEER's opinion to protect OWNER from loss because:

a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;

b. the Contract Price has been reduced by Written Amendment or Change Orders;

c. OWNER has been required to correct defective Work or complete Work in accordance with paragraph 13.09; or

d. ENGINEER has actual knowledge of the occurrence of any of the events enumerated in paragraph 15.02.A.

#### *C. Payment Becomes Due*

1. Thirty-five days after presentation of the Application for Payment to OWNER with ENGINEER's recommendation, the amount recommended will (subject to the provisions of paragraph 14.02.D) become due, and when due will be paid by OWNER to CONTRACTOR.

#### *D. Reduction in Payment*

1. OWNER may refuse to make payment of the full amount recommended by ENGINEER because:

a. claims have been made against OWNER on account of CONTRACTOR's performance or furnishing of the Work;

b. Liens have been filed in connection with the Work, except where CONTRACTOR has delivered a specific Bond satisfactory to OWNER to secure the satisfaction and discharge of such Liens;

c. there are other items entitling OWNER to a setoff against the amount recommended; or

d. OWNER has actual knowledge of the occurrence of any of the events enumerated in paragraphs 14.02.B.5.a through 14.02.B.5.c or paragraph 15.02.A.

2. If OWNER refuses to make payment of the full amount recommended by ENGINEER, OWNER must give CONTRACTOR immediate written notice (with a copy to ENGINEER) stating the reasons for such action and promptly pay CONTRACTOR any amount remaining after deduction of the amount so withheld. OWNER shall promptly pay CONTRACTOR the amount so withheld, or



any adjustment thereto agreed to by OWNER and CONTRACTOR, when CONTRACTOR corrects to OWNER's satisfaction the reasons for such action.

3. If it is subsequently determined that OWNER's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by paragraph 14.02.C.1.

#### 14.03 *CONTRACTOR's Warranty of Title*

A. CONTRACTOR warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to OWNER no later than the time of payment free and clear of all Liens.

#### 14.04 *Substantial Completion*

A. When CONTRACTOR considers the entire Work ready for its intended use CONTRACTOR shall notify OWNER and ENGINEER in writing that the entire Work is substantially complete (except for items specifically listed by CONTRACTOR as incomplete) and request that ENGINEER issue a certificate of Substantial Completion. Promptly thereafter, OWNER, CONTRACTOR, and ENGINEER shall make an inspection of the Work to determine the status of completion. If ENGINEER does not consider the Work substantially complete, ENGINEER will notify CONTRACTOR in writing giving the reasons therefor. If ENGINEER considers the Work substantially complete, ENGINEER will prepare and deliver to OWNER a certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a list of items to be completed or corrected before final acceptance and payment. OWNER shall have seven days after receipt of the certificate during which to make written objection to ENGINEER as to any provisions of the certificate or attached list. If, after considering such

objections, ENGINEER concludes that the Work is not substantially complete, ENGINEER will within 14 days after submission of the certificate to OWNER notify CONTRACTOR in writing, stating the reasons therefor. If, after consideration of OWNER's objections, ENGINEER considers the Work substantially complete, ENGINEER will within said 14 days execute and deliver to OWNER and CONTRACTOR a revised certificate of Substantial Completion (with a revised list of items to be completed or corrected) reflecting such changes from the original certificate as ENGINEER believes justified after consideration of any objections from OWNER. At the time of delivery of the certificate of Substantial Completion ENGINEER will deliver to OWNER and CONTRACTOR a written recommendation as to division of responsibilities pending final acceptance and payment between OWNER and CONTRACTOR with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless OWNER and CONTRACTOR agree otherwise in writing and so inform ENGINEER in writing prior to ENGINEER's issuing the revised certificate of Substantial Completion, ENGINEER's aforesaid recommendation will be binding on OWNER and CONTRACTOR until final payment.

B. OWNER shall have the right to exclude CONTRACTOR from the Site after the date of Substantial Completion, but OWNER shall allow CONTRACTOR reasonable access to complete or correct items on the list of items to be completed.

#### 14.05 *Partial Utilization*

A. Use by OWNER at OWNER's option of any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which OWNER, ENGINEER, and CONTRACTOR agree constitutes a separately functioning and usable part of the Work that can be used by OWNER for its intended purpose without significant interference with CONTRACTOR's



performance of the remainder of the Work, may be accomplished prior to Substantial Completion of all the Work subject to the following conditions.

1. OWNER at any time may request CONTRACTOR in writing to permit OWNER to use any such part of the Work which OWNER believes to be ready for its intended use and substantially complete. If CONTRACTOR agrees that such part of the Work is substantially complete, CONTRACTOR will certify to OWNER and ENGINEER that such part of the Work is substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. CONTRACTOR at any time may notify OWNER and ENGINEER in writing that CONTRACTOR considers any such part of the Work ready for its intended use and substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. Within a reasonable time after either such request, OWNER, CONTRACTOR, and ENGINEER shall make an inspection of that part of the Work to determine its status of completion. If ENGINEER does not consider that part of the Work to be substantially complete, ENGINEER will notify OWNER and CONTRACTOR in writing giving the reasons therefor. If ENGINEER considers that part of the Work to be substantially complete, the provisions of paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

2. No occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of paragraph 5.10 regarding property insurance.

#### 14.06 *Final Inspection*

A. Upon written notice from CONTRACTOR that the entire Work or an agreed portion thereof is complete, ENGINEER will promptly make a final inspection with OWNER and CONTRACTOR and will notify CONTRACTOR in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. CONTRACTOR shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

#### 14.07 *Final Payment*

##### A. *Application for Payment*

1. After CONTRACTOR has, in the opinion of ENGINEER, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, warranties, Bonds, certificates or other evidence of insurance certificates of inspection, marked-up record documents (as provided in paragraph 6.12), and other documents, CONTRACTOR may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by: (i) all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by subparagraph 5.04.B.7; (ii) consent of the surety, if any, to final payment; and (iii) complete and legally effective releases or waivers (satisfactory to OWNER) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in paragraph 14.07.A.2 and as approved by OWNER, CONTRACTOR may furnish receipts or releases in full and an



affidavit of CONTRACTOR that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which OWNER or OWNER's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, CONTRACTOR may furnish a Bond or other collateral satisfactory to OWNER to indemnify OWNER against any Lien.

*B. Review of Application and Acceptance*

1. If, on the basis of ENGINEER's observation of the Work during construction and final inspection, and ENGINEER's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, ENGINEER is satisfied that the Work has been completed and CONTRACTOR's other obligations under the Contract Documents have been fulfilled, ENGINEER will, within ten days after receipt of the final Application for Payment, indicate in writing ENGINEER's recommendation of payment and present the Application for Payment to OWNER for payment. At the same time ENGINEER will also give written notice to OWNER and CONTRACTOR that the Work is acceptable subject to the provisions of paragraph 14.09. Otherwise, ENGINEER will return the Application for Payment to CONTRACTOR, indicating in writing the reasons for refusing to recommend final payment, in which case CONTRACTOR shall make the necessary corrections and resubmit the Application for Payment.

*C. Payment Becomes Due*

1. Thirty-five days after the presentation to OWNER of the Application for Payment and accompanying documentation, the amount recommended by ENGINEER will become due and, when due, will be paid by OWNER to CONTRACTOR.

*14.08 Final Completion Delayed*

A. If, through no fault of CONTRACTOR, final completion of the Work is significantly delayed, and if ENGINEER so confirms, OWNER shall, upon receipt of CONTRACTOR's final Application for Payment and recommendation of ENGINEER, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by OWNER for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required in paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by CONTRACTOR to ENGINEER with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

*14.09 Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by OWNER against CONTRACTOR, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified



therein, or from CONTRACTOR's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by CONTRACTOR against OWNER other than those previously made in writing which are still unsettled.

## **ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION**

---

### **15.01 OWNER May Suspend Work**

A. At any time and without cause, OWNER may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to CONTRACTOR and ENGINEER which will fix the date on which Work will be resumed. CONTRACTOR shall resume the Work on the date so fixed. CONTRACTOR shall be allowed an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if CONTRACTOR makes a Claim therefor as provided in paragraph 10.05.

### **15.02 OWNER May Terminate for Cause**

A. The occurrence of any one or more of the following events will justify termination for cause:

1. CONTRACTOR's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the progress schedule established under paragraph 2.07 as adjusted from time to time pursuant to paragraph 6.04);

2. CONTRACTOR's disregard of Laws or Regulations of any public body having jurisdiction;

3. CONTRACTOR's disregard of the authority of ENGINEER; or

4. CONTRACTOR's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in paragraph 15.02.A occur, OWNER may, after giving CONTRACTOR (and the surety, if any) seven days written notice, terminate the services of CONTRACTOR, exclude CONTRACTOR from the Site, and take possession of the Work and of all CONTRACTOR's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by CONTRACTOR (without liability to CONTRACTOR for trespass or conversion), incorporate in the Work all materials and equipment stored at the Site or for which OWNER has paid CONTRACTOR but which are stored elsewhere, and finish the Work as OWNER may deem expedient. In such case, CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by OWNER arising out of or relating to completing the Work, such excess will be paid to CONTRACTOR. If such claims, costs, losses, and damages exceed such unpaid balance, CONTRACTOR shall pay the difference to OWNER. Such claims, costs, losses, and damages incurred by OWNER will be reviewed by ENGINEER as to their reasonableness and, when so approved by ENGINEER, incorporated in a Change Order. When exercising any rights or remedies under this paragraph OWNER shall not be required to obtain the lowest price for the Work performed.



C. Where CONTRACTOR's services have been so terminated by OWNER, the termination will not affect any rights or remedies of OWNER against CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of moneys due CONTRACTOR by OWNER will not release CONTRACTOR from liability.

#### 15.03 *OWNER May Terminate For Convenience*

A. Upon seven days written notice to CONTRACTOR and ENGINEER, OWNER may, without cause and without prejudice to any other right or remedy of OWNER, elect to terminate the Contract. In such case, CONTRACTOR shall be paid (without duplication of any items):

1. for completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. for expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. for all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. for reasonable expenses directly attributable to termination.

B. CONTRACTOR shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

#### 15.04 *CONTRACTOR May Stop Work or Terminate*

A. If, through no act or fault of CONTRACTOR, the Work is suspended for more than 90 consecutive days by OWNER or under an order of court or other public authority, or ENGINEER fails to act on any Application for Payment within 30 days after it is submitted, or OWNER fails for 30 days to pay CONTRACTOR any sum finally determined to be due, then CONTRACTOR may, upon seven days written notice to OWNER and ENGINEER, and provided OWNER or ENGINEER do not remedy such suspension or failure within that time, terminate the Contract and recover from OWNER payment on the same terms as provided in paragraph 15.03. In lieu of terminating the Contract and without prejudice to any other right or remedy, if ENGINEER has failed to act on an Application for Payment within 30 days after it is submitted, or OWNER has failed for 30 days to pay CONTRACTOR any sum finally determined to be due, CONTRACTOR may, seven days after written notice to OWNER and ENGINEER, stop the Work until payment is made of all such amounts due CONTRACTOR, including interest thereon. The provisions of this paragraph 15.04 are not intended to preclude CONTRACTOR from making a Claim under paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to CONTRACTOR's stopping the Work as permitted by this paragraph.

### **ARTICLE 16 - DISPUTE RESOLUTION**

---

#### 16.01 *Methods and Procedures*



A. Dispute resolution methods and procedures, if any, shall be as set forth in the Supplementary Conditions. If no method and procedure has been set forth, and subject to the provisions of paragraphs 9.09 and 10.05, OWNER and CONTRACTOR may exercise such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any dispute.

## **ARTICLE 17 - MISCELLANEOUS**

---

### *17.01 Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

### *17.02 Computation of Times*

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day

made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

### *17.03 Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents, and the provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

### *17.04 Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Agreement.

### *17.05 Controlling Law*

A. This Contract is to be governed by the law of the State of Indiana.

END OF SECTION



SECTION  
00 73 00

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions which are defined in the Standard General Conditions of the Construction Contract have the meaning assigned to them in the General Conditions.

SUPPLEMENTARY CONDITIONS TO ARTICLE 1. DEFINITIONS AND TERMINOLOGY

SC-1.01A.7. In the first sentence of the paragraph 1.01A.7. of the General Conditions delete "Advertisement or Invitation to Bid" and substitute "Official Notice to Bidders" therefor.

SC-1.01A.51. Add new paragraph 1.01A.51. immediately after paragraph 1.01A.50. of the General Conditions which shall read as follows:

51.	"Additional Insureds", except where otherwise expressly defined, shall mean:
Michigan City Sanitary District	City of Michigan City
1100 E 8th Street	100 E. Michigan Blvd.
Michigan City, IN 46360	Michigan City, IN 46360

Weaver Consultants North Central, LLC  
7121 Grape Road  
Granger, IN 46530

SUPPLEMENTARY CONDITIONS TO ARTICLE 2. PRELIMINARY MATTERS

SC-2.02A. Amend the first sentence of paragraph 2.02A. of the General Conditions by striking out "ten" and inserting "five", and as so amended paragraph remains in effect.

SC-2.07A. Amend the first sentence of paragraph 2.07A. of the General Conditions by deleting "... conference attended by CONTRACTOR, ENGINEER ..." and substituting "... teleconference arranged by CONTRACTOR with the ENGINEER ..." therefore, and as so amended paragraph remains in effect.

SUPPLEMENTARY CONDITIONS TO ARTICLE 4. AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

Delete existing 4.02A and insert the following:

SC-4.02A In the preparation of Drawings and Specifications, ENGINEER or ENGINEER's consultants have relied upon:



- 4.02A1. The following reports of explorations and tests of subsurface conditions at the site of the work:  
a. Site Characterization Report, Karwick Road Nature Park, Prepared by Weaver Consultants, dated March 9, 2015.
- 4.02A.2. The following drawings of physical conditions in or relating to existing surface and subsurface structures which are at or contiguous to the site of the work:  
a. Drawings contained in the Site Characterization Report referenced above.  
b. ALTA/NSPS Land Title Survey & Topographic Survey (3 Sheets), prepared by Weaver Consultants Group, dated 3/30/2018.

Copies of these reports and drawings as specified in 4.02A.1 and 4.02A.2, that are not included with Bidding Documents may be examined at the Michigan City Sanitary District, 1100 E. 8<sup>th</sup> Street, Michigan City, Indiana, 46360 during regular business hours. These reports and drawings are not part of the Contract Documents, but the technical data contained therein upon which CONTRACTOR is entitled to rely as provided in paragraph 4.02B. of the General Conditions and as identified and established above are incorporated therein by reference. CONTRACTOR is not entitled to rely upon other information and data utilized by ENGINEER and Engineer's Consultants in the preparation of Drawings and Specifications.

SC-4.06 (Insert) In the preparation of Drawings and Specifications, ENGINEER or ENGINEER's consultants have relied upon:

Delete existing 4.06A and insert:

- 4.06A. The following reports and drawings relating to hazardous environmental conditions identified at or contiguous to the site of the work:

---

Copies of these reports and drawings that are not included with Bidding Documents may be examined at the Michigan City Waste Water Treatment Plant, 1100 E. 8<sup>th</sup> St., Michigan City, IN 46360 during regular business hours. These reports and drawings are not part of the Contract Documents, but the technical data contained therein upon which CONTRACTOR is entitled to rely as provided in paragraph 4.06B. of the General Conditions and as identified and established above are incorporated therein by reference. CONTRACTOR is not entitled to rely upon other information and data utilized by ENGINEER and Engineer's Consultants in the preparation of Drawings and Specifications.

#### SUPPLEMENTARY CONDITIONS TO ARTICLE 5. BONDS AND INSURANCE

SC-5.04 The limits of liability for the insurance required by paragraph 5.04 of the General Conditions shall provide the following coverages for not less than the following amounts or greater where required by Laws and Regulations, (A copy of the insurance policy and



endorsements must be made available upon request of the Michigan City Sanitary District.):

5.04A.1. and 5.04A.2. **Workers' Compensation and Employers Liability**, etc. under paragraphs 5.04A.1. and 5.04A.2. of the General Conditions:

- |     |  |                         |
|-----|--|-------------------------|
| (1) | State: Indiana   | Statutory               |
| (2) | Applicable Federal<br>(e.g., Longshoreman's or Jones Act): | If Applicable           |
| (3) | Employer's Liability:                                      |                         |
|     | Bodily Injury by Accident                                  | \$500,000 each accident |
|     | Bodily Injury by Disease                                   | \$500,000 policy limit  |
|     | Bodily Injury by Disease                                   | \$500,000 each employee |

Notes:

- a) Waiver of Subrogation in favor of the Michigan City Sanitary District, City of Michigan City, and Sanitary District's Engineer.
- b) 30-day notice of cancellation to Michigan City Sanitary District.
- c) Michigan City Sanitary District, City of Michigan City, and Sanitary District's Engineer shall be Additional Insureds and Engineer's sub-consultants or such other engineer or engineers as may act on behalf of the Sanitary District under the contract, against similar claims.

5.04A.3., 5.04A.4. and 5.04A.5. **Contractor's Commercial General Liability Insurance** under paragraphs 5.04A.3. through 5.04A.5. of the General Conditions which shall also include completed operations and product liability coverages and eliminate the exclusion with respect to property under the care, custody and control of CONTRACTOR:

- |     |   |                |
|-----|---|----------------|
| (1) | General Aggregate<br>(other than Prod/Comp Ops Liability) | \$2,000,000.00 |
| (2) | Products / Completed<br>Operations Aggregate              | \$2,000,000.00 |
| (3) | Personal and Advertising Injury<br>Liability              | \$1,000,000.00 |
| (4) | Bodily Injury and Property Damage<br>(Each Occurrence)    | \$1,000,000.00 |

Notes:

- a) Property Damage liability insurance will provide Explosion, Collapse and Underground coverage where applicable.
- b) Primary and Non-Contributory.



- c) Waiver of Subrogation in favor of the Michigan City Sanitary District, City of Michigan City, and Sanitary District's Engineer.
- d) 30-day notice of cancellation to Michigan City Sanitary District.
- e) Michigan City Sanitary District, City of Michigan City, and Sanitary District's Engineer shall be Additional Insureds, for Ongoing Operations and Products/Completed Operations (CG2010 [10/01](#) CG2037 [10/01](#) or equivalent), and Engineer's sub-consultants or such other engineer or engineers as may act on behalf of the Sanitary District under the contract, against similar claims.

(5) **Automobile Liability**

(1) Combined Single Limit

\$1,000,000.00

Each Accident

Notes:

- a) Waiver of Subrogation in favor of the Michigan City Sanitary District, the City of Michigan City, and Sanitary District's Engineer.
- b) 30-day notice of cancellation to Michigan City Sanitary District.
- c) Michigan City Sanitary District, City of Michigan City, and Sanitary District's Engineer shall be Additional Insureds and Engineer's sub-consultants or such other engineer or engineers as may act on behalf of the Sanitary District under the contract, against similar claims.

(6) **Umbrella Liability**

General Aggregate

\$5,000,000.00

Each Occurrence

\$5,000,000.00

Note:

- a) Umbrella Liability is to be excess over the General Liability, Employer's Liability, and Automobile Liability.
- b) Waiver of Subrogation in favor of the Michigan City Sanitary District, the City of Michigan City, and Sanitary District's Engineer.
- c) 30-day notice of cancellation to Michigan City Sanitary District.
- d) Michigan City Sanitary District, City of Michigan City, and Sanitary District's Engineer shall be Additional Insureds and Engineer's sub-consultants or such other engineer or engineers as may act on behalf of the Sanitary District under the contract, against similar claims.

SC-5.06 Delete paragraph 5.06 of the General Conditions in its entirety and insert the following in its place:

5.06 Property Insurance

- A. CONTRACTOR shall purchase and maintain property insurance upon the Work at the site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in these Supplementary Conditions or required by Laws and Regulations). This insurance shall:



1. include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, Engineer's Consultants and any other persons or entities identified in the Supplementary Conditions, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;
2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss and damage to the Work, temporary buildings, falsework and Work in transit and shall insure against at least the following perils: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils as may be specifically required by the Supplementary Conditions;
3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
4. cover materials and equipment in transit for incorporation in the Work or stored at the site or at another location that was agreed to in writing by OWNER prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by ENGINEER; and
5. allow for partial utilization of the Work by OWNER;
6. include testing and startup; and
7. be maintained in effect until final payment is made unless otherwise agreed to in writing by OWNER, CONTRACTOR and ENGINEER with thirty days written notice to each other additional insured to whom a certificate of insurance has been issued.

The policies of insurance required to be purchased and maintained by CONTRACTOR in accordance with this paragraph 5.06A. shall comply with the requirements of paragraph 5.06C of the General Conditions.

SC-5.06B. Delete Paragraph 5.06.B and replace with the following:

B. CONTRACTOR shall purchase and maintain equipment breakdown insurance or additional property insurance required by Laws and Regulations, which insurance will include the interest of OWNER, CONTRACTOR, Subcontractors, and Engineer, and the



officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.

SC-5.06D. The amount of the deductible provision included in the OWNER's property insurance provided under paragraph 5.06 of the General Conditions is N/A.

#### SUPPLEMENTARY CONDITIONS TO ARTICLE 6. CONTRACTOR'S RESPONSIBILITIES

SC-6.02B. Add the following to paragraph 6.02B. of the General Conditions:

1. Work Hours: Perform work between 7:00 a.m. and 7:00 p.m. Mondays through Fridays only. Emergency work may be performed anytime without the OWNER's written consent required in paragraph 6.02B.
2. Work After Hours: Night work may be established by CONTRACTOR as regular procedure with written consent of OWNER. Such consent, however, may be revoked at any time by OWNER if CONTRACTOR fails to maintain adequate equipment and supervision for proper prosecution and control of night work.

SC-6.06B. Add a new paragraph after paragraph 6.06B. of the General Conditions which shall read as follows:

1. Within 15 days after the effective date of the Agreement, CONTRACTOR shall submit to ENGINEER for review a list in duplicate of the names of proposed manufacturers, materialmen, suppliers and subcontractors and obtain approval of this list by OWNER prior to submission of any shop drawings or product data.

SC-6.10 Add the following language at the end of paragraph 6.10 of the General Conditions:

"Materials and equipment that are purchased for this project that will become the property of the OWNER are exempt from sales tax. CONTRACTORS purchasing materials or equipment for the project shall register with the State of Indiana for the sales tax exemption. To register, a federal tax ID number, a business address and a fee are required".

SC-6.13 Add the following new paragraphs 4., 5., 6. and 7. after paragraph 6.13A.3. of the General Conditions which shall read as follows:

4. No Duty. The duty of the OWNER or ENGINEER to observe CONTRACTOR's performance does not include any review of the adequacy of CONTRACTOR's safety measures in, on, or near the Work site or sites. ENGINEER has not been retained or compensated to provide design and construction review services relating to CONTRACTOR's safety precautions required for CONTRACTOR to perform the Work.



5. No Liability. Neither the OWNER, nor any official or employee of the OWNER, nor the ENGINEER, or any authorized assistant or agent of any of them, shall be responsible for safety precautions and programs in connection with the Work or any liability arising therefrom.
6. Protection of Operations. The CONTRACTOR shall take all necessary precautions so as to cause no unauthorized interruption in any essential part of the Michigan City Sanitary District operations. The Michigan City Sanitary District operations must be maintained at the same level during construction as existed prior to construction.

Shutdowns for construction Work shall be scheduled in advance (minimum 14 days advance notice), carefully planned, and shall be carried out in close cooperation with the Michigan City Sanitary District officials.

The Michigan City Sanitary District officials shall retain the authority to require the cessation of construction activities and return to service of any component of the collection system should the need arise.

7. Special Requirements for Structural Design. All structures to be provided by the CONTRACTOR, (except those structures for which details are shown on the Drawings), that require structural design shall be designed and constructed under the observation of a structural engineer, registered in the State of the Project, acting for and retained by the CONTRACTOR. Drawings and calculations for such structures shall be prepared and sealed by the structural engineer and submitted to the ENGINEER for record. A clear outline of the proposed construction procedure shall be shown on the drawings. A statement in writing by the structural engineer attesting that said engineer has visited the Work site or sites, that the design does satisfy the conditions as actually encountered and that the actual construction conforms to the drawings and calculations, as submitted, must be submitted to the ENGINEER before the Work related to such structures will be considered complete.

All temporary structures, including sheeting and bracing for excavations, that affect the safety of the public, workmen, inspectors, or OWNER's or ENGINEER's personnel shall be regarded as structures that require structural design.

SC-6.17E. Add a new paragraph immediately after paragraph 6.17E.3. of the General Conditions which is to read as follows:

4. "ENGINEER, generally, will process shop drawings and return them to the CONTRACTOR in not more than 10 working days from day of receipt. If the nature of the shop drawing is such that the review cannot be completed in 10 working days, ENGINEER will advise the CONTRACTOR giving a schedule for performing the review."

#### SUPPLEMENTARY CONDITIONS TO ARTICLE 7. OTHER WORK



SC-7.02            Add a new paragraph immediately after paragraph 7.02B. of the General Conditions which shall read as follows:

C. Should CONTRACTOR cause damage to the Work or property of any separate CONTRACTOR at the site, or should any claim arising out of CONTRACTOR's performance of the Work at the site be made by any separate contractor against CONTRACTOR, OWNER, ENGINEER, Engineer's Consultants, or any other person, CONTRACTOR shall promptly attempt to settle with such other contractor by agreement, or to otherwise resolve the dispute by arbitration or at law. CONTRACTOR shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold OWNER, ENGINEER, and Engineer's Consultants harmless from and against all claims, damages, losses and expenses (including, but not limited to, fees of engineers, architects, attorneys and other professionals and court and arbitration costs) arising directly, indirectly or consequentially out of any action, legal or equitable, brought by any separate contractor against OWNER, ENGINEER, or Engineer's Consultants to the extent based on a claim arising out of CONTRACTOR's performance of the Work. Should a separate contractor cause damage to the Work or property of CONTRACTOR or should the performance of Work by any separate contractor at the site give rise to any other claim, CONTRACTOR shall not institute any action, legal or equitable, against OWNER, ENGINEER, or Engineer's Consultants or permit any action against any of them to be maintained and continued in its name or for its benefit in any court or before any arbiter which seeks to impose liability on or to recover damages from OWNER, ENGINEER, or Engineer's Consultants on account of any such damage or claim. If CONTRACTOR is delayed at any time in performing or furnishing Work by any act or neglect of a separate contractor and OWNER and CONTRACTOR are unable to agree as to the extent of any adjustment in Contract Times attributable thereto, CONTRACTOR may make a claim for an extension of times in accordance with Article 12. An extension of the Contract Times shall be CONTRACTOR's exclusive remedy with respect to OWNER, ENGINEER, and Engineer's Consultants for any delay, disruption, interference or hindrance caused by any separate contractor. This paragraph does not prevent recovery from OWNER, ENGINEER, or ENGINEER's consultant for activities that are their respective responsibilities.

#### SUPPLEMENTARY CONDITIONS TO ARTICLE 9. ENGINEER'S STATUS DURING CONSTRUCTION

SC-9.04            Delete the first sentence of paragraph 9.04A of the General Conditions and insert the following in its place:

A. ENGINEER will issue, within five working days of receipt, such written clarifications or interpretations of the requirements of the Contract Documents (in the form of Drawings or otherwise) as ENGINEER may determine necessary, which shall be consistent with the intent of and reasonably inferable from Contract Documents. If ENGINEER determines, based upon the nature of the requested clarification or interpretation, that the response cannot be furnished in five working days, ENGINEER will advise the CONTRACTOR giving a schedule for furnishing the information.



SUPPLEMENTARY CONDITIONS TO ARTICLE 11. COST OF WORK; CASH ALLOWANCES;  
UNIT PRICE WORK

SC-11.03 Paragraph 11.03C of the General Conditions is hereby deleted in its entirety and the following is substituted in its place:

C. The unit price of an item of Unit Price Work shall be subject to re-evaluation and adjustment under the following conditions:

1. If the total cost of a particular item of Unit Price Work amounts to 10 percent or more of the Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by CONTRACTOR differs by more than 10 percent from the estimated quantity of such item indicated in the Agreement; and
2. If there is no corresponding adjustment with respect to any other item of Work; and
3. If CONTRACTOR believes that CONTRACTOR has incurred additional expense as a result thereof; or if OWNER believes that the quantity variation entitles OWNER to an adjustment in the unit price, either OWNER or CONTRACTOR may make a claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed.

SUPPLEMENTARY CONDITIONS TO ARTICLE 14. PAYMENTS TO CONTRACTOR AND  
COMPLETION

SC-14.02 Add a new paragraph immediately after paragraph 14.02A.3. of the General Conditions which is to read as follows:

4. CONTRACTOR shall submit applications for payment on the form included as Section 00 90 00.

SC-14.05 Add a new paragraph immediately after paragraph 14.05A.2. of the General Conditions which is to read as follows:

3. OWNER may at any time request CONTRACTOR in writing to permit OWNER to take over operation of any such part of the Work although it is not substantially complete. A copy of such request will be sent to ENGINEER and within a reasonable time thereafter OWNER, CONTRACTOR and ENGINEER shall make an inspection of that part of the Work to determine its status of completion and will prepare a list of the items remaining to be completed or corrected thereon before final payment. If CONTRACTOR does not object in writing to OWNER and ENGINEER that such part of the Work is not ready for separate operation by OWNER, ENGINEER will finalize the list of items to be completed or corrected and will deliver such lists to OWNER and CONTRACTOR together with a written recommendation as to the division of responsibilities pending final payment between OWNER and CONTRACTOR with respect to security, operation, safety, maintenance, utilities, insurance warranties and guarantees for that part of the Work which will become binding upon OWNER and CONTRACTOR at the time when OWNER takes over such operation (unless they shall



have otherwise agreed in writing and so informed ENGINEER). During such operation and prior to Substantial Completion of such part of the Work, OWNER shall allow CONTRACTOR reasonable access to complete or correct items on said list and to complete other related Work.

SC-14.10 Add a new paragraph immediately after paragraph 14.09 of the General Conditions which is to read as follows:

14.10 Audits, Access to Records

- A. The CONTRACTOR shall comply with the following record and audit requirements.
  - 1. The CONTRACTOR shall maintain, for at least 3 years after receiving final payment, books, records, documents, and other evidence directly pertinent to performance of work under this agreement in accordance with generally accepted business and accounting principles and practices consistently applied in effect on the date of execution of this agreement. The CONTRACTOR shall also maintain the financial information and data used by the CONTRACTOR in the preparation or support of the cost submission required for any negotiated change order and a copy of the cost summary submitted to the OWNER.
  - 2. The OWNER or any of its authorized representatives shall have access to all such books, records, documents, and other evidence for the purpose of inspection, audit and copying during normal business hours. The CONTRACTOR will provide proper facilities for such access and inspection.
  - 3. The CONTRACTOR agrees to make paragraphs (1) through (3) of this clause applicable to all sub-contracts, negotiated change orders, and agreement amendments affecting the agreement price.
  - 4. Audits conducted under this provision shall be in accordance with generally accepted auditing standards.

SUPPLEMENTARY CONDITIONS TO ARTICLE 16 - DISPUTE RESOLUTION

Resolution of disputes shall be by good faith negotiation and, that failing, litigation.

SUPPLEMENTARY CONDITIONS TO ARTICLE 17. MISCELLANEOUS

SC-17.05 Add a new paragraph immediately after paragraph 17.05 of the General Conditions, which is to read as follows:

**Wage Payment & Rates:**



- 17.06 Contractors to comply with Ind. Code 5-16-13 as it pertains to Public Works Construction Projects and selection of wage rates for Public Works Projects. Refer to Specification Section 00 73 43. (Comply with the requirements of IDEM SRF wage rates if applicable)

END OF SECTION



SECTION  
00 73 43

PUBLIC WORKS CONTRACT REQUIREMENTS

1. GENERAL

A. Public works contract requirements provided in Indiana Code 5-16-13 that the CONTRACTOR is to comply with:

1. Some notable requirements in that Chapter for public works contracts include:

- a) Public agencies must state within or incorporate by reference all of the requirements set forth in Ind. Code 5-16-13 into its public works construction contracts.
- b) Public agencies may not enter into a public works contract with a contractor unless the contract contains: (i) a provision requiring the contractor to enroll in and verify the work eligibility status of newly hired employees through E-verify; and (ii) a provision that a contractor is not required to verify the work eligibility status of all newly hired employees of the contractor through E-verify program if E-verify no longer exists.
- c) Public agencies may not enter into a contract with a prime contractor unless the prime contractor signs an affidavit that it doesn't knowingly employ an unauthorized alien.
- d) If the public agency "reasonably suspects" that a prime contractor or a subcontractor, whatever tier, has violated the new public works requirements of Ind. Code 5-16-13, the public agency "shall" take certain statutory prescribed actions depending on the type of violation.
- e) Pursuant to IC 5-16-13-10(c), the prime contractor or a subcontractor of whatever tier whose contract or subcontract is for \$300,000 or more, prior to performing any construction work, must be qualified by either the Indiana Department of Administration, pursuant to IC 4-13.6-4-1, *et seq.*, or INDOT, pursuant to IC 8-23-10-0.5, *et seq.*
- f) For public works projects by local governmental entities under Ind. Code 36-1-12 estimated to cost \$150,000 or more, the prime contractor, and any of its subcontractors whose sub-contract is \$150,000 or more, must submit documentation with the bid demonstrating compliance with the requirements for an approved drug testing program for their employees as provided for by Ind. Code 4-13-18. Sections IC-4-13-18-5, 6, 7 are included below as reference:

**IC 4-13-18-5 Employee drug testing plan required in bid; collective bargaining agreements.**

Sec. 5 (a) A solicitation for a public works contract must require each contractor that submits a bid for the work to submit with the bid a written plan for a program to test the contractor's employees for drugs.



(b) A public works contract may not be awarded to a contractor whose bid does not include a written plan for an employee drug testing program that complies with this chapter.

(c) A Contractor that is subject to a collective bargaining agreement shall be treated as having an employee drug testing program that complies with this chapter if the collective bargaining agreement establishes an employee drug testing program that includes the following:

- 1) The program provides for the random testing of the contractor's employees.
- 2) The program contains a five (5) drug panel that tests for the substances identified in section 6(a)(3) of this chapter.
- 3) The program imposes disciplinary measures on an employee who fails a drug test. The disciplinary measures must include at a minimum, all the following:
  - a) The employee is subject to suspension or immediate termination.
  - b) The employee is not eligible for reinstatement until the employee tests negative on a five (5) drug panel test certified by a medical review officer.
  - c) The employee is subject to unscheduled sporadic testing for at least one (1) year after reinstatement.
  - d) The employee successfully completes a rehabilitation program recommended by a substance abuse professional if the employee fails more than one (1) drug test.

A copy of the relevant part of the collective bargaining agreement constitutes a written plan under this section.

*As added by P.L.160-2006, SEC.2.*

**IC 4-13-18-6 Employee drug testing program requirements.**

Sec. 6. (a) A contractor's employee drug testing program must satisfy all of the following:

- 1) Each of the contractor's employees must be subject to a drug test at least one (1) time each year.
- 2) Subject to subdivision (1), the contractor's employees must be tested randomly. At least two percent (2%) of the contractor's employees must be randomly selected each month for testing.
- 3) The program must contain at least a five (5) drug panel that tests for the following:
  - a) Amphetamines.
  - b) Cocaine.
  - c) Opiates (2000 ng/ml).
  - d) PCP.
  - e) THC.
- 4) The program must impose progressive discipline on an employee who fails a drug test. The discipline must have at least the following progression:
  - a) After the first positive test, an employee must be:
    - i. suspended from work for thirty (30) days;
    - ii. directed to a program of treatment or rehabilitation; and
    - iii. subject to unannounced drug testing for one (1) year, beginning the day the employee returns to work.
  - b) After a second positive test, an employee must be:
    - i. Suspended from work for ninety (90) days;
    - ii. directed to a program of treatment or rehabilitation; and



- iii. subject to unannounced drug testing for one (1) year, beginning the day the employee returns to work.
- c) After a third or subsequent positive test, an employee must be:
  - i. suspended from work for one (1) year;
  - ii. directed to a program of treatment or rehabilitation; and
  - iii. subject to unannounced drug testing for one (1) year, beginning the day the employee returns to work.

The program may require dismissal of the employee after any positive drug test or other discipline more severe than is described in this subdivision.

(b) An employer complies with the requirement of subsection (a) to direct an employee to a program of treatment or rehabilitation if the employer does either of the following:

- 1) Advises the employee of any program of treatment or rehabilitation covered by insurance provided by the employer.
- 2) If the employer does not provide insurance that covers drug treatment or rehabilitation programs, the employer advises the employee of agencies known to the employer that provide drug treatment or rehabilitation programs.

*As added by P.L.160-2006, SEC.2.*

**IC 4-13-18-7 Contract cancellation for noncompliance.**

**Sec. 7. (a) The public works contract must provide for the following:**

- 1) That the contractor implement the employee drug testing program described in the contractor's plan.
- 2) Cancellation of the contract by the agency awarding the contract if the contractor:
  - a) fails to implement its employee drug testing program during the term of the contract;
  - b) fails to provide information regarding implementation of the contractor's employee drug testing program at the request of the agency; or
  - c) provides to the agency false information regarding the contractor's employee drug testing program.
- (b) The provisions of the public works contract relating to cancellation of the contract by the agency awarding the contract apply to cancellation of the public works contract under this section.

*As added by P.L.160-2006, SEC.2*

- g) The prime contractor and all subcontractors, whatever tier, must preserve its payroll and related records for three years after completion of the project work and such records must be open to inspection by the Indiana Department of Workforce Development.
- h) If the prime contractor or any subcontractor, whatever tier, employs 10 or more employees then such prime contractor/subcontractor must provide access to a training program applicable to the tasks to be performed in the normal course of the employee's employment.



- i) If the prime contractor or a first tier subcontractor employs more than 50 journeymen, such prime contractor / first tier subcontractor shall participate in an apprenticeship or training program that meets the standards established by or has been approved by any of the following: U.S. Dept. of Labor, Bureau of Apprenticeship and Training, the Indiana Department of Labor, the Federal Highway Administration or INDOT.
- j) All contractors of whatever tier must maintain general liability insurance of at least \$1,000,000 per occurrence and \$2,000,000 aggregate with the Sanitary District, the City of Michigan City, and the project engineer named as additional insureds.
- k) All contractors of whatever tier must provide documentation that they are in compliance with Indiana worker compensation law and must comply with all federal and Indiana minimum wage, overtime, and wage payment laws and Indiana unemployment compensation law requirements.

**3. CONTRACTOR is responsible to read and comply with all provisions of IC 5-16-13 which are incorporated herein by reference.**

END OF SECTION



SECTION  
00 90 00

APPLICATION FOR PAYMENT

Application for Payment No. \_\_\_\_\_

To: \_\_\_\_\_ (OWNER)

From: \_\_\_\_\_ (CONTRACTOR)

Contract: \_\_\_\_\_

Project: \_\_\_\_\_

**OWNER's Contract No.** \_\_\_\_\_

**ENGINEER's Project No.** \_\_\_\_\_

For Work accomplished through the date of: \_\_\_\_\_

1. Original Contract Price: \$ \_\_\_\_\_
2. Net change by Change Orders and Written Amendments (+ or -): \$ \_\_\_\_\_  
(List each Change Order by number and amount)
  - a. \_\_\_\_\_ \$ \_\_\_\_\_
  - b. \_\_\_\_\_ \$ \_\_\_\_\_
  - c. \_\_\_\_\_ \$ \_\_\_\_\_
  - d. \_\_\_\_\_ \$ \_\_\_\_\_
3. Current Contract Price (1 plus 2): \$ \_\_\_\_\_
4. Total completed and stored to date: \$ \_\_\_\_\_
5. Retainage (per Agreement):  
    \_\_\_\_\_ % of completed Work: \$ \_\_\_\_\_  
    \_\_\_\_\_ % of stored material: \$ \_\_\_\_\_  
    Total Retainage: \$ \_\_\_\_\_
6. Total completed and stored to date less retainage (4 minus 5): \$ \_\_\_\_\_
7. Less total of previously approved applications for payment: \$ \_\_\_\_\_
8. **CURRENT PAYMENT DUE CONTRACTOR**  
**THIS APPLICATION (6 minus 7):** \$ \_\_\_\_\_
9. Balance of Contract Price to finish (3 minus 4): \$ \_\_\_\_\_
10. Balance of Contract Price payable to CONTRACTOR to finish,  
    including retainage (3 minus 6): \$ \_\_\_\_\_

Accompanying Documentation:



CONTRACTOR'S Certification:

The undersigned CONTRACTOR certifies that (1) all previous progress payments received from OWNER on account of Work done under the Contract referred to above have been applied on account to discharge CONTRACTOR's legitimate obligations incurred in connection with Work covered by prior Applications for Payment numbered 1 through \_\_\_\_ inclusive; (2) title of all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to OWNER at time of payment free and clear of all Liens, security interests and encumbrances (except such as are covered by a Bond acceptable to OWNER indemnifying OWNER against any such Lien, security interest or encumbrance); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and not defective.

Dated \_\_\_\_\_  
CONTRACTOR

By: \_\_\_\_\_

State of \_\_\_\_\_  
County of \_\_\_\_\_  
Subscribed and sworn to before me this \_\_\_\_\_  
day of \_\_\_\_\_, \_\_\_\_\_

\_\_\_\_\_  
Notary Public  
My Commission expires: \_\_\_\_\_

Payment of the above AMOUNT DUE THIS APPLICATION is recommended.

Dated \_\_\_\_\_  
ENGINEER

By: \_\_\_\_\_

Based on the foregoing representations of the CONTRACTOR and ENGINEER, and input from staff, I recommend that the Board approve this Application For Payment.

\_\_\_\_\_  
Michael P. Kuss, General Manager                      DATE



OWNER  
MICHIGAN CITY SANITARY DISTRICT  
BOARD OF COMMISSIONERS

ATTEST: \_\_\_\_\_  
Holt Edinger, Secretary Date



## APPLICATION FOR PAYMENT

### INSTRUCTIONS

---

#### A. GENERAL INFORMATION

The sample form of Schedule of Values is intended as a guide only. Many projects require a more extensive form with space for numerous items, descriptions of Change Orders, identification of variable quantity adjustments, summary of materials and equipment stored at the site and other information. It is expected that a separate form will be developed by Engineer and Contractor at the time Contractor's Schedule of Values is finalized. Note also that the format for retainage must be changed if the Contract permits (or the law provides), and Contractor elects to deposit securities in lieu of retainage. Refer to Article 14 of the General Conditions for provisions concerning payments to Contractor.

#### B. COMPLETING THE FORM

The Schedule of Values, submitted and approved as provided in paragraphs 2.05.B.3 and 2.07 of the General Conditions, should be reproduced as appropriate in the space indicated on the Application for Payment form. Note that the cost of materials and equipment is often listed separately from the cost of installation. Also, note that each Unit Price is deemed to include Contractor's overhead and profit.

All Change Orders affecting the Contract Price should be identified and included in the Schedule of Values as required for progress payments.

The form is suitable for use in the Final Application for Payment as well as for Progress Payments; however, the required accompanying documentation is usually more extensive for final payment. All accompanying documentation should be identified in the space provided on the form.

#### C. LEGAL REVIEW

All accompanying documentation of a legal nature, such as Lien waivers, should be reviewed by an attorney, and Engineer should so advise Owner.



## SCHEDULE OF VALUES

Application No. \_\_\_\_\_ Date: \_\_\_\_\_

A	B	C	D	E	F	G	H	I	J	K	L	M
ITEM	UNIT PRICE	ESTIMATED QUANTITY	SCHEDULE OF VALUES AMOUNT (B x C)  CONTRACT PRICE	WORK PREVIOUSLY COMPLETED  (E + F)	WORK COMPLETED THIS PERIOD	MATERIALS AND EQUIPMENT CURRENTLY STORED  (NOT IN E OR F)	TOTAL COMPLETED AND STORED TO DATE (E + F + G)	PERCENT COMPLETED (%)  (H / D)	BALANCE TO FINISH  (D - H)	BALANCE TO FINISH, PAYABLE TO CONTRACTOR  (D - H + M)	RETAINAGE THIS PERIOD	RETAINAGE TO DATE
1.	\$		\$	\$	\$	\$	\$		\$	\$	\$	\$
2.												
3.												
4.												
5.												
6.												
7.												
8.												
9.												
10.												
11.												
12.												
13.												
14.												
15.												
16.												
17.												
18.												
19.												
20.												
<b>TOTAL</b>	\$		\$	\$	\$	\$	\$		\$	\$	\$	\$

Note: Total Schedule of Values Amount should equal the current Contract Price.



SECTION  
00 90 10

RETAINAGE RELEASE REQUEST

Application for Payment No. \_\_\_\_\_

To: \_\_\_\_\_ (OWNER)

From: \_\_\_\_\_ (CONTRACTOR)

Contract: \_\_\_\_\_

Project: \_\_\_\_\_

**OWNER's Contract No.** \_\_\_\_\_

**ENGINEER's Project No.** \_\_\_\_\_

For Work accomplished through the date of: \_\_\_\_\_

- |     |   |          |
|-----|---|----------|
| 1.  | Original Contract Price:  | \$ _____ |
| 2.  | Net change by Change Orders and Written Amendments (+ or -):<br>(List each Change Order by number and amount) | \$ _____ |
| 3.  | Current Contract Price (1 plus 2):  | \$ _____ |
| 4.  | Total completed and stored to date:   | \$ _____ |
| 5.  | Retainage (per Agreement):  |          |
|     | _____ % of completed Work:  | \$ _____ |
|     | _____ % of stored material:   | \$ _____ |
|     | Total Retainage:  | \$ _____ |
| 6.  | Total completed and stored to date less retainage (4 minus 5):  | \$ _____ |
| 7.  | Previous Payments to CONTRACTOR (excluding retainage):  | \$ _____ |
| 8.  | Retainage previously released:  | \$ _____ |
| 9.  | RETAINAGE DUE TO CONTRACTOR (5 minus 8):  | \$ _____ |
| 10. | Remainder of Contract Price Unpaid:<br>(3 minus 7, 8, and 9)  | \$ _____ |

Accompanying Documentation:



CONTRACTOR'S Certification:

The undersigned CONTRACTOR certifies that (1) all previous progress payments received from OWNER on account of Work done under the Contract referred to above have been applied on account to discharge CONTRACTOR's legitimate obligations incurred in connection with Work covered by prior Applications for Payment numbered 1 through \_\_\_\_\_ inclusive; (2) title of all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Retainage Release Request will pass to OWNER at time of payment free and clear of all Liens, security interests and encumbrances (except such as are covered by a Bond acceptable to OWNER indemnifying OWNER against any such Lien, security interest or encumbrance); and (3) all Work covered by this Retainage Release Request is in accordance with the Contract Documents and not defective.

Dated \_\_\_\_\_  
CONTRACTOR

By: \_\_\_\_\_

State of \_\_\_\_\_  
County of \_\_\_\_\_  
Subscribed and sworn to before me this \_\_\_\_\_  
day of \_\_\_\_\_, \_\_\_\_\_

\_\_\_\_\_  
Notary Public  
My Commission expires: \_\_\_\_\_

Payment of the above AMOUNT DUE THIS APPLICATION is recommended.

Dated \_\_\_\_\_  
ENGINEER

By: \_\_\_\_\_

Based on the foregoing representations of the CONTRACTOR and ENGINEER, and input from staff, I recommend that the Board approve the Release of Retainage.

\_\_\_\_\_  
Michael P. Kuss, General Manager      DATE



Based on the foregoing representations of the CONTRACTOR and ENGINEER and recommendation of the General Manager, the Owner approves this Release of Retainage.

OWNER  
MICHIGAN CITY SANITARY DISTRICT  
BOARD OF COMMISSIONERS

By: \_\_\_\_\_  
Garry Mitchell, President Date

ATTEST: \_\_\_\_\_  
Holt Edinger, Secretary Date



SECTION  
00 91 10

WORK CHANGE DIRECTIVE

NUMBER: \_\_\_\_\_  
CONTRACT: \_\_\_\_\_  
PROJECT: \_\_\_\_\_  
DATE OF ISSUANCE: \_\_\_\_\_ EFFECTIVE DATE: \_\_\_\_\_  
\_\_\_\_\_

OWNER: Michigan City Sanitary District \_\_\_\_\_  
OWNER'S Contract No. \_\_\_\_\_  
CONTRACTOR: \_\_\_\_\_ ENGINEER: \_\_\_\_\_  
\_\_\_\_\_

You are directed to proceed promptly with the following change(s):

Description:

Purpose of Work Change Directive:

Attachments: (List documents supporting change)

\_\_\_\_\_

If OWNER or CONTRACTOR believe that the above change has affected Contract Price any Claim for a Change Order based thereon will involve one or more of the following methods as defined in the Contract Documents.

Method of determining change in  
Contract Price:

~ Unit Prices  
~ Lump Sum  
~ Cost of the Work \_\_\_\_\_

Estimated increase (decrease) in Contract Price:	Estimated increase (decrease) in Contract Times:
\$ _____ If the change involves an increase, the estimated amount is not to be exceeded without further authorization.	Substantial Completion: _____ days; Ready for final payment: _____ days.



RECOMMENDED:

By: \_\_\_\_\_  
Engineer

Date: \_\_\_\_\_

APPROVED: MICHIGAN CITY  
SANITARY DISTRICT

By: \_\_\_\_\_  
Michael P. Kuss, General Manager

Date: \_\_\_\_\_



## WORK CHANGE DIRECTIVE

### INSTRUCTIONS

---

#### A. GENERAL INFORMATION

This document was developed for use in situations involving changes in the Work which, if not processed expeditiously, might delay the Project. These changes are often initiated in the field and may affect the Contract Price or the Contract Times. This is not a Change Order, but only a directive to proceed with Work that may be included in a subsequent Change Order.

For supplemental instructions and minor changes not involving a change in the Contract Price or the Contract Times a Field Order should be used.

#### B. COMPLETING THE WORK CHANGE DIRECTIVE FORM

Engineer initiates the form, including a description of the items involved and attachments.

Based on conversations between Engineer and Contractor, Engineer completes the following:

METHOD OF DETERMINING CHANGE, IF ANY, IN CONTRACT PRICE: Mark the method to be used in determining the final cost of Work involved and the estimated net effect on the Contract Price. If the change involves an increase in the Contract Price and the estimated amount is approached before the additional or changed Work is completed, another Work Change Directive must be issued to change the estimated price or Contractor may stop the changed Work when the estimated time is reached. If the Work Change Directive is not likely to change the Contract Price, the space for estimated increase (decrease) should be marked "Not Applicable".

Once Engineer has completed and signed the form, all copies should be sent to OWNER for authorization because Engineer alone does not have authority to authorize changes in Price or Times. Once authorized by Owner, a copy should be sent by Engineer to Contractor. Price and Times may only be changed by Change Order signed by Owner and Contractor with Engineer's recommendation.

Paragraph 10.03.A.2 of the General Conditions requires that a Change Order be initiated and processed to cover any undisputed sum or amount of time for Work actually performed pursuant to this Work Change Directive.

Once the Work covered by this directive is completed or final cost and times are determined, Contractor should submit documentation for inclusion in a Change Order.

THIS IS A DIRECTIVE TO PROCEED WITH A CHANGE THAT MAY AFFECT THE CONTRACT PRICE OR CONTRACT TIMES. A CHANGE ORDER, IF ANY, SHOULD BE CONSIDERED PROMPTLY.



SECTION  
00 92 10

CHANGE ORDER

NUMBER: \_\_\_\_\_  
PROJECT: \_\_\_\_\_  
DATE OF ISSUANCE: \_\_\_\_\_ EFFECTIVE DATE: \_\_\_\_\_  
\_\_\_\_\_

OWNER: \_\_\_\_\_  
OWNER'S Contract No. \_\_\_\_\_  
CONTRACTOR: \_\_\_\_\_ ENGINEER: \_\_\_\_\_  
\_\_\_\_\_

The following changes in the Contract Documents are agreed to by Contractor and recommended by Engineer:

Description:

Reason for Change Order:

Attachments: (List documents supporting change)

<b>CHANGE IN CONTRACT PRICE:</b> Original Contract Price  \$ _____	<b>CHANGE IN CONTRACT TIMES:</b> Original Contract Times  Substantial Completion: _____ Ready for final payment: _____ days or dates
Net changes from previous Change Orders No. ____ to No. ____  \$ _____	Net changes from previous Change Orders No. ____ to No. ____  _____ (days)
Contract Price prior to this Change Order  \$ _____	Contract Times prior to this Change Order  Substantial Completion: _____ Ready for final payment: _____ days or dates
Net Increase (Decrease) of this Change Order  \$ _____	Net Increase (Decrease) of this Change Order  _____ (days)
Contract Price with all approved Change Orders  \$ _____	Contract Times with all approved Change Orders  Substantial Completion: _____ Ready for final payment: _____ days or dates

Contractor  
KARWICK NATURE PARK  
CORRECTIVE ACTION  
1873-356-10-01

Date  
00 92 10-1

Engineer  
Date  
CHANGE ORDER



Based on the foregoing representations of the Contractor and Engineer, and input from staff, I recommend that the Board approve this Change Order No. \_\_\_\_.

\_\_\_\_\_  
Michael P. Kuss, General Manager

\_\_\_\_\_  
DATE

Based on the foregoing representations of the Contractor and Engineer and recommendation of the General Manager, the OWNER Approves Change Order No. \_\_\_\_ as described above.

OWNER

MICHIGAN CITY SANITARY DISTRICT  
BOARD OF COMMISSIONERS

By: \_\_\_\_\_  
Garry Mitchell, President

\_\_\_\_\_  
Date



SECTION  
00 93 10

CERTIFICATE OF PARTIAL UTILIZATION

PROJECT: \_\_\_\_\_ ENGINEER: Weaver Consultants Group  
(name, address) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
TO: (OWNER) \_\_\_\_\_ CONTRACTOR: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
CONTRACT FOR: \_\_\_\_\_  
CONTRACT DATE: \_\_\_\_\_  
DATE OF ISSUANCE: \_\_\_\_\_

Designated Portion of Project Work for Partial Utilization:

- 
- 
- 

The above-designated portion of the Project Work performed under this Contract has been reviewed and found to be ready for operation by all parties whose signatures are listed below. The date of partial utilization of the Work designated above is hereby established as: \_ \_\_\_\_\_

DEFINITION OF DATE OF PARTIAL UTILIZATION

The Date of Partial Utilization for the above-designated Work is 1) the Established Date hereby certified by the CONTRACTOR that the above-designated Work is substantially completed and can be made operational, 2) the Established Date hereby certified by the Engineer when construction of the designated portion of the Work described above is complete to the extent that the system is sufficiently operational in accordance with the Contract Documents, so the OWNER can occupy or utilize the above designated Work for the use for which it is intended as expressed in the Contract Documents, 3) the Established Date when the OWNER and/or the Plant Operator has received all O&M Manuals, Equipment Training, Certified Start-up, and Spare Parts for the designated Work, and 4) the Established Date when operational control, including maintenance, of the designated Work will be transferred to the OWNER and/or the Plant Operator.

Acceptance and/or certification of this Certificate of Partial Utilization does not absolve the parties from their overall responsibility to ensure that the entire project and all work contained within the Contract Documents functions as designed, without design and/or construction flaws or defects, throughout the first anniversary of the certified date of substantial completion of the entire project. Warranties on all equipment, including the above-designated portion of the project Work, will commence upon certification of substantial completion of the entire project by the Engineer and acceptance by the OWNER.

Contractor	Date	Engineer	Date
KARWICK NATURE PARK CORRECTIVE ACTION 1873-356-10-01	00 93 10-1	CERTIFICATE OF PARTIAL UTILIZATION	



Based on the foregoing representations of the Contractor and Engineer, and input from staff, I recommend that the Board approve this "Certificate of Partial Utilization".

\_\_\_\_\_  
Michael P. Kuss, General Manager      DATE

Based on the foregoing representations of the Contractor and Engineer and recommendation of the General Manager, the OWNER approves this "Certificate of Partial Utilization" for Work as designated above and will assume full possession thereof at \_\_\_\_\_ (time) on \_\_\_\_\_ (date).

OWNER  
MICHIGAN CITY SANITARY DISTRICT  
BOARD OF COMMISSIONERS

By: \_\_\_\_\_  
Garry Mitchell, President      Date

ATTEST: \_\_\_\_\_  
Holt Edinger, Secretary      Date

Distribution to:  
OWNER \_\_\_\_\_  
ENGINEER \_\_\_\_\_  
CONTRACTOR \_\_\_\_\_  
FIELD \_\_\_\_\_  
OTHER \_\_\_\_\_

KARWICK NATURE PARK  
CORRECTIVE ACTION  
1873-356-10-01

00 93 10-2

CERTIFICATE OF PARTIAL  
UTILIZATION



SECTION  
00 94 10

CERTIFICATE OF SUBSTANTIAL COMPLETION

PROJECT: \_\_\_\_\_ ENGINEER: Weaver Consultants Group  
(name, address) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
CONTRACTOR'S PROJECT NO.: \_\_\_\_\_

TO: (OWNER) \_\_\_\_\_ CONTRACTOR: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
CONTRACT FOR: \_\_\_\_\_

DATE OF ISSUANCE: \_\_\_\_\_ CONTRACT DATE: \_\_\_\_\_

The Work performed under this Contract has been reviewed and found to be substantially complete. The Date of Substantial Completion of the Project and commencement of applicable warranties required by the Contract Documents and pursuant to Section 14.04 of the General Conditions is hereby established as:

DEFINITION OF DATE OF SUBSTANTIAL COMPLETION

The Date of Substantial Completion of the Work is the Date certified by the Engineer when construction is sufficiently complete, in accordance with the Contract Documents, so the OWNER can occupy or utilize the Work for the use for which it is intended, as expressed in the Contract Documents.

A "punch list" of items to be completed or corrected, prepared by the Engineer and verified by the Contractor is attached hereto. The failure to include any items on such "punch list" does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. The date of commencement of warranties for items on the attached "punch list" will be the date of final payment unless otherwise agreed to in writing. All "punch list" items will be completed within the time period provided for in Section 4.02 of the Agreement.

The Contractor will complete or correct the Work on the "punch list" attached hereto within \_\_\_\_\_ days from the designated Date of Substantial Completion.

\_\_\_\_\_  
CONTRACTOR BY: \_\_\_\_\_ DATE \_\_\_\_\_

\_\_\_\_\_  
ENGINEER BY: \_\_\_\_\_ DATE \_\_\_\_\_

KARWICK NATURE PARK  
CORRECTIVE ACTION  
1873-356-10-01

00 94 10-1

CERTIFICATE OF SUBSTANTIAL  
COMPLETION



Based on the foregoing representations of the Contractor and Engineer, and input from staff, I recommend that the Board accept the Work designated as "substantially complete".

\_\_\_\_\_  
Michael P. Kuss, General Manager      DATE

Based on the foregoing representations of the Contractor and Engineer and recommendation of the General Manager, the OWNER accepts the Work designated as "substantially complete" and will assume full possession thereof at \_\_\_\_\_ (time) on \_\_\_\_\_ (date).

OWNER  
MICHIGAN CITY SANITARY DISTRICT  
BOARD OF COMMISSIONERS

By: \_\_\_\_\_  
Garry Mitchell, President      Date

ATTEST: \_\_\_\_\_  
Holt Edinger, Secretary      Date

Distribution to:  
OWNER \_\_\_\_\_  
ENGINEER \_\_\_\_\_  
CONTRACTOR \_\_\_\_\_  
FIELD \_\_\_\_\_  
OTHER \_\_\_\_\_

KARWICK NATURE PARK  
CORRECTIVE ACTION  
1873-356-10-01

00 94 10-2

CERTIFICATE OF SUBSTANTIAL  
COMPLETION



SECTION  
00 95 10

CERTIFICATE OF FINAL COMPLETION, APPROVAL AND ACCEPTANCE OF WORK

PROJECT: \_\_\_\_\_ ENGINEER: Weaver Consultants Group  
(name, address) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
CONTRACTOR'S PROJECT NO.: \_\_\_\_\_

TO: (OWNER) Michigan City Sanitary District  
Board of Commissioners

CONTRACTOR: \_\_\_\_\_  
CONTRACT FOR: \_\_\_\_\_  
CONTRACT DATE: \_\_\_\_\_

DATE OF ISSUANCE: \_\_\_\_\_

\_\_\_\_\_  
The Work performed under this Contract has been reviewed and found to be complete. The Date of Final Completion of the Project and commencement of applicable warranties required by the Contract Documents and pursuant to Section 14.07 of the General Conditions is hereby established as:  
\_\_\_\_\_.

DEFINITION OF DATE OF FINAL COMPLETION, APPROVAL AND ACCEPTANCE

The Date of Final Completion, Approval and Acceptance of the Work is the Date when the structures, equipment and facilities supplied, installed, modified or constructed under the Contract together with all appurtenances are tested and ready to be placed in continuous satisfactory operation by the District in the manner intended.

All of the work under this Agreement has been reviewed and found to be complete in accordance with the Contract Documents. The CONTRACTOR certifies that the project has been completed in accordance with the Contract Documents. Signing of this Certificate by the OWNER in no way alters the responsibility of the CONTRACTOR to have completed all Work in accordance with the Contract Documents or the Engineer's contractual responsibilities to OWNER.

\_\_\_\_\_  
CONTRACTOR BY: \_\_\_\_\_ DATE \_\_\_\_\_

\_\_\_\_\_  
ENGINEER BY: \_\_\_\_\_ DATE \_\_\_\_\_

KARWICK NATURE PARK  
CORRECTIVE ACTION  
1873-356-10-01

00 95 10-1

CERTIFICATE OF FINAL  
COMPLETION, APPROVAL AND  
ACCEPTANCE OF WORK



Based on the foregoing representations of the Contractor and Engineer, and input from staff, I recommend that the Board accept the Work as complete.

\_\_\_\_\_  
Michael P. Kuss, General Manager      DATE

Based on the foregoing representations of the Contractor and Engineer and recommendation of the General Manager, the OWNER accepts the Work as of \_\_\_\_\_, 2018.

OWNER  
MICHIGAN CITY SANITARY DISTRICT  
BOARD OF COMMISSIONERS

By: \_\_\_\_\_  
Garry Mitchell, President      Date

ATTEST: \_\_\_\_\_  
Holt Edinger, Secretary      Date

Distribution to:  
OWNER \_\_\_\_\_  
ENGINEER \_\_\_\_\_  
CONTRACTOR \_\_\_\_\_  
FIELD \_\_\_\_\_  
OTHER \_\_\_\_\_

KARWICK NATURE PARK  
CORRECTIVE ACTION  
1873-356-10-01

00 95 10-2

CERTIFICATE OF FINAL  
COMPLETION, APPROVAL AND  
ACCEPTANCE OF WORK



SECTION  
01 10 00

SUMMARY OF WORK

**PART 1        GENERAL**

**1.1        SECTION INCLUDES**

- A.    Project Identification
- B.    Work to be Done by Contractor
- C.    Work by Owner
- D.    Contractor Use of Site and Premises
- E.    Site Visits
- F.    Equipment and Materials
- G.    Obstacles, Interference, and Coordination
- H.    Examination of Premises, Drawings, Etc.
- I.    Temporary First Aid Facilities
- J.    Construction Schedule
- K.    Cleanup
- L.    Supervision
- M.    Future Work
- N.    Work Sequence
- O.    Site Access

**1.2        PROJECT IDENTIFICATION**

The Karwick Road Nature Park (Site) is located in Michigan City, Indiana in a predominantly rural/residential area on the west side of Karwick Road, between the Chicago South Shore and South Bend (CSS & SB) Railroad as the north boundary, and the Pere Marquette Railway as the south boundary. Trail Creek, a salmonid stream and tributary to Lake Michigan, borders the Site on the west. Historical records and observations indicate that dumping at the Site primarily consisted of solid waste. The Site was not operated by Michigan City or its subdivisions as a permitted landfill. Dumping occurred at this location in the 1950's, 1960's and 1970's. The landfill portion of the site is approximately 5.5 acres. In the late 1990s and early 2000s, the City of Michigan City began transforming the Site into a nature park.

Approximately 6.9 acres of land will be remediated under this project. These areas are collectively designated as the "Remediation Site". This project includes stabilization along 1,625 linear feet of the east bank of Trail Creek adjacent to a historical dumpsite. Stabilization will include installation of a



leachate collection trench to intercept discharges into the creek (redirected to the municipal sewer); relocation of refuse and existing soil cover away from the creek; and the placement of clean sandy borrow to improve the soil cover over the refuse to a minimum of 2 ft. A portion of the work will be below the ordinary high water mark of Trail Creek. Work along the bank of Trail Creek will include placement of compacted bank clay and topsoil to replace the refuse removed from the bank and to support habitat restoration. Erosion control measures will be installed along the creek bank to prevent long term erosion and to protect upland parts of the dumpsite from the rise and fall of creek waters. Control measures will include permanent vegetation matting and bioengineered natural technology combined with hard armoring of select areas where needed.

Work in the upland park area will excavation of existing refuse and soil cover in localized areas to prevent ponding of surface water, placement of excavated material from the bank and upland park near the east boundary of the Site, and placement of up to 2 feet of clean soil fill and top soil in localized areas of less than 2 feet of existing soil cover. Work in the Karwick Road right-of-way will include installation of a leachate forcemain to transmit intercepted discharges from the Site to a municipal sewer manhole south of the Pere Marquette Railway.

### **1.3 WORK TO BE DONE BY CONTRACTOR**

The CONTRACTOR's construction activities for implementing the selected remediation technologies are listed below. Qualified contractors inclined to propose suitable alternative technologies are encouraged to do so and provide sufficient information to judge the expected cost and effectiveness.

- A. A project-specific Health and Safety Plan (HASP) will be prepared to support the safe implementation of construction.
- B. Necessary permits will be obtained by CONTRACTOR. ENGINEER will provide and prepare a Notice of Intent (NOI) required to inform the IDEM and local authority that construction will be performed in a manner consistent with the requirements established under 327 IAC Rule 5 "Storm Water Run-Off Associated with Construction Activity".
- C. Pre-construction submittals will be prepared and submitted. These will include the following, among others:
  - 1. HASP
  - 2. Rule 5 NOI
  - 3. Construction Storm Water Pollution Prevention Plan (Construction SWPPP)
  - 4. Borrow Area Investigation for Suitable Soil, if other than the pre-approved source
- D. Mobilization.
- E. Underground utility locating and protection.
- F. Field location of all required work.



- G. Clearing, loading, chipping and transportation of approximately 7.5 acres of trees and brush to the OWNER's Hitchcock Road facility located at 1021 North 1100 West, Michigan City, Indiana 46360. A portion of the chipped trees/brush may be used as backfill in the ShoreSox bank stabilization.
- H. Installation of 1,275 linear feet of temporary 8' high chain link construction fence with sight line screening.
- I. Extension or sealing and abandonment of existing groundwater monitoring wells (By Others).
- J. Excavation, loading, and transportation of approximately 18,910 CY of refuse and contaminated surface soil and debris for disposal on site. Remedial excavation will extend to variable depths along the bank to achieve the required excavation grades as shown on the Drawings.
- K. Grouting and abandonment of existing storm water drainage pipe along the bank that may discharge into Trail Creek.
- L. Post-excavation subgrade preparation for backfilling and final grading and drainage.
- M. Deliver, place, and compact approximately 5,600 CY of compacted bank clay to replace excavated refuse and contaminate soil along creek bank to achieve top of bank clay grading plan.
- N. Deliver and place approximately 12,030 CY of common borrow sand, and 5,300 CY of topsoil capable of sustaining healthy landscape plantings to achieve final grading plan.
- O. Construct stormwater management facilities.
- P. Grout and abandon existing 18" stormwater pipe.
- Q. Furnish and install 490 linear feet of 18" stormwater pipe and associated catch basin tie in and inlet construction.
- R. Furnish and install approximately 1,320 linear feet of leachate gravity drain pipe, lift station and associated electric, pumps, controls, and fittings.
- S. Pump, haul, or otherwise handle water that has come into contact with exposed waste (leachate) to the extent necessary to construct the work.
- T. Trench or directionally bore a leachate forcemain from the lift station near the northwest corner of the Site to an existing municipal sewer manhole in Karwick Road southeast of the Site (1,740 linear feet). Cross existing underground utility lines, including natural gas and water.
- U. Seed, fertilize, mulch and establish vegetation across all disturbed areas.
- V. Demobilization.
- W. The work to be done shall include all work shown on the Drawings and specified herein. All work shall be in accordance with the Drawings and the requirements of the specifications and addendums (if any).



- X. The foregoing is a general description only and shall not be construed as a complete description of the work to be performed.

#### **1.4 WORK BY OWNER**

The OWNER's/ENGINEER's remediation-related activities will include the following:

- A. Review and evaluation of CONTRACTOR submittals.
- B. Continuous observation of the CONTRACTOR's activities.
- C. Other quality assurance testing, such as bank clay sampling and testing.
- D. Progress surveying for measurement and payment of construction soil volumes and areas and certification purposes.
- E. As-built documentation and remediation completion report.
- F. The OWNER will issue all instructions to the CONTRACTOR through the ENGINEER.
- G. Items noted "NIC" (Not in Contract) will be furnished and installed by OWNER or other Contractors.

#### **1.5 CONTRACTOR USE OF SITE AND PREMISES**

- A. Limit use of site and premises to allow:
  - 1. Owner occupancy.
  - 2. Work by Others and Work by Owner.
- B. The CONTRACTOR shall confine his materials and their storage, and the operation of his workmen to limits indicated by laws, ordinances permits, directions of the ENGINEER and as shown, and will not unreasonably encumber the premises with such materials, but shall store them in orderly fashion so that they will not interfere with the work under this Contract or other contracts, or with the operation of the OWNER's facilities. The CONTRACTOR shall not load nor permit any part of the work to be loaded with a weight that will endanger its safety or unduly affect the structure or any part thereof. The CONTRACTOR shall enforce the instructions of the ENGINEER regarding signs, fires, and smoking.
- C. Contractor staging areas and stockpiles of material shall be in areas approved or designated by the ENGINEER.
- D. Neither the CONTRACTOR nor any of his employees shall park any vehicle anywhere on the site, except at such locations as shown or as specifically approved by the ENGINEER for the purpose.



## **1.6 SITE VISITS**

- A. The undertaking of periodic site visits by the U.S. EPA, IDEM, ENGINEER, or OWNER shall not be construed as supervision of actual Work, or make them responsible for the safety of persons; or make them responsible for means, methods, techniques, sequences, or procedures of construction selected by the CONTRACTOR or his Subcontractors; or make them responsible for safety programs and precautions incidental to the Work.

## **1.7 EQUIPMENT AND MATERIALS**

- A. CONTRACTOR shall furnish all equipment and materials necessary to meet all requirements of the Contract Documents.

## **1.8 OBSTACLES, INTERFERENCE, AND COORDINATION**

- A. General
  - 1. The CONTRACTOR shall complete Work substantially as indicated in the Contract Documents; in addition, the CONTRACTOR shall verify exact location and elevations of Work.
  - 2. Due to small scale of Drawings, it is not possible to indicate all changes in elevations, interferences, etc. The CONTRACTOR shall make necessary changes in the Work after notification is given to the OWNER and ENGINEER and approval is received to proceed.

## **1.9 EXAMINATION OF PREMISES, DRAWINGS, ETC.**

- A. Before Submitting Proposal the Bidder shall:
  - 1. Examine all Drawings and Specifications relating to Work of all trades to determine scope of Work.
  - 2. Examine all existing conditions affecting compliance with Drawings and Specifications by visiting the Site.
- B. Ascertain access to Site.
- C. Before commencing Work on any phase, or in any area, the CONTRACTOR shall verify all governing dimensions at the Site.
- D. Tender of proposal by CONTRACTOR will confirm agreement by CONTRACTOR to all items and conditions referred to herein and/or indicated on accompanying Drawings. No consideration, additional moneys, or time extensions will be granted for alleged misunderstanding.

## **1.10 TEMPORARY FIRST AID FACILITIES**

- A. The CONTRACTOR shall furnish and maintain, at his expense, proper first-aid facilities for the use of his workers during the Work.



### **1.11 CONSTRUCTION SCHEDULE**

- A. The CONTRACTOR shall provide, with his bid, a proposed Work Schedule showing start and completion dates for various segments of the Work.
1. The CONTRACTOR shall notify the OWNER and ENGINEER whenever there is a deviation from the current project schedule. The CONTRACTOR shall then provide sufficient information as to the impact of the Work activities relative to the stated modifications.
  2. The CONTRACTOR shall report weekly progress on Work activities relative to the current project schedule agreed upon by the OWNER.
  3. The weekly progress report shall be transmitted to the ENGINEER.
    - 1) If significant changes occur which affect the original project completion date due to deviations, the CONTRACTOR shall submit a revised schedule within one (1) week to reflect all changes and their impacts to the project schedule.
    - 2) The sequence of the Work shall be carried out in a manner satisfactory to the OWNER.
  4. Additionally, the CONTRACTOR shall report progress on a daily basis using a form and format agreeable to the OWNER. Such reports shall be delivered by electronic mail no later than noon of the following work day.

### **1.12 CLEANUP**

- A. Periodic cleaning: The CONTRACTOR at all times, during the progress of the Work, shall keep the Site free from accumulation of waste matter or rubbish and shall confine his apparatus, materials and operations of his workmen to the limits of Work prescribed except as the latter may be extended with the approval of the OWNER. Cleaning of the Site must be performed daily and removal of waste matter or rubbish must be performed at least once a week. CONTRACTOR shall at all times keep access road and public roads clean of mud and construction debris.
- B. Final clean-up: Upon completion of the Work covered by the Contract, the CONTRACTOR shall leave the completed project ready for use without the need of further cleaning. In addition, upon completion of all Work the CONTRACTOR shall remove from the vicinity of the Work all rubbish, temporary fencing, unused materials, and other materials belonging to him or used under his direction during performance of the Work, or which impair the use or appearance of the property. In the event of his failure to do so, the same shall be removed by the OWNER at the expense of the CONTRACTOR.
- C. Disposal: All removed materials (wood, fencing, rubble, etc.) not specifically designated for re-use at the Site shall be disposed of by the CONTRACTOR in accordance with all applicable laws, rules, and regulations.



### **1.13 SUPERVISION**

- A. Supervision: The CONTRACTOR shall give the Work proper supervision. A competent superintendent, satisfactory to the OWNER and ENGINEER, shall be kept on the job during all working hours.
- B. The CONTRACTOR shall submit with his bid a resume stating past experience of its construction superintendent. The superintendent shall be subject to the OWNER's approval.

### **1.14 FUTURE WORK**

- A. Project is designed for reforestation and public recreational use upon completion.

### **1.15 WORK SEQUENCE**

- A. CONTRACTOR shall obtain all required permits prior to beginning work.
- B. CONTRACTOR shall install all temporary erosion and sediment control measures prior to beginning excavation.
- C. CONTRACTOR shall perform the work in a sequence that allows for the on-going sampling and testing of the contaminated soil and debris.

### **1.16 SITE ACCESS**

- A. The CONTRACTOR shall maintain access for public utilities to service their respective utilities throughout the duration of the Project.
- B. The CONTRACTOR shall provide necessary signage for park closure throughout the duration of the Project and road closure as permitted.

## **PART 2 PRODUCTS**

Not Used.

## **PART 3 EXECUTION**

Not Used.

END OF SECTION



SECTION  
01 29 01

MEASUREMENT AND PAYMENTS

**PART 1        GENERAL**

**2.1        SECTION INCLUDES**

- A. Procedures for measurement and payment for the work to be done under the respective items listed in the itemized quantity listing for this project.

**2.2        GENERAL**

- A. The following paragraphs describe measurement of and payment for the work to be done under the respective items listed in the itemized bid for this contract (listed in Section 00 41 00 – BID FORM).
- B. Each lump sum and unit price stated in the itemized bid shall constitute full compensation for not only all labor, equipment and materials necessary and required to complete all work specified under that particular item including cleaning up, but also all costs for doing related work as set forth in these Specifications and/or on the Construction Drawings or implied in carrying out their intent.
- C. Requests for payment shall be in accordance with CONTRACTOR's agreement with OWNER.

**2.3        COMPUTATION OF QUANTITIES**

- A. Measurement of quantities expressed as area shall be based upon a horizontal, planimetric projection to the work limits as determined by survey Record Drawings for each item with no additional allowances for slopes.
- B. Measurement of quantities expressed as volume shall be based upon an in place comparison of survey Record Drawings performed both prior to and upon completion of each item unless otherwise specified in the bid item descriptions.
- C. Measurement of linear items such as piping will be for quantities actually field installed to the specified work limits, based upon surveyed stations recorded along the straight or curved centerline of each respective item.
- D. No partial payments shall be made for items which have not been tested and approved.
- E. Payment will be made to the limits as specified in the Contract Documents. If the constructed limits are less than the specified limit, payment will be made to the actual limits of construction as shown on the Record Drawings. Payment for quantities that exceed the specified contract limits will only be made with the approval of the OWNER/ENGINEER. The payment for quantities that exceed the contract quantities can only be obtained through an approved change order before contract quantities are exceeded.



## **PART 2            CONSTRUCTION ITEMS**

Below is a description of the anticipated construction items for the Project. The corresponding construction item on the Bid Form in Section 00 41 00 is listed in parenthesis below. The table in Part 3 of this Section summarizes the allowable construction tolerances for the construction layers listed below.

### **3.1      MOB & DEMOB (ITEM 1)**

The lump sum price for this item shall be payment in half at the beginning of construction for mobilization and demobilization of all parts, material, and equipment to the site as well as Contractor-provided utilities and ongoing related expenses considered normal for administration of the work. The remaining half of the item will be paid at the end of the construction.

### **3.2      GENERAL CONDITIONS & STORM WATER MANAGEMENT (ITEM 2)**

Clearing and grubbing both inside and outside the limit of work (as shown in the Plans), required by the CONTRACTOR for staging areas and parking areas will be paid as part of this item. The cost of providing all construction surveying services necessary to maintain horizontal and vertical control during execution of all work shall be included in this bid item. Dewatering and surface water control measures (including temporary berms, channels, and storm water pumping) during construction and preparation and implementation of the Construction SWPPP and NOI shall also be included in this item as well as development of a site specific Health and Safety Plan for the project. Costs associated with watering haul roads and the project work area to prevent excessive dust shall also be included in this bid item. This item will also include construction and maintenance of the required construction entrance (as shown on the Drawings) and cleaning of Karwick road as necessary (at least daily) using a street sweeper or other method approved by the OWNER that adequately cleans Karwick road (or other roads impacted by the CONTRACTOR) to provide a safe driving surface. Any and all traffic signage, closures, flagmen, and local permits (right-of-way, utility crossing, etc.) shall be included in this item. This item shall also include any temporary toilet facilities required for use by the CONTRACTOR. Implementation of the required temporary erosion control measures including 3,500-foot silt fence around the entire perimeter of the project site including the creek bank shall also be included in this item. This item shall also include any and all costs associated with the CONTRACTOR finding a clean soil and clay borrow source and prequalification testing of the borrow soils for approval by the OWNER and ENGINEER shall be included in this item. This item shall also include payment in full for all materials, labor and equipment necessary to furnish and install 1,300 linear feet of temporary 8-foot high chain link construction fence with sight line screening (opaque green/blue mesh or similar) along the northern and eastern project boundaries as shown on the Construction Drawings. The price shall also include two gates; one at the northern construction entrance and one at the southern NIPSCO access drive as shown on the Construction Drawings. The Contractor shall remove the fence upon the completion of the project.

### **3.3      DEWATERING / LEACHATE HANDLING & DISPOSAL (ITEM 3)**

The unit price per gallon for this item shall be payment in full for all materials, labor, and equipment necessary for handling, managing, pumping, and transporting of leachate (water that has contacted exposed waste) as necessary to perform the Work. The CONTRACTOR will be responsible for procuring, installing and operating pumps to pump leachate as well as haul trucks or temporary piping to dispose of the leachate off site at the Sanitary District located at 1100 E 8th St, Michigan City, Indiana 46360. No disposal fees will apply to leachate from this Project dropped off at the Michigan City Wastewater Treatment Plant, 1100 E 8<sup>th</sup> St, Michigan City, IN, 46360.



### **3.4 CLEARING & GRUBBING (ITEM 4)**

The unit price per square foot for this item shall be payment in full for all materials, labor, and equipment necessary to clear and grub the existing vegetation, small trees (<10" in diameter), brush or other deleterious items from the project area. The stripped trees and brush will be chipped and disposed of off-site (with the exception of the amount necessary to install the Shoresox bank stabilization system as described in Item 18). No burning of the trees and brush will be allowed without prior approval from the City. This item shall also include removal of remaining stumps to below ground level and disposal off-site. Payment shall be made based on a field survey of the area that was cleared and grubbed.

### **3.5 TREE CLEARING AND REMOVAL (ITEM 5)**

The unit price per acre for this item shall be payment in full for all materials, labor, and equipment necessary to clear and remove the existing larger trees (>10" in diameter). A tree survey was performed for the site and the trees >10" diameter are shown on the drawing titled "ALTA/NSPS Land Title Survey & Topographic Survey", prepared by Weaver Consultants Group, dated 3/23/2018 which is included with these Bidding Documents. The trees shall be chipped and disposed of off-site (with the exception of the amount necessary to install the Shoresox bank stabilization system as described in Item 18). No burning of the trees will be allowed. Payment will be made based on a field survey of the actual tree clearing and removal area.

### **3.6 EXCAVATION OF BANK AND LOCALIZED UPLAND AREAS (ITEM 6)**

The unit price per cubic yard for this item shall be payment in full for excavating high areas to reach design excavation grades and placing the excavated materials as fill in Excavated Waste Fill Area designated in Construction Drawings. The excavation will meet the requirements of Section 31 23 16 and 31 20 01 of the Specifications and the Construction Drawings. The excavated waste shall be placed in 2 to 3 foot lifts, tracked in place to eliminate large voids and minimize settlement. Waste must be covered by clean soil, tarps, or spray on cover (Posi-Shell or similar) at the end of each day. Finished waste surfaces, including the excavated bank surface, will be free of protrusions or voids that may be deleterious to the soil layers. Costs associated with furnishing, placing and removing any crane mats or similar items to facilitate access for haul trucks shall be included in this item. Payment will be made based on field surveys of the bank excavation and excavated waste placement areas, designated in the Construction Drawings, prior to and after existing material excavation and waste filling activities.

### **3.7 F&I LEACHATE SEEP DRAIN TRENCH (ITEM 7)**

The unit price per linear foot for this item shall be for all materials, labor, and equipment necessary to install the leachate seep drain trench as shown on the Drawings. The costs shall include supply and installation of the 6" perforated HDPE piping and associated fittings, clean INDOT #2 stone, and 8 oz/sy nonwoven geotextile and backfilling the trench. The cost of shoring and bracing if required by applicable regulations or necessary to complete the work shall be included in this bid item. The cost of dewatering leachate if necessary to construct the seep drain shall be included in Item 3 – Leachate Handling. Waste removed during trench excavation shall be placed in the Excavated Waste Fill Area. Clean soil material removed may be used for clean soil fill (if the material is deemed acceptable by the ENGINEER). The excavation and pipe placement will meet the requirements of Sections 31 23 16, 31 23 19 and 33 34 01 of



the Specifications, and the Construction Drawings. Payment will be made based on a field survey of the length of the completed leachate seep drain pipe.

### **3.8 GROUT AND ABANDON EXISTING 18" STORMWATER PIPE (ITEM 8)**

The lump sum unit price for this item shall be payment in full for all material, labor, and equipment necessary to cut back the existing 18" stormwater pipe and grout it shut to the full extent possible as shown on the Drawings.

### **3.9 F&I 18" HDPE SDR 17 STORMWATER PIPE (ITEM 9)**

The unit price per linear foot for this item shall be payment in full for all material, labor, and equipment necessary to supply and install the proposed 18" HDPE SDR 17 stormwater pipe as shown on the Drawings. Cost will include supply and installation of the HDPE pipe, excavation through the waste (and any shoring or bracing required to complete the excavation), backfill material (INDOT #53), backfilling the trench, placing excavated waste into the waste fill area, supply and installation of an 18-inch HDPE flared end section, and supply and installation of the 10'x10' riprap apron and underlying nonwoven geotextile as shown on the Drawings. Payment will be made based on a field survey of the actual length of pipe installed.

### **3.10 F&I 18" STORMWATER INLET STRUCTURE (ITEM 10)**

The unit price per linear foot for this item shall be payment in full for all material, labor, and equipment necessary supply and install the proposed concrete stormwater inlet structure and 18" HDPE pipe under the Karwick road section as shown on the Drawings. Cost will include supply and installation of the precast concrete inlet, open cutting of the existing Karwick Road pavement section, 18" HDPE pipe, backfill material (INDOT #53), backfilling the trench, and replacing the existing pavement section as shown on the Drawings. Payment will be made based on a field survey of the actual length of pipe installed.

### **3.11 F&I 3" HDPE SDR 11 FORCEMAIN (ITEM 11)**

The unit price per linear foot for this item shall be payment in full for all material, labor, and equipment necessary supply and install the proposed 3" HDPE SDR 11 forcemain pipe as shown on the Drawings. Cost will include supply and installation of the 3" HDPE pipe and associated fittings and backfill material, excavating the trench within the project area, directional drilling in areas under Karwick Road, and replacing the existing pavement section on Karwick road as necessary. Cost will also include hydroexcavation as necessary to cross existing utilities and obtaining approval from NIPSCO to cross the gas line. Cost will also include the tie-in to the existing sanitary manhole. Payment will be made based on a field survey of the actual length of pipe installed.

### **3.12 F&I LEACHATE LIFT STATION (ITEM 12)**

The lump sum price for this item shall be payment in full for supply and installation of the leachate lift station in accordance with the Construction Drawings. The lump sum price for this item also shall be payment in full for furnishing and installation of the concrete lift station manhole and valve vault, all associated piping, fittings, valves, leachate pumps, controls and control panel, concrete pads, fencing and all other items necessary to install the leachate pump station as shown on the Drawings. The pump shall be capable of pumping 75 gpm at the system head requirements. The control panel shall meet the



requirements as outlined in the lift station notes on Sheet 10 of the Drawings. Cost for supply and installation and electrical engineering to size wiring, etc., of all electric work associated with the leachate lift station shall be included in this item including coordination with NIPSCO and Michigan City for the electric power drop and metering.

### **3.13 F&I LEACHATE FORCEMAIN CLEANOUTS (ITEM 13)**

The unit price per item shall be payment in full for supply and installation of the leachate forcemain cleanouts as shown on the Drawings. The price shall include supply and installation of all HDPE piping and fittings, replacement of pavement disturbed to install the cleanouts, equipment and materials to flush mount the cleanout with the top of pavement in paved areas. Payment will be made based on the number of cleanouts actually installed.

### **3.14 F&I CLEAN SOIL FILL (FROM ON-SITE) (ITEM 14)**

The unit price per cubic yard for this item shall be payment in full for furnishing and installing clean soil fill from on-site to cover the upland park areas to achieve the required fill over the existing waste and to reach the design grades shown on the Drawings. On-site clean soil sources may include clean excavated soil from the bank and the existing stockpile of general soil. The clean soil fill may be sandy, silty, or clayey clean natural soil material meeting the requirements of Section 31 23 23 of the Specifications and the Drawings. The soil shall be tracked in place to eliminate large voids and minimize settlement. Payment will be made based on field surveys of the fill areas, designated in the Construction Drawings, prior to and after soil filling activities.

### **3.15 F&I CLEAN SOIL FILL (FROM OFF-SITE) (ITEM 15)**

The unit price per cubic yard for this item shall be payment in full for furnishing, hauling, and installing clean soil fill from off-site to cover the upland park areas to achieve the required fill over the existing waste and to reach the design grades shown on the Drawings. The material will be obtained from an off-site soil borrow source proposed by the CONTRACTOR and approved by the OWNER and ENGINEER. The clean soil fill may be sandy, silty, or clayey clean natural soil material meeting the requirements of Section 31 23 23 of the Specifications and the Drawings. The soil shall be tracked in place to eliminate large voids and minimize settlement. Payment will be made based on field surveys of the fill areas, designated in the Construction Drawings, prior to and after clean soil filling activities.

### **3.16 INSTALL CLEAN SOIL FILL (OWNER PROVIDED) (ALTERNATIVE 1, ITEM 15A1)**

The unit price per cubic yard for this item shall be payment in full for installing clean soil fill from off-site (delivered to the site by the OWNER) to cover the upland park areas to achieve the required fill over the existing waste and to reach the design grades shown on the Drawings. The material will be furnished, hauled, and stockpiled from an off-site soil borrow source by the OWNER. The clean soil fill may be sandy, silty, or clayey clean natural soil material meeting the requirements of Section 31 23 23 of the Specifications and the Drawings. The soil shall be tracked in place to eliminate large voids and minimize settlement. Payment will be made based on field surveys of the fill areas, designated in the Construction Drawings, prior to and after clean soil filling activities.



### **3.17 F&I 24" COMPACTED BANK CLAY (FROM OFF-SITE) - (ITEM 16)**

The unit price per cubic yard for this item shall be payment in full for the furnishing, placing, moisture conditioning (CONTRACTOR will be required to maintain a water truck on site during construction), compacting and any other installation work for the 24" minimum compacted bank clay layer along the bank slope and benches in accordance with Section 31 23 24 of the Specifications and the lines and grades in the Drawings. The clay material will be obtained from an off-site clay borrow source proposed by the CONTRACTOR and approved by the OWNER and ENGINEER. Payment will be made based on field surveys of the clay fill areas, designated in the Construction Drawings, prior to and after clay filling activities. No payment shall be made for any material in excess needed to complete the full 2-foot thickness to the grades shown on the Drawings. Cost for these items will include preparing the top of bank clay surface for topsoil layer placement (including keeping bank clay moist until covered) as well as pumping storm water from the bank clay until the entire bank clay has been covered with topsoil or erosion control materials.

### **3.18 F&I 6" TOPSOIL LAYER (FROM OFF-SITE) - (ITEM 17)**

The unit price per cubic yard for this item shall be payment in full for placing a 6-inch minimum topsoil layer on the disturbed areas of the Site to the limits shown on the Drawings. Topsoil shall be placed in accordance with Section 31 23 25 of the Specifications. Pay quantity will be based on the plan area of the areas of topsoil placement per actual as-built survey.

### **3.19 F&I 3:1 BANK SLOPE EROSION PROTECTION (SHORESOFX OR EQUAL) - (ITEM 18)**

The unit price per square foot for this item shall be payment in full for supply and installation of the 3:1 bank slope erosion protection (Shoresox or equal) as shown on the Drawings. Cost shall include supply and installation of all materials, staking, backfill materials (on-site chipped mulch combined with compost or topsoil per the manufacturer's recommendations), and all other items necessary to fully install the product at the locations prescribed in the Drawings. Pay quantity will be based on the plan area of the areas installed per actual as-built survey.

### **3.20 F&I 3:1 BANK SLOPE EROSION PROTECTION (RIPRAP) - (ALTERNATIVE ITEM 18A1)**

Alternate Item 18A1 shall be either the partial selective or complete substitution of natural stone (e.g. glacier stone) riprap for the Shoresox Bank Slope erosion protection (Item 18 above). The Work may therefore include one or both items to address bank slope erosion protection. The unit price per cubic foot for this Alternate item shall be payment in full for supply and installation of the 3:1 bank slope erosion protection as shown on the Drawings. The OWNER may indicate areas to be covered with 12" to 24" diameter glacier stone riprap (D50 = 18") and underlying 8 oz/sy nonwoven geotextile, in place of Shoresox. The stone shall be non-calcareous (i.e. crushed limestone will not be allowed) and shall be placed in a minimum 18" thick layer. Geotextile shall extend from the limit of top soil placement to the surface of Trail Creek. Riprap shall be placed under the surface of Trail Creek as needed to support the riprap placed above the water's surface. Cost shall include supply and installation of all materials, staking, and all other items necessary to fully install the product at the locations prescribed in the Drawings. Pay quantity will be based on the plan area of the areas installed per actual as-built survey.



**3.21 F&I STEEP BANK SLOPE EROSION PROTECTION (ENVIROGRID OR EQUAL) - (ITEM 19)**

The unit price per square foot for this item shall be payment in full for supply and installation of the steep bank slope erosion protection (Envirogrid or equal) as shown on the Drawings. Cost shall include supply and installation of all materials, staking, tendons backfill materials (concrete grout below the high water line and topsoil above the high water line), and all other items necessary to fully install the product at the locations prescribed in the drawings. Pay quantity will be based on the size of the areas installed per actual as-built survey.

**3.22 ESTABLISH VEGETATION - (ITEM 20)**

The unit price per acre for this item shall be payment in full for seeding, fertilizing, and mulching the topsoil and disturbed areas (including the bank erosion protection areas, and upland areas) in accordance with Section 32 92 19 of the Specifications and the Drawings. Pay quantity will be based on the size of the areas approved to be vegetated per actual as-built survey. It is anticipated that full ground cover will need to be established across the entire disturbed area to stabilize the ground even in the floodway planting areas. The contractor is responsible for establishing vegetative growth and providing a 36-month warrantee on all work performed for this item.

**3.23 F&I GRAVEL DRIVE AND PATHS - (ITEM 21)**

The unit price per square foot for this item shall be payment in full for all material, labor and equipment necessary for construction of the gravel drives and paths as shown on the Drawings. Cost shall include supply and installation of the 8 oz/sy nonwoven geotextile, INDOT #2 stone, and INDOE #53 stone as shown on the Drawings. Pay quantity will be based on the size of the gravel drive and path areas per actual as-built survey.

**3.24 FLOODWAY TREE/SHRUB REPLACEMENT - (ITEM 22)**

The lump sum unit price for this item shall be payment in full for supply and installation of the required floodway tree and shrub replacements in accordance with the Drawings. The contractor is responsible for establishing vegetative growth and providing a 36-month warrantee on all work performed for this item.

**PART 3 EXECUTION**

- A. CONTRACTOR shall be allowed the placement tolerances listed below, but design slopes and minimum thicknesses must be maintained per the design drawings and specifications.



<b><u>Soil Layer</u></b>	<b><u>Placement Tolerance</u></b>
Bottom of Bank Clay	Design Elevation +/- 0.1 feet
Compacted Bank Clay	Design Elevation +/- 0.1 feet
Clean Soil Fill/Backfill	Design Elevation +/- 0.1 feet
Topsoil	Design Elevation +/- 0.1 feet

END OF SECTION



SECTION  
01 31 00

COORDINATION AND MEETINGS

**PART 1        GENERAL**

**1.1        SECTION INCLUDES**

- A.    Coordination
- B.    Preconstruction Conference
- C.    Site Mobilization Conference
- D.    Progress Meetings

**1.2        COORDINATION**

- A.    The General Contractor shall have primary responsibility to coordinate schedule and the work. However, each Contractor shall be responsible for adhering to the schedule and coordinating submittals and installation of the work of the various Sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements. Accordingly, each Contractor shall, as applicable, perform the following tasks.
  - 1.    Verify that all utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
  - 2.    Coordinate completion and clean-up of work of separate Sections in preparation for Substantial Completion and for portions of work designated for OWNER's occupancy.
  - 3.    After OWNER occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of OWNER's activities.

**1.3        PRECONSTRUCTION CONFERENCE**

- A.    OWNER and ENGINEER will schedule a conference after Notice of Award.
- B.    Attendance Required – OWNER, ENGINEER, and CONTRACTOR.
- C.    Agenda
  - 1.    Execution of Owner-Contractor Agreement.
  - 2.    Submission of executed bonds and insurance certificates.
  - 3.    Distribution of Contract Documents.



4. Critical work sequencing.
5. Submission of list of subcontractors, list of products, Schedule of Values, and construction work schedule in accordance with Section 01 33 00 – Submittals.
6. Designation of personnel representing the parties in Contract and the ENGINEER.
7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders and Contract closeout procedures.
8. Scheduling.
9. Security.
10. Environmental protection concerns and procedures.

#### **1.4 SITE MOBILIZATION CONFERENCE**

- A. ENGINEER and OWNER will schedule a conference at the Project site prior to CONTRACTOR occupancy.
- B. Attendance Required – OWNER, ENGINEER, Special Consultants, and CONTRACTOR, CONTRACTOR's Superintendent, and major subcontractors.
- C. Agenda
  1. Use of premises by Owner and Contractor.
  2. Owner's requirements and partial occupancy.
  3. Construction facilities and controls provided by Owner.
  4. Temporary utilities provided by Owner, if any.
  5. Survey layout.
  6. Security and housekeeping procedures.
  7. Schedules.
  8. Procedures for testing.
  9. Procedures for maintaining Record Documents.

#### **1.5 PROGRESS MEETINGS**

- A. The ENGINEER will schedule and administer meetings throughout progress of the work at maximum weekly intervals or as necessary.



- B. The ENGINEER will make arrangements for meetings, preside at meetings, record minutes, and distribute copies to OWNER, CONTRACTOR, participants, and those affected by decisions made.
- C. Attendance Required – Job superintendent, major subcontractors and suppliers, OWNER and ENGINEER, as appropriate to agenda topics for each meeting.
- D. Agenda
  - 1. Review minutes of previous meetings.
  - 2. Review of work progress and Contractor's construction schedule.
  - 3. Field observations, problems, and decisions.
  - 4. Identification of problems which impede planned progress.
  - 5. Review of submittals schedule and status of submittals.
  - 6. Maintenance of progress schedule.
  - 7. Planned progress during succeeding work period.
  - 8. Coordination of projected progress.
  - 9. Maintenance of quality and work standards.
  - 10. Effect of proposed changes on progress schedule and coordination.
  - 11. Other business relating to work.

**PART 2 PRODUCTS**

Not Used.

**PART 3 EXECUTION**

Not Used.

END OF SECTION



SECTION  
01 32 50

PROGRESS SCHEDULE

**PART 1      GENERAL**

**1.1      EXTENT**

- A. The Schedule of Work given in Article 1.3 of this Specification Section sets forth certain target dates which the CONTRACTOR is required to meet. However, the stipulation of these target dates shall not relieve the CONTRACTOR of the obligation to process the Work, from start to completion, in an orderly and continuous manner during the course of the Work.
- B. The CONTRACTOR shall continuously show evidence of this orderly progress by submitting updated schedules and progress reports to the OWNER.

**1.2      CONSTRUCTION PROGRESS REPORTS**

- A. A Construction Progress Report shall be submitted weekly, at least 24 hours prior to each Progress Meeting as described in Specification Section 01 310 00 - Coordination and Meetings. A construction progress report shall be submitted with each application for partial payment. Work that is reported to be complete but not readily apparent to the OWNER must be substantiated with supporting data when requested by OWNER.
- B. The Construction progress report shall consist of the revised construction progress schedule and a narrative report which shall include but not be limited to the following:
  - 1. Comparison of actual progress to planned progress shown on originally accepted schedule (percent complete on procurement, fabrication, installation, testing, etc.).
  - 2. Summary of activities completed since the previous construction progress report.
  - 3. Activities that are to be completed during the next reporting period.
  - 4. Definition of any concerns with proposed solutions.
- C. Weekly Progress Reports
  - 1. CONTRACTOR shall submit a weekly progress report (in email, PDF, or Microsoft Word-compatible format) that documents the work activities which will occur, the number and size of crews to complete the work, and the construction equipment on site to complete the work.

**1.3      SCHEDULE TARGET DATES**

- A. CONTRACTOR's schedule shall be such that the work can be carried out in accordance with the table below:



<b><u>Activity</u></b>	<b><u>Date</u></b>
Contract Award	Wed 4/24/2019
Mobilize	Wed 5/22/2019
Submit Final Schedule for the Work	Within one week after award of Contract
Preconstruction Meeting	Wed 5/8/2019
Progress Meetings	Weekly Meetings
Substantial Completion	Fri 10/11/2019
Final Completion	Fri 10/18/2019
As-Built Drawings of Completed Work	Two weeks after installation is complete

- B. Within one week after award of Contract, the CONTRACTOR shall prepare and submit to the OWNER a final level 3 schedule for the Work. The schedule shall indicate the times (number of days or dates) for starting and completing the various stages of the Work including any milestones specified in the Contract Documents. The detailed schedule shall clearly identify the time allowed for the OWNER to review submittals. The minimum duration for submittal review shall be 15 working days. Also to be shown in the schedule are start/finish dates, the shifts that will be worked, the personnel present during each shift, and the types of construction equipment that will be used for the Work.
- C. It shall be the CONTRACTOR's responsibility to maintain the progress of the Work in accordance with the schedule.
- D. The project construction schedule shall be revised and updated on a weekly basis (Monday by 10:00 a.m. using 7:00 a.m. as the data date). It shall be the responsibility of the CONTRACTOR to provide weekly progress reports with information relating to actual installation and delivery progress, as well as an update of CONTRACTOR's master document list. OWNER and ENGINEER will review and comment on the construction progress schedule following each weekly progress meeting. Changes will be made to the schedule upon agreement between OWNER, ENGINEER, and CONTRACTOR.

#### **1.4 SUBSTANTIAL COMPLETION**

- A. Substantial completion of the project will be in accordance with the supplemental conditions provided by the OWNER.

#### **1.5 FINAL COMPLETION**

- A. Final completion of the project will be in accordance with the supplemental conditions provided by the OWNER.



## **1.6 FINAL ACCEPTANCE**

- A. Final acceptance of the project will be in accordance with the supplemental conditions provided by the OWNER.

## **PART 2 PRODUCTS**

Not Used.

## **PART 3 EXECUTION**

Not Used.

END OF SECTION



SECTION  
01 33 00

SUBMITTALS

**PART 1        GENERAL**

**1.1        SECTION INCLUDES**

- A.    Submittal Procedures
- B.    Construction Progress Schedules
- C.    Proposed Products List
- D.    Product Data
- E.    Samples
- F.    Manufacturers' Instructions
- G.    Manufacturers' Certificates
- H.    Construction Photographs

**1.2        RELATED SECTIONS**

- A.    Section 01 45 00 – Quality Control
- B.    Section 01 78 90 – Contract Closeout
- C.    Section 01 45 16 – Field Engineering

**1.3        SUBMITTAL PROCEDURES**

- A.    Prepare a complete listing of all submittals required for the project noting the number of each submittal and the date each submittal is to be submitted. The CONTRACTOR shall identify submittals that are time critical to completion of the project. The listing shall be submitted within 7 days of Award of the Contract and shall be a prerequisite to the first partial payment.
- B.    Transmit each submittal with ENGINEER accepted form. Submit the number of copies which the CONTRACTOR requires plus two (2) copies for the ENGINEER and one (1) copy for the OWNER.
- C.    Sequentially number the submittals using the section and sequential number (e.g., 31 11 00-1, 31 11 00-2). Resubmittals shall have the same submittal number with a sequential letter designation for each succeeding resubmittal (e.g., 31 11 00-1-A, 31 11 00-1-B).



- D. Identify Project, Contractor, subcontractor or supplier; pertinent Drawing sheet and detail number(s), and specification Section number, as appropriate.
- E. Apply Contractor's stamp, signed or initialed certifying that review, verification of products required, field dimensions, adjacent construction work, and coordination of information, is in accordance with the requirements of the work and Contract Documents.
- F. Schedule submittals to expedite the project, and deliver to ENGINEER's business address. Coordinate submission of related items such that a complete review of the submittal can be performed. Incomplete submittals or submittals not fully coordinated will not be reviewed. The CONTRACTOR will be advised in writing of the reasons for the ENGINEER's action.
- G. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of the completed work.
- H. Provide space for CONTRACTOR and ENGINEER review stamps.
- I. Revise and resubmit submittals as required, identify all changes made since previous submittal.
- J. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.
- K. The CONTRACTOR shall allow a minimum of 10 working days for the ENGINEER to review each submittal. The ENGINEER will endeavor to complete the review of all submittals as soon as possible in accordance with the CONTRACTOR's assigned priority to each submittal. Failure by the CONTRACTOR to make submittals on time or failure to allow sufficient time for review of any and all submittals will not relieve him of the responsibility to complete the project in the specified time.

#### **1.4 CONSTRUCTION WORK SCHEDULES**

- A. Submit initial construction work schedule and critical path method (CPM) network analysis schedule in duplicate within 5 days after date of Owner-Contractor Agreement for Engineer review.
- B. Revise as required and resubmit with each request for payment. Payment requests will not be processed without a revised construction work schedule and CPM network analysis schedule.
- C. Submit computer generated network analysis diagram using the critical path method, generally as outlined in Associated General Contractors of America (AGC) publication "The Use of CPM in Construction – A Manual for General Contractors and the Construction Industry".
- D. Show complete sequence of construction by activity, identifying work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, total and free float dates, and activity durations.
- E. Indicate estimated percentage of completion for each item of work at each submission.



- F. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by OWNER and under Allowances.

## **1.5 PROPOSED PRODUCTS LIST**

- A. Within 15 days after date of Owner-Contractor Agreement, submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number of each product. This can be coordinated with Article 1.3 of this Section.
- B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

## **1.6 PRODUCT DATA**

- A. Submit the number of copies which the CONTRACTOR requires, plus two (2) copies which will be retained by the ENGINEER and one (1) copy to be forwarded to the OWNER.
- B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this Project.
- C. After review, distribute in accordance with Article on Procedures above and provide copies for Record Documents described in Section 01 78 90 – Contract Closeout.

## **1.7 SAMPLES**

- A. Submit samples to illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals to ensure approval will not interfere with construction sequence.
- B. Submit samples of finishes from the full range of manufacturers' standard colors, textures, and patterns for OWNER's and/or ENGINEER's selection.
- C. Include identification on each sample, with full Project information.
- D. Submit the number of samples specified in individual specification Sections; one of which will be retained by ENGINEER.
- E. Reviewed samples which may be used in the work are indicated in individual specification Sections.

## **1.8 MANUFACTURER'S INSTRUCTIONS**

- A. When specified in individual specification Sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.
- B. Identify conflicts between manufacturers' instructions and Contract Documents.



## **1.9 MANUFACTURER'S CERTIFICATES**

- A. When specified in individual specification Sections, submit manufacturers' certificate to ENGINEER for review, in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product, but must be acceptable to ENGINEER.

## **PART 2 PRODUCTS**

Not Used.

## **PART 3 EXECUTION**

Not Used.

END OF SECTION



SECTION  
01 35 43

ENVIRONMENTAL PROTECTION

**PART 1        GENERAL**

**1.1        WORK INCLUDED**

- A.    The CONTRACTOR shall furnish all labor, equipment, and materials required for environmental protection during and as the result of construction operations under this Contract except for those measures set forth in other provisions of these Specifications. Environmental protection requires consideration of air, water and land, and involves noise and solid waste management as well as other pollutants.

**1.2        RELATED SECTIONS**

- A.    Section 01 50 00 – Construction Facilities and Temporary Controls

**1.3        APPLICABLE REGULATIONS**

- A.    In order to prevent environmental pollution and to provide for environmental protection arising from construction activities related to the performance of this Contract, the CONTRACTOR and his subcontractors shall comply with all applicable Federal, State, and local laws and regulations concerning environmental protection, as well as the specific requirements stated in this Section and elsewhere in the Specifications.
- B.    The CONTRACTOR shall carry out the remedial actions in accordance with the Corrective Action Work Plan.

**1.4        SUBMITTALS**

- A.    Implementation Plan

Prior to commencement of the work, the CONTRACTOR shall:

- 1.    Submit in writing his plans for implementing this Section for environmental protection as well as implementing the requirements of the Corrective Action Work Plan.
- 2.    Meet with the ENGINEER to develop mutual understandings relative to compliance with the provisions of this Section and administration of the environmental protection program.

- B.    Erosion Sedimentation Plan

- 1.    The ENGINEER shall prepare and provide a detailed erosion and sedimentation plan sufficiently in advance of construction so as not to delay initiation of work. The plan shall include location and construction details of the CONTRACTOR's proposed dikes, basins, etc. In addition, the plan shall include the CONTRACTOR's control measures for stockpile



material. No site work may commence without an approved plan. Plan should conform to Indiana Storm Water Quality Manual.

## **PART 2 PRODUCTS**

### **2.1 GENERAL**

- A. All materials shall be in accordance with the CONTRACTOR's plan for environmental protection.

### **2.2 MATERIALS**

- A. Silt Fence
- B. Hay
- C. Snow Fences
- D. Burlap

## **PART 3 EXECUTION**

### **3.1 PROTECTION OF LAND RESOURCES**

- A. General – It is intended that the land resources within the project boundaries and outside the limits of permanent work performed under this Contract be preserved in their present condition, or be restored to a condition after completion of construction, that will appear to be natural and not detract from the appearance of the project. The CONTRACTOR shall confine his construction activities to areas defined on the Drawings or in the Specifications except with written approval of the property owners and the ENGINEER.
- B. The CONTRACTOR shall maintain clean, uncontaminated roadways for use by over-the-road haul trucks to minimize the chance for contamination leaving the site.
- C. Prevention of Landscape Defacement – Limits of working areas include areas for storage of construction material, and shall be cleared in a manner which will enable satisfactory restoration and which will not affect the environment during or after the construction period. The CONTRACTOR shall not enter beyond the working limits of the working area except with written approval of the ENGINEER and OWNER.
- D. Location of Storage – The location of areas for storage of the CONTRACTOR's materials required temporarily in the performance of the work, shall be within the limits of the working area and shall require written approval of the ENGINEER prior to use. The preservation of the landscape shall be an imperative consideration in the selection of all such sites. Where temporary structures are constructed on sidehills, the ENGINEER may require cribbing to be used to obtain level foundation. Benching or leveling of earth may not be allowed, depending on the location of the proposed facility.
- E. Post-Construction Cleanup or Obliteration – The CONTRACTOR shall obliterate all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of



temporary structures, stockpiles of excess or waste materials, or any other vestiges of construction. It is anticipated that excavation, filling and plowing of roadways will be required to restore the area to near natural conditions which permit the growth of vegetation thereon.

### **3.2 PROTECTION OF WATER RESOURCES**

- A. General – The CONTRACTOR shall not pollute streams, lakes or reservoirs with fuels, oils, bitumens, calcium chloride, acids, or harmful materials. It is the responsibility of the CONTRACTOR to investigate and comply with all applicable Federal, State, County, and Municipal laws concerning pollution of rivers, streams and impounded water. All work under this Contract shall be performed in such a manner that objectionable conditions will not be created in streams through, or bodies of water adjacent to, the project area.
- B. At no time shall the CONTRACTOR pump water that has come into contact with waste to the City storm sewer, roadways, retention basins or any other waters of the state.
- C. Erosion – Surface drainage from cuts and fills within the construction limits, whether or not completed, and from borrow and waste disposal areas, shall, if turbidity producing materials are present, be held in suitable sedimentation basins or shall be graded to control erosion within acceptable limits. Temporary erosion and sediment control measures such as berms, dikes, drains, or sedimentation basins, if required to meet the above standards, shall be provided and maintained until permanent drainage and erosion control facilities are completed and operative. The area of bare soil exposed at any one time by construction operations should be held to a minimum.
- D. Spillages – At all times of the year, special measures shall be taken to prevent chemicals, fuels, oils, greases, bituminous materials, waste washings, herbicides and insecticides, and cement and surface drainage from entering public waters. Should a spillage into the public waters occur, the CONTRACTOR shall immediately notify the proper authorities. The CONTRACTOR will be responsible for any and all costs associated with the cleanup of spillages.
- E. Washing and Curing Water – Water used in embankment material processing, aggregate processing, concrete curing, foundation and concrete cleanup, and other wastewaters shall not be allowed to reenter the waterway if an increase in the turbidity of the waterway will result therefrom. At the point where this water enters the waterway, precautions must be taken to assure that no permanent damage or serious temporary damage is caused by change of the pH factor of the stream or by introduction of nutrients or oxygen-consuming materials. Chemicals shall be added to adjust pH factor, if required.
- F. Water used for dust control on the Site or moisture control of the compacted bank clay may be pumped from Trail Creek if compliant with all applicable federal, state and local Laws and Regulations. Water extraction may not exceed 100,000 gallons per day. Pump intake must be equipped with stainless steel fish diversion screen.

### **3.3 PROTECTION OF FISH AND WILDLIFE**

- A. The CONTRACTOR shall at all times perform all work and take such steps required to prevent any interference or disturbance to fish and wildlife. The CONTRACTOR will not be permitted to alter water flows or otherwise disturb native habitat adjacent to the project area which, in the opinion of the ENGINEER, are critical to fish or wildlife. Fouling or polluting of water will not be permitted.



Wash waters and wastes shall be processed, filtered, ponded, or otherwise treated prior to their release into streams or other waterways. Should polluting or fouling the water occur, the CONTRACTOR shall immediately notify the proper authorities. The CONTRACTOR will be responsible for any and all costs associated with the cleanup of polluted or fouled waters.

### **3.4 MAINTENANCE**

- A. The CONTRACTOR shall dispose of all discarded debris, aggregate samples and concrete test samples from any source whatsoever, in a manner approved by the ENGINEER. Toilet facilities shall be kept clean and sanitary at all times. Services shall be performed at such a time and in such a manner to least interfere with the operations. Services shall be accomplished to the satisfaction of the ENGINEER.
- B. The CONTRACTOR shall frequently remove materials no longer required on the site, such as excess excavated material, forms, temporary structures and similar materials and equipment so that, at all times, the site, access routes to the site and any other areas disturbed by his operations shall present a neat, orderly, workmanlike appearance.
- C. Before substantial completion inspection, the CONTRACTOR shall remove all surplus material, falsework, temporary structures, including foundations thereof, plant of any description, and debris of every nature resulting from his operations, and put the site in a neat, orderly condition; and restore all areas which have been used for storage of materials and equipment, and all areas which have been disturbed by his operations, to their original condition or to a condition satisfactory to and approved by the ENGINEER.

### **3.5 DUST CONTROL**

- A. The CONTRACTOR shall maintain all excavations, embankments, stockpiles, haul roads, temporary and permanent access roads, waste areas, borrow areas and all other work areas within or without the project boundaries free from dust which would cause a hazard or nuisance to others or contaminate surface water.
- B. The CONTRACTOR shall, at his own expense, keep dust under control at all times on all roadways and other areas adjacent to the work or on the site of the work by the use of at least once a day and at other times when directed, including after working hours, Saturdays, Sundays and holidays, of self-loading motor sweepers, vacuums, spraying water, and a combination of these methods.
- C. The CONTRACTOR shall operate in such a way as to prevent any dust emissions from extending beyond the boundaries of the Site.
- D. Approved temporary methods of stabilization consisting of motor sweepers, vacuums, spraying water, and a combination of these methods, will be permitted to control dust. Spraying water shall be repeated at such intervals so as to keep all parts of the disturbed area at least damp at all times, and the CONTRACTOR shall have sufficient suitable equipment on the job to accomplish this, if sprinkling is used. Dust control shall be performed daily as the work proceeds and whenever a dust nuisance or hazard occurs.
- E. All areas undergoing excavation, grading, filling, cutting or subject to other dust-producing activities by vehicles should be subjected to dust-inhibiting practices. The use of liquid palliatives



and penetrating asphaltic materials will not be permitted. Anchored mulch (asphaltic binders will not be permitted) shall be applied to non-traffic areas subject to blowing as a temporary treatment. Permanent vegetation shall be established as soon as possible.

### **3.6 NOISE CONTROL**

- A. The CONTRACTOR shall use every effort and means possible to minimize or eliminate noise caused by his operation which the ENGINEER may consider objectionable. The CONTRACTOR shall provide working machinery, designed to operate with the least possible noise. The CONTRACTOR is responsible for maintaining compliance with all applicable noise regulations and all State and local noise ordinances.

### **3.7 PROHIBITED CONSTRUCTION PROCEDURES**

- A. The CONTRACTOR is advised that the disposal of excess excavated material in wetlands, stream corridors, and floodplains is strictly prohibited. Any violation of this restriction by the CONTRACTOR or any person employed by him, will be brought to the immediate attention of the responsible regulatory agencies, with a request that appropriate action be taken against the offending parties. Therefore, the CONTRACTOR will be required to remove the fill at his own expense and restore the area impacted.
- B. The CONTRACTOR shall, at a minimum, be strictly prohibited from performing the following construction procedures:
  - 1. Dumping of spoil material into any stream corridor, any wetlands, any surface waters, or at unspecified locations.
  - 2. Indiscriminate, arbitrary or capricious operation of equipment in any stream corridors, any wetlands or any surface waters.
  - 3. Pumping of silt-laden water from trenches or other excavations into any surface waters, any stream corridors or any wetlands.
  - 4. Damaging vegetation adjacent to, or outside of, the disturbed areas designated in the Construction Drawings.
  - 5. Disposal of trees, brush and other debris in any stream corridors, any wetlands, any surface waters, or at unspecified locations.
  - 6. Permanent or unspecified alteration of the flow line of any stream except if specifically shown on the Drawings.
  - 7. Open burning of project debris.
  - 8. Location of storage stockpile areas in environmentally sensitive area.
  - 9. Disposal of excess or unsuitable excavation material in wetlands or floodplains even with permission of the property owner, except as specifically allowed by permit for this project.



10. Discharging silty or muddy water from demucking or dewatering operations into natural water courses.

END OF SECTION



SECTION  
01 36 00

HEALTH AND SAFETY PROVISIONS

**PART 1        GENERAL**

**4.1        SECTION INCLUDES**

- A.    Site Health and Safety Requirements for the Work to be performed for the on-site remedial actions at Karwick Nature Park.

**4.2        RELATED SECTIONS**

- A.    Section 01 35 43 – Environmental Protection
- B.    Section 31 23 16 – Excavation

**4.3        GENERAL REQUIREMENTS**

- A.    The CONTRACTOR agrees to comply with all the requirements and procedures contained in this document. The requirements and procedures are as follows:
  - 1.    The CONTRACTOR shall prepare a site and project specific Health and Safety Plan to support the safe implementation of the construction.
  - 2.    The CONTRACTOR shall be responsible to maintain a safe workplace and take all prudent environmental, health and safety precautions to protect employees, all other workers, and the public.
  - 3.    Comply with all applicable Federal, State, municipal, local, and any other applicable occupational safety and health regulations and requirements issued or imposed by any governmental authority (including, but not limited to, Title 29, Code of Federal Regulations Parts 1910 and 1926).
  - 4.    The CONTRACTOR agrees to monitor working conditions at all times during construction and, as necessary, to provide appropriate protective clothing, equipment and facilities for his personnel, and/or to establish workplace procedures to ensure their safety.
  - 5.    If, at any time, the OWNER or the ENGINEER is apprised of a safety hazard which demands immediate attention because of its high potential for harm to public travel, persons on or about the work, or public or private property, the OWNER or the ENGINEER shall have the right to order such safeguards to be erected and such precautions to be taken as necessary, and the CONTRACTOR shall comply with such orders. If, under such circumstances the CONTRACTOR does not or cannot immediately put the work into proper and approved condition, or if the CONTRACTOR or his representative is not upon the site so that he can be notified immediately of the insufficiency of safety precautions, then the OWNER may put the work into such a condition that it shall be, in his opinion, in all respects safe, and the CONTRACTOR shall pay all expenses of such labor and materials as may have been used for



this purpose by him or by the OWNER. The fact that the OWNER or the ENGINEER does not observe a safety hazard or does not order the CONTRACTOR to take remedial measures, shall in no way relieve the CONTRACTOR of the entire responsibility for any costs or claims for loss, damage or injury, by or against any party sustained on account of the insufficiency of the safety precautions taken by him or by the OWNER acting under authority of this Section.

6. It is the responsibility of the CONTRACTOR to take appropriate safety precautions to meet whether conditions of hazard may be present during the performance of the work, whether reasonably foreseeable or not. The CONTRACTOR is altered to the fact that it shall be his sole responsibility to anticipate and provide such additional safety precautions, facilities, personnel, and equipment as shall be necessary to protect life and property from whatsoever conditions of hazard are present or may be present.
7. The CONTRACTOR also agrees that the OWNER or ENGINEER may immediately stop CONTRACTOR's work if the Protection Contractor violates any applicable Federal, State, municipal or local, or any other rules regulations and requirements, or other contract terms and conditions regarding environmental safety and health.
8. The OWNER may conduct periodic inspections of CONTRACTOR operations and document violations. Documented violations will be considered in evaluation of CONTRACTOR's performance. The OWNER's inspection program in no way relieves the CONTRACTOR of the obligation to maintain its own safety program and conduct safety inspections as required by Federal, State, municipal, local and any other rules, regulations, or requirements.

#### **4.4 PERSONNEL PROTECTIVE EQUIPMENT**

- A. CONTRACTOR personnel must obtain and utilize appropriate personal protective equipment for the work performed in accordance with applicable State and Federal OSHA standards. This includes, but is not limited to, the use of eye protection, foot protection, respiratory protection, protective clothing, hearing protection, and head protection:
  1. Eye Protection – Safety eyewear meeting ANSI Z87.1 shall be worn in areas designated as "Eye Protection Required," and on all jobs where a potential injury to the eyes is possible, whether or not the area is posted. Special eye protection and/or face protection will be worn when applicable.
  2. Foot Protection – Affected employee(s) shall wear protective footwear when working in areas where there is a danger of foot injuries due to falling or rolling objects, or objects piercing the sole, and where such employee's feet are exposed to electrical hazards. Safety shoes and boot which meet the ANSI Z41 standard, shall be provided when impact and/or compression hazards exist. Soft shoes including, but not limited to, tennis shoes, athletic shoes, moccasins, sandals, and open-toed or open-heeled shoes shall not be worn.
  3. Respiratory Protection – Appropriate MSHA/NIOSH-approved respiratory protective devices must be worn when applicable State and/or Federal action levels or permissible exposure levels are exceeded. CONTRACTOR must have fully implemented a respiratory protection program meeting the requirements of Title 29, Code of Federal Regulations, Section 1910.139/1926.103, prior to issuing and using respiratory equipment. CONTRACTOR shall



supply and maintain appropriate air monitoring and respiratory protection equipment in areas expected to pose such hazards.

4. Protection Clothing – Such as suits, aprons, boots or gloves, shall be worn where there is a hazard to the body through dermal contact with chemicals, dusts, heat or other harmful agents or conditions.
5. Hearing Protection (muffs and/or plugs) – Must be worn in all areas posted to indicate high noise level or where CONTRACTOR employees are exposed to noise levels in excess of the OSHA permissible exposure limit.
6. Head Protection will meet the requirements of ANSI and be worn in all areas where there is a danger of impact to the head or hazard from falling or moving objects.
7. CONTRACTOR will issue or cause to be issued prior to commencing the job, all necessary personal protective equipment and air monitoring equipment to all its agents and employees, together with full instructions and training on the use of said equipment.
8. CONTRACTOR will meet all Federal, State, municipal, and local requirements for protective clothing and equipment. CONTRACTOR will properly supervise all its agents and employees to ensure protective clothing and equipment is used in conformance with applicable rules and regulations.
9. Site Safety Briefing – Prior to the commencement of work, a site briefing shall be conducted by each supervisor/site safety person identifying the hazards associated within the scope of work, including a review of the site safety plan.

#### **4.5 USE OF HAZARDOUS MATERIALS — HAZARD COMMUNICATION**

- A. The CONTRACTOR personnel shall not bring any hazardous substances (as defined by OSHA) onto the site premises unless accompanied by a Material Safety Data Sheets (MSDS). MSDS' must be maintained at the job site.
- B. CONTRACTOR shall ensure all containers of hazardous materials are labeled in compliance with State and Federal OSHA regulations with the product name, appropriate hazard warnings, and the name and address of the manufacturer.
- C. CONTRACTOR shall ensure its employees are trained in the safe handling and use of hazardous materials in accordance with Title 29 CFR 1910.1200 – Hazard Communication.
- D. CONTRACTOR shall ensure that all applicable employees are medically qualified (as defined by OSHA) to perform the work assigned.

## **PART 2 PRODUCTS**

Not Used



**PART 3        EXECUTION**

Not Used

END OF SECTION



SECTION  
01 45 00

**QUALITY CONTROL**

This section includes general quality control requirements. Additional quality control requirements are included in each of the individual sections of these Specifications.

**PART 1        GENERAL**

**5.1        SECTION INCLUDES**

- A.    Quality assurance and control of installation
- B.    References
- C.    Field samples
- D.    Inspection and testing laboratory services
- E.    Manufacturers' field services and reports

**5.2        RELATED SECTIONS**

- A.    Section 01 33 00 – Submittals
- B.    Section 01 45 23 – Testing Laboratory Services
- C.    Section 01 45 29 – Inspection Services

**5.3        QUALITY ASSURANCE/CONTROL OF INSTALLATION**

- A.    Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B.    Comply fully with manufacturers' instructions, including each step in sequence.
- C.    Should manufacturers' instructions conflict with Contract Documents, request clarification from ENGINEER before proceeding.
- D.    Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes, or manufacturer's specified requirements indicate higher standards or more precise workmanship.
- E.    Work is to be performed by persons qualified to produce workmanship of specified quality.
- F.    Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.



#### **5.4 REFERENCES**

- A. Conform to reference standard by date of issue current on date of Contract Documents.
- B. Should specified reference standards conflict with Contract Documents, request clarification for ENGINEER before proceeding.
- C. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

#### **5.5 FIELD SAMPLES**

- A. Install field samples at the site as required by individual specifications Sections for review.
- B. Acceptable samples represent a quality level for the work.
- C. Where field sample is specified in individual Sections to be removed when directed by the ENGINEER remove the sample and restore the area as specified.

#### **5.6 INSPECTION AND TESTING LABORATORY SERVICES**

- A. The CONTRACTOR will appoint, employ, and pay for services of an independent firm to perform inspection and testing as required by each technical specification.
- B. The independent firm will perform inspections, tests, and other services specified in individual specification Sections and as required by the ENGINEER.
- C. Reports will be submitted by the independent firm to the ENGINEER, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
- D. Cooperate with independent firm; furnish samples of materials, equipment, tools, storage and assistance as requested:
  - 1. Notify ENGINEER and independent firm 48 hours (not including Saturday, Sunday and Holidays), prior to expected time for operations requiring services.
  - 2. Make arrangements with independent firm and pay for samples and tests required for CONTRACTOR's use.
- E. Retesting required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the ENGINEER. Payment for retesting will be the responsibility of the CONTRACTOR responsible for the non-conforming work.

#### **5.7 MANUFACTURERS' FIELD SERVICES AND REPORTS**

- A. When specified in individual specification Sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of



surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance of equipment as applicable, and to initiate instructions when necessary.

- B. Individuals to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- C. Submit report in duplicate within 30 days of observation to ENGINEER for review.

**PART 2        PRODUCTS**

Not Used.

**PART 3        EXECUTION**

Not Used.

END OF SECTION



SECTION  
01 45 16

FIELD ENGINEERING

**PART 1        GENERAL**

**1.1        SECTION INCLUDES**

- A.     Quality control.
- B.     Submittals.
- C.     Project Record Documents.
- D.     Division of Surveying Responsibilities.

**1.2        RELATED SECTIONS**

- A.     Section 01 78 90 – Contract Closeout

**1.3        SUMMARY**

This section specifies administrative and procedural requirements for field-engineering services including, but not limited to, the following:

- A.     Land survey work.
- B.     Civil engineering services.

**1.4        SUBMITTALS**

- A.     Submit a certificate signed by the land surveyor or professional engineer certifying the location and elevation of improvements.
- B.     On request, submit documentation verifying accuracy of survey work.
- C.     Submit a copy of registered site drawing and certificate signed by the Land Surveyor that the elevations and locations of the work are in conformance with Contract Documents.

**1.5        SURVEY REFERENCE POINTS**

- A.     CONTRACTOR to locate and protect survey control and reference points.
- B.     Control datum for survey is National Geodetic vertical datum.
- C.     Protect survey control points prior to starting site work; preserve permanent reference points during construction.



- D. Promptly report to ENGINEER the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to ENGINEER.

## **1.6 SURVEY REQUIREMENTS**

- A. CONTRACTOR shall engage a land surveyor registered in the State of Indiana to perform all land-surveying services necessary to complete the work and determine quantities of unit cost work.
- B. ENGINEER shall engage a second land surveyor registered in the State of Indiana to perform all land-surveying services necessary to furnish Record Drawings and verify quantities of unit cost work.
- C. All work under this Contract shall be constructed in accordance with the lines and grades shown on the Construction Drawings or as directed by the ENGINEER. The OWNER will provide benchmarks with appropriate horizontal and vertical control. The CONTRACTOR shall provide such materials as templates, stakes, ranges, spikes, nails and boards, and give such assistance as may be required. Elevation of existing ground, structures and appurtenances are believed to be reasonably correct but are not guaranteed to be absolute and, therefore, are presented only as approximations. Any error or apparent discrepancy in the data shown, or omissions of data required for accurately accomplishing the stakeout survey shall be referred immediately to the ENGINEER for interpretation or correction.
- D. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
  - 1. Site improvements including stakes for grading, fill placement, slopes, and invert elevations.
  - 2. 50-foot construction grid as directed by the ENGINEER.
  - 3. The ENGINEER will supply a construction grid system that will be established by the CONTRACTOR in the field with a maximum spacing of 50 feet over the entire limits of Work. The grid system shall be established and maintained by the CONTRACTOR for the purpose of determining cut and fill quantities for payment, as well as locating work and testing by the ENGINEER. The CONTRACTOR shall establish the ground elevations at every grid point immediately after clearing and grubbing, after excavation, after compacted clay placement, after clean soil fill placement, and after final grades of topsoil and bank stabilization system installation.
  - 4. The ENGINEER shall furnish Record Drawings indicating, at a minimum, the limit of CONTRACTOR's work for each payment item, spot elevations at all construction grid point locations, contours, all drainage features and stockpile areas. The Record Drawings shall include locations and elevations of all work as directed by the ENGINEER.
  - 5. The CONTRACTOR shall provide sufficient survey to determine quantities included in requests for payment.



- E. Periodically verify layouts by same means.

## **1.7 PROJECT RECORD DOCUMENTS**

- A. CONTRACTOR shall maintain a complete and accurate log of control and survey work as it progresses.
- B. Submit Record Documents under provisions of Sections 00 90 00 – Application for Payment, 01 33 00 – Submittals, and 01 78 90 – Contract Closeout.
- C. Record Drawings shall be prepared at a scale of 1" = 50' with a 1-foot contour interval, unless otherwise directed by the ENGINEER. All Record Drawings shall be signed and sealed by a Surveyor licensed in the State of Indiana. The ENGINEER is to submit an AutoCAD 2018-compatible DWG file for each Record Drawing required.

## **1.8 SURVEYS FOR MEASUREMENT AND PAYMENT**

- A. Perform surveys to determine quantities of unit cost work, including control surveys to establish measurement reference lines. Notify ENGINEER prior to starting work.
- B. CONTRACTOR shall sign surveyor's field notes or keep duplicate field notes and shall calculate and certify quantities for payment purposes.
- C. ENGINEER shall verify quantities for payment purposes.

## **PART 2 PRODUCTS**

Not Used.

## **PART 3 EXECUTION**

Not Used.

END OF SECTION



SECTION  
01 45 23

TESTING LABORATORY SERVICES

**PART 1        GENERAL**

**1.1        SECTION INCLUDES**

- A.     Selection and Payment
- B.     Quality Assurance
- C.     Contractor Submittals
- D.     Laboratory Responsibilities
- E.     Laboratory Reports
- F.     Contractor Responsibilities
- G.     Certificates of Manufacturers

**1.2        RELATED SECTIONS**

- A.     Section 01 45 00 – Quality Control
- B.     Section 01 45 29 – Inspection Services
- C.     Section 01 78 90 – Contract Closeout

**1.3        REFERENCES**

- A.     ANSI/ASTM D3740 – Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- B.     ANSI/ASTM E329 – Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction.

**1.4        SELECTION AND PAYMENT**

- A.     The OWNER shall employ and pay for services of an independent testing laboratory to perform specified testing as required to be performed by the ENGINEER by each technical specification or as elected to be performed by the ENGINEER or OWNER.
- B.     Employment of testing laboratory shall in no way relieve CONTRACTOR of obligation to perform work in accordance with requirements of Contract Documents.



## **1.5 QUALITY ASSURANCE**

- A. Comply with requirements of ANSI/ASTM E329 and ANSI/ASTM D3740.
- B. Laboratory – Authorized to operate in state where project is located.
- C. Testing Equipment – Calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards (NBS) or accepted values of natural physical constants.

## **1.6 CONTRACTOR SUBMITTALS**

- A. Prior to start of work, CONTRACTOR shall submit the required samples to the ENGINEER as required in the individual specifications within these Contract Documents.

## **1.7 LABORATORY RESPONSIBILITIES**

- A. Test samples of materials submitted by CONTRACTOR.
- B. Provide qualified personnel. Cooperate with ENGINEER and CONTRACTOR in performance of services.
- C. Perform specified inspection, sampling, and testing of Products in accordance with specified standards.
- D. Ascertain compliance of materials and mixes with requirements of Contract Documents.
- E. Promptly notify ENGINEER and CONTRACTOR of observed irregularities or non-conformance of work or products.
- F. Perform additional inspections and tests required by ENGINEER.

## **1.8 LABORATORY REPORTS**

- A. After each inspection and test, within 48 hours, submit electronic copy (in PDF format) of laboratory report to ENGINEER and to OWNER. Laboratory results may also be submitted in XLSX or CSV format.
- B. Include:
  - 1. Date issued
  - 2. Project title and number
  - 3. Name of inspector
  - 4. Date and time of sampling or inspection
  - 5. Identification of product and Specifications Section
  - 6. Location in the project



7. Type of inspection or test
8. Date of test
9. Results of tests
10. Conformance with Contract Documents

C. When requested by ENGINEER, provide interpretation of test results.

## **1.9 CONTRACTOR RESPONSIBILITIES**

- A. Deliver to laboratory at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.
- B. Cooperate with laboratory personnel, and provide access to the work.
- C. Provide incidental labor and facilities to provide access to work to be tested, to obtain and handle samples at the site or at source of products to be tested, to facilitate tests and inspections, storage and curing of test samples.
- D. Notify ENGINEER and laboratory 48 hours (not including Saturday, Sunday, or Holidays), prior to expected time for operations requiring inspection and testing services.

## **1.10 CERTIFICATES OF MANUFACTURERS**

- A. For any materials that are normally tested in the shop by the manufacturer, the CONTRACTOR shall furnish the ENGINEER certified records of physical, chemical and other pertinent tests, and/or certified statements from the manufacturer that the materials have been manufactured and tested in conformity with the Specifications. Where such a small quantity of material is required as to make physical tests or chemical analyses impractical, a certificate from the manufacturer stating the results of such tests or analyses of similar materials, which were concurrently produced, may, at the discretion of the ENGINEER, be considered as the basis for the acceptance of such materials.

## **PART 2 PRODUCTS**

Not Used.

## **PART 3 EXECUTION**

Not Used.

END OF SECTION



SECTION  
01 45 29

INSPECTION SERVICES

**PART 1        GENERAL**

**1.1        SECTION INCLUDES**

- A.    Related Sections
- B.    Requirements

**1.2        RELATED SECTIONS**

- A.    Section 01 45 00 - Quality Control
- B.    Section 01 45 23 - Testing Laboratory Services

**1.3        REQUIREMENTS**

- A.    Inspection – The OWNER contemplates and the CONTRACTOR agrees to a thorough inspection of the work, including all labor performed and materials furnished, delivered, or intended to be used in the work, and including manufacture, preparations and testing at such times as the OWNER's representatives or the ENGINEER desire. The CONTRACTOR shall not use any material which has not been inspected or tested, and accepted. The CONTRACTOR shall keep the ENGINEER advised of the progress of the work away from the site requiring inspection or witnessing of tests, so that arrangements may be made for inspection at the proper time.
  - 1.    Inspection, tests, or acceptance of any material prior to shipment shall not be deemed as a final acceptance of the materials. The ENGINEER may inspect or require tests or analyses of any portion of the materials at any time after delivery to the site either before or after installation, and any material which is found to be defective or which does not otherwise conform to the requirements of the Contract Documents will be rejected and shall be removed forthwith from the site, as provided in the Contract.
  - 2.    The performance of such inspections and acceptance of the work by the OWNER's representatives or the ENGINEER will in no way release the CONTRACTOR of his complete responsibility for construction means, methods and techniques, and for performing the work in accordance with the Contract Documents.
- B.    Significance of Tests - Test results shall be binding on both the CONTRACTOR and the OWNER, and shall be considered irrefutable evidence of compliance or non-compliance with the Specification requirements, unless supplementary testing shall prove, to the satisfaction of the ENGINEER, that the initial samples were not representative of actual conditions.
- C.    Supplementary and Other Testing - Nothing shall restrict the CONTRACTOR from conducting tests he may require. Shall the CONTRACTOR at any time request the OWNER to consider



such test results, the test reports shall be certified by an independent testing laboratory acceptable to the OWNER. Testing of this nature shall be conducted at the CONTRACTOR's expense.

**PART 2        PRODUCTS**

Not Used.

**PART 3        EXECUTION**

Not Used.

END OF SECTION



SECTION  
01 50 00

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

**PART 1      GENERAL**

**2.1      SECTION INCLUDES**

- A.    Temporary Utilities - Electricity, lighting, heat, ventilation, phone service, water, and sanitary facilities.
- B.    Temporary Controls - Barriers, enclosures and fencing, protection of the work, and water control.
- C.    Construction Facilities - Access roads, parking, progress cleaning, project signage, and temporary buildings.

**2.2      RELATED SECTIONS**

- A.    Section 01 36 00 – Health and Safety Provisions
- B.    Section 01 35 43 – Environmental Protection
- C.    Section 01 78 90 – Contract Closeout
- D.    Section 31 11 00 – Clearing and Grubbing

**2.3      TEMPORARY OFFICE(S)**

- A.    The CONTRACTOR shall be responsible for providing temporary office space for his use.

**2.4      TEMPORARY ELECTRICITY**

- A.    The CONTRACTOR shall be responsible for providing temporary electric power for construction if necessary. He shall coordinate requirements of other contractors, arrange for payments, and contact the electric utility to provide the service for the temporary power.
- B.    The CONTRACTOR shall install a meter and pay for all expenses for electrical service used during the course of the work.

**2.5      PHONE SERVICE**

- A.    CONTRACTOR shall be accessible by cell phone and pay for all expenses for his cell phone service used during the course of the work. CONTRACTOR shall utilize a wireless telecommunication provider with adequate coverage/reception to transmit uninterrupted calls to/from the Site.



## **2.6 TEMPORARY WATER SERVICE**

- A. CONTRACTOR shall provide temporary water service for construction purposes, dust control, sanitary facilities, fire protection, and for cleaning.
- B. Potable water shall be furnished for construction personnel by portable containers.
- C. Water service shall be protected from freezing, and the service shall be extended and relocated as necessary to meet temporary water requirements.
- D. The CONTRACTOR shall install a meter and pay for all expenses associated with temporary water service during the course of the work, including furnishing all necessary permits and fees required for temporary water service.
- E. Comply with all applicable codes and arrange for all necessary inspections and approvals.
- F. Upon completion of all work, the CONTRACTOR shall disconnect and remove all temporary connections and fixtures.

## **2.7 TEMPORARY SANITARY FACILITIES**

- A. CONTRACTOR shall provide at the site suitable enclosed toilet facilities for the use of construction personnel. The CONTRACTOR shall observe and enforce all sanitary regulations and maintain satisfactory sanitary conditions around and on all parts of the work.
- B. Adequate washing facilities shall be provided for the construction personnel.
- C. CONTRACTOR shall maintain service and clean and disinfect facilities in a satisfactory manner and enforce proper use of the sanitary facilities.
- D. CONTRACTOR shall be subject to a fine and prosecution if any human excrement is deposited in or around the construction site.
- E. The CONTRACTOR shall pay for all expenses associated with temporary sanitary facilities during the course of the work, including furnishing all necessary permits and fees required for temporary sanitary facilities.
- F. Comply with all applicable codes and arrange for all necessary inspections and approvals.

## **2.8 FIRST-AID FACILITIES AND ACCIDENTS**

- A. First Aid Facilities
  - 1. The CONTRACTOR shall provide, at the site, such equipment and facilities as are necessary to supply first aid to any of his personnel who may be injured in connection with the work.
- B. Accident



1. The CONTRACTOR shall within 24 hours report in writing to the OWNER and ENGINEER all accidents and whatsoever arising out of, or in connection with, the performance of the work, whether on or adjacent to the site, which cause death, personal injury or property damage, giving full details and statements of witnesses.
2. If death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the OWNER and the ENGINEER.
3. If any claim is made by anyone against the CONTRACTOR or a subcontractor on account of any accidents, the CONTRACTOR shall promptly report the facts in writing to the ENGINEER, giving full details of the claim.

## **2.9 WATER CONTROL**

- A. Grade site to drain. Maintain excavations free of water, unless infeasible due to the water level of Trail Creek. Provide, operate, and maintain pumping equipment.
- B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
- C. Provide temporary control of surface water, stormwater runoff, and discharge from pumping in accordance with CONTRACTOR's approved soil erosion and sediment control plan.

## **2.10 SECURITY**

- A. Provide security and facilities to protect work, and existing facilities, and OWNER's operations from unauthorized entry, vandalism, or theft.
- B. Coordinate with OWNER's security program.
- C. Furnish security during the course of the work.

## **2.11 ACCESS ROADS**

- A. Traffic into and out of the project area shall use the existing north Karwick Road entrance. Except for passenger vehicles, construction traffic into and out of the site using the existing south Karwick Road entrance (NIPSCO property) shall be prohibited unless approved by NIPSCO and OWNER. Additional access roads from Karwick Road to the site may be created with the OWNER's approval.
- B. Maintain construction entrance to project area as shown in the Construction Drawings.
- C. Provide and maintain access to fire hydrants, free of obstructions.
- D. Provide means of removing mud from vehicle wheels before entering public and private streets. Clean all mud and debris from construction traffic at no additional expense to OWNER. Comply with all State and local regulations.



- E. Designated existing on-site roads may be used for construction traffic, as directed by OWNER and ENGINEER.

## **2.12 PARKING**

- A. Provide temporary gravel surface parking areas to accommodate construction personnel.
- B. When site space is not adequate, provide additional off-site parking.
- C. Do not allow vehicle parking on existing pavement.
- D. Designate 1 parking space for the OWNER and one for the ENGINEER.

## **2.13 PROGRESS CLEANING**

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove waste materials, debris, and rubbish from site weekly and dispose off-site.

## **2.14 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS**

- A. Remove temporary above grade or buried utilities, equipment, facilities, materials, prior to Final Application for Payment inspection.
- B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

## **PART 2 PRODUCTS**

Not Used.

## **PART 3 EXECUTION**

Not Used.

END OF SECTION



SECTION  
01 60 00

MATERIAL AND EQUIPMENT

**PART 1        GENERAL**

**3.1        SECTION INCLUDES**

- A.    Products
- B.    Transportation and Handling
- C.    Storage and Protection
- D.    Substitutions

**3.2        RELATED SECTIONS**

- A.    Document – Instructions to Bidders: Product options and substitution procedures.

**3.3        PRODUCTS**

- A.    Products – Means new material, machinery, components, equipment, fixtures, and systems forming the work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the work. Products may also include existing materials or components required for reuse.
- B.    Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- C.    Provide interchangeable components of the same manufacturer, for similar components.

**3.4        TRANSPORTATION AND HANDLING**

- A.    Transport and handle products in accordance with manufacturer's instructions.
- B.    Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.
- C.    Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

**3.5        STORAGE AND PROTECTION**

- A.    Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight, climate controlled enclosures.
- B.    For exterior storage of fabricated products, place on sloped supports, above ground.



- C. Provide off-site storage and protection when site does not permit on-site storage or protection.
- D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.
- E. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- F. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- G. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

### **3.6 SUBSTITUTIONS**

- A. Refer to Section 00 72 00 – Standard General Conditions, Article 6, Paragraph 6.05 for general substitution conditions and procedures.
- B. ENGINEER will consider requests for Substitutions only within 15 days after date of Owner-Contractor Agreement.
- C. Substitutions may be considered when a product becomes unavailable through no fault of the CONTRACTOR.
- D. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- E. A request constitutes a representation that the CONTRACTOR:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product. The CONTRACTOR shall furnish in writing along with his request, a detailed comparison of the substituted product to the specified product showing the substituted product's ability to meet or exceed all performance criteria of the originally specified product.
  - 2. Will provide the same warranty for the Substitution as for the specified product.
  - 3. Will coordinate installation and make changes to other work which may be required for the work to be complete with no additional cost to OWNER.
  - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
  - 5. Will reimburse OWNER for ENGINEER's review and/or redesign services and expenses.
- F. Substitution will not be considered unless all conditions in Paragraph D above are met.



G. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

H. Substitution Submittal Procedure:

1. Submit three (3) copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.
3. The ENGINEER will notify CONTRACTOR, in writing, of decision to accept or reject request.

**PART 2        PRODUCTS**

Not Used.

**PART 3        EXECUTION**

Not Used.

END OF SECTION



SECTION  
01 78 90

CONTRACT CLOSEOUT

**PART 1        GENERAL**

**4.1        SECTION INCLUDES**

- A.    Closeout Procedures
- B.    Final Cleaning
- C.    Project Record Documents

**4.2        RELATED SECTIONS**

- A.    Section 01 45 16 – Field Engineering
- B.    Section 01 50 00 – Construction Facilities and Temporary Controls

**4.3        CLOSEOUT PROCEDURES**

- A.    Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for ENGINEER's inspection.
- B.    Provide submittals to ENGINEER and OWNER that are required by governing or other authorities.
- C.    Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

**4.4        FINAL CLEANING**

- A.    Execute final cleaning prior to final inspection.
- B.    Clean site; sweep paved areas, rake clean landscaped surfaces.
- C.    Remove waste and surplus materials, rubbish, and construction facilities from the site.

**4.5        PROJECT RECORD DOCUMENTS**

- A.    The following Project Record Documents will be submitted to the ENGINEER:
  - 1.    Electronic Construction Drawings with as-built modifications recorded. Drawings to be in format that allows for upload to GIS system.
  - 2.    Specifications



3. Addenda
  4. Change Orders and other Modifications to the Contract
  5. Reviewed shop drawings, product data, and samples
  6. Operations and maintenance manuals
  7. Training turnover from CONTRACTOR to OWNER
- B. Specifications – Legibly mark and record at each product section description of actual products installed, including the following:
1. Substitutions or alternates utilized.
  2. Changes made by Addenda and Modifications.
- C. Construction Drawings – Legibly mark each item to record actual construction including:
1. Requirements as noted in Section 01 45 16 – Field Engineering.
  2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
  3. Field changes of dimension and detail.
  4. Details not on original Construction Drawings.
- D. Delete Engineer title block and seal from all documents.
- E. Submit documents to ENGINEER within 14 days of the Substantial Completion Inspection.

**PART 2        PRODUCTS**

Not Used.

**PART 3        EXECUTION**

Not Used.

END OF SECTION



SECTION  
26 01 01

BASIC ELECTRICAL REQUIREMENTS

**PART 1        GENERAL**

**1.1        SECTION INCLUDES**

- A.    Scope of Electrical Contractor's work
- B.    Division of Responsibility

**1.2        RELATED SECTIONS**

- A.    Section 01 60 00 – Material and Equipment
- B.    Section 00 72 00 – Standard General Conditions

**1.3        SCOPE OF WORK**

- A.    CONTRACTOR shall be responsible for supply, labor, materials, electrical engineering, and Michigan City licensing associated with completing all electrical aspects of the work including hiring of the Electrical Contractor if the CONTRACTOR cannot self-perform the work.
- B.    Furnish and install the control panel, cable, conduit, fittings, etc. as shown and as specified in the Construction Drawings.
- C.    Coordinate with local power utility and install transformer and meter as necessary to supply power for the project.
- D.    Furnish all power and signal distribution and service facilities, and conduit, cable and wiring for power, instrumentation and controls systems.
- E.    Supply and install heat trace on all above ground piping, valves, fittings, etc.
- F.    The Electrical Contractor will be required to provide Control Panel shop drawings including details of the enclosure, hardware configuration and wiring diagrams. The Electrical Contractor will also update the drawings based on as-built conditions.
- G.    Perform all work in accordance with the Sanitary District of Michigan City Standard Lift Station Notes.

**1.4        COORDINATION OF WORK**

- A.    The Electrical Contractor shall coordinate installation of all conduit with the CONTRACTOR. Electrical conduit may be placed in a common trench with the gravity drain line(s) and forcemain where appropriate.



## **1.5 REFERENCES**

- A. ANSI/NFPA 70 – National Electrical Code
- B. Local Electrical Codes.

## **1.6 SUBMITTALS**

- C. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.
- D. Submit an Operations and Maintenance (O&M) manual for all materials and equipment supplied and installed for the project.
- E. Mark dimensions and values in units to match those specified.

## **1.7 REGULATORY REQUIREMENTS**

- A. Conform to applicable Local Codes and Ordinances.
- B. Electrical: Conform to NFPA 70.
- C. Obtain permits and request inspections from authority having jurisdiction.
- D. Pursuant to Sec. 22-691 of Michigan City Municipal Code, an electrical contractor and/or subcontractor license must be obtained from the city licensing board.

## **1.8 PROJECT/SITE CONDITIONS**

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions.
- B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of OWNER before proceeding.
- C. CONTRACTOR shall comply with the requirements of the Construction SWPPP.

## **PART 2 PRODUCTS**

### **2.1 GENERAL**

- A. Electrical equipment, panels and components, shall be of the same manufacture, series, class, and model number as the unit used for the same application for the most recent similar facility, unless specified otherwise on the Construction Drawings or in this Specification.
- B. Substitutions by the Electrical Contractor shall be considered in accordance with the same conditions and procedures applicable to the CONTRACTOR. See Section 01 60 00 and Section 00 72 00, Article 6, Paragraph 6.05.



## **2.2 SITE VISIT BEFORE BIDDING**

- A. Contractors are required to visit the site before bidding to fully understand the existing electrical supply situation and project needs.

## **PART 3 EXECUTION**

Not Used

END OF SECTION



SECTION  
31 11 00

CLEARING AND GRUBBING

**PART 1        GENERAL**

**1.1        SECTION INCLUDES**

- A.    The CONTRACTOR shall furnish all labor, materials, equipment, tools and appurtenances required to complete the work of clearing, grubbing, tree removal, and topsoil stripping of the work site as shown, specified, or required.

**1.2        RELATED SECTIONS**

- A.    Section 31 23 16 – Excavation
- B.    Section 31 20 01 – Waste Excavation

**1.3        REGULATORY REQUIREMENTS**

- A.    Conform to applicable Federal, State, and local laws and regulations concerning the cutting of trees, disposal of debris, as well as the specific requirements stated in this Section and elsewhere in the Specifications. No burning debris on-site.
- B.    Coordinate clearing work with utility companies.

**PART 2        PRODUCTS**

**2.1        MATERIALS**

- A.    None under this Section

**PART 3        EXECUTION**

**3.1        CLEARING, GRUBBING AND TREE REMOVAL**

- A.    Trees considered habitat for Indiana bats shall only be cut between October 15 and March 31.
- B.    No clearing, grubbing, tree removal or stripping of topsoil shall commence until the CONTRACTOR has staked out the proposed work, except for the work that may be required to complete the stakeout survey.
- C.    Except as otherwise directed, the CONTRACTOR shall clear and grub all objectionable material such as trees, stumps, brush, shrubs and roots, within the limits of clearing as required by the construction. The trees and branches shall be chipped by the CONTRACTOR, and these chips and the whole stumps shall be disposed of off-site by the CONTRACTOR to the OWNER's Hitchcock Road facility located at 1021 North 1100 West, Michigan City, Indiana 46360.



- D. Areas outside the limits of clearing shall be protected. No equipment or materials shall be stored in or allowed to damage these areas.
- E. Materials removed from the Site as part of the clearing and grubbing activities shall be treated as contaminated materials and disposed of as required by the Corrective Action Work Plan.

END OF SECTION



SECTION  
31 20 01

WASTE EXCAVATION

**PART 1        GENERAL**

**1.1      SECTION INCLUDES**

- A.    The CONTRACTOR shall furnish all labor, materials, equipment, tools and appurtenances required to complete the work of properly disposing of all waste materials during and as the result of the construction operations under this Contract, as specified or required.

**1.2      RELATED SECTIONS**

- A.    Section 31 11 00 – Clearing and Grubbing
- B.    Section 31 23 16 – Excavation
- C.    Section 31 23 23 – Clean Soil Fill

**1.3      APPLICABLE REGULATIONS**

- A.    In order to prevent environmental pollution arising from the construction activities related to the performance of this Contract, the CONTRACTOR and his subcontractors shall comply with all applicable Federal, State, and local laws and regulations concerning waste material disposal, as well as the specific requirements stated in this Section and elsewhere in the Specifications.
- B.    The CONTRACTOR is advised that the disposal of excess excavated material in wetlands, stream corridors, and plains is strictly prohibited, excluding the designated Excavated Waste Fill Area in the Construction Drawings. Any violation of this restriction by the CONTRACTOR or any person employed by him will be brought to the immediate attention of the responsible regulatory agencies, with a request that appropriate action be taken against the offending parties. Therefore, the CONTRACTOR will be required to remove the fill at his own expense and restore the area impacted.

**PART 2        PRODUCTS**

Not Used

**PART 3        EXECUTION**

**3.1      GENERAL**

- A.    If any waste or surplus material is dumped in unauthorized areas, the CONTRACTOR shall remove the material and restore the area to the condition of the adjacent undisturbed area. If necessary, contaminated ground shall be excavated, properly disposed of, and replaced with suitable fill material, compacted and finished with topsoil, all at the expense of the CONTRACTOR. The CONTRACTOR is responsible for any fines associated with improper disposal of waste material.



- B. No materials shall be burned at the site.
- C. The Excavated Waste Fill Area must be covered with clean soil or tarps at the end of each day of work and while work is not being performed. Waste cover material must be adequately secured to withstand adverse weather conditions.
- D. The CONTRACTOR shall ensure that no uncovered waste piles are visible from Karwick Road throughout construction (i.e. the eastern and portions of the north and south sides of the waste pile needs to be covered immediately so exposed waste is not visible from Karwick Road).

END OF SECTION



SECTION  
31 23 16

EXCAVATION

**PART 1        GENERAL**

**1.1        SECTION INCLUDES**

- A.    The CONTRACTOR shall furnish all labor, materials, equipment, tools and appurtenances required to complete the work of excavation, disposal of contaminated materials, and other related and incidental work within the designated area and as required for the construction of other work, as shown, specified or required.
- B.    The CONTRACTOR shall dispose of excavated material in accordance with Section 31 23 23 of these Specifications.
- C.    The CONTRACTOR shall locate all existing utilities in work areas prior to commencing any excavation activities.

**1.2        RELATED SECTIONS**

- A.    Section 31 23 23 – Clean Soil Fill
- B.    Section 31 20 01 – Waste Excavation

**1.3        DEFINITIONS**

- A.    Excavation shall mean the removal from place of all materials and shall include existing waste, soil, debris, structures above and below ground, rock, pavements, topsoil, demolition waste material, boggy waste, rubbish, tree stumps, boulders, logs, ashes, cinders or organic material such as peat, humus or organic silt.

**1.4        PROTECTION OF PEOPLE AND PROPERTY**

- A.    The CONTRACTOR shall plan and conduct his operations so as to prevent damage to existing structures, safeguard people and property, minimize traffic inconvenience, protect the structures to be installed, and provide safe working conditions.
- B.    Excavations, except as specified hereinafter, shall be adequately shored and braced. Where the installation of shoring is impractical or might cause damage, as a result of, but not limited to, vibration, settlement or lateral movement, the CONTRACTOR shall utilize other methods.
- C.    Excavation may be made without shoring and bracing within the limitations and requirements of the governmental agencies having jurisdiction, provided that:
  - 1.    Hazards, such as described hereinbefore, do not exist in the proximity of the excavation.
  - 2.    Work is not in streets or other paved, landscaped or improved areas.



3. Work can be restricted to the land provided for the CONTRACTOR's use.
  4. Shoring and bracing are not specifically required by the Contract Documents.
  5. Stability against cave-in, slide, or collapse can be provided by proper sloping or benching of excavation walls according to OSHA standards for Type C soil as determined by the CONTRACTOR.
  6. Any review or comments by the ENGINEER in connection with excavation safety shall not relieve the CONTRACTOR of his responsibility arising from the excavation.
- D. In cases where excavation without shoring and bracing is not permissible solely because of protection of workmen, trench boxes may be used. Such use shall be certified by a Professional Engineer retained by the CONTRACTOR.
- E. The CONTRACTOR shall not stockpile any material without the ENGINEER's approval.
- F. Stockpiles that are approved by the ENGINEER shall be carefully placed and the surrounding area shall be protected by placement of hay or straw bales, or an equivalent erosion control structure in accordance with the OWNER's and State of Indiana's erosion and sediment control guidelines.

## **PART 2 PRODUCTS**

Not Used

## **PART 3 EXECUTION**

### **3.1 LIMITS OF EXCAVATION**

- A. Excavation shall be carried to the dimensions indicated, specified or required or as directed by the ENGINEER to provide sufficient clearance for the construction and inspection of the structure to be installed.
- B. The CONTRACTOR shall perform excavation in a manner that allows for the grid sampling and testing of the Remediation Area soils by the ENGINEER. If testing indicates additional soil is required to be removed below the excavation elevations shown on the plans, the ENGINEER shall direct the CONTRACTOR as to the limits and depths of excavation.
- C. If the reaches soil (native or otherwise) prior to reaching the excavation elevations shown on the Drawings, and visual observations suggest that the soil may not be contaminated, the CONTRACTOR shall stop excavation activities in the area until sampling and testing is performed on the material. If testing indicates that the soil is not contaminated, excavation may cease in the area represented by the testing results as directed by the ENGINEER.

### **3.2 STORAGE AND DISPOSAL**

- A. Excavated material shall be placed in the designated Excavated Waste Fill Area, in accordance with Section 31 20 01 and the Corrective Action Work Plan. Clean excavated material may be



stockpiled and proposed for clean soil fill if tested in accordance with Section 31 23 23 and approved by the ENGINEER.

### **3.3 EXCAVATION INSTRUCTIONS**

- A. No excavation shall commence until the CONTRACTOR has staked out and surveyed the proposed work.
- B. Following excavation for swales, concrete structures, outlets, outfalls, pipes, etc., the CONTRACTOR shall regrade and add compacted fill as needed in order to achieve required surface for placement of materials as shown in the Plans. All visible sharp protruding objects shall be removed.

### **3.4 FIELD QUALITY CONTROL**

- A. The depth and limit of excavation will be in accordance with these Specifications and the ENGINEER's direction and will be verified during the course of excavation by the ENGINEER.

END OF SECTION



SECTION  
31 23 19

DEWATERING

**PART 1        GENERAL**

**1.1        SECTION INCLUDES**

- A. The CONTRACTOR shall furnish all labor, materials, equipment, tools and appurtenances required to complete and maintain the work of lowering and control of groundwater levels, hydrostatic pressures, and surface water to permit all excavations, muck excavations and construction to be performed as shown, specified or required. The control of all surface water, temporary drainage, ice, and snow, shall be considered as part of this work. The CONTRACTOR shall correct all damage resulting from inadequacy of the dewatering system or from flooding of the construction site from other causes.

**1.2        RELATED SECTIONS**

- A. Section 31 23 16 – Excavation
- B. Section 31 23 23 – Clean Soil Fill

**1.3        SUBMITTALS**

- A. Prior to starting the work, the CONTRACTOR shall submit a plan of the proposed dewatering systems prepared by a specialist having at least 5 years' experience in the field of dewatering. The dewatering shall be coordinated with the shoring and bracing, and other excavation work. Any review or comments by the ENGINEER shall not relieve the CONTRACTOR of his responsibility for dewatering.

**PART 2        PRODUCTS**

**1.4        MATERIALS**

- A. Materials shall conform to those included in the CONTRACTOR's plan for dewatering

**PART 3        EXECUTION**

**1.5        REQUIREMENTS**

- A. The CONTRACTOR shall comply with the following minimum requirements for dewatering:
  - 1. Trail Creek water level will vary based on season and weather conditions. The static water level within the excavation area shall be drawn down as necessary to maintain the undisturbed state of the foundation soils and allow the installation of the structure and placement of backfill to the required density.



2. The pumping water well shall be provided with filters to prevent loss of fine materials. Water that is pumped out shall be passed through a sedimentation device before discharging to natural drainage courses.
3. The system used shall not cause settlement damage to adjacent structures. The CONTRACTOR shall carry out the work by the use of other methods which will not endanger adjacent structures; all such work shall be done at the CONTRACTOR's expense. The CONTRACTOR shall be responsible for correcting, as necessary, any adverse effects his dewatering may have on existing buildings, wells, utilities, and water courses at no additional cost to the OWNER.
4. Pumping shall be carefully controlled. The CONTRACTOR shall observe the elevation of the groundwater in the excavation and shall control the pumping as necessary.
5. The CONTRACTOR shall provide sufficient standby equipment for immediate operation. This equipment shall be capable of maintaining dewatering on a continuous basis in the event that all of, or part of, the system should become inadequate or fail, including failure by a power outage.
6. The release of groundwater to its static level shall be performed in a manner as to maintain the undisturbed state of the soils, prevent disturbance of the backfill and prevent flotation or movement of the structures.
7. There shall be NO discharge of silty, muddy or polluted water from construction or dewatering operations to a natural water course or wetland. The CONTRACTOR shall ensure that all waters reaching existing water courses meet or exceed the existing quality of the water course. To allow sediment to settle out of water that interferes with construction before such water enters any streams or ponds, dewatering operations shall direct pumpage as far away from such areas as practical. Care should be taken not to damage or kill vegetation by excessive watering or by damaging silt accumulation in the discharge area.
8. The CONTRACTOR is responsible for all permits and approvals associated with construction dewatering and temporary surface water control.

END OF SECTION



SECTION  
31 23 23  
CLEAN SOIL FILL

**PART 1        GENERAL**

**1.1        SECTION INCLUDES**

- A.    The CONTRACTOR shall procure an off-site borrow source to obtain the clean soil fill (sand) for use in this project. The CONTRACTOR shall verify that off-site borrow soil meets applicable remedial objectives before it is brought to the Site for use as backfill or clean soil fill. This may require sampling and analyses for potential contaminants.
- B.    The work specified includes all fill required to achieve the final restoration grades as shown on the Construction Drawings.

**1.2        RELATED SECTIONS**

- A.    Section 01 45 16 - Field Engineering
- B.    Section 01 45 00 - Quality Control
- C.    Section 31 23 16 – Excavation
- D.    Section 31 23 25 - Topsoil
- E.    Section 31 20 01 – Waste Excavation

**1.3        DEFINITION**

- A.    Backfill or clean soil fill shall consist of furnishing material and placing the clean sand material over the excavated waste areas as shown on the Drawings.

**1.4        PROTECTION OF PEOPLE AND PROPERTY**

- A.    Protection of people and property shall conform to the requirements of 31 23 16 – Excavation

**1.5        SUBMITTALS**

- A.    The CONTRACTOR shall investigate, sample and analyze proposed borrow soil for use as backfill at a frequency of not less than one sample per 5,000 cubic yards. The CONTRACTOR shall submit results of testing of the soil materials to the ENGINEER for approval prior to transporting the material to the site. The testing shall be performed in accordance with Article 2.2 below.
- B.    The material proposed shall meet the requirements of Part 2 below.



## **PART 2        PRODUCTS**

### **2.1        MATERIALS — GENERAL**

- A. All backfill and clean soil fill materials, unless otherwise specified, shall consist of suitable selected and approved clean soil. The clean soil fill shall be a sandy soil material and shall have a USGS classification as sand.
- B. No frozen earth shall be used for backfill or clean soil fill. All fill materials shall be free from all perishable and objectionable materials.
- C. All fill materials shall be natural soil, not containing deleterious material, organic material, refuse, rubble, muck, metal, wood, etc., and no particle greater than 3 inches in size can be used.
- D. The top 6 inches of the fill required to meet the restoration grades shall be tracked in and graded but not compacted to allow a rooting zone for the vegetation.
- E. All required fill materials shall be substantially free from organic materials, wood, trash, and other objectionable materials which may be compressible or which cannot be properly compacted. It shall not contain granite blocks, broken concrete, masonry rubble, or other similar materials. It shall have physical properties such that it can be readily spread and compacted to the specified permeability and/or density. Snow, ice, and frozen soil shall not be permitted.
- F. Clean excavated soil from the bank, if approved by the ENGINEER and meeting the requirements of this Section of the Specifications, may be stockpiled to allow for drying and use as clean soil fill. An existing stockpile of general soil, designated in the Construction Drawings, may be used as fill. Clean excavated soil and existing stockpile soil must each meet the testing requirements specified in this Section.
- G. Additional materials used as fill shall be provided by the CONTRACTOR from an off-site borrow source. The soil to be used shall be tested by the CONTRACTOR with the following tests: grain size, Atterberg limits, modified Proctor, and natural moisture content. Additionally, the CONTRACTOR shall not place fill prior to the completion of testing, and only after testing with the approval of the ENGINEER. Soil from a new source location shall not be included in the work prior to the written acceptance of testing by the ENGINEER. Depending on the results, the ENGINEER shall accept or reject the soil or require further testing. The CONTRACTOR shall not proceed with construction using this material, prior to acceptance by the ENGINEER. Should unstable soils be encountered, torvane and pocket penetrometer testing, or grab samples and a gradation analysis may be performed by the ENGINEER, and no further material shall be placed in the area in question without the approval of the ENGINEER.
- H. The CONTRACTOR is to designate the intended source facility(ies) for the fill material required to be provided by these Specifications. The CONTRACTOR is to provide a copy of the valid permit(s) and certification(s) by the holder of the permit that adequate fill quantities exist.

### **2.2        TESTING**

- A. The CONTRACTOR shall provide the ENGINEER access to obtain samples of any soils proposed for fill are structurally or otherwise appropriate. This access is to be provided for each individual



source and at a frequency of not less than 1 sample per 5,000 cubic yards. The cost of this testing shall be the responsibility of the CONTRACTOR. This evidence shall include, but not necessarily be limited to, the following testing:

1. Gradation D7928 & D6913 (formerly D422)
  2. Atterberg Limits ASTM D4318
  3. Classification ASTM D2487
- B. The CONTRACTOR shall submit the above evidence along with a minimum of 100 pounds of each different soil and each soil from different sources which are proposed for use in clean fill.
- C. The CONTRACTOR shall not proceed with backfill placement until the ENGINEER has approved the proposed material.
- D. If in the opinion of the ENGINEER of the CONTRACTOR's proposed soil is unsuitable for the proposed application, the CONTRACTOR shall submit the above evidence for soil of another type or from another source for consideration by the ENGINEER.

### **PART 3 EXECUTION**

#### **3.1 PRECAUTIONS**

- A. Fill placement shall not:
1. Be performed with frozen materials.
  2. Be placed on snow that has a thickness greater than a tenth of an inch.
  3. Be placed on ice. Ice shall be defined as frozen water on the surface of in situ soils or previously placed material.
- B. Subgrade fill placement will not be permitted on frozen underlying layers.

#### **3.2 BACKFILLING**

- A. Backfill shall not be placed until the excavated subgrade surface (top of waste) has been inspected in place and approved. Placement of the clean soil fill may be done in one lift.
- B. Unless otherwise directed, excavations shall be backfilled as soon as possible after structures are removed, pipes are laid and the work is inspected, tested as required and accepted, and permission to backfill has been given by the ENGINEER. Immediately prior to backfilling, all rubbish, debris, forms and similar materials shall be removed from the excavations.
- C. Backfill shall be brought up evenly on each side of structures, and for their full length. The thickness of each compacted layer shall not exceed that specified under Article 2.1 unless specified otherwise or as directed by the ENGINEER. Care shall be taken to ensure that no damage is done to structures or protective coatings thereon.



- D. Where sheeting is withdrawn, all cavities left thereby shall be filled with select soil, hosed or tamped in place so as to fill all voids thoroughly.

### **3.3 TRENCH BACKFILL PROCEDURES**

- A. Pipes shall be bedded and backfilled as shown in the Plans or as directed by the ENGINEER. Care shall be taken to place and compact material under pipe haunches.
- B. Trenches shall be backfilled by hand to a depth of not less than 12 inches above the top of the pipe, for the full width of the trench. Such backfill shall be uniformly placed in 6-inch maximum layers. Care shall be taken not to damage the pipe. Each layer shall be hand tamped and compacted before the next layer is placed. After the trench has been backfilled to 12 inches above the top of the pipe, backfill may then be placed and compacted in 12-inch lifts.

### **3.4 FIELD QUALITY CONTROL**

- A. Tests for all fill materials proposed for construction from new sources will be made by a qualified testing laboratory employed by the ENGINEER as listed below. The test information will be reviewed by the ENGINEER for approval before any fill material is used in construction. Tests for all materials used in construction will be made on random grab samples taken by the Resident ENGINEER on the minimum frequencies specified below by a qualified lab selected by the OWNER. If the test results show the materials conform to the Specifications, the OWNER will pay for these tests. If the tests show the material does not meet the Specifications, the cost for the tests on the defective material will be deducted from moneys due to the CONTRACTOR.

1. The following quality control tests shall be performed on the backfill material utilized for this project:

<b><u>Test Required</u></b> <b><u>(ASTM Designations)</u></b>	<b><u>Frequency of Tests</u></b>
During Construction (a) Mechanical Analysis — D7928 & D6913 (formerly D422) (b) Liquid Limit — D4318 (c) Plastic Limit — D4318 (d) Classification — D2487	A minimum of 1 test of (a), (b), (c), and (d) per 5,000 cubic yards of in-place material and every change in source of material.



- B. The ENGINEER retains the right to perform additional on-site and laboratory testing at the OWNER's cost. If imported fill appears to appreciably change on-site or sieve analyses shows any imported material does not meet the Specifications, samples will be sent out for lab testing. If the lab test results show the material does not meet the Specifications, the costs of the tests on the defective material will be deducted from moneys due the CONTRACTOR. The results of such testing are binding and may require the CONTRACTOR to either remove and replace the material not conforming to the Specifications, or perform additional work or reworking of the material in either case, at no additional cost to the OWNER.

END OF SECTION



SECTION  
31 23 24

COMPACTED BANK CLAY

**PART 1        GENERAL**

**1.1      SECTION INCLUDES**

- A.    The CONTRACTOR shall furnish all labor, materials, equipment, tools and appurtenances required to complete the work of furnishing, placing and compacting material for the compacted bank clay as shown, specified or required. The CONTRACTOR will be required to bring the soil for the compacted bank clay from an off-site borrow source determined by the CONTRACTOR.

**1.2      RELATED SECTIONS**

- A.    Section 31 23 16 – Excavation
- B.    Section 31 23 23 – Clean Soil Fill
- C.    Section 33 34 01 – HDPE Pipe

**1.3      TOLERANCES**

- A.    Tolerance for finished bank clay elevation is 0.0 to +0.1 foot. In all cases this elevation is determined from design elevation of the top of the compacted bank clay. The minimum thickness of the compacted bank clay is 2.0 feet. In no case shall the surveyed thickness of the compacted bank clay be less than specified.
- B.    The maximum slope for bank clay is 3:1 or 33.3 percent.
- C.    The maximum acceptable compacted lift thickness is 6 inches for all areas.
- D.    The principal bank clay slope shall be toward Trail Creek. The bank clay shall not be graded away from Trail Creek or create ponding of surface water.

**1.4      DELIVERY, STORAGE, AND HANDLING**

- A.    All soil for use as compacted bank clay shall be delivered, stored, and handled in a manner to prevent contamination by other soil or new soil materials.

**PART 2        PRODUCTS**

**2.1      GENERAL**

- A.    The CONTRACTOR shall construct the compacted bank clay with natural clay soil from an off-site borrow source.



- B. Natural clay soil means a fine-grain soil containing sufficient plastic fines (No. 200 sieve), on the order of 25 percent or greater such that the soil acts as a clay and will achieve the required degree of impermeability. The soil is typically classified as a CL or CH (Unified Soil Classification System), with a liquid limit between 25 and 60, placed above the A-line on the plasticity chart and a minimum plastic index of 8.

## **2.2 MATERIALS**

- A. The soil used for the compacted bank clay shall have a maximum particle size of 2 inches.
- B. All required fill materials shall be substantially free from organic materials, wood, trash, and other objectionable materials which may be compressible or which cannot be properly compacted. It shall not contain granite blocks, broken concrete, masonry rubble, or other similar materials. It shall have physical properties such that it can be readily spread and compacted to the specified permeability and/or density. Snow, ice, and frozen soil shall not be permitted.
- C. No soil shall be used prior to the ENGINEER's approval of the borrow source. The CONTRACTOR shall assist the ENGINEER in obtaining suitable soil samples for preconstruction testing.
- D. The CONTRACTOR shall provide the ENGINEER access to obtain samples of any soils proposed for clay fill are structurally or otherwise appropriate. This access is to be provided for each individual source and at a frequency of not less than 1 sample per 5,000 cubic yards. The cost of this testing shall be the responsibility of the CONTRACTOR. This evidence shall include, but not necessarily be limited to, the following testing:
  - 1. Gradation                      ASTM D7928 & D6913 (formerly D422)
  - 2. Atterberg Limits            ASTM D4318
  - 3. Standard Proctor          ASTM D698
  - 4. Classification              ASTM D2487
- E. The ENGINEER shall obtain a sample of soil to develop the moisture-density/permeability relationship. The CONTRACTOR shall provide a minimum of 300 pounds of soil representative of the borrow source. The ENGINEER shall prepare the moisture-density/permeability relationship and acceptability envelope for moisture-density testing.
- F. No soil shall be used prior to the ENGINEER providing the CONTRACTOR with the moisture-density/permeability relationship and acceptability envelope for moisture-density.
- G. If there is any variation in the approved material during construction, or material is obtained from an alternate source, additional testing will be required as noted in the approved CQA Plan.

## **2.3 WATER**

- A. Water used to adjust the moisture content of the compacted bank clay shall, at a minimum, be clean, fresh water, odorless, with a pH range of between 5.5 and 9.5 and a total dissolved solids



content of less than 400 mg/l, and be free of any other substances which may be deleterious to the bank clay.

## **PART 3 EXECUTION**

### **3.1 PLACEMENT**

- A. Prior to the start of any clay placement activities, the CONTRACTOR shall supply the ENGINEER with a survey drawing showing the elevations of the bank excavation subgrade by a surveyor licensed by the State. The ENGINEER may check the grades as required, and no lining shall begin prior to approval of the subgrade by the ENGINEER. The CONTRACTOR shall note any discrepancies and shall plan his operations so that upon completion of the bank clay, the top grades conform with the proposed grades.
- B. The soil shall be placed by mechanical spreaders and compacted by tracking the clay soil material in with the construction equipment. The maximum compacted lift thickness shall not exceed 6 inches. The CONTRACTOR shall place and compact the bank clay material in lifts not to exceed this maximum. All large surface rocks shall be removed. Complying with this maximum lift thickness shall in no way relieve the CONTRACTOR of his responsibility for the permeability of the bank clay.
- C. The CONTRACTOR shall continue to place and compact lifts of bank clay to form a uniform upper surface to the lines and grades as shown in the Plans. The upper surface of each lift shall be scarified, dried or hydrated when required as determined by the ENGINEER to provide proper adhesion to subsequently placed lifts of bank clay.
- D. The bank clay shall be placed so as to minimize ponding of rainfall and runoff. Where ponding has occurred, the CONTRACTOR shall remove the water prior to continuing operations in those areas. Any material which has become too wet to compact sufficiently or shows visible weaving or pumping while compacting shall be removed and/or dried prior to placement of additional material.
- E. The top lift of bank clay material shall be placed and finished to a smooth, uniform appearance free of cracks or other openings that would allow drying of underlying layers. The top lift shall also be free of any rocks larger than ½ inch in diameter.
- F. The CONTRACTOR shall restrict all vehicular traffic or equipment operation on finished bank clay areas except as required for redressing or other necessary construction activities. Those areas which are completed and approved by the ENGINEER shall be marked along the perimeters by lathe and flagging or other suitable means. Any deformation of the bank clay caused by traffic shall be reworked, or removed and replaced.
- G. No bank clay material shall be placed in a frozen state or on any material that has become frozen. Said frozen material shall be completely removed prior to placement of additional bank clay.
- H. Hauling and spreading equipment will not be considered as compaction equipment.
- I. Compacted bank clay material in place which fails to meet the required thickness, compaction or moisture content requirements, or exhibits cracking, drying, or suffers any material damage prior



to certification, shall be reworked, or removed and replaced by the CONTRACTOR according to the Specifications at no cost to the OWNER.

- J. All bank clay that after placement and prior to covering is determined by the ENGINEER to be unsuitable, i.e., too wet, too dry or otherwise compromised, shall be repaired by the CONTRACTOR to the satisfaction of the ENGINEER and in conformance with all the provisions of these Specifications at no cost to the OWNER.

## **PART 4 QUALITY CONTROL**

### **4.1 GENERAL**

- A. The ENGINEER will issue a construction control grid. The control grid shall be placed and maintained by a professional surveyor licensed by the State. The control grid shall have defined positions every 50 feet across the area of the disturbed areas designated in the Construction Drawings. All aspects of construction shall be defined by the control grid including, but not limited to, tops and toes of slope, contact water collection, laterals and cleanout risers, berms, manholes, roadways and culverts.
- B. Tests for all fill materials proposed for construction from new sources will be made by a qualified testing laboratory employed by the ENGINEER as listed below. The test information will be reviewed by the ENGINEER for approval before any fill material is used in construction. Tests for all materials used in construction will be made on random grab samples taken by the Resident ENGINEER on the minimum frequencies specified below by a qualified lab selected by the OWNER. If the test results show the materials conform to the Specifications, the OWNER will pay for these tests. If the tests show the material does not meet the Specifications, the cost for the tests on the defective material will be deducted from moneys due to the CONTRACTOR.
1. The following quality control tests shall be performed on the clay material utilized for this project:

<b><u>Test Required</u></b> <b><u>(ASTM Designations)</u></b>	<b><u>Frequency of Tests</u></b>
During Construction (a) Mechanical Analysis — D7928 & D6913 (formerly D422) (b) Liquid Limit — D4318 (c) Plastic Limit — D4318 (d) Standard Proctor – D698 (e) Classification — D2487	A minimum of 1 test of (a), (b), (c), and (d) per 5,000 cubic yards of in-place material and every change in source of material.

- C. The ENGINEER retains the right to perform additional on-site and laboratory testing at the OWNER's cost. If imported fill appears to appreciably change on-site or sieve analyses shows any imported material does not meet the Specifications, samples will be sent out for lab testing. If the lab test results show the material does not meet the Specifications, the costs of the tests on the defective material will be deducted from moneys due the CONTRACTOR. The results of such



testing are binding and may require the CONTRACTOR to either remove and replace the material not conforming to the Specifications, or perform additional work or reworking of the material in either case, at no additional cost to the OWNER.

- D. The thickness of the bank clay shall be determined by comparison of Record Survey Drawings of the excavation grades to the top of the completed, compacted bank clay at the locations of the established 50-foot control grid.

END OF SECTION



SECTION  
31 23 25

TOPSOIL

**PART 1        GENERAL**

**1.1        SECTION INCLUDES**

- A.     Furnish all labor, materials, equipment and incidentals necessary to perform all fill and grading required to complete the placement of the 0.5-ft. topsoil to be placed across the clean soil fill and portion of the clay layer as shown on the Drawings and as directed by the ENGINEER. The work shall include, but not necessarily be limited to, the earthwork required for topsoil placement and all related work.

**1.2        RELATED SECTIONS**

- A.     Section 31 23 23 – Clean Soil Fill
- B.     Section 32 92 19 – Seeding

**1.3        SUBMITTALS**

- A.     The CONTRACTOR shall submit test results for Organic Content and pH of the proposed Topsoil material at a frequency of one test per 5,000 cubic yards of material and a minimum of one test per source. The topsoil shall meet the requirements of Section 2.1 below.

**PART 2        PRODUCTS**

**2.1        TOPSOIL**

- A.     The CONTRACTOR shall supply topsoil for use at this Project. The topsoil shall be natural sandy soil not containing deleterious material, refuse, rubble, metal, branches, wood, or other objectionable materials. The topsoil shall be capable of supporting vegetation, shall have a maximum clay content of 10%, and shall have a minimum organic content of 2%. The topsoil shall be amended as necessary to ensure the vegetative growth as specified in the Seeding Specification (Section 32 92 19) and the floodway tree and shrub plantings (as specified on the Construction Drawings) will be able to adequately grow and stabilize.

**PART 3        EXECUTION**

**3.1        TOPSOIL INSTALLATION**

- A.     This item shall consist of the placement of topsoil in the parkway area along the western boundary of the Remediation Site as shown on the Drawings and as directed by the ENGINEER. The CONTRACTOR shall provide all the required materials, labor, and equipment to perform the work in accordance with these Specifications.
- B.     Topsoil shall be installed in a single, 6-inch lift.



- C. The CONTRACTOR shall take care to ensure that underlying soil remains intact and does not become mixed with the topsoil during installation.

END OF SECTION



SECTION  
31 32 19

GEOTEXTILE

**PART 1        GENERAL**

**1.1      SECTION INCLUDES:**

- A.      This Section addresses the geotextile to be installed in the leachate seep drain trench, under the gravel pathways, and under the riprap apron(s) as shown on the Drawings.
- B.      The CONTRACTOR will purchase all geotextile material required to complete the Work. The CONTRACTOR is responsible for arranging shipping to the jobsite to meet scheduling needs, and the CONTRACTOR is responsible for unloading the material and placing it into storage when it arrives at the jobsite. The CONTRACTOR is responsible for supplying all labor and equipment necessary to install the geotextile over the granular leachate collection layer as described in this Section and as shown on the Construction Drawings. The CONTRACTOR is responsible for placing the 8-oz cushioning geotextile in the leachate collection sump(s) and beneath the rip rap as shown on the drawings.

**1.2      REFERENCES:**

- A.      The below listed American Society for Testing and Materials (ASTM) test methods are hereby made a part of these Technical Specifications. For the purpose of determining compliance with these Technical Specifications, the most recent version of each test method applies throughout this Section of the Technical Specifications.
  - 1.      ASTM D5261 Standard Test Method for Measuring Mass per Unit Area of Geotextiles
  - 2.      ASTM D4632 Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
  - 3.      ASTM D4533 Standard Test Method for Trapezoidal Tearing Strength of Geotextiles
  - 4.      ASTM D4751 Standard Test Method for Determining Apparent Opening Size of a Geotextile
  - 5.      ASTM D4354 Standard Practice for Sampling of Geosynthetics for Testing
  - 6.      ASTM D4491 Standard Test Methods for Water Permeability of Geotextiles by Permittivity
  - 7.      ASTM D4759 Standard Practice for Determining the Specification Conformance of Geosynthetics
  - 8.      ASTM D4355 Standard Practice for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc Type Apparatus



9. ASTM D5199 Standard Test Method for Measuring the Nominal Thickness of Geosynthetics
10. ASTM D6241 Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm

### **1.3 SUBMITTALS:**

- A. Submittals shall be prepared and submitted as specified in Section 01300 - Submittals.
- B. Submittals shall include, but shall not be limited to, the following:
  1. Product Data: Specifications, installation instructions, and general recommendations from manufacturer of geotextile material. Specification sheets shall give minimum physical properties and descriptions of test methods used.
  2. Geotextile manufacturer's quality control certifications, including quality control test results demonstrating compliance with the material properties listed in Table 1 of this Section, for each roll of geotextile delivered to the Project Site. The quality control certificates shall be submitted to the CQA Manager prior to installation of the material.
  3. CONTRACTOR's Quality Control manual describing the method of documenting placement, seaming, laps, and related items. The manual shall be submitted to OWNER prior to initial pre-construction meeting.

### **1.4 QUALITY ASSURANCE**

- A. The OWNER will furnish a CQA Consultant and CQA Manager to monitor and document that all construction activities are performed in accordance with the Technical Specifications. One or more CQA Monitors will be on site during the geotextile installation. Unless specifically noted otherwise in this Technical Specification, the CQA Monitor may act on behalf of the CQA Consultant and the CQA Manager.
- B. The CONTRACTOR shall be responsible for removing and replacing nonconforming geotextile materials that do not meet the installation requirements of the Technical Specifications and the Construction Drawings, or have been damaged during storage or installation, at the CONTRACTOR's expense.
- C. CONTRACTOR shall provide one or more Construction Quality Control (CQC) Managers to monitor installation, testing, and documentation of the geotextile installation. The CQA Consultant and CQC Manager will coordinate all activities relating to the installation, testing, and documentation.

### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. During shipment and storage, the geotextile shall be protected from ultraviolet light exposure, precipitation, mud, dirt, dust, puncture, or other damaging or deleterious conditions.



- B. CONTRACTOR shall receive, store, and handle geotextile materials as recommended by manufacturer. Completely cover all materials while being stored at the Project Site prior to use.
- C. Each roll of geotextile material delivered to the site shall be labeled by the manufacturer with the following information:
  - 1. Name of manufacturer and supplier;
  - 2. Style and type of material;
  - 3. Roll number;
  - 4. Batch (lot) number;
  - 5. Date of manufacture; and,
  - 6. Roll length and width.
- D. The CQA Monitor shall visually examine all rolls of geotextile delivered to the site, and document that the material is free from defects and/or damage and that each roll is clearly labeled by the manufacturer with the above information.
- E. The CQA Monitor shall document and report to the OWNER any rolls of geotextile or portions thereof which, in the opinion of the CQA Manager, should be rejected and removed from the site, or which require repair.

## **PART 2 PRODUCTS**

### **2.1 GEOTEXTILE**

- A. All geotextiles shall be manufactured of new, first quality products.
- B. All installed geotextile shall be free of tears, punctures, other damage, or contamination by foreign matter. Damaged material on rolls shall be cut out and removed from the Project Site. All defects shall be repaired in accordance with the manufacturer's recommendations, or in a manner satisfactory to the CQA Manager.
- C. All geotextile must be uniform in thickness with a maximum 10% deviation from the nominal thickness. Edges shall be straight and free of nicks and cuts.
- D. Geotextile shall be a non-woven material specified and tested to show compliance with performance properties listed in the below table.



<b><u>Property</u></b>	<b><u>Test Method</u></b>	<b><u>8-oz Geotextile Minimum Value</u></b>
Mass per Unit Area, oz/yd <sup>2</sup>	ASTM D5261	8
Grab Tensile Strength, lb	ASTM D4632	205
Puncture Strength, lb	ASTM D4833	110
Trapezoidal Tear Strength, lb	ASTM D4533	85

## **PART 3 EXECUTION**

### **3.1 PREPARATION**

- A. All surfaces prepared for placement of geotextiles shall be smooth and free of all rocks, stones, sticks, roots, sharp objects, or debris of any kind.
- B. The prepared surface shall provide a firm unyielding foundation for the fabric with no sharp or abrupt changes, or breaks in grade.
- C. The prepared surface shall be free of standing water and excessive moisture.

### **3.2 INSTALLATION**

- D. Material Placement
  - 1. Geotextile rolls shall be handled by the CONTRACTOR using equipment that minimizes the risk of damage to the geotextile and any previously installed geosynthetics, if applicable.
    - a. Install geotextile using equipment and techniques capable of achieving and maintaining intimate contact between the geotextile and the soil subgrade.
    - b. Do not drive directly on geotextile with heavy equipment. Any damage to the geotextile resulting from CONTRACTOR's heavy equipment operations shall be repaired at no additional cost to the OWNER.
    - c. Deploy geotextile using lightweight rubber-tired equipment such as 4-wheel all-terrain vehicles (ATVs). ATVs may be driven directly on the geotextile provided the ATV makes no sudden stops, starts, or turns.
  - 2. Install geotextile on prepared surface using careful procedures with minimum handling. Unroll panels as close to their final position as possible.
  - 3. Remove water, snow, and ice from the surface prior to fabric installation.
  - 4. Geotextiles shall be installed free of folds or wrinkles.



5. All deployed geotextile shall be weighted down with sandbags or the equivalent during placement. Sandbags shall remain until OWNER allows removal
6. Prior to covering the deployed geotextile each panel shall be inspected for damage resulting from construction.
7. No smoking shall be allowed on or near geotextile material in storage areas or during installation.
8. No glass or metal containers will be allowed within the Work area during geotextile installation.

E. Seaming of geotextile:

1. Geotextile between adjacent panels shall be joined by either sewing or thermal bonding.
2. Geotextile panels shall be overlapped a minimum of 4 inches before seaming.
3. Sewn Seams:
  - a. Thread shall be of such color that it is easily distinguished from geotextile.
  - b. Stitch density shall be 4 to 6 stitches per inch of seam.
  - c. Stitch type shall be double thread lock.
  - d. Seam type shall be the flat or "prayer" type.
  - e. Thread shall be made of the same material as the geotextile.
4. Thermally Bonded Seams:
  - a. Thermally bonded geotextile panels shall be joined by thermally bonding the overlapping mating surfaces together using either wedge welding or hot air welding (such as a "Leister").
  - b. Torch (open flame) bonding will not be permitted.
  - c. Control installation methods and temperatures as required to prevent burning or melting holes through the geotextile and geomembrane (if present).
  - d. Cover any burn holes through geotextile with a hot air welded or adhesive welded geotextile patch extending not less than 12 inches beyond the limits of the defect.

F. Repairs

1. Any damaged areas such as holes, rips, or tears or other defects on the deployed geotextile shall be repaired by placing a patch extending a minimum of twelve (12) inches beyond the edges of the damaged or defective area.



2. The patch shall be secured to the original material by thermal bonding or sewing as described in this Section.
3. If the area to be repaired is more than 50 percent of the width of the panel, the damaged area shall be cut out and replaced with new geotextile material, or the two undamaged portions of the geotextile shall be joined in accordance with this Section.

END OF SECTION



SECTION  
31 35 01

ENVIROGRID BANK STABILIZATION

**PART 1        GENERAL**

**1.1        WORK INCLUDED**

- A. This specification governs the installation of the Envirogrid bank stabilization material (or approved equal) at the locations shown on the drawings.

**1.2        SUBMITTALS**

- A. Comply with Section 01 33 00 – Submittals including the following items:
1. Manufacturer's Product Data: Submit manufacturer's product data and installation instructions
  2. Shop Drawings: Submit manufacturer's typical drawings, indicating dimensions, section layout, cell depth, and system components.
  3. Samples: Submit manufacturer's sample of geocells.
  4. Certificate of Compliance: Submit manufacturer's certificate of compliance indicating geocells comply with specified requirements.
  5. Manufacturer's Certificate of Analysis: Manufacturer shall supply certificate of analysis containing the following test results for the project-specific cellular confinement material to ensure compliance:
    - a. Base Resin Lot Number(s)
    - b. Resin Density per ASTM D 1505
    - c. Production Lot Number(s)
    - d. Material Thickness per ASTM D 5199
    - e. Sheet Thickness per GRI-GS14
    - f. Short Term Seam Peel Strength per USACE Technical Report GL-86-19, Appendix A
    - g. Carbon Black percentage.
  6. Quality Assurance Certification: Submit manufacturer's ISO 9001:2008 and CE quality assurance certifications.
  7. No material will be considered an equivalent to the geocell material specified herein unless it meets all requirements of this specification, without exception. Manufacturers seeking to supply what they represent as equivalent material must submit records, data, independent test results, samples, certifications, and documentation deemed necessary by the ENGINEER to prove equivalency. The ENGINEER shall approve or disapprove other



Manufacturers materials in accordance with the General Conditions after all information is submitted and reviewed. Any substitute materials submitted shall be subject to independent lab testing at the CONTRACTOR's expense.

## **PART 2        PRODUCTS**

### **2.1        MANUFACTURER**

- A.    Geo Products, LLC, 12626 North Houston Rosslyn Rd., Houston, Texas 77086; phone (281) 820-5493; fax (281) 820-5499;  
Email: info@geoproducts.org  
Website: www.geoproducts.org

### **2.2        ENVIROGRID® CELLULAR CONFINEMENT SYSTEM**

- A.    Material Properties:
1.    Material: Virgin, non-thermally degraded, high-density polyethylene (HDPE). No post-consumer resins (PCR) of any type are added to the formulation.
  2.    Polymer Density, ASTM D 1505: 0.935 – 0.965 g/cm<sup>3</sup> (58.4 – 60.2 lb/ft<sup>3</sup>).
  3.    Environmental Stress Crack Resistance, ASTM D 5394 >400 hours.
  4.    Environmental Stress Crack Resistance, ASTM D 1693, 6000 hours
  5.    Minimum Carbon Black Content, ASTM D 1603: 1.5 percent by weight.
  6.    Carbon Black Dispersion, ASTM D 5596: For 10 different views, 9 must be in Categories 1 or 2 and 1 in Category 3.
  7.    Nominal Sheet Thickness by Weight, GRI-GS14: 1.25mm (50 mils) minus 10 percent.
  8.    Nominal Sheet Thickness, Smooth Sheet, ASTM D 5199: 1.25 mm (50 mils) plus 10 percent, minus 5 percent.
  9.    Nominal Sheet Thickness, Textured Sheet, ASTM D 5199: 1.50 mm (60 mils) plus 10 percent, minus 5 percent.
  10.   Seam Efficiency, Perforated Strip, GRI-GS13: 100%
  11.   Tear Resistance, Perforated Strip, ASTM D 1004: 35 lb (155N)
  12.   Resistance to Oxidative Degradation (HPOIT), ASTM D 5885: >400 minutes
  13.   UV Resistance, ASTM D 7238, >50% HPOIT retained after 1600 hours
  14.   The polyethylene strip shall be textured with a multitude of rhomboidal (diamond shape) indentations. The rhomboidal indentations shall have a surface density of 22 to 31 per cm<sup>2</sup> (140 to 200 per in<sup>2</sup>).
  15.   Minimum seam strengths are required by design and shall be reported in test results. Materials submitted with average or typical values will not be accepted. Written certification of minimum strengths must be supplied to the engineer at the time of submittals.
  16.   Seam Peel Strength, USACE Technical Report GL-86-19, Appendix A:



- a. Cell Depth 150 mm (6.0 inches): 2,130 N (480 pounds).
- 17. Seam Hang Strength: 102-mm (4.0-inch) weld joint supporting load of 72.5 kg (160 pounds) for 30 days minimum or for 7 days minimum while undergoing temperature change from 23 degrees C (74 degrees F) to 54 degrees C (130 degrees F) on 1-hour cycle.
- B. Model: EnviroGrid EGA 20.
  - 1. Cell Depth - 150 mm (6.0 inches)
  - 2. Nominal Expanded Cell Size: 259 mm (10.2 inches) wide by 224 mm (8.8 inches) long.
  - 3. Nominal Expanded Cell Area: 289 cm<sup>2</sup> (44.8 square inches).
  - 4. Nominal Expanded Section: 2.56 m (8.4 feet) wide by 6.52 m (21.4 feet) long.
  - 5. Cells per Section: 10 cells wide by 29 cells long.
  - 6. Nominal Expanded Section Area: 16.7 m<sup>2</sup> (180 square feet).
  - 7. Weld Spacing: 355 mm plus or minus 3 mm (14.0 inches plus or minus 0.12 inch).
- E. Cell Wall: Perforated.
  - 1. Horizontal Rows: 10-mm diameter holes, 16.6 mm on center.
  - 2. Stagger horizontal rows and separate 8.3 mm relative to hole centers.
  - 3. Edge of Cell Wall to Nearest Edge of Perforations: 7.93 mm.
  - 4. Centerline of Weld to Nearest Edge of Perforations: 27.9 mm minimum.
  - 5. A slot with a dimension of 11.4 mm (0.45 inches) x 48.3mm (1.9 inches) is standard in the center of the non-perforated areas and at the center of each weld.
  - 6. Perforations Remove:
    - a. For 75mm (3 inches) & 150mm (6 inches) cell depths: 15% to 17% percent of cell wall area is removed.
    - b. For 100mm (4 inches) & 200mm (8 inches) cell depths: 11% to 13% percent of cell wall area is removed.
- A. Cell Wall: Solid.
- G. Section Length: 0.23 m (0.74 feet).
- H. Color: Black.
  - 1. Fascia Strips: Black.

## 2.3 REQUIRED INSTALLATION COMPONENTS

- A. Panel Connection Components
  - 1. EnviroLock
    - a. The EnviroLock is an injection molded high-strength UV stabilized Nylon part used to connect EnviroGrid panels together at each fin and end to end connection.
    - b. Connection Type: Mechanical across the full depth of the cell
    - c. Minimum Break Strength: 310 lb.

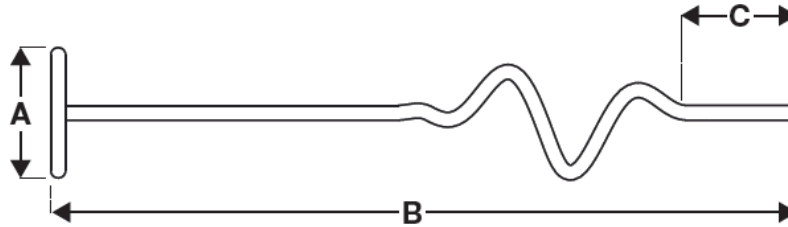


- d. UV Resistance: Excellent
- e. Color: Black

B. Anchoring Components

2. EnviroClip:

- i. The EnviroClips and Twist Anchors shall be Galvanized Steel conforming to ASTM A 123.
- ii. The EnviroClip shall have the dimensions of 2.56inch (66mm) wide by 1.57inch (40mm) tall.
- iii. The Twist Anchor shall be one of the following 3 options based on soil type.



	TL-TA1(8")	TL-TA1(12")	TL-TA2(8")
Dimension	Length (in)		
A	1.38	1.38	1.38
B	7.87	7.87	11.87
C	1.1	0	1.1

- iv. The Twist Anchor head and installation chuck must be fabricated in a way that it allows the Twist Anchor to be installed to full depth without damaging the EnviroClip.
- v. The Twist Anchor must also be fabricated in a way so no washer is needed to be added to spread the load and secure the EnviroClip.
- vi. The Twist Anchor must have supporting 3<sup>rd</sup> party testing available that provides pullout resistance in 3 separate soil types (Clay, Loam, Sand).
- b. Steel Reinforcing Bars: [Uncoated] [Galvanized] [Epoxy coated].
  - 1) Diameter: [10 mm (0.375 inch)] [12 mm (0.500 inch)] [16 mm (0.625 inch)] [20 mm (0.75 inch)] [As indicated on the drawings].
  - 2) Length: As indicated on the drawings.
  - 3) Hook: [180-degree bend] [45-degree bend] [As indicated on the drawings].
- c. Fiberglass Reinforced Polymer (FRP) Reinforcing Bars:
  - 1) Diameter: [12 mm (0.500 inch)] [As indicated on the drawings].
  - 2) Length: As indicated on the drawings.
  - 3) Hook: As indicated on the drawings.



- 4) Tensile Strength: 100 kpsi.
2. Straight Stakes:
    - a. Material with sufficient strength to support and anchor geocells.
    - b. Material: [Steel reinforcing bars, uncoated] [Steel reinforcing bars, galvanized] [Steel reinforcing bars, epoxy coated] [Wood].
    - c. Diameter: As indicated on the drawings.
    - d. Length: As indicated on the drawings.
- C. Tendon Anchorage
1. Woven Polyester - [PT2200] [PT3285] [PT5100] [PT7700] [PT11000] [PT16500]
    - a. Material shall be bright, high-tenacity, industrial-continuous-filament, polyester yarn woven into a braided strap.
    - b. Elongation shall be 9 to 15 percent at break.
    - c. Minimum break strength shall be:
      - 1) [2,200 lbf (9.34 KN) for PT2200]
      - 2) [3,285 lbf (14.6 KN) for PT3285]
      - 3) [5,100 lbf (23.2 KN) for PT5100]
      - 1) [7,700 lbf (35 KN) for PT7700]
      - 2) [11,000 lbf (50 KN) for PT11000]
      - 3) [16,500 lbf (75 KN) for PT16500]
  2. Woven Kevlar/Aramid - [AT2500] [AT3000] [AT4000]
    - a. Material shall be Kevlar®/Aramid material woven into a strap.
    - b. Minimum break strength shall be:
      - 1) [2500 lbf (11.1 KN) for AT2500]
      - 2) [3000 lbf (13.3 KN) for AT3000]
      - 3) [4000 lbf (17.8 KN) for AT4000]
  3. Woven Polypropylene - [PPT2200]
    - a. Material shall be Polypropylene 3-strand twisted rope.
    - b. Minimum break strength shall be [2200 lbf (9.34 KN) for PPT2200]

## 2.4 INFILL MATERIAL

- A Cell infill material shall be an engineered fill consisting of topsoil and aggregate mixture for vegetated surfaces.
1. Engineered infill shall be a mix of topsoil and aggregate having a homogeneous mixture of a clear crushed aggregate having an AASHTO #5 or similar designation blended with pulverized topsoil and a minimum 30% void space for air and/or water.
  2. The mixture will promote vegetation growth and provide structural support.
  3. The aggregate portion shall have a particle range from 0.375 to 1.0 inches (9.5 to 25 mm) with a D50 of 0.5 inches (13 mm).
  4. The percentage void space of the aggregate portion when compacted shall be at least 30%.
  5. The pulverized topsoil portion shall equal 25% of the total volume. The topsoil shall be blended with the aggregate to produce a homogeneous mixture.
  6. Once placed, the engineered fill shall be compacted to a 95% Standard Proctor.



- E. Infill material shall be free of any foreign material.
- F. Clays, silts and organic materials are not acceptable infill material.
- G. Infill material shall be free-flowing and not frozen when placed in the EnviroGrid sections.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Examine area to receive geocells. Notify ENGINEER if area is not acceptable. Do not begin preparation or installation until unacceptable conditions have been corrected.

### **3.2 PREPARATION**

- A. Prepare site by removing vegetative cover, debris, and unacceptable soils from area where geocells will be installed.
- B. Replace removed soils with acceptable materials.
- C. Complete earthwork, including toe-in trenches when required for slope or channel lining applications, as specified in Section 31 23 16.

### **3.3 INSTALLATION**

- A. Install geocells in accordance with manufacturer's instructions at locations indicated on the drawings.
- B. Anchor geocell sections as necessary to resist sliding due to gravitational forces and sheet flow.
- C. Ensure top edges of adjoining cell walls are flush with each other and in proper alignment.
- D. Deliver infill material to geocells from top of slope or channel to bottom in accordance with manufacturer's instructions.
- E. Limit drop height of infill material to a maximum of 1 m (3 feet) to prevent damage to geocells.
- F. Overfill expanded geocell sections by 25 to 50 mm (1 to 2 inches) to allow for settling and compaction, when using granular infill materials.

END OF SECTION



SECTION  
32 92 19

SEEDING

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. The CONTRACTOR shall furnish all labor, materials, equipment, tools, and appurtenances required to complete the seeding of all areas disturbed during the course of construction.

**1.2 RELATED SECTIONS**

- A. Section 31 23 25 – Topsoil

**1.3 DEFINITIONS**

- A. Weeds – Includes Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Broome Grass.

**1.4 REGULATORY REQUIREMENTS**

- A. Comply with regulatory agencies for fertilizer and herbicide composition.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver grass seed mixture in sealed containers showing weight, seed mix, year of production, date of packaging, and location of packaging. Seed in damaged packaging is not acceptable.

**PART 2 PRODUCTS**

**2.1 SEED MIXTURE**

- A. For disturbed areas on the Site, the CONTRACTOR shall place a seed mixture consisting of the following:



## HERBACEOUS RIPARIAN VEGETATION LIST

SCIENTIFIC NAME	COMMON NAME	INDICATOR	SIZE/CLASS
<i>AGERATINE ALTISSIMA</i>	WHITE SNAKEROOT	FACU	WILDFLOWER
<i>AMPHICARPAEA BRACTEATA</i>	HOG PEANUT	FAC	VINE
<i>CAREX VULPINOIDEA</i>	FOX SEDGE	FACW	SEDGE
<i>CRYPTOTAENIA CANDADENSIS</i>	HONEWORT	FAC	WILDFLOWER
<i>ELYMUS CANADENSIS</i>	CANADA WILD RYE	FAC	GRASS
<i>ELYMUS HYSTRIX</i>	BOTTLEBRUSH GRASS	FACU	GRASS
<i>ELYMUS VIRGINICUS</i>	VIRGINIA WILD-RYE	FACW	GRASS
<i>GEUM CANADENSE</i>	WHITE AVENS	FAC	WILDFLOWER
<i>HELIOPSIS HELIANTHOIDES</i>	FALSE SUNFLOWER	FACU	WILDFLOWER
<i>OSMORHIZA CLAYTONII</i>	HAIRY SWEET CINDY	FACU	WILDFLOWER
<i>PHLOX DIVARICATA</i>	WILD BLUE FLOX	FACU	WILDFLOWER
<i>PANICUM VIRGATUM</i>	SWITCH GRASS	FAC	GRASS
<i>RUDBECKIA TRILOBA</i>	BROWN EYE SUSAN	FACU	WILDFLOWER
<i>SYMPHYOTRICHUM LANCEOLATUM</i>	PANICLED ASTER	FAC	WILDFLOWER

*Species with an indicator status of FACW or FAC will be planted near Trail Creek.*

*Species with an indicator status of FACU will be planted farther from Trail Creek.*

### SCIENTIFIC NAME

### COMMON NAME

<b>TEMPORARY COVER:</b>	
<i>AVENA SATIVA</i>	SEED OATS
<i>LOLIUM MULTIFLORUM</i>	ANNUAL RYE
<i>TRITICUM AESTIVUM</i>	WINTER WHEAT

- B. Seed shall be clean, high in germinating value, and of the recommended mixture. It shall be obtained from a reliable seed company and be accompanied by certificates relative to mixture, purity, and germinating value. Seed selection shall be subject to approval by the ENGINEER.

## 2.2 ACCESSORIES

- A. Mulching Material – Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.
- B. Mulching Material – Hemlock species wood cellulose fiber, chip form, free of growth or germination inhibiting ingredients.



- C. Fertilizer – No fertilizer will be used to minimize weed growth.
- D. Water – Clean, fresh and free of substances or matter which could inhibit vigorous growth of grass.

## **PART 3        EXECUTION**

### **3.1        INSPECTION**

- A. Verify that prepared soil base is ready to receive the work of this Section.

### **3.2        SEEDING**

- A. Soil shall be worked to a depth of 3-inches. All large debris is to be removed from the area to be seeded.
- B. Apply seed at rate recommended by the seed supplier evenly in two intersecting directions. Seed shall be drilled. Do not seed area in excess of that which can be mulched on same day.
- C. Seed is to be sown using a Brillion grass seed drill or an approved drill of similar design.
- D. Do not sow immediately following rain, when ground is too dry, or during windy periods.
- E. Seed will be applied as a total mix or in several passes if species are not compatible during mixing or application. No fertilizer will be used. Seed will be drilled. Seeds shall not be placed more than 1/8 inch deep.

### **3.3        MULCHING**

- A. Straw mulch is to be applied at 2 ton per acre.
- B. Straw mulch is to be crimped in.

### **3.4        HYDROSEEDING**

- A. Hydroseeding may be allowed as approved by the ENGINEER.

### **3.5        MAINTENANCE AND GUARANTEE**

- A. The CONTRACTOR shall maintain and care for all seeded areas including as required: watering, weeding, rolling, trimming, and mowing until a good solid turf is established to satisfaction of ENGINEER.
- B. All bare or scant spots shall be reseeded until a uniform turf is established over all seeded areas. Erosion is the responsibility of the CONTRACTOR, who will replace topsoil in washed-out areas and then reseed, refertilize, and remulch at no additional cost to OWNER.
- C. Seeded areas lost by "winterkill" or any other causes shall be replaced and reseeded during following Spring following procedures described in this Section, at no additional cost to OWNER.



- D. Continue maintenance period at no additional cost to OWNER until all deficiencies have been corrected.
- E. CONTRACTOR shall ensure vegetation is well established and warrantee the vegetation for a period of 36-months.

END OF SECTION



SECTION  
33 34 01

HDPE PIPE

**PART 1        GENERAL**

**1.1        SECTION INCLUDES**

- A.    Work covered by this Section includes the requirements, materials, and methods for installing HDPE piping and fittings.
- B.    The CONTRACTOR shall furnish and install the various pipelines and appurtenant work as indicated in the Plans and as specified herein, or as reasonably required to produce a complete, proper, and functional installation in accordance with the intent of these Documents.

**1.2        RELATED SECTIONS**

- A.    Section 31 23 16 – Excavation
- B.    Section 31 23 23 – Structural Fill

**1.3        QUALITY ASSURANCE**

- A.    Pipe installation shall be performed by skilled workers. Each pipe laying crew shall have a pipe laying foreman.
- B.    Pipe shall be accurately installed to the lines and grades shown on the Drawings, or as approved by the ENGINEER, so that inverts are smooth.
- C.    Deflections in horizontal alignment at joints are not permitted without written consent of the ENGINEER. If so approved, the deflections shall not exceed one-half the manufacturer's recommendation.
- D.    When requested by the ENGINEER, a qualified field representative of the manufacturer shall be present at the jobsite for the first day of pipe laying and during leakage testing to assure that proper procedures are followed.
- E.    The ENGINEER shall be notified in advance whenever an existing pipeline location conflicts with the proposed locations of the work.
- F.    Pipe and fittings of the same type shall be the products of a single manufacturer.
- G.    Pipe Adaptors – Join pipes of different materials with adaptors specifically manufactured for that purpose and as approved by the ENGINEER, or as detailed in the Plans.
- H.    All piping shall be of the type and size as shown in the Plans and described in this Section of the Specifications.



## **1.4 DELIVERY, STORAGE, AND HANDLING**

- A. All pipes and fittings shall be carefully handled when loading and unloading. Lift by hoists or lower on skidways in a manner to avoid shock.
- B. Where required, due to weight of material and for the safety and protection of workmen, materials, equipment, property, and the work, use derricks, ropes, or other suitable equipment for lowering pipe into trenches. Take particular care to avoid damaging the pipe.
- C. For convenience of handling, HDPE pipe shall be protected from sunlight exposure (unless restrained in racks) to prevent possible bowing of the pipe as a result of expansion and contraction caused by uneven heating. Such protection shall consist of canvas covering, or other material as recommended by the manufacturer. Plastic sheets shall not be used which may allow excessive temperatures to develop where the pipe is stored.
- D. The manufacturer's instructions for pipe stacking shall be followed. When pipe is stacked for storage, the heaviest series of pipe shall be placed at the bottom.
- E. HDPE pipe and fittings shall be protected from damage by sharp objects through all phases of work.
- F. If any defective pipe is discovered after being laid or placed, removal and replacement with a sound pipe will be required without cost to the OWNER.

## **PART 2 PRODUCTS**

### **2.1 FINAL COVER DRAIN PIPES AND FITTINGS**

- A. All cap drain pipes and fittings shall be manufactured from virgin polyethylene resin, PE 3408 or approved equal, and shall conform to ASTM D3350. The CONTRACTOR shall submit shop drawings demonstrating conformance with these Specifications.
- B. All polyethylene fittings shall have a pressure rating equal to or higher than the pressure rating of the pipe.
- C. All HDPE fittings at the manholes shall have ANSI Class 150 316 stainless steel backing rings as shown in the Plans.
- D. Unless noted otherwise, all HDPE pipes and fittings shall be SDR 17 rated at 80 psi (as noted on the Drawings), and shall be Phillips Driscopipe 1000 or approved equal.
- E. All piping and valves shall be supported by the size and style supports shown in the Plans or an approved equal.



## **PART 3        EXECUTION**

### **3.1        INSPECTION - GENERAL**

- A. Each length of pipe and each fitting shall be carefully inspected prior to lowering into trench. All materials not meeting the requirements of these Specifications, or otherwise found defective or unsatisfactory by the ENGINEER, shall be rejected and immediately marked and removed from the jobsite by the CONTRACTOR on the same working day as so discovered.
- B. The underlying geosynthetics shall be carefully inspected prior to laying. All conditions shall be made available to the ENGINEER for inspection purposes, and the ENGINEER shall be further advised where, in the CONTRACTOR's opinion, unstable or otherwise deleterious conditions exist.
- C. Each stretch of completed pipeline shall be inspected prior to backfilling. Backfilling operations shall not be initiated prior to inspection by the ENGINEER.
- D. If any defective pipe is discovered after being placed, removal and replacement with sound pipe will be required at no cost to the OWNER.

### **3.2        PREPARATION**

- A. Pipe and fitting interiors, joint surfaces, and gaskets shall be thoroughly cleaned prior to installation. Pipes and fittings shall be maintained clean. For HDPE pipe, a clean cotton cloth shall be employed for cleaning; polyester-type materials shall not be used as they may melt during fusion procedures and stick to the heater.

### **3.3        PIPE INSTALLATION**

- A. Pipes and fittings shall be carefully lowered onto the geocomposite.
- B. Pipe and fittings shall be installed so that there will be no deviation at the joints and so that inverts present a smooth surface. Pipe and fittings which do not fit together to form a tight fitting joint are not permitted.
- C. Pipes shall be installed in the locations and to the required lines and grades as shown in the Plans and provided in these Specifications, using an approved method of control. The ENGINEER has the authority to order the removal or relaying of all pipe laid contrary to the specifications, his instructions, or during his absence.
- D. Excavations shall be maintained free of water during the progress of the work. No pipes shall be laid in water nor shall there be any joints made up in water. All slides or cave-ins of the trenches or cuts shall be remedied to the satisfaction of the ENGINEER.
- E. Cleanliness of installed pipe and fitting interiors shall be maintained throughout the Work.
- F. When unsuitable materials and/or conditions are encountered, the ENGINEER may direct the excavation to continue below grade and the trench filled with gravel or crushed stone foundation, or the ENGINEER may order other corrective measures.



- G. Fittings shall be installed as required and in accordance with the Plans and Specifications. The installation of fittings after the pipeline has been laid will not be permitted without the written approval of the ENGINEER. In such cases, complete details pertaining to the proposed type of fittings and the installation procedure shall be submitted by the CONTRACTOR to the ENGINEER for review before approval will be considered.
- H. Approval by the ENGINEER is required prior to changing the location of any of the work due to field conditions. Changes in pipe sizes are prohibited without a written consent from the ENGINEER.
- I. All installed piping shall form completely connected systems including connections to valves and appurtenances specified in other sections to result in a satisfactorily operating installation.

### **3.4 HDPE PIPE JOINING**

- A. HDPE pipe should be joined by butt-fusion methods, having a completely uniform and monolithic pipe interior according to the fusion joining procedures as instructed by the manufacturer, except within the structures, as shown in the Plans.
- B. Each individual performing fusion joining shall have at least 1 year of experience in the use of the fusion procedure.
- C. Persons performing fusion joining shall meet the qualification requirements as specified in Title 49 of the Code of Federal Regulations, Part 192. While these Federal regulations are geared towards the installation of gas piping systems, the same qualifications shall be required, as specified herein, for any individual performing fusion joining in this construction project.
- D. No person may make fusion joints unless that person has appropriate training and experience in the fusion procedure and been qualified under the fusion method as defined above and as summarized herein:
  - 1. The individual must make a sample joint that passes the following inspections and tests:
    - a. The joint must be visually examined during and after joining and found to have the same appearance as a photograph or sample of an acceptable joint that was joined in accordance with the procedure.
    - b. The joint must be tested or examined by one of the following methods:
      - Pressure and tensile test as described in 49 CFR Section 192.283
      - Ultrasonic inspection and found to be free of flaws that would cause failure
      - Cut into at least 3 longitudinal straps, each of which is:
        - Visually examined and found to be free of voids or unbonded areas on the cut surface of the joint



- Deformed by bending, torque or impact and if failure occurs, it must not initiate in the joint area.
- E. A person must be requalified under an applicable procedure, if during any 12-month period he:
1. Does not make any joints under the procedure.
  2. Has 3 joints or 3 percent of the joints he has made, whichever is greater, that are found unacceptable by testing under 49 CFR Section 192.513.
- F. The inspection of joints shall be performed by a person who has been qualified by training or experience to evaluate the acceptability of HDPE joints made under the applicable joining procedure.
- G. Each primary pipe joint shall be inspected and approved by the ENGINEER.
- H. Join pipe sections at ground level to a length recommended by the manufacturer such that maximum allowable stress, when pulling the pipe into position alongside the trench, is not exceeded. Use appropriate materials and equipment, as recommended by the HDPE pipe manufacturer, when pulling butt-fused pipe sections alongside the trench to prevent pipe damage.
- I. For summertime installations it may be necessary to provide a slightly longer length of HDPE pipe when connections are to be made between two fixed points or structures to compensate for contraction of the pipe in a cooler trench bottom. The additional pipe length requirements shall be in accordance with the HDPE pipe manufacturer's instructions.

### **3.5 CONNECTIONS TO STRUCTURES**

- A. Where noted in the Plans or as directed by the ENGINEER, the CONTRACTOR shall make connections to manhole enclosures. The use of excessive force or blunt instruments is prohibited in installing the pipe through the wall. The structure shall be maintained in good repair. The CONTRACTOR shall provide approved flexible and watertight connections at the wall.

END OF SECTION



KARWICK NATURE PARK  
CORRECTIVE ACTION  
1873-356-10-01

33 34 01-1

HDPE PIPE



## **Appendix A**

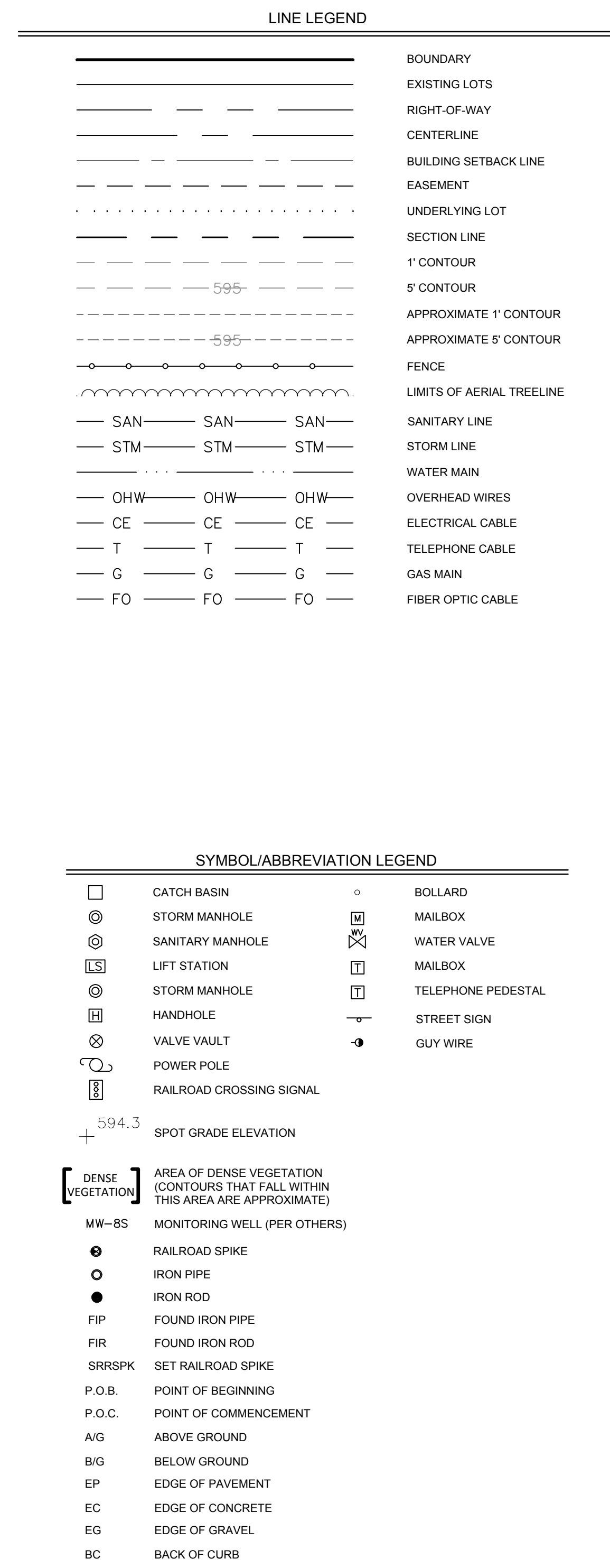
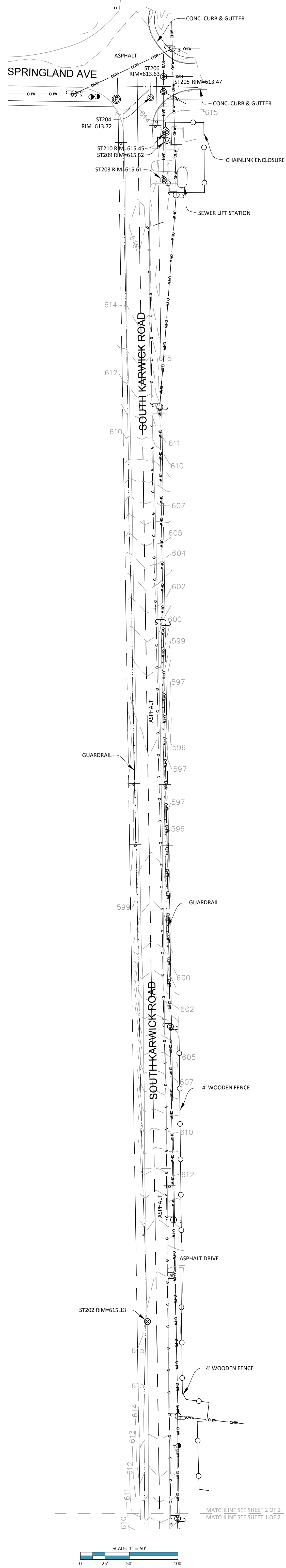
### **ALTA/NSPS Land Title Survey and Topographic Survey**







ALTA/NSPS LAND TITLE SURVEY  
& TOPOGRAPHIC SURVEY



Point Table	
TREE TAG #	TREE TYPE/SIZE
501	TRD 36
502	TRD 18
503	TRD 15
504	TRD 18
505	TRD 15
506	TRD 15
507	TRD 12 MULTI
508	TRD 10
509	TRD 10
510	TRD 16
511	TRD 36
512	TRD 15 MULTI
513	TRD 18
514	TRD 18 MULTI
515	TRD 18
516	TRD 15
517	TRD 30
518	TRD 18
519	TRD 15
520	TRD 10
521	TRD 10
522	TRD 24
523	TRD 18
524	TRD 15
525	TRD 12 MULTI
526	TRD 4x 15
527	TRD 24
528	TRD 15
529	TRD 15
530	TRD 18
531	TRD 10
532	TRD 15
533	TRD 15
534	TRD 10
535	TRD 12 W/MULTI 6
536	TRD 15
537	TRD 16
538	TRD 18
539	TRD 15
540	TRD 12
541	TRD 15
542	TRD 15
543	TRD 18 W/2x 10
544	TRD 18
545	TRD 24
546	TRD 24
547	TRD 15
548	TRD 18
549	TRD 12
550	TRD 10

TREE TAG #	TREE TYPE/SIZE
551	TRD 2x 12
552	TRD 18
553	TRD 12
554	TRD 12
555	TRD 15
556	TRD 15
557	TRD 10
558	TRD 10
559	TRD 10
560	TRD 11
561	TRD 2x 12
562	TRD 10
563	TRD 24 W/ 1x 10
564	TRD 15
565	TRD 12
566	TRD 12
567	TRD 18
568	TRD 30
569	TRD 10
570	TRD 12
571	TRD 10
572	TRD 12
573	TRD 10
574	TRD 15
575	TRD 15
576	TRD 15
577	TRD 24
578	TRD 15
579	TRD 12
580	TRD 10
581	TRD 12
582	TRD 12
583	TRD 2x 15
584	TRD 2x 12
585	TRD 30
586	TRD 12
587	TRD 12 10.0N
588	TRD 15
589	TRD 12
590	TRD 18 W/ 12 OH
591	TRD 15 W/ 1x 12
592	TRD 12
593	TRD 18
594	TRD 2x 15
595	TRD 15
596	TRD 2x 12 W/ 1x 18
597	TRD 15
598	TRD 12
599	TRD 12
600	TRD 15

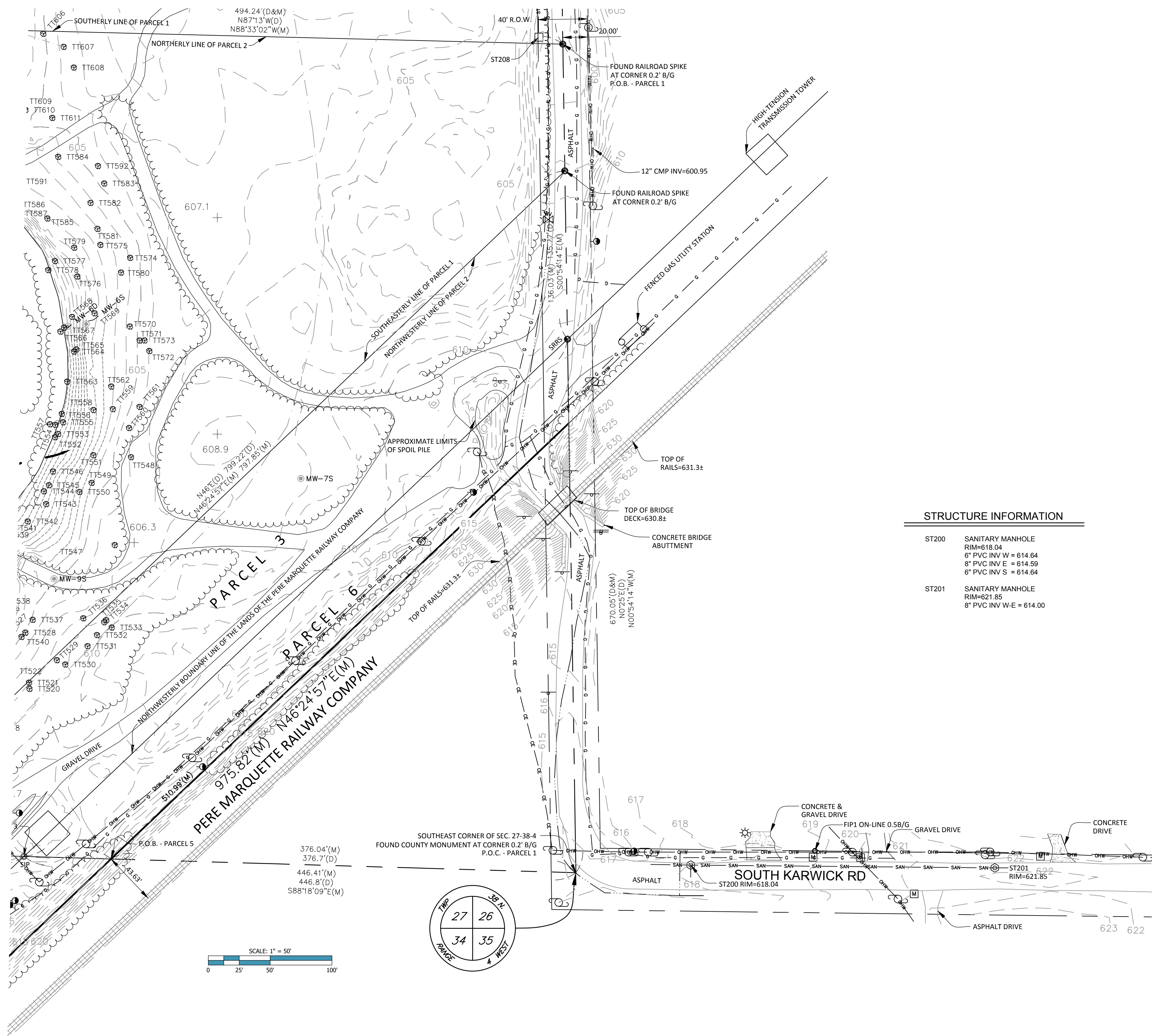
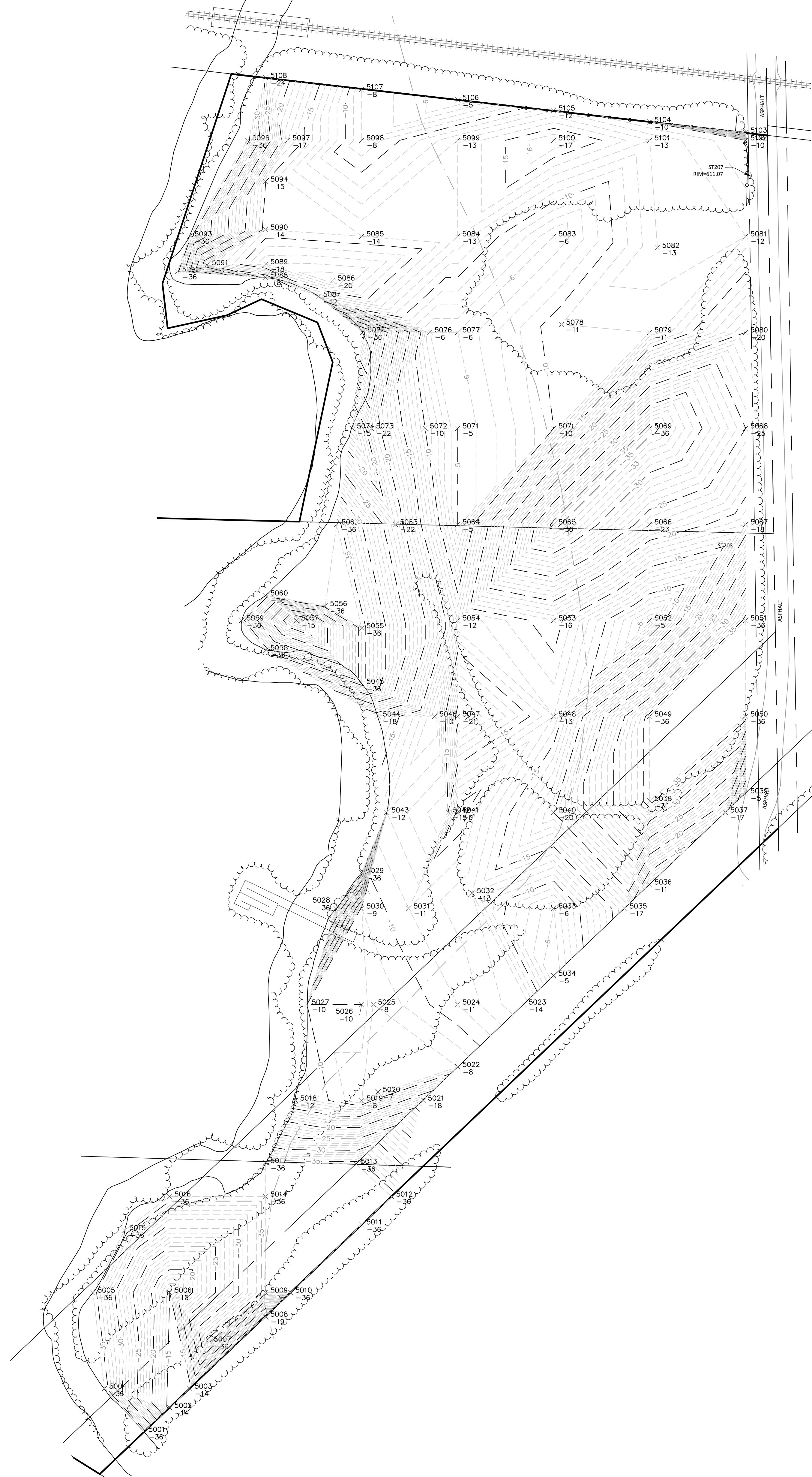
TREE TAG #	TREE TYPE/SIZE
601	TRD 30
602	TRD 36
603	TRD 18
604	TRD 18
605	TRD 12
606	TRD 10
607	TRD 15
608	TRD 10
609	TRD 2x 12
610	TRD 12
611	TRD 12
612	TRD 12
613	TRD 15 W/ 1x 12
614	TRD 12
615	TRD 12
616	TRD 15
617	TRD 15
618	TRD 12
619	TRD 10
620	TRD 15
621	TRD 12
622	TRD 2x 12
623	TRD 12
624	TRD 2x 12
625	TRD 3x 12
626	TRD 15
627	TRD 15
628	TRD 18
629	TRD 15
630	TRD 15
631	TRD 18
632	TRD 15
633	TRD 15
634	TRD 12
635	TRD 12
636	TRD 12
637	TRD 18
638	TRD 18
639	TRD 24 W/ 1x 10
640	TRD 30
641	TRD 15
642	TRD 18
643	TRD 10
644	TRD 18
645	TRD 15
646	TRD 12
647	TRD 18
648	TRD 12
649	TRD 18
650	TRD 15

TREE TAG #	TREE TYPE/SIZE
651	TRD 15
652	TRD 24
653	TRD 18
654	TRD 15
655	TRD 10
656	TRD 18
657	TRD 15
658	TRD 30
659	TRD 18 W/1x 15
660	TRD 10
661	TRD 15
662	TRD 12
663	TRD 15
664	TRD 15
665	TRD 36
666	TRD 12
667	TRD 3x 12
668	TRD 12
669	TRD 12

**SOIL COVER DEPTH**  
NOTE: SOIL DEPTHS SHOWN HEREON REPRESENT THE DEPTH TO WASTE, IN INCHES. SOIL DEPTHS SHOWN AS 30" INDICATE A DEPTH GREATER THAN SAID MEASUREMENT.

SCALE: 1" = 40'

0 30 60 120



**STRUCTURE INFORMATION**

ST200	SANITARY MANHOLE RIM=618.04 8" PVC INV W = 614.64 8" PVC INV E = 614.59 8" PVC INV S = 614.64
ST201	SANITARY MANHOLE RIM=621.85 8" PVC INV W-E = 614.50

PREPARED FOR:  
**SANITARY DISTRICT OF MICHIGAN CITY**  
1100 E. 8th STREET  
MICHIGAN CITY, IN 46360

**ALTA/NSPS LAND TITLE SURVEY  
& TOPOGRAPHIC SURVEY**  
KARWICK ROAD NATURE PARK  
MICHIGAN CITY, IN 46360

NO.	DATE	REVISION DESCRIPTION
1		SHEET 1

**Weaver Consultants Group**

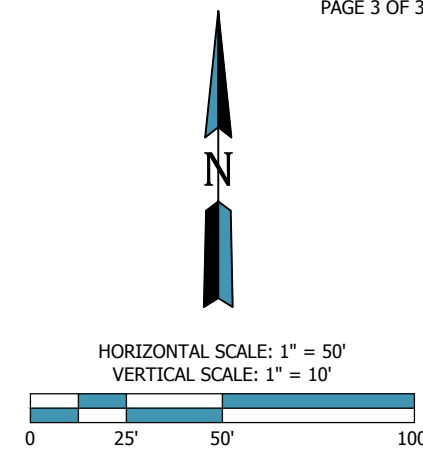
WEAVER CONSULTANTS GROUP  
1100 E. 8th STREET, SUITE 100  
MICHIGAN CITY, IN 46360  
(317) 317-4646  
www.wcgrp.com

REUSE OF DOCUMENTS  
This document, and the designs incorporated herein, are the property of Weaver Consultants Group, and is not to be used in whole or in part without the written authorization of Weaver Consultants Group.

DRAWN BY: CJS/AJW  
REVIEWED BY: KJA/RFW  
DATE: 05/26/2017  
SCALE: 1873-300-09  
M0001\_REV20180319.dwg

**SHEET 2**  
3





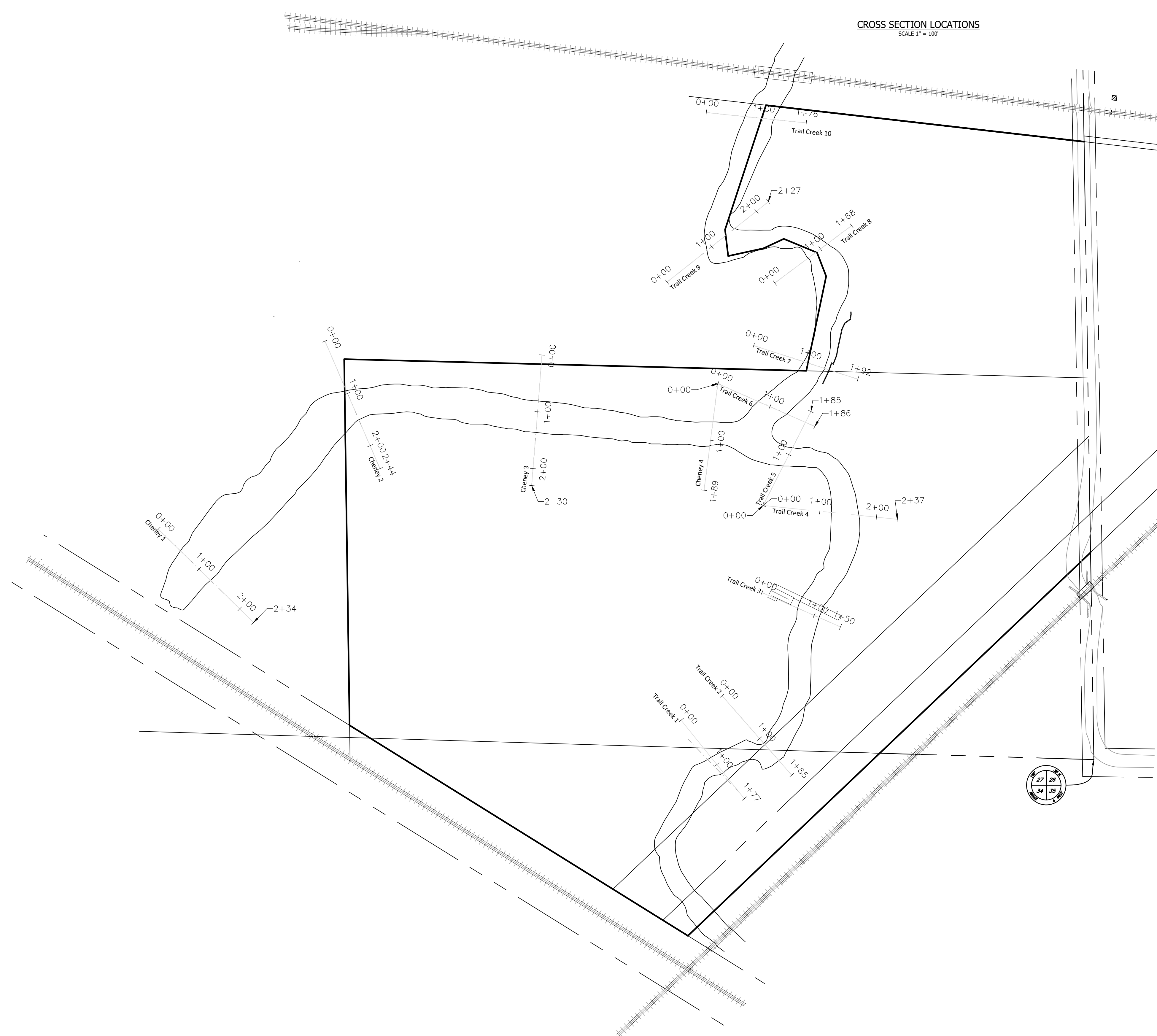
## CREEK SECTIONS

HORIZONTAL SCALE: 1" = 50'

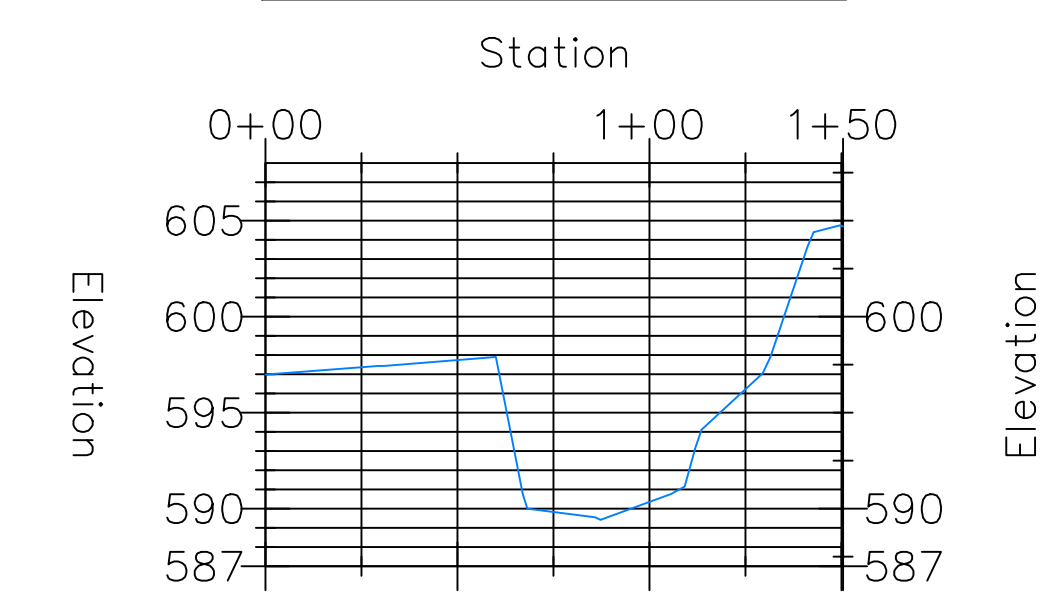
VERTICAL SCALE: 1" = 10'

## CROSS SECTION LOCATIONS

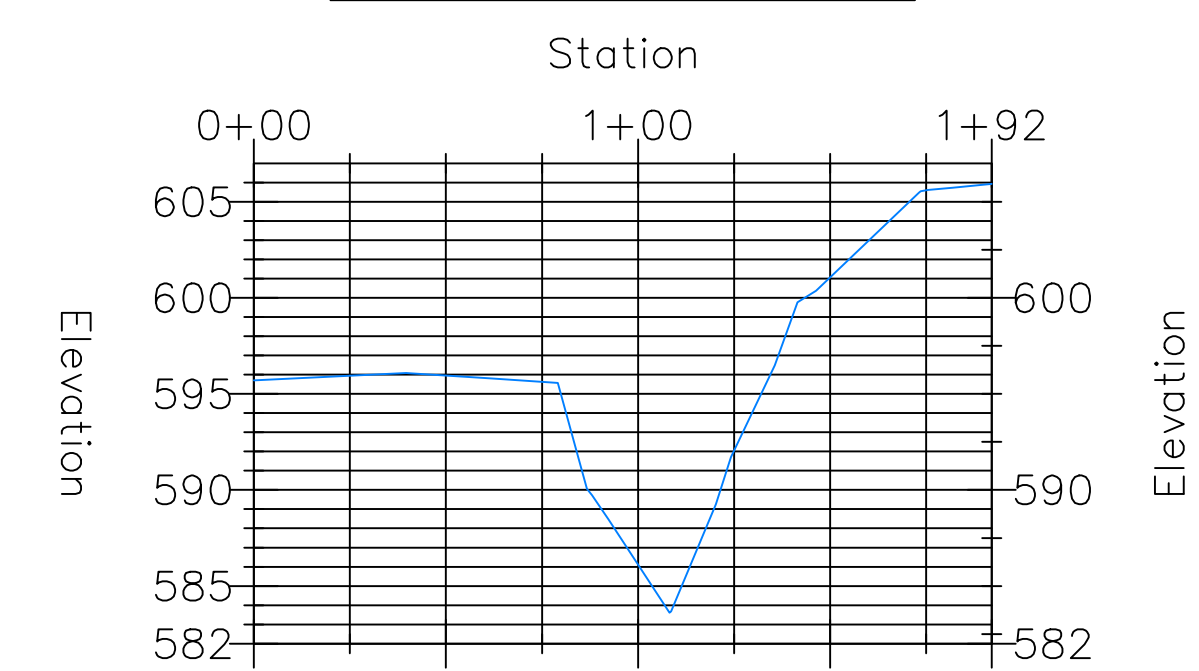
SCALE 1" = 100'



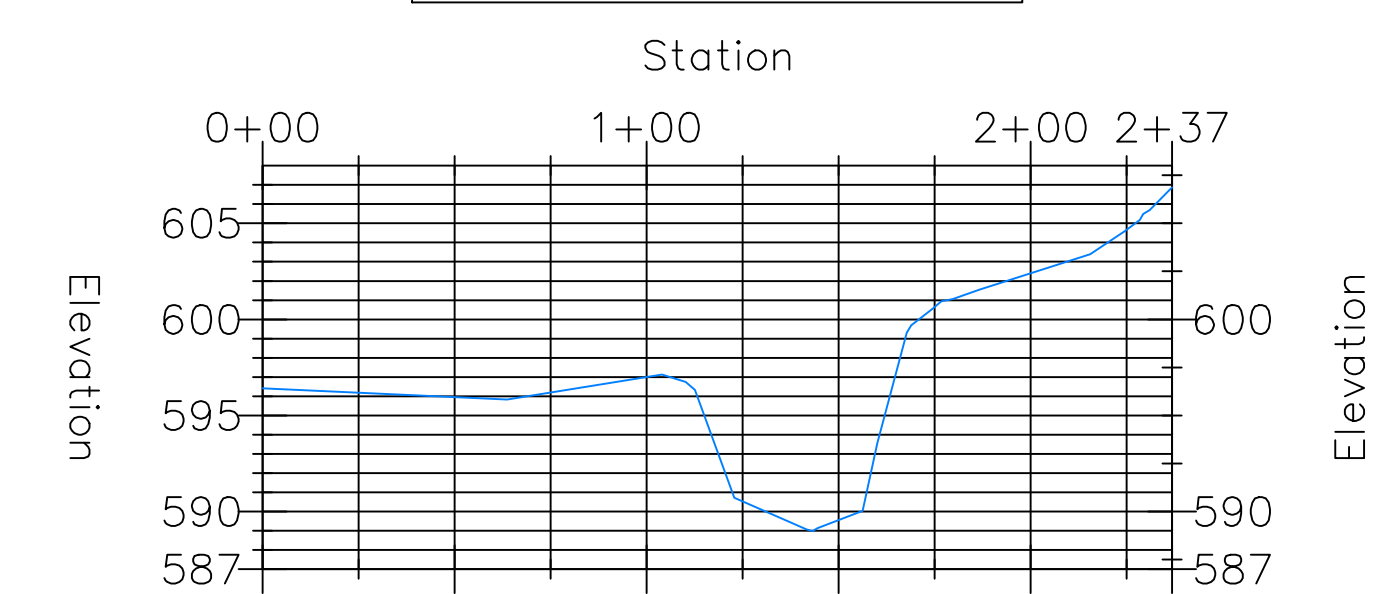
TRAIL CREEK 3 PROFILE



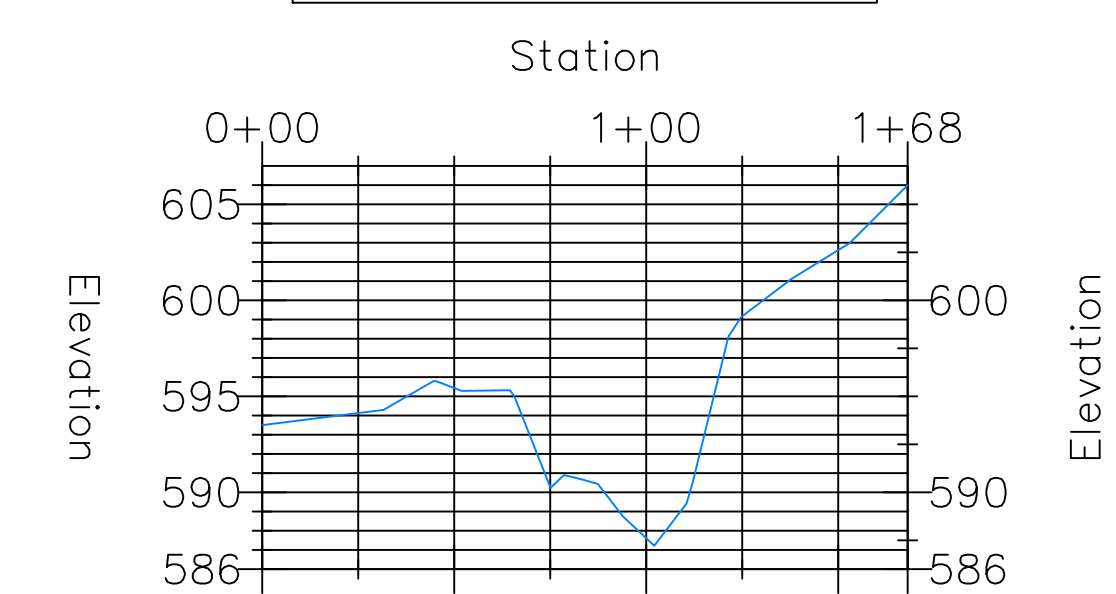
TRAIL CREEK 7 PROFILE



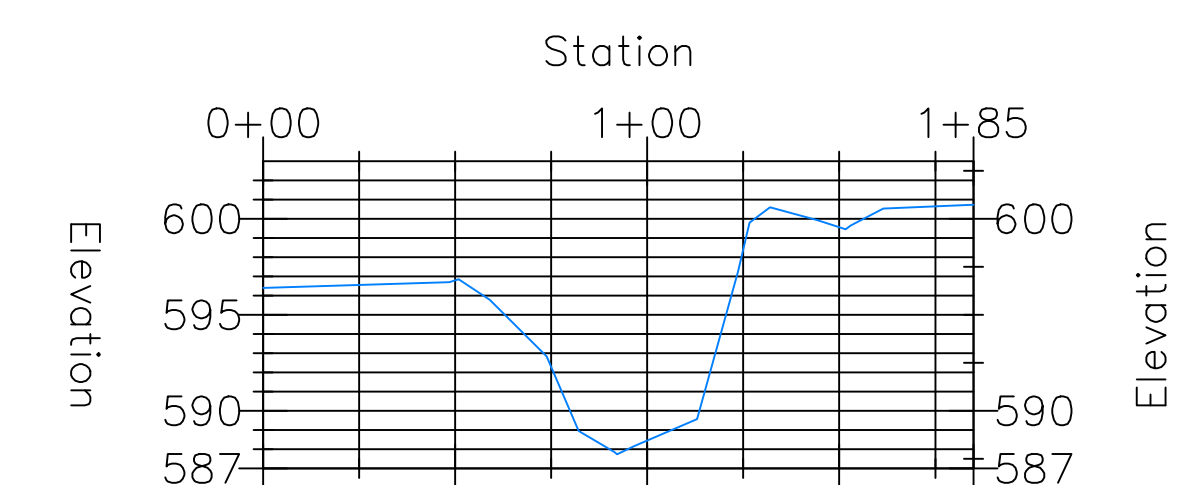
TRAIL CREEK 4 PROFILE



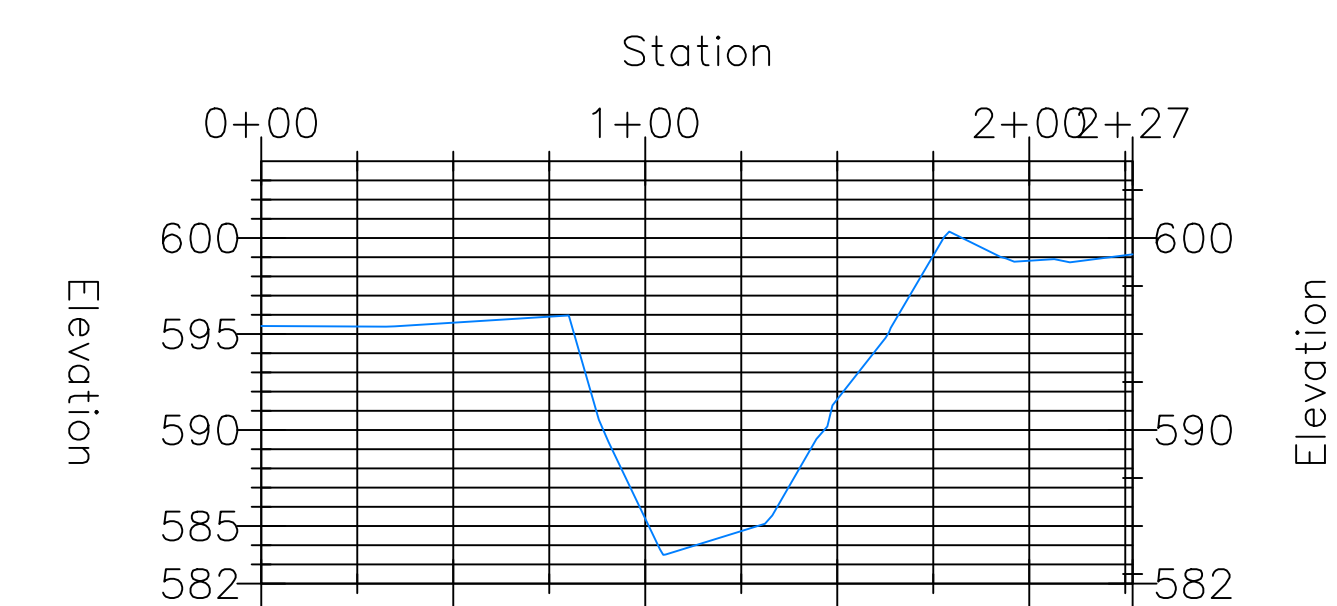
TRAIL CREEK 8 PROFILE



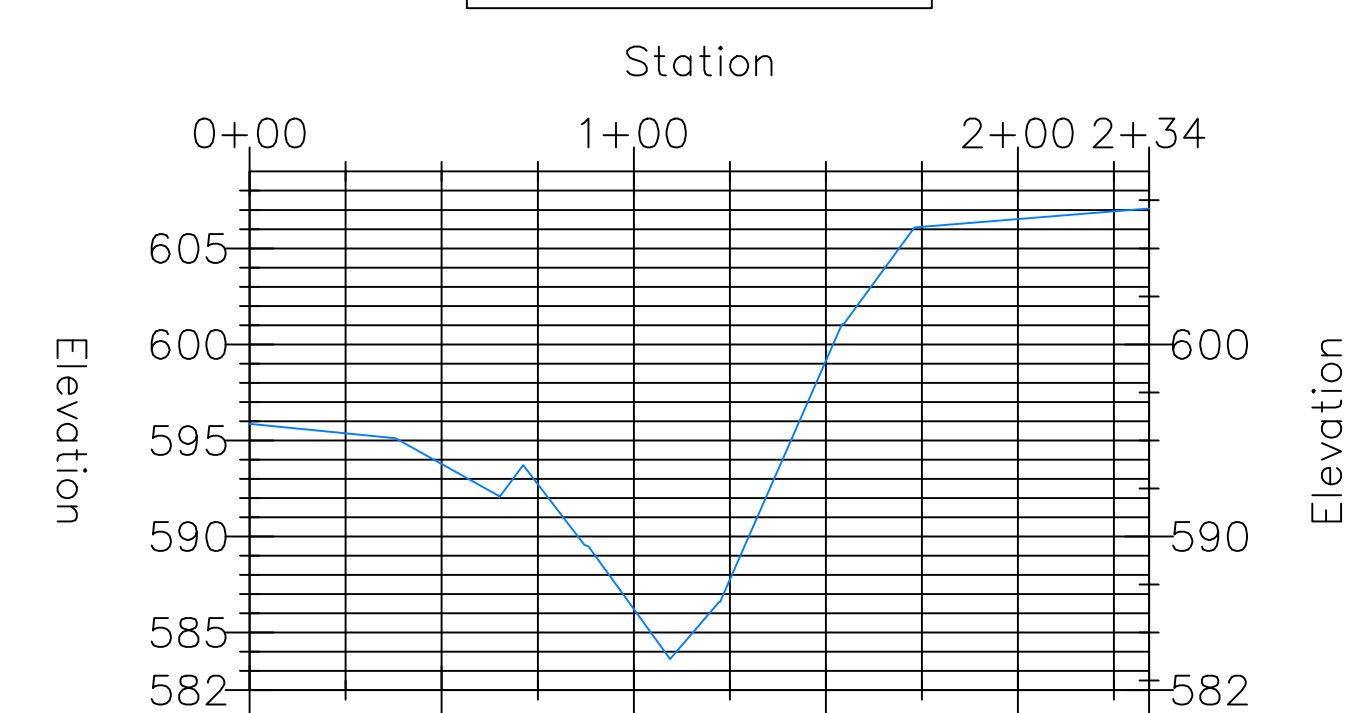
TRAIL CREEK 5 PROFILE



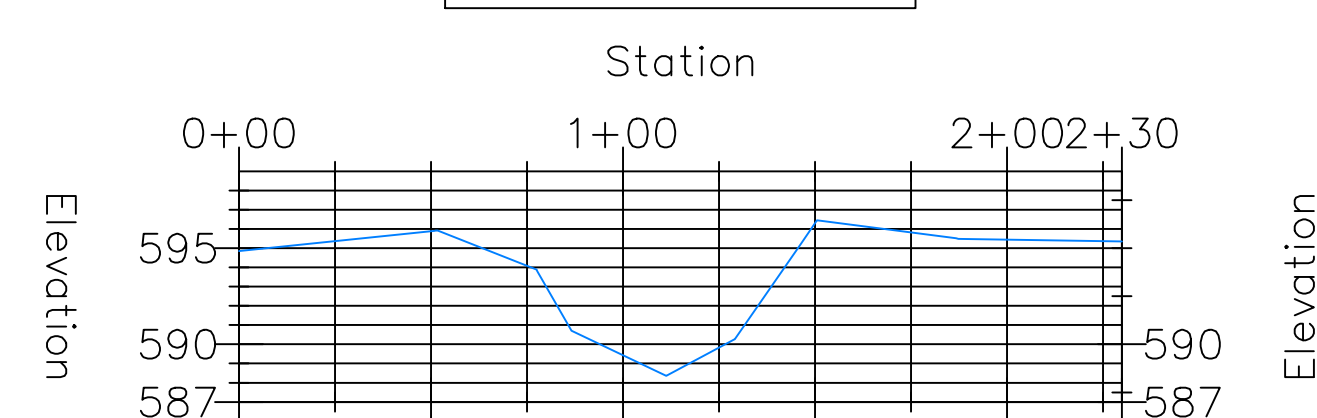
TRAIL CREEK 9 PROFILE



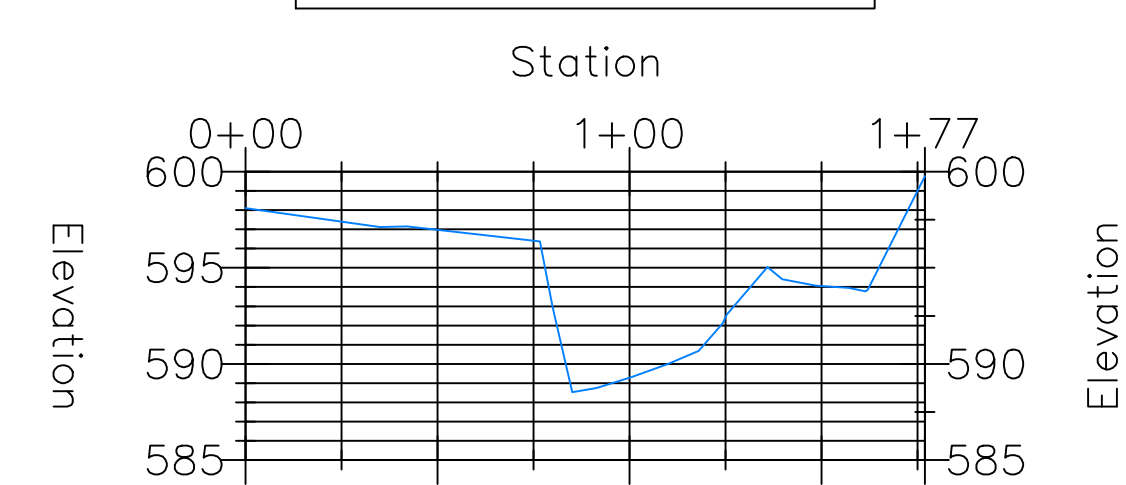
CHENEY 1 PROFILE



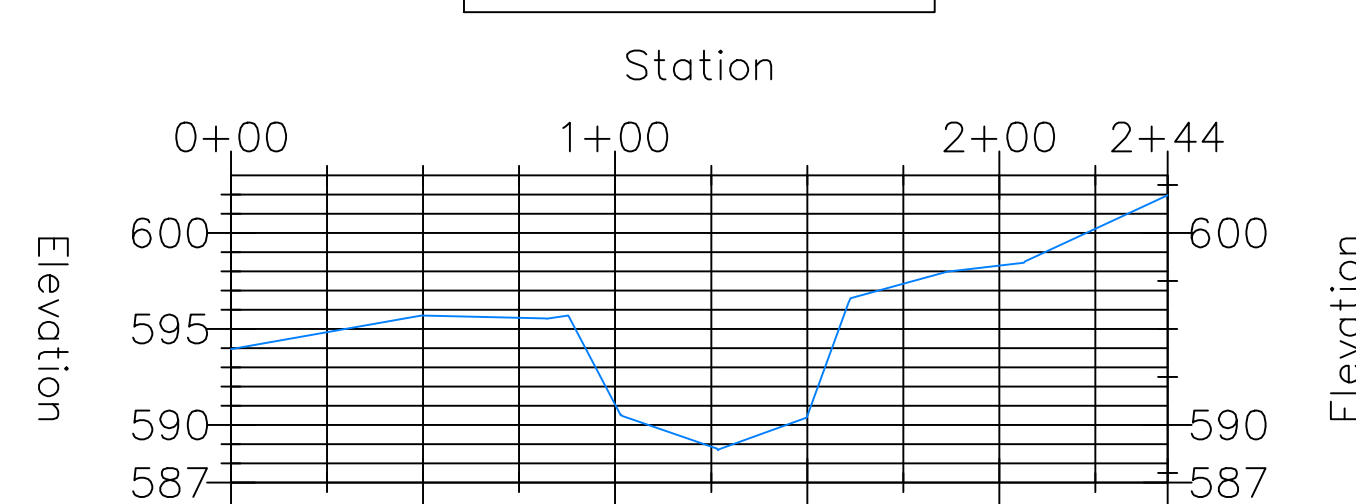
CHENEY 3 PROFILE



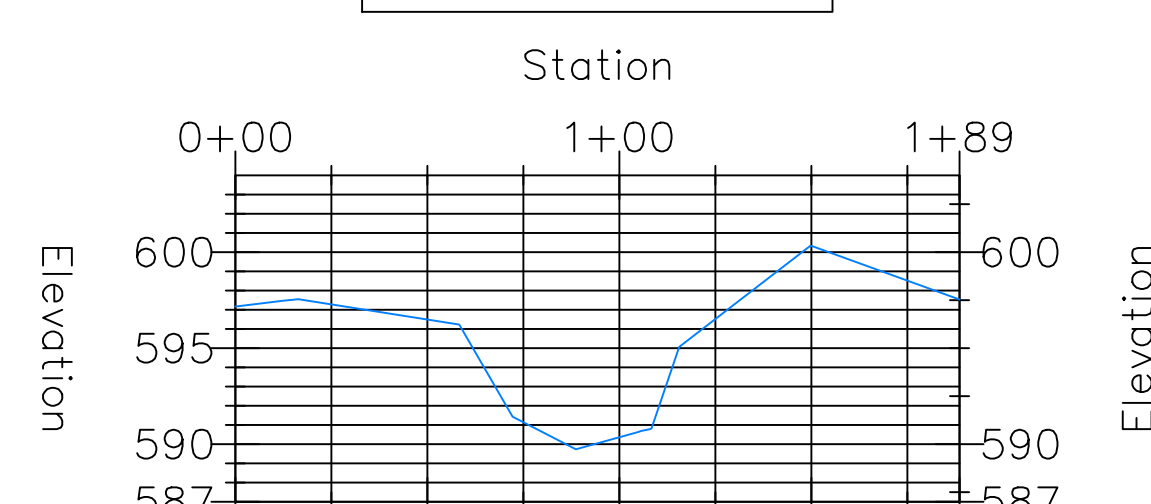
TRAIL CREEK 1 PROFILE



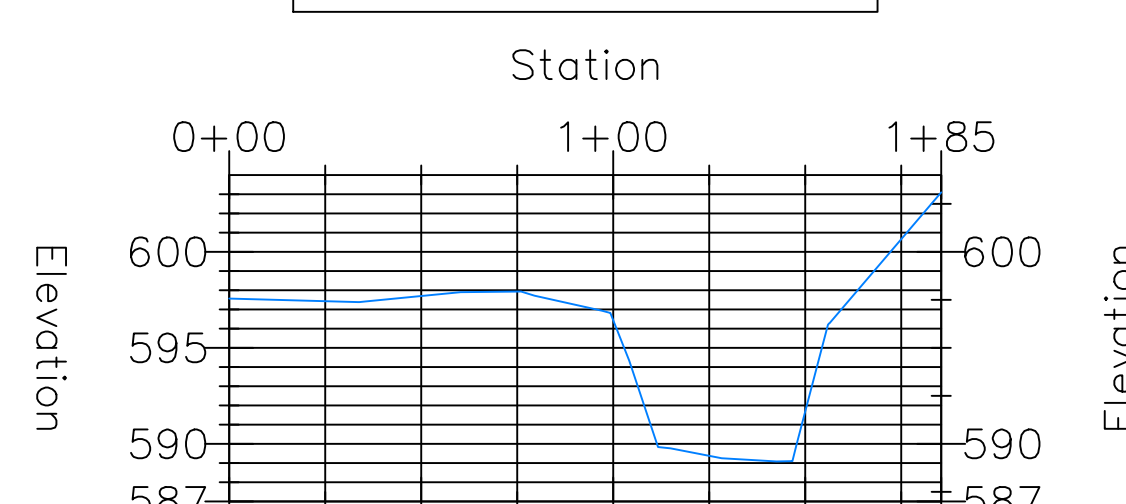
CHENEY 2 PROFILE



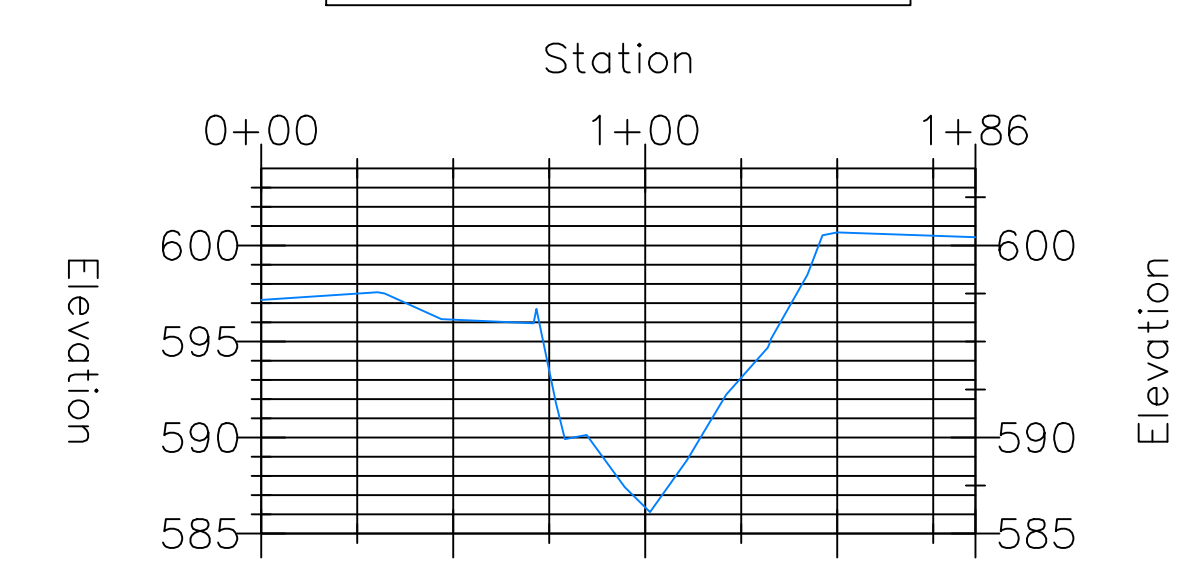
CHENEY 4 PROFILE



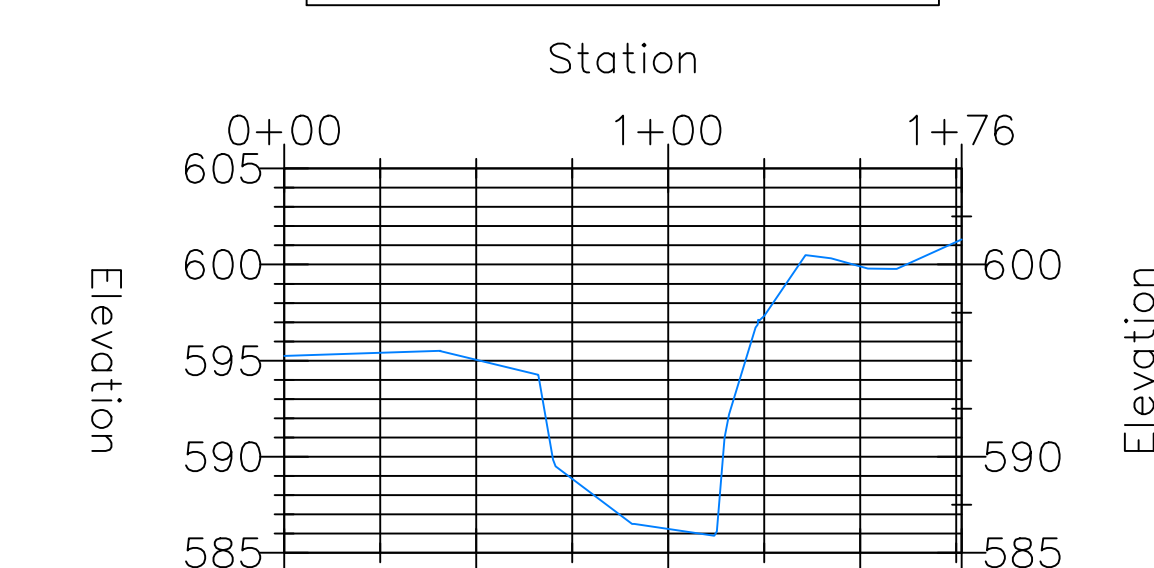
TRAIL CREEK 2 PROFILE



TRAIL CREEK 6 PROFILE



TRAIL CREEK 10 PROFILE



PREPARED FOR:  
**SANITARY DISTRICT OF MICHIGAN CITY**  
 1100 E. 8th STREET  
 MICHIGAN CITY, IN 46360

**CHENEY RUN & TRAIL CREEK**  
**TOPOGRAPHIC SURVEY**  
 KARNWICK ROAD NATURE PARK  
 MICHIGAN CITY, IN 46360

NO.	DATE	REVISION DESCRIPTION

**Weaver**  
**Consultants**  
**Group**

WEAVER CONSULTANTS GROUP  
 1510 BROAD STREET, SUITE 100  
 ANN ARBOR, MICHIGAN 48106  
 (800) 717-4646  
[www.wcgrp.com](http://www.wcgrp.com)

REUSE OF DOCUMENTS  
 This document, and the designs incorporated herein, are the property of Weaver Consultants Group, and is not to be used in whole or in part, without the written authorization of Weaver Consultants Group.

DRAWN BY: **AJW**  
 REVIEWED BY: **KJA/RJW**  
 DATE: **03/30/2018**  
 PLOT: **1873-300-09**  
 FILE: **0001\_REV20180319.dwg**

MCH 0001\_REV20180319.dwg

SHEET 1 OF 1



## **Appendix B**

### **Site Characterization Report – Karwick Road Nature Park**

Note: Corrective Action Alternative 3 is the selected and approved alternative for design and implementation as described in the Project Specifications.



March 9, 2015  
1873-356-04

# SANITARY DISTRICT OF MICHIGAN CITY

## SITE CHARACTERIZATION REPORT KARWICK ROAD NATURE PARK

MICHIGAN CITY, INDIANA

PREPARED BY



7121 Grape Road  
Granger, Indiana 46530  
574.271.3447 • [wcgrp.com](http://wcgrp.com)



## EXECUTIVE SUMMARY

---

Weaver Consultants Group, LLC (WCG), f/k/a Weaver Boos Consultants, LLC, has characterized the Karwick Road Nature Park Site (Site) and historical refuse dump as described herein on behalf of the Sanitary District of Michigan City (District). Based on the scope of service listed in the Site Characterization Plan and Quality Assurance Project Plan approved by the Indiana Department of Environmental Management (IDEM), WCG has found that the Site, located along the east bank of Trail Creek, received significant amounts of mainly household refuse, demolition debris, and similar materials beginning in approximately 1965 and ending sometime around 1971. Weaver Consultants Group conducted soil borings and exploratory test pits through and around the Site, and from this work it was found that the refuse deposit ranges from approximately 6 ft. to 19 ft. thick, and extends over approximately 9.7 acres. The refuse deposit appears to extend well south of the City's property onto the adjoining land owned by NIPSCO to the south.

Samples of the soil and refuse mixture comprising the deposit were tested for VOCs, SVOCs, and total metals. Concentrations of benzene, naphthalene, 1,2,4-trimethyl benzene, or arsenic were detected at concentrations above their respective residential soil migration to groundwater Screening Levels (SLs) in several test pits. Although chlorobenzene was detected at concentrations less than migration to groundwater SLs in two of the test pit soil samples, the presence of chlorobenzene is noted because it was also detected in several of the shallow groundwater samples, the discharge from the 18-inch CMP, and also in the sediment of Trail Creek. Chlorobenzene, therefore, appears to be a relevant indicator for cross-media migration from the refuse to the shallow groundwater and to the creek sediment.

Groundwater flow beneath the Site is controlled by the topography, the presence of Trail Creek, and the orientation of the underlying hydrologic units. Shallow groundwater flowing through the refuse deposit takes on the characteristics of weak municipal solid waste leachate and discharges to Trail Creek. The site characterization sampling program for shallow groundwater/leachate indicates the presence of chlorobenzene, arsenic, iron, manganese, and lead at concentrations greater than their respective residential tap water SLs, as well as ammonia at an average concentration of



76 mg/l. The ammonia loading to Trail Creek is estimated to be approximately 4.2 lbs/day.

The semi-confining organic silt layer underlying the refuse deposit is laterally continuous and separates the shallow groundwater from the deeper groundwater as evidenced by the 7 ft. (or greater) difference between water levels measured in nested monitoring wells screened in the refuse and those screened in the deeper sand and gravel aquifer. Groundwater in the deeper aquifer, therefore, flows upward beneath the creek. This conceptual site model indicates that there is little potential for horizontal migration of potential contaminants of concern through shallow groundwater beyond Trail Creek to the west or through the deeper sand and gravel aquifer.

Acetone and 2-butanone (methyl ethyl ketone) were detected in the four Creek sediment samples adjoining the Site at concentrations greater than EPA Region 5 SLs. Neither compound was detected in the up-stream sample. Polycyclic aromatic hydrocarbons including benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene were similarly distributed at concentrations greater than their respective Threshold Effect Levels (TELs) listed in NOAA's Screening Quick Reference Tables (SQuiRTs). Total arsenic also exceeded its TEL in two sediment samples. Chlorobenzene was detected in sediment samples SD-2 and SD-4 at concentrations below EPA Region 5 SLs, but is noted as an indicator of cross-media migration from the refuse deposit.

The site characterization surface water sampling program was conducted in September 2014, and indicates no exceedances of Surface Water Quality Standards (SWQs) in Trail Creek while the Creek flowed at approximately twice its 7-day/10 year low flow ( $Q_{7/10}$ ). The 18-inch CMP was, therefore, plugged by the District shortly after it was sampled, because the discharge concentration of ammonia was relatively high at 12.3 mg/l. This pipe was discharging at approximately 10 gallons per minute (gpm). Plugging of the CMP eliminated the point source discharge, but is expected to have increased the groundwater seepage to maintain equilibrium between groundwater inflows and surface water outflows to and from the refuse deposit.

Based on the site characterization, the following concerns have been identified:

- The current sandy soil cover over the refuse is insufficient to adequately protect against groundwater or surface water contamination.



- Refuse is exposed along the Trail Creek bank at several locations and some upland areas of the cover are topographical depressions.
- Slope stability analysis indicates that the west side of the refuse deposit is only marginally stable (FS=1.08). Care must be used during construction of any slope improvement projects to prevent large scale disturbance of this material. Additional failure of the slope could occur due to 1) high water levels in Trail Creek causing erosion which undermines the slope or 2) sudden changes in water level in the creek inducing pore pressure changes in the underlying soils which may cause sloughing or deeper rotational failures of the saturated soils.
- The refuse currently exposed along the Trail Creek bank and along upland trails is a safety hazard associated with slips, trips, and falls, or due to irregular or sharp objects protruding from the surface of the Site.
- Shallow groundwater/leachate within the refuse deposit is impacted by ammonia above SWQS and total iron at concentrations above tap water SLs. Some of the shallow monitoring wells also indicate concentrations of chlorobenzene, arsenic, lead, or manganese above tap water SLs.
- While ammonia and other leachate constituents are discharging into the Creek, the surface water of Trail Creek was found to meet SWQSS when flowing at approximately twice its Q<sub>7/10</sub> low flow. Low flow conditions did not occur and were not assessed during site characterization.
- Headspace gas concentrations in two shallow monitoring wells exceeded the LEL for methane. Surface measurements over the cover did not detect methane. There may be a need for additional monitoring of methane gas.

Four potential corrective action alternatives were considered for resolving the current environmental concerns. The first alternative (Alternative 1) considered is a minimal intervention approach (i.e., “no action”). As set forth in greater detail herein, this alternative is not appropriate because the IDEM is requiring that existing waste at the Site be addressed. The second alternative and its variations encompass the upper bound of the effort and the cost associated with comprehensive, permanent remediation by the removal and off-site disposal of all refuse at the Site (Alternative 2A), or by a comprehensive in-place closure using a low permeability soil cover system (Alternative 2B). The third alternative (Alternative 3) is proposed as an appropriate



planning-level approach that addresses potential concerns identified during the site characterization process. The corrective action alternatives are analyzed based on their ability to meet several criteria:

- Overall protectiveness of human health and the environment
- Compliance with regulatory requirements
- Long-term effectiveness and performance
- Constructability
- Conceptual-level probable cost to construct and maintain
- State acceptance
- Community acceptance

Based on an evaluation of several alternatives, WCG recommends that Alternative 3 be submitted for regulatory consideration. The elements of Alternative 3 include the following:

- Clear trees and brush from the approximately 3.3 acres of the refuse deposit footprint.
- Lay back the steep portions of the creek bank to a slope no steeper than 3H:1V (33.3%) by excavating the refuse and thin cover soil.
- Install a shallow groundwater/leachate collection trench to intercept ongoing discharges to Trail Creek. The intercepted leachate could be discharged to the sanitary sewer system for treatment.
- Approximately 12,000 cubic yards (CY) of refuse and existing cover soil will need to be removed to lay back the steep slope and to facilitate the installation of a shallow groundwater/leachate collection trench.
- Because pollutants appear to be entering the deteriorated 18-inch CMP, it may be necessary to grout and abandon it in place, or to line the 18-inch CMP to eliminate the direct migration pathway from the Site to Trail Creek.
- Place clean common borrow on the Site to re-grade the remaining low spots over approximately 2.1 acres of the existing cover to create a minimum upland



slope of 2% to prevent ponding of surface water and promote runoff. Also, selectively remove exposures of refuse and place 2 ft. of common borrow over localized areas of the existing cover estimated to total about 1 acre. An estimated total of 12,000 CY of common borrow is needed for these purposes.

- Install a final cover system over approximately 1.2 acres along the creek bank. This system is considered to include a 2 ft. thick compacted clay liner overlain by 0.5 ft. of topsoil. An estimated 4,000 CY of compacted clay and 1,000 CY of topsoil are needed for this purpose.
- Install erosion control measures along the creek bank to prevent long term erosion and to protect the final cover from the rise and fall of creek waters. Erosion control measures will include permanent turf/vegetation reinforcement matting combined with tied concrete block mats, large riprap, glacier stone, or other hard armoring of select areas. An estimated 1.2 acres (6,000 square yards (SY)) of reinforcement matting and on the order of 1,000 tons of riprap or glacier stone are needed for this purpose.
- Re-vegetate approximately 4.3 acres to establish vegetative cover across all disturbed areas.
- Install a post-corrective action groundwater monitoring well network to augment existing wells that may be damaged or need to be relocated after construction. An estimated 10 groundwater monitoring wells are considered appropriate for this purpose.
- Implement post-corrective action operations, maintenance, and monitoring to include regular visual inspections of the cover and erosion control measures, annual repair of minor erosion damage, annual O&M on the leachate collection system, and semi-annual monitoring of groundwater for a broad range of analytes to include VOCs, SVOC, metals, and ammonia in 10 groundwater monitoring wells.

Weaver Consultants Group's preliminary opinion of probable cost to construct the recommended corrective Alternative 3 is on the order of **\$2.4 million**. Annual post-corrective action care costs are estimated at approximately \$26,500, indicating a total post-corrective action care expense of approximately \$795,000 (current dollars) for 30 years. The probable costs estimated herein do not specifically include amenities that



may be considered appropriate by the District or the City to promote the beneficial use of the property as a recreation area and public fishing access.

This Executive Summary provides a brief overview of the findings of this Site Characterization Report (SCR). Although the Executive Summary is an integral part of the Report, it does not substitute for reading the entire Report, appended data, and referenced documents to fully understand the findings, conclusions, and recommendations presented herein in their entirety.



## TABLE OF CONTENTS

---

### Contents

<b>1</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	General.....	1
1.2	Purpose and Objective.....	1
1.3	Background Information .....	2
1.4	Historical Investigations.....	4
1.4.1	Historical Concentrations in Shallow Groundwater .....	4
1.4.2	Historical Concentrations in Surface Water .....	4
1.4.3	Historical Concentrations in Sediment .....	4
1.4.4	Historical Concentrations in Subsurface Soil .....	5
1.4.5	Usability of Historical Data.....	5
1.5	Recent Investigations.....	5
1.6	Current Conditions.....	6
1.7	Report Organization.....	6
<b>2</b>	<b>LOCATION AND PHYSICAL SETTING.....</b>	<b>7</b>
2.1	Location and Physical Setting .....	7
2.2	Regional Geology and Hydrogeology.....	8
2.2.1	Regional Geology .....	8
2.2.2	Regional Hydrogeology .....	9
2.3	Water Well Information.....	10
<b>3</b>	<b>CONCEPTUAL HYDROLOGICAL SITE MODEL .....</b>	<b>11</b>
3.1	Source and Contaminants of Concern .....	11
3.2	Potential Contaminant Migration Pathways .....	11
3.3	Background Evaluation .....	12
3.4	Receptor Identification .....	13
3.5	Hydrological System Boundary .....	13
<b>4</b>	<b>SITE CHARACTERIZATION METHODS AND FIELDWORK .....</b>	<b>14</b>
4.1	Delineation of Refuse Boundary .....	14
4.2	Soil Boring Program .....	15
4.3	Groundwater Sampling Program .....	15
4.4	In-Situ Hydraulic Conductivity Measurements .....	16
4.5	Streambed Sediment and Surface Water Sampling Program .....	16
4.6	Dumpsite Gas Sampling Program .....	17
4.7	Sampling Summary .....	18



4.7.1	Data Quality Assessment .....	19
4.7.2	Sample Location Survey Control .....	19
<b>5</b>	<b>RESULTS AND FINDINGS.....</b>	<b>20</b>
5.1	Site Geology .....	20
5.2	Site Hydrogeology .....	21
5.2.1	Groundwater Flux and Flow Velocities .....	23
5.3	Geotechnical Conditions .....	24
5.3.1	Geotechnical Properties of the Layers.....	24
5.3.2	Slope Stability.....	25
5.4	Refuse Boundary .....	26
5.4.1	Historical Aerial Photographs .....	26
5.4.2	Test Pits .....	27
5.4.3	Other Observations and Inferred Boundary .....	28
5.5	Test Pit Sample Results .....	29
5.6	Groundwater Sample Results .....	30
5.7	Streambed Sediment Sampling Results .....	33
5.8	Stream Surface Water Sampling Results .....	35
5.9	Dumpsite Gas Results .....	36
5.10	Data Quality Assessment .....	37
5.10.1	Sample Delivery and Analytical Work.....	37
5.10.2	Field QA/QC Results .....	38
<b>6</b>	<b>CONDITIONS WARRANTING CORRECTIVE ACTION.....</b>	<b>39</b>
6.1	Notice of Violations.....	39
6.2	Corrective Action Assessment .....	40
6.2.1	Dumpsite Cover.....	40
6.2.2	Slope Stability.....	41
6.2.3	Upland Recreational Exposure and Risk .....	41
6.2.4	Leachate Generation, Groundwater Impact, Recreational Exposure, and Risk .....	41
6.2.5	Surface Water Impact .....	42
6.2.6	Dumpsite Gas Generation.....	42
<b>7</b>	<b>EVALUATION OF CORRECTIVE ACTION ALTERNATIVES .....</b>	<b>44</b>
7.1	Alternative 1 – Minimal Intervention (No-Further-Action) .....	45
7.2	Alternatives 2A and 2B– Comprehensive Intervention .....	45
7.2.1	Alternative 2A Complete Removal and Off-Site Disposal of Refuse.....	45
7.2.2	Alternative 2B Comprehensive In-Place Closure .....	46
7.3	Alternative 3 – Reasonable and Appropriate Intervention .....	48
7.4	Summary of Alternatives .....	50



<b>8</b>	<b>CONCLUSIONS.....</b>	<b>52</b>
<b>9</b>	<b>QUALIFICATIONS AND LIMITATIONS.....</b>	<b>57</b>
<b>10</b>	<b>REFERENCES CITED.....</b>	<b>58</b>

## **LIST OF FIGURES**

FIGURE 1	Site Location Map
FIGURE 2	Site Plan and Data Collection Locations
FIGURE 3	Geological Cross Sections
FIGURE 4	Potentiometric Surface (May 19-20, 2014)
FIGURE 5	Shallow Potentiometric Surface (December 1, 2014)
FIGURE 6	Deep Potentiometric Surface (December 1, 2014)
FIGURE 7	Test Pit Soil Results
FIGURE 8	Groundwater (Shallow) Results
FIGURE 9	Groundwater (Deep) Results
FIGURE 10	Streambed Sediment Results
FIGURE 11	Stream Surface Water Results
FIGURE 12	Dumpsite Gas and Vapor Results
FIGURE 13	Conceptual Corrective Action Plan

## **LIST OF TABLES**

TABLE 1	Monitoring Well Information
TABLE 2	Water Level Elevations
TABLE 3	In-Situ Hydraulic Conductivity (Slug) Test Results
TABLE 4	Ex-Situ Hydraulic Conductivity (Lab) Test Results
TABLE 5	Test Pit Soil Results
TABLE 6	Groundwater Results
TABLE 7	Streambed Sediment Results
TABLE 8	Stream Surface Water Results
TABLE 9	Preliminary Opinion of Probable Cost – Alternative 2A
TABLE 10	Preliminary Opinion of Probable Cost – Alternative 2B
TABLE 11	Preliminary Opinion of Probable Cost – Alternative 3



## **LIST OF APPENDICES**

APPENDIX A	Water Well Survey
APPENDIX B	Historical Aerial Photographs
APPENDIX C	Test Pit Logs, Photographic Log, Soil Boring Logs, and Monitoring Well Details
APPENDIX D	Slug Test Reports and Geotechnical Test Reports
APPENDIX E	Slope Stability Calculations and Estimate Flow to Drain Trench Calculations
APPENDIX F	Test Pit Soil Sample Results
APPENDIX G	Groundwater Sample Results
APPENDIX H	Streambed Sediment and Surface Water Sample Results
APPENDIX I	VRP Documents



# 1 INTRODUCTION

---

## 1.1 General

This Site Characterization Report (SCR) has been prepared by Weaver Consultants Group, LLC (WCG) f/k/a Weaver Boos Consultants, LLC, on behalf of the Sanitary District of Michigan City (District) to characterize the Karwick Road Nature Park (Site) located in Michigan City as illustrated in **Figure 1 – Site Location Map**. The scope of service is as specified in Task 3 of the Request for Qualifications and Proposal (RFQ&P) prepared by the District on September 10, 2013. This service was authorized by the District's acceptance of WCG Proposal No. LLCP-001-13-13 on March 26, 2014.

## 1.2 Purpose and Objective

The purpose of this SCR is to characterize the historic dump beneath the surface of the Site as needed to identify current conditions warranting corrective action, and to present an assessment of applicable corrective measures consistent with the requirements listed under Indiana Administrative Code (IAC) Title 10-21-13 *Corrective Action Program*. Characterization of the Site as described herein was undertaken consistent with the following planning documents:

- Compliance Plan for Karwick Nature Park dated May 9, 2013;
- Scoping Technical Memorandum (STM) dated August 12, 2014;
- Quality Assurance Project Plan (QAPP) dated September 5, 2014; and,
- Site Characterization Plan (SCP) dated September 16, 2014.

The Indiana Department of Environmental Management (IDEM) acknowledged the adequacy of the QAPP “for the site characterization of the nature park and Trail Creek” in its review letter dated November 24, 2014. The Geology Enclosure accompanying the review letter listed several comments regarding proposed groundwater monitoring well locations; continuing source(s) for potential harm to human health and the environment; monitoring well seal installation; dumpsite gas sampling; and electronic



data submittal format. WCG endeavored to comply with each of the comments listed in the Geology Enclosure while implementing the SCP, except when the physical constraints of the Site prevented it from doing so. We note that groundwater monitoring wells drilled along the downgradient boundary of the dumpsite were advanced as close as practicable to Trail Creek but were, nevertheless, advanced through historic dumpsite deposits. These locations were used because WCG considered characterization of the shallow groundwater/leachate seeping directly into Trail Creek to be an essential data quality objective (DQO). Additionally, had alternate potential locations beyond the downgradient refuse boundary along the creek bank been used, or along the west side of the Creek beyond the waste boundary, are at low surface elevations prone to inundation when Trail Creek is at or near peak flow.

Site characterization guidance contained in the IDEM's Remediation Closure Guide (RCG) dated March 22, 2014 (corrected and updated through 2014) was also considered in the planning and implementation process. The overall objective remains the safe and effective resolution of environmental impacts from historic dumping in accordance with regulatory requirements and future recreational use of the Site as a park and a public access to Trail Creek.

### **1.3 Background Information**

Historical records and observations indicate that dumping at the Site primarily consisted of solid waste, including, but not limited to: construction debris, trash, auto parts, appliances, and household refuse. The Site was not operated by Michigan City or its subdivisions as a permitted landfill. Dumping was previously inferred to have taken place in the 1950's, 1960's and 1970's. Review of historical aerial photographs, as further discussed herein, and the evaluation of other information such as employee interviews, suggests that significant dumping did not begin until approximately 1965 and ended sometime around 1971. Newspapers recovered during exploratory test pits were dated between January 1968 and October 1970 as also further discussed herein. In the late 1990s and early 2000s, the City of Michigan City (City) began transforming the Site into a nature park through participation in Indiana's Voluntary Remediation Program (VRP). The Site was enrolled into the VRP by the City in March 2002. The City subsequently withdrew its VRP application and Voluntary Remediation Agreement with the State of Indiana in correspondence dated October 30, 2007. The State acknowledged the withdrawal of the Site from the VRP in correspondence dated



November 20, 2007. Copies of the VRP documents referenced herein are provided in **Appendix I – VRP Documents**.

Historical dumping on the Site deposited refuse along the bank of Trail Creek and upland to Karwick Road. Over later years, erosion along the creek bank exposed refuse in a few locations. The amount of exposure was minor in early 2012 when the City sought guidance from the IDEM, the Indiana Department of Natural Resources (IDNR), the Army Corps of Engineers (ACOE), and other government agencies to correct this condition. The IDEM subsequently inspected the Site in July 2012 and required the City to submit a plan for investigating impacts at the Site and developing long-term corrective measures. This plan, which was titled the “Compliance Plan for Karwick Nature Park,” was prepared by MCSD personnel and submitted to the IDEM on May 9, 2013.

Prior to the major rain event impacting Northwest Indiana from April 15 through April 18, 2013 the Creek bank was stable with only a few small areas where refuse was visible along the top of the bank. These exposures were minor and caused no immediately apparent adverse environmental impacts. However, the aforementioned major rain event and at least two log jams caused the Trail Creek current to change course, making an outward bend that significantly eroded the creek bank. Refuse was exposed, and some refuse was at or near the water elevation of Trail Creek, and the potential existed for refuse to enter Trail Creek.

The City implemented emergency measures to mitigate the erosion between April 26 and May 8, 2013. These measures included the clearing of small trees and brush to facilitate bank stabilization, the clearing of a log jam, the placement of erosion control Geo-grid netting over the bank, the placement of glacier stone over the netting, and the installation of silt fence. Clean clay fill and topsoil were placed on the upland portion of the bank, seeded, and mulched to reestablish vegetative cover. Results of the emergency measures, which continue to protect the upland portion of the creek bank, were described in the Emergency Work Plan submitted by the District to the IDEM and IDNR on May 9, 2013. The District solicited qualifications and proposals to retain a consultant to provide planning and site characterization services for the Site on September 10, 2013. Weaver Consultants Group (then known as Weaver Boos Consultants) was subsequently selected.



## **1.4 Historical Investigations**

Great Lakes Engineering and Testing advanced several borings into the Site in 2001 as part of a geotechnical assessment for the then-proposed construction of several structures for the Karwick Road Nature Park. These borings (B-1 and B-2), which are the deepest that have been advanced at the Site, extended to 70 ft. to 75 ft. below ground surface, providing useful stratigraphic data for natural soils beneath the fill deposit.

Historical investigation of the Site on behalf of the City was performed by APT, Limited (APT), consisting of a Phase I Environmental Site Assessment (ESA) in March 2002 and a Phase II Environmental Assessment (EA) performed in several steps between 2001 and 2003. The Phase II EA included the installation of shallow groundwater monitoring wells that remain at the Site; the collection and analyses of groundwater, surface water, and sediment samples; and the collection and analysis of a single soil sample.

### ***1.4.1 Historical Concentrations in Shallow Groundwater***

Several volatile organic compounds (VOCs) were detected in shallow groundwater samples at concentrations above the residential tap water Screening Levels (SLs) listed in the IDEM's current (2014) Remediation Closure Guide during APT's historical assessment. Additionally, several semi-volatile organic compounds (SVOCs) were detected in turbid bore water samples at concentrations above their respective SLs. Several of these results are considered less than representative of current conditions because low-flow sampling techniques were not consistently used in the collection of historical data and the resulting turbidity may have interfered with the analytical results. The shallow groundwater was further characterized by WCG as described herein below.

### ***1.4.2 Historical Concentrations in Surface Water***

Acetone and carbon disulfide were detected in surface water. Neither constituent has a surface water criterion listed, but both results were less than their respective residential tap water SLs. The surface water was further characterized by WCG as described herein below.

### ***1.4.3 Historical Concentrations in Sediment***

Concentrations of fluoranthene, several metals, or PCB 1254 were detected in several sediment samples. The historical sampling and analyses indicated concentrations that were less than their current respective SLs for residential direct contact or migration to



groundwater exposure routes. The highest historical concentration of fluoranthene (5.40 mg/kg) and the highest historical lead concentration (45.7 mg/kg) appeared to exceed ecological screening levels listed in the National Oceanic and Atmospheric Administration (NOAA) Screening Quick Reference Tables (SQuiRTs), suggesting that further ecological evaluation may be warranted. Streambed sediment of Trail Creek was further characterized by WCG as described herein below.

#### ***1.4.4 Historical Concentrations in Subsurface Soil***

A single subsurface soil sample was collected from a depth of 8 ft. below ground surface by APT and analyzed for VOCs. The historical concentrations of several VOCs exceeded their RCG SLs for migration to groundwater or soil direct exposure SLs for residential land use. The refuse deposit was further characterized by WCG as described herein below.

#### ***1.4.5 Usability of Historical Data***

The historical data reported by APT were developed under extensive quality assurance/quality control procedures and validated for use at the time of their development. The data were found usable for characterizing the Site at the time of their development over 10 years ago. The data remain useful, in the opinion of WCG, subject to the understanding that the passage of time may have led to changes in current groundwater, surface water, and/or sediment concentrations.

### **1.5 Recent Investigations**

The District investigated the surface water quality of that stretch of Trail Creek adjoining the Site by collecting upstream and downstream samples on April 17, 2013. The results indicated that no VOCs or SVOCs were detected. Total chromium, copper, lead, nickel, and zinc were detected in both upstream and downstream samples, but concentrations were well below potentially relevant surface water criteria and below RCG tap water screening levels. Additionally, it is noted that the upstream total metals concentrations were slightly higher than those detected downstream.

On May 2 and 3, 2013, the District sampled the discharge from an 18-inch corrugated metal pipe (CMP) that outlets to Trail Creek along the west side of the fill. The source of water that discharges from this pipe is believed by the District to be storm water from an up-stream catch basin located along Karwick Road with potential infiltration of the pipe by shallow groundwater or leachate. The results showed that chloroethane was



detected at 12 ug/l and chlorobenzene was detected at 16 ug/l, neither exceeding relevant criteria. No SVOCs and no PCBs were detected. This sample was not analyzed for total metals. The ammonia, nitrogen concentration of 24.2 mg/l appeared to exceed surface water criteria for continuous surface water concentration (2.1 mg/l) at the sample's measured pH (6.8) and temperature (13.8° C). The surface water of Trail Creek and the discharge from the CMP was further characterized by WCG as described herein below. The District plugged the CMP shortly after its May 2013 sampling, but this plug was removed sometime thereafter when localized ponding of stormwater occurred on Karwick Road near the site. WCG sampled the discharge from the pipe on September 30, 2014, and after the results again showed high ammonia values the District plugged the pipe and the pipe remains plugged to this date.

## **1.6 Current Conditions**

An overview of current Site conditions is illustrated in **Figure 2 – Site Plan and Data Collection Locations**. The Site's topography is irregular. The entire Site is vegetated with grass, brush, or forested, except in the gravel/dirt roadway and parking area near Karwick Road and along several walking trails that were mulched or covered with geotextile material. As part of the STM, WCG inspected the eight shallow groundwater monitoring wells installed by APT and found them to be intact. These existing groundwater monitoring wells (MW-1S through MW-8S) were, therefore, incorporated into the site characterization process and were sampled and analyzed as reported herein below.

## **1.7 Report Organization**

Section 1 provides general information, the purpose, and objective for this Report and relevant background information. The location and physical setting of the Site is discussed in Section 2. A conceptual site model based on investigations and current conditions is described in Section 3. Site characterization methods and fieldwork are described in Section 4. Results and findings of the site characterization process are discussed in Section 5. Current conditions that may warrant corrective action are summarized in Section 6. Corrective action alternatives are identified and described in Section 7. Section 8 summarizes the conclusions of the site characterization process and identifies a corrective action alternative recommended for further consideration. Qualifications and limitations applying to this SCR are provided in Section 10. Cited references are listed in Section 11.



## 2 LOCATION AND PHYSICAL SETTING

---

### 2.1 Location and Physical Setting

The Karwick Road Nature Park Site is located in Michigan City, Indiana in a predominantly rural/residential area on the west side of Karwick Road, between the Chicago South Shore and South Bend (CSS & SB) Railroad as the north boundary and the Chesapeake and Ohio Railroad (CSX) as the south boundary, as illustrated in **Figure 1**. The Site is located within the east  $\frac{1}{2}$  of the southeast  $\frac{1}{4}$  of the southeast quarter of Section 27, Township 38 North, Range 4 West of the Second Principal Meridian. Trail Creek, a salmonid stream and tributary to Lake Michigan, borders the Site on the west. The portion of the Site on which the dumping occurred was previously estimated to have consisted of approximately 5.5 acres of a 23.5 contiguous acres owned by the City of Michigan City, according to APT, Limited (2004). As discussed herein below, the refuse fill area is presently estimated by WCG to be approximately 9.7 acres, and is inferred to extend more than 100 ft beyond the southern boundary of the City's property, onto property owned by Northern Indiana Public Service Company (NIPSCO), as illustrated on **Figure 2 – Site Plan and Data Collection Locations**.

The Site is situated within a low area along the east side of Trail Creek, which flows north towards Lake Michigan. The Site is directly east of the confluence of Trail Creek and Cheney Run Stormwater Discharge Channel. The Cheney Run Stormwater Discharge Channel flows easterly to Trail Creek and conveys storm water runoff from a large area of Michigan City. The stormwater enters the discharge channel from a 108-inch diameter storm sewer.

Since 2007, the surface water flow and elevation of Trail Creek has been gauged by the USGS (Station 04095300) at Springland Avenue approximately 2,000 ft. downstream from the Site. Surface water elevation at that location is typically 586 to 588 ft. NVGD29, but has been measured at or above 594 ft. on at least 11 occasions since 2007 and near or above 596 ft. on approximately five occasions during that period. Based on these historical data and the measurements taken by WCG on December 1, 2014, the



surface water elevation appears to be on the order of 4 ft. higher at the Site during average flow conditions.

The Site's original topography sloped westerly towards the Creek from an elevation of approximately 600 ft. NVGD29 along Karwick Road to an elevation of approximately 590 ft. along the east bank of the Creek. The Site was subsequently filled, raising the majority of its surface elevation to levels of 600 ft. to 610 ft. NAVD88, suggesting the placement of on the order of 10 to 15 ft. of refuse and soil. Little of the filled area appears to be prone to inundation during high flow in Trail Creek, but land along the west bank appears to be relatively flat and rises only to elevations on the order of 595 ft. NAVD88 and is likely prone to flooding based on the USGS gauge measurements since 2007. A majority of the Site surface is now forested with softwood trees, the largest of which are generally located along the east bank of Trail Creek. Additionally, the District is currently evaluating the feasibility of using the land adjacent to the Cheney Run Storm Channel and across from the Site as a stormwater wetland treatment area that could provide treatment to the stormwater discharges from the Cheney Run storm sewer system.

## **2.2 Regional Geology and Hydrogeology**

### ***2.2.1 Regional Geology***

Surface soils at the Site are mapped by the USDA/SCS (1982) as including the Cohoctah-Fluvaquents-Suman soils, nearly level, very poorly drained and somewhat poorly drained soils that formed in loamy and sandy alluvium. According to Schneider and Keller (1970), upland sub-soils beneath the Site are outwash, lacustrine, beach, and dune sands. These soils are texturally comprised mainly of sand and gravel of the Atherton Formation. Lowland sub-soils directly along Trail Creek are mapped as alluvium composed of silt, sand, and gravel, designated the Martinsville Formation.

Bedrock directly beneath the Site is of the Devonian Antrim Formation (Schneider and Keller, 1970), consisting chiefly of shale. Supplemental information developed by Gray (1973) indicates the shale is black to greenish gray, exhibits a very low permeability, and that joints may yield small quantities of water that is commonly very high in sulfur content.



### ***2.2.2 Regional Hydrogeology***

Rosenshein and Hunn (1968) reported that La Porte County is underlain by four primary hydrologic units which include the following, from the surface downward: Unit 1 – sandy aquifer, Unit 2 – confining till layer, Unit 3 – sand and gravel aquifer, and Unit 4 – a deep confining till layer resting atop bedrock. According to Hill et al. (1979), the Site is located in an area underlain by all four hydrologic units, beneath which bedrock occurs at an elevation of approximately 475 ft. to 500 ft., indicating unconsolidated soil deposits total approximately 100 ft. to 125 ft. deep beneath the Site. The upper units of the bedrock, consisting of shale, are not considered useable aquifers. Groundwater beneath the region is recharged by precipitation falling in areas where sandy soils extend to the surface. Groundwater is discharged to both natural and manmade waterways and ditches which, in turn, discharge to Trail Creek and Lake Michigan. Groundwater beneath the Site is expected to flow westerly to Trail Creek.

According to the IDNR (1994), the Site is located on or near the boundary separating the Calumet Aquifer System and the Lacustrine Plain Aquifer System. The Calumet Aquifer System to the north is described as a fine to medium-grained sand with dispersed lenses of beach gravel. Beds of inter-laminated silt and clay, together with deposits of peat and muck, confine the aquifer in small areas across the region. The Calumet Aquifer is not extensively exploited as a source of water because of its proximity to Lake Michigan. The Lacustrine Plain Aquifer System to the south consists of a series of confined aquifers that are more extensively utilized for domestic water supply in rural areas. The individual aquifers consist of fine to medium-grained glacial-lacustrine and coastal sands capped by either lacustrine clays or till. The thickness of individual aquifers ranges from 7 to 90 feet and they average about 24 feet in thickness.

Potable water drawn from Lake Michigan for the residents of Michigan City is provided by the Department of Water Works, with service available to residents located near the Site as indicated in Superintendent Randall E. Russell's March 19, 1992 letter to the IDEM responding to a request for information relative to the then-active CERCLIS site assessment process. In this letter, Mr. Russell further indicated that he was aware that a few homes in the area of the Site were served by private wells although the Department of Water Works maintained no records for private wells.



## 2.3 Water Well Information

To identify water supply wells located near the Site, WCG utilized the IDNR's Enhanced Water Well Web Viewer at <http://www.in.gov/dnr/water/6604.htm> to search for water wells located within a 1-mile radius of the Site and for high-capacity water wells (greater than 70 gallons per minute) located within a 2-mile radius of the Site. Records for approximately 96 water wells located within a 1-mile radius were found. The locations of these wells are illustrated on the map provided in **Appendix A**, along with a table summarizing records for the water wells located within the 1-mile radius. The water well identified nearest to the Site is listed under record No. 362380 and is located approximately 0.40 mile to the southwest. This is a residential well owned by "Lemmons" at 100 Plum Street, Michigan City, Indiana and extends to a depth of 26 ft. below ground surface (bgs). A copy of this well record is provided in Appendix A, along with records for several additional nearby wells. Records for approximately 32 high-capacity water wells located within a 2-mile radius of the Site were also found. These are mapped and tabulated as shown in Appendix A. None of the nearby water wells identified herein appear to be located immediately downgradient or otherwise located where groundwater quality impacts might be expected in connection with the Site.

WCG also contacted the La Porte County Health Department to inquire as to locally available water well records. Mr. Anthony Mancuso informed us that La Porte County does not issue water well permits and, therefore, has no locally searchable records for water wells.



### **3 CONCEPTUAL HYDROLOGICAL SITE MODEL**

---

Historical and current data and information were considered, as appropriate, to develop a conceptual site model (CSM) as described herein. Elements of the CSM include those listed in the IDEM's RCG, which is based in part on ASTM's (2003) Guide for Developing Conceptual Site Models for Contaminated Sites.

#### **3.1 Source and Contaminants of Concern**

Based on the historical information reviewed, the dump deposits are composed mainly of ordinary refuse and are, therefore, a source of potential contaminants that may include VOCs, SVOCs, other organic compounds, metals, total dissolved solids (TDS), ammonia, or other contaminants commonly found in municipal refuse leachate. Methane gas from the decomposition of the refuse is also a contaminant of potential concern.

#### **3.2 Potential Contaminant Migration Pathways**

Potential contaminant migration pathways are influenced by groundwater recharge, flow, and discharge of groundwater beneath the Site. These factors are controlled by the topography, the presence of Trail Creek (and Cheney Run), and the orientation of the underlying hydrologic units. Trail Creek forms the nadir of a narrow valley; groundwater recharge occurs atop the highlands adjoining the creek channel. Groundwater flows through the more permeable units toward the Creek. Included among the more permeable units is the refuse deposit on the east side of Trail Creek that appears to transmit shallow groundwater or leachate directly to the creek channel. That this is occurring is supported by the presence of visible seeps of shallow groundwater or leachate along the western toe of the fill area just above the Creek. The presence of an underlying confining unit is important in this instance because it would be anticipated to hydraulically separate the refuse from the underlying sand and gravel aquifer. Shallow groundwater is expected to flow mainly in the horizontal direction along the contact between the refuse and an underlying confining unit if such a unit is present. This conceptual model of the Site's hydrogeological setting was previously



described by Billy E. Giles, Geologist with the IDEM's Site Investigation Section, in his historical Geologic Assessment Memorandum dated August 28, 1992.

Because Trail Creek is a receiving stream for both surface water and groundwater, WCG expects that groundwater at deeper depths flows horizontally towards Trail Creek and, thence, upward where it is expected to discharge into the Creek. Upward vertical groundwater flow near the Creek is expected to mitigate the potential for migration of leachate to the deeper sand aquifer or to nearby water supply wells. Rather than migrating to nearby water wells, groundwater potentially affected by the Site is expected to discharge into Trail Creek. Pre-characterization evidence for this conceptual model of deeper hydrogeological conditions is provided by two geotechnical borings (B-1 and B-2)<sup>1</sup> advanced by WCG's predecessor (Weaver Boos & Gordon, Inc.) in 2001. Additional potential migration pathways of concern include vertical gas or vapor migration from the fill deposit to the atmosphere above.

### **3.3 Background Evaluation**

Certain metals, such as iron and manganese, and related parameters, such as hardness, fluoride, and total dissolved solids (TDS), occur naturally in groundwater from unconsolidated deposits as reported by the IDNR (1994). This report indicates that natural iron concentrations in the area are reported to range from <300 ug/l to >2,000 ug/l. Manganese is reported to range from <100 ug/l to >500 ug/l. Hardness ranges from 61 mg/l up to >400 mg/l as calcium carbonate. Fluoride is reported to occur at concentrations of <0.50 mg/l to >2.0 mg/l. Total dissolved solids is reported to range from 300 mg/l to >500 mg/l beneath the east side of Michigan City.

Compounds such as VOCs and most SVOCs do not occur naturally and are appropriately attributed to the refuse deposit if absent in upgradient monitoring well(s). Background monitoring at other Midwestern locations by WCG also indicates that naturally occurring ammonia concentrations are typically very low for groundwater, ranging from <0.5 mg/l up to approximately 1.5 mg/l. Higher concentrations would suggest the influence of refuse-derived leachate. Ammonia is a common refuse leachate constituent at concentrations ranging from about 50 mg/l to >2,000 mg/l in the experience of WCG.

---

<sup>1</sup> Borings B-1 and B-2 were advanced as part of a geotechnical assessment for a nature center building that was being considered for construction in 2001.



### **3.4 Receptor Identification**

As a nature park used for hiking and exploring, and popular public access location for fishing Trail Creek and for launching a canoe or kayak, recreational users are the most frequent potential receptors at the Site. Other relevant ecological receptors include salmon and other fish, and benthos inhabiting Trail Creek. The downstream reaches of Trail Creek are considered some of the most prime recreation waters in the Midwest, and are heavily recreated. Additionally, Trail Creek flows into Lake Michigan near Washington Park Beach - one of America's top visited beaches.

### **3.5 Hydrological System Boundary**

The hydrological system boundary is taken to encompass the lateral and vertical extent of significantly elevated concentrations of contaminants of concern, especially concentrations above relevant screening levels. The horizontal upland boundary corresponds approximately to the footprint of the refuse deposit. The horizontal surface water boundary is considered to include the reach of Trail Creek adjacent to the Site and immediately downgradient. The vertical boundary beneath the Site is expected to extend no deeper than to the top of the Antrim Shale bedrock that forms the lower boundary of the unconsolidated aquifer system.



## 4 SITE CHARACTERIZATION METHODS AND FIELDWORK

---

Site characterization was implemented according to the methods listed in the SCP and supporting QAPP, with significant fieldwork conducted on several occasions between September 30 and December 22, 2014. Sample analyses and data reduction was completed by approximately January 30, 2015. This section summarizes the site characterization methods utilized, fieldwork, and sampling efforts implemented.

### 4.1 Delineation of Refuse Boundary

Identification of the refuse boundary was undertaken by using a broad approach of considering historical aerial photographs, excavation of exploratory test pits, and the advancement of soil borings as specified in the SCP. Historical aerial photographs were obtained for this purpose from Historical Information Gathers (HIG) for a period extending from 1939 to 2012. Additional historical aerial photographs for 1970 and 1980 were obtained from the Northwestern Indiana Regional Planning Commission (NIRPC). The aerial photographs obtained from these sources are reproduced in **Appendix B**. The aerial photographs were reviewed for visual indications of land-disturbing activities.

Subsurface conditions beneath the Site were explored by excavating a series of 12 test pits (TP-1 through TP-12) at the locations shown in **Figure 2**. The test pits were excavated by D&M Excavating, Inc. (D&M) using a rubber tire combination excavator/loader under the direction of WCG personnel on December 22, 2014. Observations recorded in the field by WCG personnel are listed on the Test Pit Field Logs provided in **Appendix C**. Subsurface conditions encountered while drilling a series of new groundwater monitoring wells were also considered as discussed herein.

Grab samples comprising mixtures of refuse and soil were collected from eight of the test pit spoil piles by WCG personnel in accordance with *Field SOP 08-001 Surface Soil Sampling* as listed in the approved QAPP. The samples were containerized, placed on ice, documented, and shipped overnight to Pace Analytical Services for VOC, SVOC, and total metals analyses according to the methods specified in the SCP. One field duplicate



and one MS/MSD sample was collected, and a trip blank for VOCs was submitted for analysis.

## 4.2 Soil Boring Program

The soil boring program included the advancement of four relatively deep soil borings (MW-2D, MW-4D, MW-6D, and MW-10D) to depths of 40 to 60 ft. below ground surface (bgs) at the locations shown in **Figure 2**. One shallow boring (MW-9S) was also advanced to 20 ft. bgs. The soil borings were advanced on November 4, 5, and 6, 2014 by Environmental Drilling and Contracting (EDAC) using a Gus Pech 1100 rubber tire all-terrain rig turning a 4.25-inch ID hollow stem auger. Soils were sampled at regular intervals using a split-barrel sampler and thin-wall Shelby Tube sampler as described in *Field SOP 08-002 Sub-Surface Soil Sampling* for field examination and geotechnical analyses. Field observations, augmented by further examination of the soil specimens at WCG's geotechnical laboratory, are listed on the Log of Soil Boring Forms provided in **Appendix C**. Several soil samples were selected for geotechnical testing that included determination of natural moisture content, gradation, Atterberg limits, and triaxial permeability testing with confining pressure utilizing the methods specified in the SCP.

Historical soil borings advanced by Weaver Boos & Gordon, Inc. (B-1 and B-2)<sup>2</sup> and those advanced by APT during 2001 (GB-01 through GB-05 and MW-1 through MW-8) were also considered. Logs for these historical soil borings are also provided in **Appendix C**.

## 4.3 Groundwater Sampling Program

In conjunction with the soil boring program and investigation, five (5) of the soil borings (MW-2D, MW-4D, MW-6D, MW-9S, and MW-10D/MW-10S) were completed as groundwater monitoring wells at the locations shown in **Figure 2**. The monitoring wells were constructed of 2-inch diameter PVC casing and terminated with 10 ft. of #10 slot well screen set in a select sand filter pack. The remainder of the annular space was sealed with a bentonite product and the wells were completed at the surface using locking protective covers set in a 2 ft. diameter concrete pad. Well Completion Report forms provided in **Appendix C** describe the construction details for each of the new monitoring wells. Logs for historical groundwater monitoring wells installed by APT during 2001 are also provided for completeness.

---

<sup>2</sup> Borings B-1 and B-2 were advanced as part of a geotechnical assessment for a nature center building that was being considered for construction in 2001.



Following installation, each of the new wells was developed by bailing and pumping approximately 10 to 20 well volumes (about 15 to 30 gallons). Following development, the new wells were allowed to stabilize at least 24 hours and the water levels were measured on November 19-20 and again on December 1, 2014. The new and existing groundwater monitoring wells were sampled according to *Field SOP 08-003 Groundwater Sampling* on November 19-20, 2014. The groundwater samples were containerized, preserved, placed on ice, and delivered overnight to Pace Analytical Services for analyses for parameters listed in 329 IAC 10-21-16, Table 1B “Constituents for Detection Monitoring” and Table 2 “Constituents for Assessment Monitoring” according to the methods specified in the SCP. One field duplicate and one matrix spike/matrix spike duplicate (MS/MSD) sample were collected and, along with a trip blank for VOCs, were submitted for analysis.

#### **4.4 In-Situ Hydraulic Conductivity Measurements**

Following development and sampling, each monitoring well was slug tested to measure the hydraulic conductivity of the surrounding formation on December 4 and 5, 2014. Slug testing was implemented as a rising head (recovery) test during which a standard bailer was used to rapidly remove approximately 1 liter of water. Recovery was measured using a data logging pressure transducer and the results were evaluated using Aqtesolv for Windows to implement the Bouwer-Rice solution method. During data evaluation, the confined aquifer model was selected for the deep wells and the unconfined aquifer model was selected for the shallow monitoring wells. The resulting reports are provided in **Appendix D**.

#### **4.5 Streambed Sediment and Surface Water Sampling Program**

Sediment and surface water adjoining the east bank of Trail Creek was sampled at five (5) locations as shown in **Figure 2** (SD-1 through SD-5 and SW-1 through SW-5). Sediment and surface water was sampled on September 30, 2014 during a period when flow was approximately 50 cubic feet per second (CFS) at USGS gauging station 04095300, which flow is slightly above the 31-year median daily discharge value of 40 CFS reported by the USGS for this location. Creek flow at the time of sampling is also noted to be approximately two times the 7-day/10-year ( $Q_{7/10}$ ) low flow of 21 CFS stated by John Elliot, Technical Environmental Specialist for the IDEM’s Office of Water Quality/Permitting Branch (personal communication, February 9, 2015).



Streambed sediment was collected from the upper 0.5 ft. of sediment using a hand auger according to *Field SOP 14-002 Sediment Sampling*. Surface water was sampled from the upper 0.5 ft. using a dip sampler and bailer according to *Field SOP 14-001 Surface Water Sampling*. It is noted that surface water sample SW-3 was collected directly from the outfall of the 18-inch diameter CMP prior to entering or mixing with Trail Creek. The discharge rate at the time of sampling was measured at approximately 10 gallons per minute (GPM) using a bucket and a stop watch. One field duplicate and one MS/MSD sample were collected from each matrix and, along with a trip blank for VOCs, were submitted for analysis. The sediment was analyzed for total metals, cyanide, VOCs, SVOCs, organochlorine pesticides/herbicides and polychlorinated biphenyls (PCBs) according to the methods listed in the SCP. The surface water samples were analyzed for the same constituents as the groundwater samples.

The surface water sampling was repeated for organochlorine pesticides/herbicides on October 9, 2014 after the laboratory notified WCG that they had missed the hold time before extraction of the September 30 samples. The laboratory nevertheless analyzed the September 30 samples beyond their pre-extraction time and also analyzed the October 9 samples for organochlorine pesticides/herbicides with timely extraction.

#### **4.6 Dumpsite Gas Sampling Program**

The headspace in each of the groundwater monitoring wells was checked for concentrations of methane, oxygen, carbon dioxide, and balance gas (mainly nitrogen) immediately before groundwater was sampled and again immediately after groundwater was sampled on November 19 and 20, 2014. After groundwater was sampled, shallow groundwater monitoring wells appearing to be watered-in were bailed in an effort to depress their water levels to within their respective screen intervals so as to provide more representative results. The monitoring wells were sampled for gas using a GEM 2000 portable gas analyzer temporarily affixed to the top of each well pipe as described in *Field SOP 14-003 Gas Monitoring* and as recorded on the groundwater field sampling report for each well.

In addition to sampling the groundwater monitoring wells for headspace gases, the concentrations of methane, oxygen, carbon dioxide, and balance gas were measured in the atmosphere immediately above the dumpsite cover soil. This measurement was performed by traversing the Site on foot while carrying the GEM 2000 with its intake tube suspended at ankle height. This effort began by traversing the perimeter of the



inferred refuse boundary in a clock-wise direction and continued in four progressively tighter traverse loops, ending near the approximate center of the Site at monitoring well MW-8. Results were recorded in the field notebook.

The dumpsite gas sampling program continued during excavation of the exploratory test pits on December 22, 2014. Immediately following the completion of each test pit, the atmosphere immediately below the rim of each excavation was checked for concentrations of photoionizable volatile organic vapors using a RAE Systems photoionization detector (PID) fitted with a 10.6 eV lamp and a RAE Systems gas monitoring field instrument to check for methane as its percentage of its lower explosive limit (LEL), carbon monoxide, and hydrogen sulfide. Results were recorded as reported on the test pit field logs. There was no more dumpsite gas sampling performed after the test pit excavation of December 22, 2104.

## 4.7 Sampling Summary

Samples of soil, groundwater, surface water, sediment, and geotechnical soil samples were collected for analysis as summarized in the following table:

**Summary of Samples Collected and Analyzed**

Media	Number of Site Samples	Number of QA/QC Samples	Analytical Parameters
Soil	8	1 Duplicate 1 MS/MSD 1 Trip Blank (VOCs)	VOCs SVOCs/PAHs RCRA Metals
Groundwater	14	1 Duplicates 1 MS/MSD 1 Trip Blank (VOCs)	Tables 1B and 2 parameters (Section 3.4)
Surface Water/Pipe Discharge	5	1 Duplicates 1 MS/MSD 1 Trip Blank (VOCs)	Tables 1B and 2 parameters (Sections 3.4, 3.7)
Sediment	5	1 Duplicates 1 MS/MSD 1 Trip Blank (VOCs)	Condensed Tables 1B and 2 parameters (Section 3.8)
Soil (geotechnical)	20	Per applicable ASTM Standard	Moisture content
	10		Gradation
	8		Atterberg limits
	2		Triaxial permeability with confining pressure



The soil, groundwater, surface water/pipe discharge, and sediment samples were submitted to Pace Analytical Services, Inc. in Indianapolis, Indiana where they were analyzed according to the SW-846 methods specified in the approved QAPP in its included laboratory Quality Assurance Manual. The geotechnical soil samples were evaluated using applicable ASTM methods at WCG's geotechnical laboratory in Granger, Indiana.

#### ***4.7.1 Data Quality Assessment***

Data quality are assessed in the context of the overall results as described in **Section 5** with consideration for adherence to established SOPs, precision, accuracy, completeness, and sensitivity.

#### ***4.7.2 Sample Location Survey Control***

Soil borings and monitoring well locations were surveyed by a state-certified or licensed land surveyor. Fixed data points, excluding monitoring well top of riser elevations, were surveyed to the nearest 0.1 foot vertically and 0.1 foot horizontally. Monitoring well top of riser elevations were surveyed to 0.01 foot vertically and the nearest 0.1 foot horizontally. Elevations were reported in feet above NAVD88. Surveying of fixed data points was completed using a survey-grade GPS instrument operated with Real Time Kinematic (RTK) correction. Surveying of non-fixed data points, such as test pits or surface water samples, was completed using a mapping-grade field GPS unit (Trimble Juno 3B), generally capable of 2 to 5-meter accuracy.



## 5 RESULTS AND FINDINGS

---

This section reports the results and findings of the Site Characterization Program in the context of the CSM and DQOs established in the STM, SCP, and supporting QAPP. The geological and hydrogeological elements of the CSM are considered first, followed by a summary of hydrogeological results, geotechnical results, and the nature, extent, and concentrations of contaminants of concern (COCs). Concentrations of COCs detected in soil, groundwater, sediment, and surface water are compared with the numerical environmental quality criteria and screening levels listed in the SCR which include the following:

- Recreation Soil Screening Levels (SLs) listed in the RCG, March 2014, where available, and recreational SLs for a community park exposure scenario calculated for this project using the guidance provided in Section A.6 of the RCG's Appendix A where unavailable.
- Soil Migration to Groundwater (MTG) SLs listed in the RCG.
- Groundwater SL listed for residential tap water in the RCG, March 2014.
- Surface Water Quality Standards (SWQS) listed in the Indiana Administrative Code (IAC) Title 327 2-1.5-8 and Screening Quick Reference Tables (SQuiRTs) values for contaminants without numeric SWQSs as listed by the National Oceanic and Atmospheric Administration (NOAA).
- SQiRTs values as listed by NOAA and U.S. EPA Region 5 sediment SLs for contaminants without numeric SQiRTs.
- Dumpsite gas lower explosive limit (LEL), which is 5 percent by volume for methane, or 100% of the LEL.

### 5.1 Site Geology

The unconsolidated subsurface conditions beneath the Site were found to be consistent with the professional literature for the region and historical site-specific assessments.



The deep soil borings (MW-2D, MW-4D, MW-6D, and MW-10D) generally encountered surficial sand or refuse underlain by organic soil (organic silt or peat) that is in turn underlain by saturated fine to medium sand or gravel. The surficial sand encountered at soil boring MW-10D appears to represent dune sand of the Atherton Formation. The organic silt or peat appears to represent the lowland alluvium of the Martinsville Formation. The deeper saturated sand appears to be outwash, lacustrine, or beach sand that is also representative of the Atherton Formation. Soil borings MW-2D, MW-4D, and MW-6D encountered 1 to 2 ft. of sandy cover soil underlain by approximately 6 to 19 ft. of refuse and fill soil underlain by approximately 5 to 25 ft. of organic silt containing sand and shells. Soil boring MW-10D encountered dune sand mixed with peat that was underlain by more than 5 ft. of peat. Organic soils were encountered in all current and historical soil borings (B-1 and B-2) advanced to sufficient depth. Shallow soil boring MW-9S encountered approximately 15 ft of refuse and fill soil that was also underlain by organic silt. Historical borings MW-1S through MW-8S advanced to sufficient depths also encountered the organic silt, clay, or clayey sand, also suggesting that the organic deposit is laterally continuous. The historic and current deep soil borings indicate that the thickness of the organic soil layer is variable. **Appendix C** provides the current and historical boring logs.

With consideration for the historical and current soil boring data and groundwater level measurements, WCG created **Figure 3 - Geological Cross Sections** to illustrate geological elements of the updated CSM. As shown on cross section A-A', the Site is flanked to the north and south by the elevated embankments of the CSS & SB and CSX Railroads, between which approximately 6 to 19 ft. of refuse and fill were placed atop natural silty sand or organic silt. The deeper unconsolidated soils are wet fine to medium to coarse sand. As shown on cross section B-B', the organic soils appear to extend from southwest to northeast beneath the refuse deposit and beneath Trail Creek. The majority of sediment samples collected from Trail Creek was composed of organic silt, consistent with the conditions illustrated in cross section B-B'.

## 5.2 Site Hydrogeology

The Site hydrogeology is assessed by measurements taken in the 14 groundwater monitoring wells located and screened as listed in **Table 1 – Monitoring Well Information**. Groundwater level elevations that were measured in the monitoring wells on three occasions are listed in **Table 2 – Water Level Elevations**. The groundwater and surface water elevations measured on December 1, 2014 are incorporated into the cross



sections shown in **Figure 3**. Because the organic silt soils are typically of a relatively low permeability, the water table is perched within the fill refuse deposit above and is, therefore, inferred to take on characteristics of municipal refuse leachate. The underlying organic silt layer acts as an aquitard, expected to provide at least partial hydraulic separation between the unconfined water table and the underlying confined sand aquifer. The cross sections illustrate the extent of hydraulic separation between the water table and confined aquifer along Trail Creek where the water levels measured in the deep confined aquifer are 7 to 7.6 ft. higher than the water levels measured in the water table. This indicates a steep upward flow gradient between the nested well screens of approximately 0.25 vertical ft/ft along Trail Creek. At the upgradient nested monitoring wells MW-10S/10D, the vertical gradient is much less, which is not unexpected more than 400 ft. from the creek. The upward flow gradient across the organic soil layer is inferred to increase from east to west, suggesting that limited downward migration from the refuse deposit may occur along Karwick Road, but is progressively less likely at locations nearer to Trail Creek. Based on the vertical groundwater flow directions determined as stated herein, no extensive groundwater quality impacts to the deeper confined aquifer are expected to occur or to extend significant distances beyond the refuse footprint. Conversely, shallow and deep groundwaters both discharge to Trail Creek, suggesting a potential for impact on the quality of its surface water.

A potentiometric map initially based on the eight historical groundwater monitoring wells is provided as **Figure 4 – Potentiometric Surface (May 19-20, 2014)**. Shallow groundwater is inferred to flow westerly towards Trail Creek as expected. Later groundwater level measurements taken after the installation of the four new deep monitoring wells are separated into shallow and deep evaluations with consideration for the vertical separation of flows determined from the cross sections. **Figure 5 – Shallow Potentiometric Surface (December 1, 2014)** illustrates westerly shallow flow towards Trail Creek at fairly steep horizontal gradients ranging from 0.018 to 0.032 ft/ft. **Figure 6 – Deep Potentiometric Surface (December 1, 2014)** also illustrates westerly flow beneath the Site to Trail Creek, but at a much gentler horizontal gradient of approximately 0.0042 ft/ft. The difference between the shallow and deep horizontal flow gradients is attributed to the lower horizontal hydraulic conductivity of the refuse deposit relative to the deeper sand aquifer and the presence of the intervening organic silt aquitard.



Horizontal hydraulic conductivities measured during slug testing are summarized in **Table 3 – In-Situ Hydraulic Conductivity (Slug) Test Results**. In the monitoring wells screened mainly within the refuse deposit, the measured hydraulic conductivities ranged from a minimum of  $9.2 \times 10^{-5}$  cm/s to a maximum of  $1.27 \times 10^{-2}$  cm/s, and indicate a geometric mean of  $1.12 \times 10^{-3}$  cm/s. In monitoring wells screened in the deep confined aquifer, the measured hydraulic conductivities ranged from a minimum of  $6.57 \times 10^{-3}$  cm/s to  $5.93 \times 10^{-2}$  cm/s, and indicate a geometric mean of  $1.86 \times 10^{-2}$  cm/s. The deep confined aquifer is therefore an average of 17 times more conductive to horizontal flow than is the refuse fill deposit. Slug tests reports for the groundwater monitoring wells are provided in **Appendix D**.

Vertical hydraulic conductivities of the organic silt semi-confining layer are measured in the WCG geotechnical laboratory using Shelby tube samples as summarized on **Table 4 – Ex-Situ Hydraulic Conductivity (Lab) Test Results**. Two intact samples were obtained (boring MW-4D, 48 to 49 ft., and boring MW-6D, 28 to 39 ft. bgs). The results indicate vertical hydraulic conductivities of  $6.21 \times 10^{-7}$  cm/s and  $2.38 \times 10^{-7}$  cm/s, respectively. The geometric mean is calculated as  $3.84 \times 10^{-7}$  cm/s, showing that the organic silt forms a semi-confining aquitard. The hydraulic conductivities for the three relevant hydrostratigraphic layers are summarized below:

**Hydraulic Conductivities**

Layer	Geometric Mean Hydraulic Conductivity (cm/s)	Geometric Mean Hydraulic Conductivity (ft/day)
Horizontal Refuse (water table aquifer)	$1.12 \times 10^{-3}$	3.17
Vertical Organic Silt (semi-confining)	$3.84 \times 10^{-7}$	0.00109
Horizontal Sand and Gravel (deeper aquifer)	$1.86 \times 10^{-2}$	52.7

### **5.2.1 Groundwater Flux and Flow Velocities**

Groundwater flux ( $v$ ), which is the specific discharge, with units of length per time (ft/day), can be estimated using the measured flow gradients ( $i$ ) and hydraulic conductivity ( $K$ ) for each of the hydrostratigraphic units using Darcy's law expressed as:



$$v = Ki$$

Flow (or seepage) velocities ( $V$ ) can be estimated based on representative values for layer porosity ( $n = 0.35$ ) using Darcy's law expressed as:

$$V = (Ki)/n$$

#### Flux and Flow Velocities

Layer / Flow Direction	Groundwater Flux ( $v$ ) (ft/day)	Groundwater Flow (or seepage) Velocity ( $V$ ) (ft/day)
Refuse / Horizontal	$(3.17 \text{ ft/d})(0.025)$ = 0.079 ft/d	$(0.079 \text{ ft/d})/(0.35)$ = 0.22 ft/d
Organic Silt / Vertical	$(0.00109 \text{ ft/d})(0.25 \text{ ft/ft})$ = 0.00027 ft/d	$(0.00027 \text{ ft/d})/(0.35)$ = 0.00077 ft/d
Sand and Gravel / Horizontal	$(52.7 \text{ ft/d})(0.0042 \text{ ft/ft})$ = 0.22 ft/d	$(0.22 \text{ ft/d})/(0.35)$ = 0.63 ft/d

## 5.3 Geotechnical Conditions

Geotechnical conditions are considered with due regard for the physical configuration of the Site, including layer properties, topography, slopes, and hydrogeological conditions. Slope stability is assessed based on its physical configuration and its position adjoining the east bank of Trail Creek.

### 5.3.1 Geotechnical Properties of the Layers

The geotechnical test reports in **Appendix D** provide additional data relevant for site characterization. Initial dry densities for the Shelby tube samples were measured at 95.7 pounds per cubic foot (pcf) and 63.3 pcf, in soil borings MW-4D and MW-6D, respectively. Initial natural moisture contents were reported at 30.1% and 52.8%. The Plasticity index for the samples was 4 and 17, indicating Unified Soil Classification (USCS) designations of CL-ML and MH. Finally, loss-on-ignition testing indicated 1.5% and 4.6% organic matter for the respective samples from borings MW-4D and MW-6D. Natural moisture contents measured in split-spoon samples from additional soil boring intervals ranged 19.1% to 102.2%, suggesting even higher percentages of organic matter in some samples of the organic silt or peat.



### 5.3.2 Slope Stability

Topographic slopes on the northern, eastern, and southern boundaries are considered de minimis and are not assessed herein. The western slope of the refuse deposit and fill material along the east bank of Trail Creek is steep in many places and is, therefore, assessed for shallow slope stability against sloughing and erosion; and deeper slope stability against rotational failure into Trail Creek.

The stability of the east bank of Trail Creek was evaluated for both shallow and deep failure mechanisms using the XSTABL computer program. The geotechnical information (described in Section 5.3.1 above) along with the standard penetration test (SPT) blow counts (N value) recorded during the historic borings and well drilling events were used to estimate the strength of the various stratigraphic layers. A review of the borings and topography determined that the worst case location to be used in the stability analysis was along Section B-B' as shown on Figure 3. This location has a very steep existing bank and a deep organic silt layer underlying the refuse. SPT blow count values for the organic silt layer show that this layer has relatively low shear strength values, especially with the high potentiometric surface elevations of the deep groundwater aquifer. SPT blow counts can provide approximate correlations to the shear strength of the soil layer but are not considered highly accurate. In order to conservatively estimate the strength of the soft organic silt layer, WCG back calculated a strength value by iterating the strength value in the model of existing conditions until a factor of safety of approximately 1 was reached. Below is a summary of the strength values used for the stability analysis:

**Soil Strength Values Used in Stability Analysis**

Soil Layer	Cohesion (psf)	Friction Angle (deg)
Cover Soil	100	25
Refuse	300	30
Organic Silt	300	0
Medium Sand	0	30
Bank Backfill	300	35

The stability analysis was performed for both existing and proposed configuration (after bank stabilization activities described in Section 7.3 are in place). The slope stability analysis indicates that the west side of the refuse deposit is only marginally stable under current conditions due to the weak underlying organic silt unit. Care must be used



during construction of any slope improvement project to prevent large scale disturbance of this material. Additional failure of the slope could occur due to 1) high water levels in Trail Creek causing erosion which undermines the slope or 2) sudden changes in water level in the Creek inducing pore pressure changes in the underlying soils which may cause sloughing or deeper rotational failures of the saturated soils. Historically, deep seated rotational slope failures do not appear to have been an issue, but erosion by Trail Creek has caused the slopes to have small scale sloughing issues. Significant bank erosion occurred during the April 2013 rain event and was subsequently corrected by the District.

The results of the analysis show that the proposed bank stabilization activities will only slightly improve the overall deep global stability of the bank. The factor of safety against deep rotational failure was calculated to be 1.08 under current conditions and 1.11 after the bank stabilization activities.

In order to prevent erosion of the bank, which could lead to bank instability, it is recommended that erosion control measures are installed along the creek bank to prevent long term erosion and to protect the final cover from the rise and fall of the creek waters. These erosion control measures would include permanent turf/vegetation reinforcement matting combined with tied concrete block mats, large riprap, glacier stone, or other hard armoring of select areas.

The stability analysis described above is preliminary and should be re-evaluated during the design of the creek bank stabilization measures.

## **5.4 Refuse Boundary**

### ***5.4.1 Historical Aerial Photographs***

The 1939 aerial photograph provided in **Appendix B** shows the Site partially forested, clear ground, and as including several small apparent farm fields or large garden plots. Little or no land disturbing activity is visible. The Site appears little changed in the 1952 photograph except for what appears to be a large patch of shallow water at its northeast corner and a small bright patch along the west side of Karwick Road that may represent an excavation, borrow pit, or perhaps a patch of snow. In the 1958 photograph a large, bright patch at the southeast corner of the Site along Karwick Road suggests excavation or borrow of reflective sand subsoil.



The 1965 photograph provides the first clear visual evidence of significant land disturbance. Near the northwest corner of the Site, a large, oblong feature appears to be a borrow pit based on the orientation of the apparent shadowing of sunlight shining from the west. Two oblong features near the center of the Site look like they might be water-filled borrow pits. The apparent dumping of refuse is indicated by the irregular feature visible on the southern portion of the Site that appears to spread westerly towards Trail Creek from the west side of Karwick Road. The 1970 photograph shows land disturbance expanded northerly and southerly from the approximate center of the Site. A majority of the northern part of the Site appears as though it may be under the cover of a reflective material or soil. The 1972 aerial photograph shows that the entire Site, including adjoining land to the south, appears to be covered with reflective soil that is partially vegetated. This indicates that the dump was no longer being used by sometime around 1971. The extent of the re-worked Site surface illustrated in the 1972 aerial photograph is considered a partial basis for the inferred refuse boundary illustrated in **Figure 2**.

The aerial photographs reviewed indicate that dumping took place mainly from 1965 (or a little earlier) until sometime around 1971. Trails visible in later aerial photographs taken in 1977, 1980, 1981, 1988, 1992, 1997, and 2003 illustrate apparent recreational land use and gradual re-forestation of the Site. The vehicle parking loop and its driveway providing access from Karwick Road is first visible in the 2008 aerial photograph and illustrates the Site in its largely current condition.

#### ***5.4.2 Test Pits***

The test pits (TP1 through TP12) excavated within the inferred refuse boundary typically encountered 0.5 to 3.0 ft. of sandy cover soil atop a refuse deposit that ranged from approximately 1 ft. thick at TP3 to greater than 14.5 ft at TP4 and TP6. The refuse deposit contained a variety of materials including:

- Beverage and other containers (bottles and cans)
- Plastic sheeting and bags
- Concrete and lumber debris
- Former household articles (metal and plastic)
- Fibrous material appearing to be carpet



- Wood
- Ferrous and other metal objects
- Vehicle tires
- Soil
- General debris rendered unrecognizable by decomposition

No refuse was encountered in TP9 excavated along the west side of Karwick Road. Cover soil at TP12 was clayey, likely placed by the District when erosion of the east bank of Trail Creek was repaired in 2013. The texture and composition of natural soil underlying the refuse deposit were variable. Sand or sand with a trace of silt was found beneath the refuse at TP1, TP3, and TP7; black peat was found at TP5; organic sand with a trace of silt was found under the refuse at TP12. Test pits TP2, TP4, TP6, TP8, TP10, and TP11 terminated in the refuse deposit and did not extend to natural underlying soil. Newspapers exhumed while excavating several of the test pits were dated between January 1968 and October 1970 as described on test pit logs provided in **Appendix C**.

#### ***5.4.3 Other Observations and Inferred Boundary***

Additional observations considered to infer the approximate boundary of the refuse as shown on **Figure 2** include the thickness of refuse encountered in the test pits, historical and current soil borings, current Site topography, and the visible exposure of refuse along parts of the east bank of Trail Creek. Relevant supporting observations include:

- The presence of 13 ft. of refuse deposit at TP10 and TP11 along the southern boundary of the City's property suggests that the refuse extends further to the south on to NIPSCO property.
- Historical soil boring MW-7 describes the presence of scrap metal, ceramic, paper, and glass to a depth of 16 ft bgs. This boring is located approximately 65 ft. south of the City's property, on land owned by the Northern Indiana Public Service Company (NIPSCO).
- The trend of the Site topography combined with available subsurface observations suggests that refuse fill likely extends southerly onto property owned by NIPSCO, to, or near to the drainage swale located at the northern toe of the CSX Railroad embankment.



- Small exposures of refuse are visible on the steepest parts of the east bank of Trail Creek along the refuse boundary inferred as illustrated on **Figure 2**.

Utility services, such as natural gas and overhead wires, are an important site characterization consideration. Notable utilities likely to influence corrective action include what NIPCSO describes as a very old and brittle 10-inch natural gas main whose alignment is shown just south of the refuse boundary on **Figure 2**. The overhead wires illustrated to the north of the natural gas main are high voltage (likely 110 kV or above) transmission lines. Overhead wires and a natural gas line are located on the C.S.S. & S.B. Railroad property in the area adjoining the northern boundary of the City property. Underground natural gas and potable water lines are both located along the west side of Karwick Road, between the inferred refuse boundary and the edge of the pavement.

## 5.5 Test Pit Sample Results

Samples of mixed soil and refuse collected from eight of the test pits (TP1, TP2, TP5, TP7, TP8, TP10, TP11, and TP12) were analyzed for VOCs, SVOCs, and total arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. As listed on **Table 5 – Test Pit Soil Results**, VOCs, SVOCs, and total metals were either not detected or, if detected, at concentrations less than their respective recreational SLs for community park recreational land use. Concentrations of benzene, naphthalene, and 1,2,4-trimethyl benzene were, however, detected in the sample from TP2 at concentrations above their respective soil migration to groundwater (MTG) SLs. The highest PID reading among the test pits was detected at the rim of TP2, which is consistent with the highest concentrations of VOCs also detected in TP2. Naphthalene was also detected above its MTG SL in samples collected from TP8, TP10, and TP11. Total arsenic was detected in the sample from TP12 above its MTG SL. These results are mapped to the Site, as shown in **Figure 7 – Test Pit Soil Results**, where specific results exceeding specific MTG SLs are highlighted. The analytical reports for test pit soil samples are provided in **Appendix F**. Included at the beginning of this Appendix are the input values and results for site-specific recreational SLs calculated using U.S. EPA’s online RSL calculator available at: [http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl\\_search](http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search).

No significant risk to recreational land users is indicated by these results. The refuse deposit nevertheless contains a variety of VOCs, and total arsenic in one instance, that implies potential for adverse impact to groundwater quality via migration from the refuse deposit to the groundwater. Although detected at concentrations less than SLs in



just two of the test pit soil samples (TP2 and TP10), the presence of chlorobenzene is notable because it was also detected in several of the shallow groundwater samples and, also, in the sediment of Trail Creek. Chlorobenzene therefore appears to be a relevant indicator for cross-media migration from the refuse to the shallow groundwater and to the creek sediment. Actual impacts to groundwater and sediment quality are further assessed based on the results of the groundwater and sediment sampling programs as subsequently described herein.

## 5.6 Groundwater Sample Results

Samples of groundwater collected from the 14 groundwater monitoring wells were analyzed for VOCs, SVOCs, PCBs, organochlorine herbicides and pesticides, cyanide, nitrogen as ammonia, nitrogen as nitrate, alkalinity, total dissolved solids (TDS), sulfide, fluoride, and the total metals listed in 329 IAC 10-21-16, Table 1B “Constituents for Detection Monitoring” and Table 2 “Constituents for Assessment Monitoring.” As listed in **Table 6 – Groundwater Results**, VOCs, SVOCs, PCBs, organochlorine herbicides and pesticides, and cyanide were typically not detected or, if detected, at concentrations typically less than their respective residential tap water SLs. Concentrations that did exceed their respective tap water SLs are chlorobenzene in monitoring well MW-9S and bis(2-ethylhexyl)phthalate, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene in monitoring wells MW-2D. Other analytes exceeding their tap water SLs included fluoride in monitoring wells MW-2D, MW-4D, and MW-6D. Total arsenic exceeded its tap water SL in monitoring wells MW-4S, MW-4D, and MW-8S. Cobalt exceeded its tap water SL in monitoring well MW-4D. Iron exceeded its tap water SL in 10 out of 14 monitoring wells. Total lead exceeded its tap water SL in monitoring wells MW-4SW, MW-5S, MW-7S, and MW-8S. Total manganese exceeded its tap water SL in monitoring wells MW-4D, MW-5S, MW-8S, and MW-9S. These results are mapped to the Site for the shallow wells as shown in **Figure 8 – Groundwater (Shallow) Results** and for the deep wells in **Figure 9 – Groundwater (Deep) Results**, where specific results exceeding their respective tap water SLs are highlighted. The analytical report for groundwater samples is provided in **Appendix G**.

Based on these results, the quality of shallow groundwater occurring within the refuse deposit is affected by releases of chlorobenzene, iron, and arsenic. Risk of exposure to the groundwater is nevertheless considered low because most residents of Michigan City obtain their water from the municipal supply sourced from Lake Michigan. As previously discussed, the nearest groundwater supply well identified during this



assessment is approximately 0.40 miles southwest of the Site and, therefore, is very unlikely to be impacted by conditions at the Site. However, the shallow and deep ground waters are indicated to discharge to Trail Creek suggesting a potential for adverse impact to its streambed sediment or surface water. These potential impacts are further discussed relative to the sediment and surface water sampling programs subsequently described herein.

With regard to the CSM, WCG notes that the shallow groundwater is anticipated to exhibit impact characteristics of refuse leachate, but significant impacts to the deeper confined aquifer are considered less likely. The deep groundwater flows upward through the organic silt semi-confining layer, which should limit the potential for downward migration from the shallow water table within the refuse deposit. Comparison of the shallow groundwater results with the deep groundwater results indicates the anticipated vertical distribution for many of the analytes, such as VOCs, ammonia, and fluoride. Volatile organic compounds, which are a reliable indicator of refuse leachate impact, were detected in six of the 10 shallow groundwater monitoring wells, but were not detected in the deep groundwater at all. Ammonia, which is also a reliable indicator for refuse leachate impact, was detected in all of the shallow downgradient monitoring wells at concentrations ranging from 21.7 mg/l in MW-8S up to 131 mg/l in MW-4S. The greatest concentration of ammonia detected in the deeper groundwater was much lower at 1.4 mg/l. Fluoride is another analyte whose distribution appears to be consistent with the CSM as a naturally occurring groundwater component. It was detected in all four of the deep monitoring wells at concentrations spanning a narrow range of 0.50 mg/l to 0.67 mg/l, but was not detected in six of the 10 shallow wells. Four of the shallow monitoring wells (MW-3S, MW-5S, MW-6S, and MW-8S) did indicate fluoride at concentrations ranging from 0.12 mg/l to 0.49 mg/l, possibly suggesting the upwelling of the deep groundwater along Trail Creek where the upward vertical flow gradient is steepest. Considering the background concentrations reported for fluoride (<0.50 mg to >2.0 mg/l) by IDNR (1994), the elevated fluoride concentrations are attributable to natural conditions.

The results for total iron, which is also an indicator for refuse leachate impact from the oxidation of ferrous metals, are possibly less consistent with the CSM. The greatest concentrations of total iron were typically detected in the shallow downgradient monitoring wells at concentrations ranging from 30,200 ug/l in monitoring well MW-5S up to 68,800 ug/l in monitoring well MW-7S, as would be anticipated for a refuse



leachate. However, deep monitoring wells MW-2D and MW-4D also indicated significantly elevated total iron concentrations at 12,500 ug/l and 36,900 ug/l, respectively. It is not clear whether the total iron detected in these deep monitoring wells originates from the refuse, or is a natural background condition. The IDNR (1994) reports that background concentrations of iron in the unconsolidated aquifer system range from <300 ug/l to >2,000 ug/l. The vertical and horizontal distributions of total iron are also highly variable as shown by the results of the groundwater sampling program.

A few of the other results of the groundwater sampling program are also difficult to explain in terms of the CSM. The detection of bis(2-ethylhexyl)phthalate and several PAHs in monitoring well MW-2D or its field duplicate sample is not anticipated based on the CSM. The bis(2-ethylhexyl)phthalate may be an artifact of drilling carried down by the augers from the refuse above. This manmade compound was detected in several of the test pit soil samples as shown on **Table 5**. Additionally, it may be an artifact of sampling or analysis, although this seems less likely. The presence of several PAH compounds in the field duplicate sample, such as benzo(a)anthracene, benzo(a) pyrene, etc., could be an artifact of drilling, or possibly even a natural occurrence considering that these were also detected in the deep background monitoring well MW-10D. Combustion byproducts from Pleistocene bog or forest fires may be present in the natural organic soils immediately beneath the refuse and might, therefore, be a source of PAHs in the deep groundwater.

Notwithstanding the variability of the total iron detected through the groundwater sampling program and certain other results, a majority of the groundwater sample results appear to support the CSM as it is described in **Section 3**. The CSM is therefore considered useful for assessing specific aspects of the historic dump and its potential impacts on human health and the environment. Assessing the characteristics of the groundwater plume, as required under 329 IAC 10-21-13, is one such aspect. Potential cross-media migration from groundwater to surface water is another aspect considered important given the designated uses for Trail Creek.

With regard to the extent of the groundwater plume attributable to the historic dumpsite deposits, shallow groundwater/leachate occurring directly within the refuse deposit may all reasonably be expected to form the majority of the groundwater plume. Since the shallow groundwater is intercepted by and discharges to Trail Creek, the approximate centerline of Trail Creek is expected to form the western boundary of the



groundwater plume. The groundwater plume is not currently anticipated to extend vertically to the deeper confined aquifer. If it does, flow through this zone likely also discharges to Trail Creek due to the inferred upward gradient flow of deeper groundwater along Creek.

Considering that shallow and deeper groundwater discharge to Trail Creek, potential contaminant loading from these sources are estimated herein for ammonia. Actual surface water concentrations are subsequently assessed in light of the surface water sampling program results. The primary migration pathway for ammonia is considered to be the westerly flow of shallow groundwater/leachate through the refuse deposit. The mass load per unit of time ( $M$ ) may be estimated based on the horizontal groundwater flux ( $V$ ) previously calculated in Section 5.2.1, the concentration ( $C$ ) of ammonia in the shallow groundwater, and the area cross-sectional boundary ( $A$ ) through which the flux of impacted groundwater takes place as follows:

$$M = (V)(C)(A)$$

The concentration is approximated as the arithmetic mean ammonia concentration detected in downgradient shallow monitoring wells MW-2S, MW-3S, MW-4S, MW-5S, MW-6S, and MW-9S, which is  $(86.4 + 84.4 + 131 + 56.0 + 69.0 + 27.5)/6 = 75.7$  mg/l nitrogen as ammonia. The area of the flux boundary is approximated from Cross Section A-A' (**Figure 3**) considering a width of approximately 1,140 ft. and saturated thickness of 10 ft. The area is therefore  $(1,140 \text{ ft} \times 10 \text{ ft}) = 11,400 \text{ ft}^2$ . The daily non-point source load is thus estimated to be on the order of:

#### Daily Non-Point Source Ammonia Load to Trail Creek

Contaminant of Concern	$(V)(C)(A)$	$(M)$ Ammonia Load (lbs/day)
Ammonia	$(0.079 \text{ ft/d})(75.7 \text{ mg/l})(11,400 \text{ ft}^2)$ $(2.2 \times 10^{-6} \text{ lbs/mg})(28 \text{ l/ft}^3)$	4.2

## 5.7 Streambed Sediment Sampling Results

Samples of Trail Creek streambed sediment collected from five locations (SD-1, SD-2, SD-3, SD-4, and SD-5) were analyzed for VOCs, SVOCs, PCBs, organochlorine herbicides and pesticides, cyanide, and 16 of the total metals listed in 329 IAC 10-21-16, Table 1B



“Constituents for Detection Monitoring” and Table 2 “Constituents for Assessment Monitoring.” As listed on **Table 7 – Streambed Sediment Results**, acetone and 2-butanone (methyl ethyl ketone) were detected in the four sediment samples (SD-2, SD-3, SD-4, and SD-5) at concentrations greater than EPA Region 5 SLs. Neither was detected in the up-stream sample (SD-1). Polycyclic aromatic hydrocarbons including benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, or pyrene were similarly distributed at concentrations greater than their respective threshold effects levels (TELs) listed in the SQuIRTS. Total arsenic also exceeded its TEL in samples SD-3 and SD-4. Chlorobenzene was detected in sediment samples SD-2 and SD-4 at concentrations below EPA Region 5 SLs, but is noted because this compound was also detected in soil samples from the refuse deposit, samples of the shallow groundwater/leachate from the refuse deposit, and, also, in the discharge from the 18-inch CMP. The results are mapped to the **Site in Figure 10 – Streambed Sediment Results**, where specific results exceeding a relevant standard are highlighted. The analytical reports for streambed sediment are provided in **Appendix H**.

The sediment results for sediment samples SD-2 through SD-5 suggest some potential for adverse impact to ecological receptors based on the SLs or TELs that are exceeded. WCG notes that, although distribution of these results may suggest direct impacts from the Site, it should also be recognized that streambed sediments at the upstream location SD-1 consisted of texturally “clean” sand compared with the organic silt comprising all the sediment samples collected alongside the Site. Texturally clean sand contains less organic matter than organic silt, and is less likely to adsorb contaminants from any source, including upstream runoff. Polycyclic aromatic hydrocarbons are well known for their presence in stormwater runoff and propensity for adsorption to natural organic carbon contained in samples SD-2 through SD-5 and may, therefore, reflect contamination by upstream runoff rather than impact from the Site. That being said, the acetone, 2-butanone, chlorobenzene, and toluene (toluene was detected in sample SD-2) are considered likely to originate from the refuse deposit and the Site. Neither acetone nor 2-butanone were detected in the shallow groundwater/leachate in the fill deposit, but WCG notes that both of these compounds are common components of refuse leachate and may, therefore, comprise byproducts of degradation reactions occurring within the organic silt deposit immediately beneath the refuse.



The sediment sample results imply some potential for adverse impacts to ecological receptors based on these results. With regard to potential adverse effects to human health, WCG further notes that all sediment results indicate concentrations less than their respective RCG SLs for residential direct contact with soil. Little if any risk is, therefore, anticipated for fishermen or other human contact with sediment along this reach of Trail Creek.

## 5.8 Stream Surface Water Sampling Results

Surface water samples were collected from Trail Creek at four locations. The sample locations are identified as SW-1, SW-2, SW-4, and SW-5. The then discharging 18-inch CMP was also sampled, and it was identified as sample location SW-3. The samples obtained from these locations were analyzed for VOCs, SVOCs, PCBs, organochlorine herbicides and pesticides, cyanide, nitrogen as ammonia, nitrogen as nitrate, alkalinity, total dissolved solids (TDS), sulfide, fluoride, and heavy metals. The heavy metals that were analyzed for include those listed in 329 IAC 10-21-16, Table 1B “Constituents for Detection Monitoring” and Table 2 “Constituents for Assessment Monitoring.” The samples were obtained when Trail Creek was flowing at approximately 50 cubic feet per second (CFS) at USGS gauging station 04095300, which was only slightly more than the 31-year median daily discharge value of 40 CFS reported by the USGS for September 30, 2014. The CMP was flowing at approximately 10 gpm at the time its discharge was sampled.

**Table 8 – Stream Surface Water Results** presents the results of the aforementioned sampling. The findings of the surface water sampling and the CMP sampling are as follows:

- VOCs, SVOCs, PCBs, organochlorine herbicides and pesticides, were either not detected, or detected at concentrations less than those listed in Indiana’s SWQS and NOAA SQuIRTs.
- In the CMP discharge then flowing at an estimated 10 gpm, ammonia was detected at 12.3 mg/l, iron was detected at 28,600 ug/l, and manganese was detected at 296 ug/l. The ammonia concentration exceeds the SWQS. The iron and manganese concentrations exceed the NOAA fresh water chronic SQuIRTs.
- Chlorobenzene was also detected in the CMP discharge at 7.2 ug/l. This concentration exceeded no criteria, but, nevertheless, appears representative of



the Site in that chlorobenzene was also detected in test pit soil, shallow groundwater, and sediment as previously discussed. These results are mapped to the **Site in Figure 11 – Stream Surface Water Results**, where specific results exceeding a relevant standard are highlighted.

- Total barium and total iron were detected in all surface water samples and the CMP discharge. The barium concentrations in all samples exceeded its NOAA fresh water chronic SQuIRTS criterion. Total iron concentrations in all samples exceeded its SWQS.

While the above results indicate surface water quality concerns, there is little, if any, discernable impact to surface water quality from the CMP discharge or non-point source discharge from the refuse deposit. This is evident by comparing the upstream sample results from sample location SW-1 to the downstream samples. Ammonia is the only apparent exception, as it was only detected at sampling location SW-4, which was located approximately 75 ft. downstream from the CMP discharge. However, the downstream result for SW-4 of 0.14 mg/l was under the limit contained in the SWQS for ammonia for the corresponding pH and temperature of Trail Creek at the time of sampling. Otherwise, the upstream and downstream surface water concentrations for ammonia, nitrate, alkalinity, TDS, and total metals were essentially identical. There is currently no significant impact to the surface water quality of Trail Creek.

## 5.9 Dumpsite Gas Results

Each of the 14 groundwater monitoring wells was sampled and field analyzed for methane, oxygen, and carbon dioxide. Each of the 12 test pits was sampled and field analyzed for photoionizable vapors, LEL, oxygen, carbon monoxide, and hydrogen sulfide. As shown in **Figure 12 – Dumpsite Gas and Vapor Results**, methane was detected above its 5% LEL in two of the 14 monitoring wells (MW-4S and MW-7S). Field readings of 0.0 percent LEL were measured at the rim of each test pit, indicating no detectable methane at the top of the open excavations. Photoionizable vapors were detected at the rims of test pits TP2 (17.0 ppmV), TP8 (0.5 ppmV), and, TP1 (0.5 ppmV). The greatest concentration of VOCs in test pit soil samples was indicated at TP2, which, as previously discussed, is consistent with these results. Field sampling and analysis of the atmosphere indicated no detectable methane concentrations approximately 0.5 ft. above the dumpsite cover. Small gas bubbles rising along the east bank of Trail Creek were observed by WCG on several occasions at several locations which may indicate



methane. These occurrences were not vigorous and resulted in no detectable methane concentrations during ground level atmospheric survey. The monitoring well gas readings are recorded on the field sampling sheets in **Appendix G**. The test pit gas and vapor readings are recorded on the test pit logs in **Appendix C**.

Results of the dumpsite gas sampling program indicate that the refuse deposit continues to generate some methane and carbon dioxide gas. Gas generation is sufficient to develop subsurface pore space concentrations of methane above the LEL, but such conditions are not widespread over the Site and do not appear to measurably affect the atmosphere directly above the dumpsite cover. The volume of gas being generated is insufficient to vent through the sandy cover soil at detectable concentrations. Neither the extent nor the volume of methane gas generation appears sufficient to result in significant risk to users of the Site. The results of the dumpsite gas sampling program indicate minimal potential for significant impact to nearby off-site areas.

## **5.10 Data Quality Assessment**

Data quality is assessed in terms of sample collection, delivery, and analytical work. The samples described herein were collected consistent with the established field SOPs listed in the approved QAPP. Samples of refuse/soil, groundwater, sediment, and surface water were analyzed according to applicable laboratory SOPs listed in the approved QAPP as described in the analytical reports for each matrix.

### ***5.10.1 Sample Delivery and Analytical Work***

The samples were collected and shipped to Pace Analytical Services, Inc., Indianapolis, where they were received under chain-of-custody control and in a timely manner in all instances. The laboratory itself missed its internal holding time before extraction of the surface water samples for organochlorine pesticides/herbicides analyses as discussed in **Section 4.5**. This deficiency was corrected by re-acquiring the samples several days later so that they were received, extracted, and analyzed in a timely fashion. WCG notes that no organochlorine pesticides/herbicides were detected in either the original samples that were extracted and analyzed past their hold time, or in the second set of samples that was extracted and analyzed in a timely manner. For all matrices sampled, the laboratory reported its analytical results without significant qualifiers, indicating that analytical QA/QC criteria were met. Method blank results for all matrix sample sets were negative, indicating no cross contamination in the laboratory. Matrix spike/matrix



spike duplicates were found in control, indicating analytical precision meeting the criteria established in the laboratory's Quality Assurance Manual. Surrogate recoveries were also within prescribed analytical limits, indicating sensitivity and accuracy within the specified analytical criteria. Additional details regarding analytical QA/QC are provided in the analytical reports appended hereto.

#### ***5.10.2 Field QA/QC Results***

Field QA/QC samples included a minimum of one field duplicate from each matrix at a frequency of not greater than one per 20 investigational samples and one trip blank for VOCs with each shipment of samples analyzed for VOCs. The precision objectives for solid and water matrix field duplicate samples are 50% and 35% relative percent differences (RPD), respectively, for samples detecting target analytes at concentrations greater than or equal to five times their matrix-specific practical quantitation limits. Inspection of the primary and field duplicate sample results listed in Tables 5, 6, 7, and 8 shows that these precision objectives were met for nearly all analytes in all instances. The sampling precision criteria are therefore met. Additionally, inspection of the trip blank results in Tables 5, 6, 7, and 8 shows that no VOCs were detected in any of the trip blanks submitted, indicating that no cross contamination occurred during sample shipment. The sampling and analytical data are, therefore, considered usable for characterizing the Site without specific limitations.



## **6 CONDITIONS WARRANTING CORRECTIVE ACTION**

---

### **6.1 Notice of Violations**

Records reviewed by WCG indicate that the IDEM inspected the Site sometime during 1991 and again on July 26, 2012. Results of the July 2012 inspection were transmitted to the City on November 9, 2012 and again on March 1, 2013 stating that apparent continuing erosion of the dumpsite was again causing entry of debris into Trail Creek. Comments listed on the inspection form stated that: "Floodwaters from the creek and run-off appeared to have eroded the walls of the landfill and have exposed the once buried debris. The landfill cap has not been maintained, erosion has not been controlled, and there is a possibility that leachate from the landfill has entered Trail Creek." The specific violations listed in the IDEM's Agricultural and Solid Waste Compliance form (State Form 47272 (R3/12-08)) are summarized as follows:

- 329 IAC 10-23-1 (1), (2), (3) Performance Standard – The dump is not being maintained in a manner that controls post-closure release of waste, waste constituents, leachate, contaminated run-off, or waste decomposition products to ground or surface water of the atmosphere.
- 329 IAC 10-23-2 (3), (4), (6), (12) Post Closure Duties – The final cover contours and thickness are not being maintained and are not providing an adequate level of environmental protection as was observed by the areas of erosion and partially buried waste materials.
- 329 IAC 10-23-5 Responsibility After Post-Closure to Correct Nuisance – Nuisance conditions at the dump site are not being controlled. Leachate is leaving the property and entering Trail Creek and erosion has caused buried items to be exposed.
- 329 IAC 10-23-6 Elimination of Threats to Human Health or the Environment After Post Closure – The leachate and runoff entering Trail Creek pose a threat to human health and the environment. The exposed waste items (glass, metals, etc.) also pose a hazard to those utilizing Trail Creek for recreational purposes.



The District responded with an Emergency Work Plan dated May 9, 2013 that described extensive repair and stabilization of the bank near the confluence of Trail Creek and Cheney run. These repairs were implemented from April 26 through May 8, 2013 and have performed well based on WCG's observations during 2014. On May 9, 2013 the District also submitted a Compliance Plan in response to IDEM letters dated March 1 and March 13, 2013, which provided for a Comprehensive Investigation Report identifying and discussing Long Term Corrective Measures; Implementation of the Long Term Corrective Measures; and, Long Term Monitoring. This Site Characterization Report comprises the Comprehensive Investigation Report specified in the District's Compliance Plan.

## **6.2 Corrective Action Assessment**

The following subsections identify current conditions appearing to warrant long term corrective action appropriate in the opinion of WCG to resolve the violations listed by the IDEM. The extent of appropriate corrective actions is also considered.

### ***6.2.1 Dumpsite Cover***

With the exception of the area where the Sanitary District performed the Emergency Repairs in 2013, the cover soils atop the approximately 9.7-acre area where refuse were found to consist of typically 1 to 2 ft. of sandy soil, prone to fast percolation of rain waters. The irregular surface topography may indicate differential settlement of the cover since 1972. A small low area is noted inside the driveway/parking circle on the north-central part of the Northern Parcel. Another larger low area is located on the east side of the Southern Parcel based on the topography shown on **Figure 13**. Both of these areas are likely to temporarily accumulate water during storm events, and may contribute to increased downward percolation through the cover.

Most of the cover is naturally reforested as stated by the IDEM, but WCG notes that regulatory prohibition of deep-rooted plants for permitted landfills is to protect low permeability cover system layers from root penetration. Low permeability layers are common cover system elements at permitted landfills. Most of the Karwick Road Nature Park Site is covered with a layer of sand that does not need protection from deep-rooted vegetation. Because the cover soil is typically thin and sandy, the trees are beneficial in that they provide for increased evapotranspiration during the growing season. The trees also protect and stabilize the soil cover from precipitation and runoff.



Weaver Consultants Group agrees with the IDEM that the dumpsite is generating leachate that discharges to Trail Creek in a non-point source fashion. Comprehensive reconstruction of the existing cover to current Municipal Solid Waste (MSW) Facility standards has the potential to reduce the volume of leachate being generated, but is unlikely to eliminate the generation of leachate, because groundwater flows upward into the refuse beneath the western part of the Site. Selective removal of exposed refuse, fill, repair, and re-grading appear to be appropriate means to mitigate the risks cited by the IDEM in connection with current surface exposures along walking paths.

### ***6.2.2 Slope Stability***

As previously discussed, slope stability analysis indicates that the west side of the refuse deposit is marginally stable ( $FS=1.08$ ) with respect to a deep-seated rotation, but history has shown that it is not well protected from erosion by Trail Creek. Protection from future erosion is, therefore, considered a critical long-term corrective action that can be combined with leachate interception identified as an appropriate long-term corrective action in Section 6.2.4.

### ***6.2.3 Upland Recreational Exposure and Risk***

Results for representative samples of the refuse deposit indicate little or no significant potential for chemical exposure to recreational users of the Site based on IDEM's recreational SLs for community park use or based on site-specific SLs calculated herein. WCG agrees that direct exposure to the refuse deposit should be prevented to mitigate safety hazards associated with slips, trips, and falls, or due to exposed sharp or irregularly shaped objects along the surface of the Site and along parts of the creek bank.

### ***6.2.4 Leachate Generation, Groundwater Impact, Recreational Exposure, and Risk***

The results of the groundwater sampling program indicate that shallow groundwater/leachate within the refuse deposit is typically impacted by ammonia above SWQS and total iron at concentrations above tap water SLs. Some of the shallow monitoring wells also indicate concentrations of chlorobenzene, arsenic, lead, or manganese above tap water SLs. The shallow groundwater/leachate discharges to Trail Creek at a volumetric rate on the order of 4,500 gallons per day, which is estimated to



include approximately 4.2 lbs/day of ammonia. The inferred horizontal extent of the shallow groundwater/leachate plume is illustrated on **Figure 8**.

Groundwater/leachate seeps are visible in some areas along the creek bank, resulting in the potential for direct exposure to fishermen. Acetone and 2-butanone were detected in four of the streambed sediment samples at concentrations greater than EPA Region 5 sediment SLs, suggesting some potential for adverse impact to ecological receptors. Chlorobenzene was also detected in two of the sediment samples at concentrations below EPA Region 5's ecological SLs. Although the chlorobenzene occurs at concentrations below relevant SLs, this result nevertheless indicates that leachate has entered the porewater of the streambed sediment. Mitigation of the continued leachate discharges should improve the quality of the streambed sediment over a reasonable period of time.

#### ***6.2.5 Surface Water Impact***

The shallow groundwater/leachate discharges from the Site are negatively impacting Trail Creek, but these impacts have decreased over time, and they are not causing acute toxicity nor are the impacts reason for emergency measures. As discussed above the leachate is discharging into Trail Creek at a rate of approximately at a volumetric rate on the order of leachate is entering Trail Creek 4,500 gallons per day, which is estimated to include approximately 4.2 lbs/day of ammonia and other contaminants, such as iron. Dilution is considerable and the surface water sampling program results indicate no exceedance of SWQs in the Creek itself while flowing at approximately twice its  $Q_{7/10}$  low flow of 23 cfs at the USGS gauging station. While the impacts at low flow might expect to be more significant, conversely it might also be expected that the leachate flow would decrease during long extended periods of dry weather, and that the net impact would be similar to the impacts determined while Trail Creek was flowing at 23 cfs. The CMP discharge did exceed its allowable point-source ammonia concentration and was, therefore, plugged by the District shortly after it was sampled. Plugging of the CMP eliminated the point source discharge but is expected to have increased the groundwater seepage to maintain equilibrium between groundwater inflows and surface water outflows to and from the refuse deposit.

#### ***6.2.6 Dumpsite Gas Generation***

The dumpsite gas sampling program indicated two locations where the headspace in shallow monitoring wells exceeded the LEL for methane. Considering the permeable



cover and the thinness of the refuse deposit, the subsurface methane is not expected to build pressure. Emissions through the cover are, therefore, diffuse rather than concentrated in specific areas above the soil cover. An appropriate corrective measure for dumpsite gas is, therefore, considered to be continued monitoring of this condition. If an impermeable cover is installed in the future, WCG notes that active collection or engineered venting of the dumpsite gas may become appropriate if pressure accumulates.



## **7 EVALUATION OF CORRECTIVE ACTION ALTERNATIVES**

---

The first alternative listed in this Section is a minimal intervention approach. As set forth in greater detail herein, the first alternative is not anticipated to be appropriate because the IDEM is requiring that existing waste at the Site be addressed. The second alternative and its variations encompass the upper bound of the effort and the cost associated with comprehensive, permanent remediation by the removal and off-site disposal of all refuse at the Site, or by comprehensive in-place closure. The third alternative is proposed as an appropriate planning-level approach that addresses potential concerns identified during the site characterization process. The corrective action alternatives are analyzed based on their ability to meet several criteria:

- Overall protectiveness of human health and the environment
- Compliance with regulatory requirements
- Long-term effectiveness and performance
- Constructability
- Conceptual-level probable cost to construct and maintain
- State acceptance
- Community acceptance

It is noted that the probable corrective action costs estimated in this report are based primarily on WCG's experience with similar projects. Quantities are based on pre-design level concepts and, thus, subject to possibly significant modification as actual design requirements are determined and design assumptions are verified. Unit prices are based primarily on WCG's recent experience and do not reflect firm pricing by any contractor, vendor, or disposal facility. The preliminary opinions of probable cost for the corrective action alternatives are mainly intended to support a comparative evaluation of relative cost among the alternatives identified herein.



## 7.1 Alternative 1 – Minimal Intervention (No-Further-Action)

The least costly and least invasive alternative at some sites is to simply take no further action. Such an option is not available here where, IDEM is requiring that the refuse at the Site be addressed. Additionally, the site characterization process has identified several concerns warranting long-term corrective action if the Site is to continue serving as a nature park and public access to Trail Creek. The probable cost for the no-further-action alternative is negligible and no construction is involved, but this alternative meets none of the other applicable criteria. The no-further-action alternative has been rejected by the State and is not further considered herein.

## 7.2 Alternatives 2A and 2B– Comprehensive Intervention

Two comprehensive alternatives are considered. The first is to completely remove the refuse deposit and dispose of it off-site. The second is to perform an extensive in-place closure similar to the closure of a major pre-Subtitle D landfill. Post-closure aspects are also considered for the alternatives that retain refuse at the Site.

### 7.2.1 *Alternative 2A Complete Removal and Off-Site Disposal of Refuse*

The refuse footprint is inferred to extend over approximately 9.7 acres. The refuse is covered with one to two feet of soil. The refuse was found to range from approximately 6 ft. to 19 ft. thick. If the refuse deposit is removed, the thin soil cover is not considered separable and would become part of the outbound waste. Large trees will need to be cleared, but grubbing is not considered necessary because stumps would be removed with the refuse. If the cover soil averages 1.5 ft. thick, and the refuse averages 12.5 ft thick, a total of approximately 220,000 cubic yards (c.y.) of material would be removed. Considering a density of approximately 1.2 tons/c.y., the outbound waste would weigh approximately 267,000 tons.

With regard to corrective action criteria, Alternative 2A is considered protective of human health and the environment at the Site. Alternative 2A will provide for Compliance with regulatory requirements and its long-term effectiveness and performance and constructability are all considered good. As the alternative requiring the most work and thousands of over-the-road truck trips, it also carries the greatest risk of accidental harm during construction. The probable cost to implement is extremely high, on the order of **\$13.9 million** as shown on **Table 2 – Opinion of Probable Cost – Alternative 2A**. No post-corrective action care is considered to be



necessary for this alternative because all refuse would be removed. The State is likely to be accepting of this alternative. The local community may express concern, especially with the large volume of construction traffic.

### ***7.2.2 Alternative 2B Comprehensive In-Place Closure***

The elements of corrective action under Alternative 2B are:

- Clear trees and brush from the approximately 9.7-acre refuse deposit footprint.
- Lay back the steep portions of the creek bank to a slope no steeper than 3H:1V (33.3%) by excavating the refuse. The excavated waste could be consolidated with the existing deposit, but that may trigger permitting requirements for a solid waste disposal facility. Therefore, the removal and off-site disposal at a permitted Subtitle D MSW facility is considered for estimating purposes. Additionally, this amount is estimated to include the approximately 12,000 cubic yards (CY) of refuse that would need to be removed for this purpose of installing a shallow groundwater/leachate collection trench.
- Install a shallow groundwater/leachate collection trench to intercept ongoing discharges to Trail Creek. The collection trench may consist of a perforated pipe placed in a trench and backfilled with gravel so that it may draw down the shallow groundwater/leachate by an estimated seven feet below its current static level. The trench may be sloped so that it flows by gravity to a sump. A pump system in the sump would pump collected liquids through a forcemain to the District's nearest acceptable collection point. One-sided inflow to such a collection trench is estimated to be approximately  $1.9 \text{ ft}^3$  per day per linear foot (LF) based on the hydraulic conductivity measured in the shallow monitoring wells and specified drawdown as calculated in **Appendix E**. The collection trench is expected to extend approximately 1,100 linear ft. along the length of the downgradient refuse boundary adjoining the Creek. Accounting for inflow to both sides of the trench and up through its bottom, the total inflow is estimated to be on the order of  $(2.5)(1.9 \text{ ft}^3/\text{day-LF})(1,100 \text{ LF})(7.48 \text{ gal}/\text{ft}^3)(1 \text{ day}/1,440 \text{ min}) = 27 \text{ gallons per minute (gpm)}$  or approximately 40,000 gallons per day.
- Grout and abandon in place or line the 18-inch CMP projecting from the east bank of the Creek, or re-line the pipe for continued use for stormwater only.



- Procure and place clean common borrow to re-grade the remaining low spots to create a minimum upland slope of 2% to prevent ponding of surface water and promote runoff. An estimated 10,000 CY of common borrow is needed for this purpose.
- Install a final cover system across approximately 9.7 acres. This system is considered to include a 2 ft. thick compacted clay liner overlain by 0.5 ft. of topsoil. An estimated 32,000 CY of compacted clay and 8,000 CY of topsoil are needed for this purpose.
- Install gas vents (approximately 1 per acre) to control the release of dumpsite gas. Passive vents are considered for estimating purposes.
- Install erosion control measures along the creek bank to prevent long term erosion and to protect the final cover from the rise and fall of the creek waters. These erosion control measures would include permanent turf/vegetation reinforcement matting combined with tied concrete block mats, large riprap, or other hard armoring. An estimated 1.2 acres (6,000 square yards (SY)) of reinforcement matting and on the order of 1,000 tons of riprap are needed for this purpose.
- Re-vegetate approximately 10 acres by hydroseeding with mulch, or by drilling the seed and mulching with crimped straw to establish gassy vegetative cover across all disturbed areas.
- Install a post-corrective action groundwater monitoring well network to augment existing wells that may be damaged or need to be relocated after construction. An estimated 10 groundwater monitoring wells are considered appropriate for this purpose.
- Implement post-corrective action operations, maintenance, and monitoring. This is considered to include regular visual inspections of the cover and erosion control measures, annual repair of minor erosion damage, annual O&M on the leachate collection system, mowing twice per year to control deep-rooted plants, and semi-annual monitoring of groundwater for a broad range of analytes to include VOCs, SVOC, metals, and ammonia in 10 groundwater monitoring wells. Prepare and submit semi-annual monitoring reports.



With regard to corrective action criteria, Alternative 2B is considered protective of human health and the environment at the Site. As an alternative requiring much work and thousands of over-the-road truck trips, it also carries the considerable risk of accidental harm during construction. Compliance with regulatory requirements; its long-term effectiveness and performance; and constructability are all considered good. The probable cost to construct is high, on the order of **\$3.6 million** as shown on **Table 10 – Opinion of Probable Cost – Alternative 2B**. Annual post-corrective action care costs are estimated at approximately \$30,500, indicating a total post-corrective action care expense of approximately \$915,000 (current dollars) over 30 years as also shown on **Table 10**. The State is likely to be accepting of this alternative. The local community may express concern with leaving the refuse in place and/or due to the large volume of construction traffic for this alternative.

### **7.3 Alternative 3 – Reasonable and Appropriate Intervention**

Characterization of the refuse deposit indicates that it presents no excess chemical exposure risk to recreational users of the Site and dumpsite gas generation appears to be *de minimis*. A comprehensive in-place closure is not considered necessary. The elements of this corrective action alternative are considered reasonable and appropriate for the site, and they are similar in many respects to those of Alternative 2B, but some items are reduced in scope. **Please refer to Figure 13 – Conceptual Corrective Action Plan for more information.** The elements of corrective action under Alternative 3 are:

- Clear trees and brush from the approximately 3.3 acres of the refuse deposit footprint.
- Lay back the steep portions of the creek bank to a slope no steeper than 3H:1V (33.3%) by excavating the refuse and thin cover soil. Approximately 12,000 CY of refuse and existing cover soil are estimated to be removed for this purpose and to facilitate the installation of a shallow groundwater/leachate collection trench.
- Install a shallow groundwater/leachate collection trench to intercept ongoing discharges to Trail Creek as discussed under Alternative 2B.
- Grout and abandon in place or line the 18-inch CMP projecting from the east bank of the Creek.



- Procure and place clean common borrow to re-grade the remaining low spots over approximately 2.1 acres of the existing cover to create a minimum upland slope of 2% to prevent ponding of surface water and promote runoff. Also, selectively remove exposures of refuse and place 2 ft. of common borrow over localized areas of the existing cover estimated to total about 1 acre. An estimated 12,000 CY of common borrow is needed for this purpose.
- Install a final cover system across approximately 1.2 acres along the creek bank. This system is expected to include a 2 ft. thick compacted clay liner overlain by 0.5 ft. of topsoil. An estimated 4,000 CY of compacted clay and 1,000 CY of topsoil are needed for this purpose.
- Omit dumpsite gas vents listed under Alternative 2B. The small quantities of methane generated by the refuse deposit are diffusing through the sandy cover at undetectable surface concentrations based on the site characterization data. Allowing any gases that re generated to continue to diffuse in this manner is reasonable and appropriate for the site.
- Install erosion control measures along the creek bank to prevent long term erosion and to protect the final cover from the rise and fall of the creek waters. These erosion control measures would include permanent turf/vegetation reinforcement matting combined with tied concrete block mats, large riprap, or other hard armoring of select areas. An estimated 1.2 acres (6,000 square yards (SY)) of reinforcement matting and on the order of 1,000 tons of riprap are needed for this purpose.
- Re-vegetate approximately 4.3 acres by hydroseeding with mulch, or by drilling the seed and mulching with crimped straw to establish gassy vegetative cover across all disturbed areas.
- Install a post-corrective action groundwater monitoring well network to augment existing wells that may be damaged or need to be relocated after construction. An estimated 10 groundwater monitoring wells are considered appropriate for this purpose.
- Implement post-corrective action operations, maintenance, and monitoring. This is expected to include regular visual inspections of the cover and erosion control measures, annual repair of minor erosion damage, annual O&M on the leachate collection system, and semi-annual monitoring of groundwater for a



broad range of analytes to include VOCs, SVOC, metals, and ammonia in 10 groundwater monitoring wells. Cover mowing is omitted in favor of naturalized vegetation. Prepare and submit semi-annual monitoring reports.

With regard to corrective action criteria, Alternative 3 is considered protective of human health and the environment at the Site. As an alternative requiring less work and fewer over-the-road truck trips, it carries a reduced risk of accidental harm during construction. Compliance with regulatory requirements; its long-term effectiveness and performance; and constructability are all considered good. The probable cost to construct, while high, is the least among the alternatives, on the order of **\$2.4 million** as shown on **Table 11 – Opinion of Probable Cost – Alternative 3**. Annual post-corrective action care costs are estimated at approximately \$26,500, indicating a total post-corrective action care expense of approximately \$795,000 (current dollars) over 30 years as also shown on **Table 10**. The State is likely to be accepting of this alternative. The local community may express concern with leaving the refuse in place and/or due to the still considerable volume of construction traffic for this alternative.

## **7.4 Summary of Alternatives**

*Alternative 1 – Minimal Intervention (No-Further-Action)* requires the least effort at the least cost, but it satisfies none of the other criteria. The State is requiring positive action so this alternative is rejected.

*Alternative 2A – Complete Removal and Off-Site Disposal of Refuse* requires the greatest effort and greatest cost and appears to satisfy all applicable criteria. All refuse would be removed under this alternative, and the Site may be restorable as a constructed wetland. The level of effort and cost on the order of \$13.9 million may not be practicable and the potential for accidental harm during construction is greatest because of the extraordinary volume of over-the-road traffic it would require.

*Alternative 2B – Comprehensive In-Place Closure* requires a high level of effort and high cost while appearing to satisfy all applicable criteria. All refuse would be covered with a low permeability soil cover and leachate flows to the Trail Creek would be intercepted and diverted to the District for treatment. The level of effort and cost on the order of \$3.6 million for construction and \$0.9 million for post-corrective action care may not be practicable, and the potential for accidental harm during construction remains high due to a large associated volume of local and over-the-road traffic it would require.



*Alternative 3 – Reasonable and Appropriate Intervention* requires a substantially reduced level of effort and cost compared to alternatives 2A and 2b while also appearing to satisfy all applicable criteria. All refuse would be covered with sandy soil cover in upland areas and low permeability soils armored against erosion along the Trail Creek Bank. Leachate flows to the Trail Creek would also be intercepted and diverted to the District for treatment. The level of effort and cost on the order of \$2.4 million for construction and \$0.8 million for post-corrective action care are the lowest among the alternatives meeting the applicable corrective action criteria. The potential for accidental harm during construction is also the least among the compliant alternatives due to the reduced volume of local and over-the-road traffic.

Weaver Consultants Group recommends that Alternative 3 be selected and proposed for further regulatory consideration. The configuration of corrective action Alternative 3 is illustrated in **Figure 13 – Conceptual Corrective Action Plan**. If acceptable to the IDEM, Alternative 3 should be further refined through design and finalization for implementation. The probable cost for implementing the corrective action alternatives considered is summarized in table below:

**Summary of Cost for Corrective Action Alternatives Considered**

<b>Alternative</b>	<b>Probable Construction Cost</b>	<b>Probable Post-Corrective Action O&amp;M for 30 Years (current dollars)</b>
<i>Alternative 1 – Minimal Intervention (No-Further-Action)</i>	\$0	\$0
<i>Alternative 2A – Complete Removal and Off-Site Disposal of Refuse</i>	\$13.9 million	\$0
<i>Alternative 2B – Comprehensive In-Place Closure</i>	\$3.6 million	\$0.9 million
<i>Alternative 3 – Reasonable and Appropriate Intervention<sup>3</sup></i>	\$2.4 million	\$0.8 million

<sup>3</sup> Corrective action consistent with the conceptual approach outlined under Alternative 3 (or a similar approach) is recommended for further consideration and development.



## 8 CONCLUSIONS

---

Weaver Consultants Group concludes the following, consistent with relevant prevailing professional principles and practice, based on the results of the current site characterization and with consideration for the historical data and information reviewed:

The Karwick Road Nature Park Site located along the east bank of Trail Creek, received significant amounts of mainly household refuse, demolition debris, and similar materials beginning in approximately 1965 and ending sometime around 1971. Weaver Consultants Group conducted soil borings and exploratory test pits through and around the Site, and from this work it was found that the refuse deposit ranges from approximately 6 ft. to 19 ft. thick, and extends over approximately 9.7 acres. The refuse deposit appears to extend well south of the City's property onto the adjoining land owned by NIPSCO to the south. The currently estimated area of 9.7 acres includes the affected area of the NIPSCO property to the south.

Samples of the soil and refuse mixture comprising the deposit were tested for VOCs, SVOCs, and total metals. Concentrations of benzene, naphthalene, 1,2,4-trimethyl benzene, or arsenic were detected at concentrations above their respective residential soil migration to groundwater Screening Levels (SLs) in several test pits. Although chlorobenzene was detected at concentrations less than migration to groundwater SLs in two of the test pit soil samples, the presence of chlorobenzene is noted because it was also detected in several of the shallow groundwater samples, the discharge from the 18-inch CMP, and also in the sediment of Trail Creek. Chlorobenzene, therefore, appears to be a relevant indicator for cross-media migration from the refuse to the shallow groundwater and to the creek sediment.

Groundwater flow beneath the Site is controlled by the topography, the presence of Trail Creek, and the orientation of the underlying hydrologic units. Shallow groundwater flowing through the refuse deposit takes on the characteristics of weak municipal solid waste leachate and discharges to Trail Creek. The site characterization sampling program for shallow groundwater/leachate indicates the presence of



chlorobenzene, arsenic, iron, manganese, and lead at concentrations greater than their respective residential tap water SLs, as well as ammonia at an average concentration of 76 mg/l. The ammonia loading to Trail Creek is estimated to be approximately 4.2 lbs/day.

The semi-confining organic silt layer underlying the refuse deposit is laterally continuous and separates the shallow groundwater from the deeper groundwater as evidenced by the 7 ft. (or greater) difference between water levels measured in nested monitoring wells screened in the refuse and those screened in the deeper sand and gravel aquifer. Groundwater in the deeper aquifer, therefore, flows upward beneath the creek. This conceptual site model indicates that there is little potential for horizontal migration of potential contaminants of concern through shallow groundwater beyond Trail Creek to the west or through the deeper sand and gravel aquifer.

Acetone and 2-butanone (methyl ethyl ketone) were detected in the four Creek sediment samples adjoining the Site at concentrations greater than EPA Region 5 SLs. Neither compound was detected in the up-stream sample. Polycyclic aromatic hydrocarbons including benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene were similarly distributed at concentrations greater than their respective Threshold Effect Levels (TELs) listed in NOAA's Screening Quick Reference Tables (SQuiRTs). Total arsenic also exceeded its TEL in two sediment samples. Chlorobenzene was detected in sediment samples SD-2 and SD-4 at concentrations below EPA Region 5 SLs, but is noted as an indicator of cross-media migration from the refuse deposit.

The site characterization surface water sampling program was conducted in September 2014, and indicates no exceedances of Surface Water Quality Standards (SWQs) in Trail Creek while the Creek flowed at approximately twice its  $Q_{7/10}$  low flow. The District plugged the CMP shortly after its May 2013 sampling indicated a value of 24.2 mg/l, but this plug was removed sometime thereafter when localized ponding of stormwater occurred on Karwick Road near the site. The 18-inch CMP was again plugged by the District shortly after it was sampled by WCG in September 2014, because the discharge concentration of ammonia was relatively high at 12.3 mg/l. This pipe was discharging at approximately 10 gpm. Plugging of the CMP eliminated the point source discharge, but is expected to have increased the groundwater seepage to maintain equilibrium between groundwater inflows and surface water outflows to and from the refuse deposit.



Based on the site characterization, the following concerns have been identified:

- The current sandy soil cover over the refuse is insufficient to adequately protect against groundwater or surface water contamination.
- Refuse is exposed along the Trail Creek bank at several locations and some upland areas of the cover are topographical depressions.
- Slope stability analysis indicates that the west side of the refuse deposit is only marginally stable (FS=1.08). Care must be used during construction of any slope improvement projects to prevent large scale disturbance of this material. Additional failure of the slope could occur due to 1) high water levels in Trail Creek causing erosion which undermines the slope or 2) sudden changes in water level in the creek inducing pore pressure changes in the underlying soils which may cause sloughing or deeper rotational failures of the saturated soils. Such failures could release significant amounts of sediment and refuse directly into Trail Creek.
- The refuse currently exposed along the Trail Creek bank and along upland trails is a safety hazard associated with slips, trips, and falls, or due to irregular or sharp objects protruding from the surface of the Site.
- Shallow groundwater/leachate within the refuse deposit is impacted by ammonia above SWQS and total iron at concentrations above tap water SLs. Some of the shallow monitoring wells also indicate concentrations of chlorobenzene, arsenic, lead, or manganese above tap water SLs.
- While ammonia and other leachate constituents are discharging into the Creek, the surface water of Trail Creek was found to meet SWQSS when flowing at approximately twice its  $Q_{7/10}$  low flow. Low flow conditions did not occur and were not assessed during site characterization. While the impacts at low flow might expect to be more significant, conversely it might also be expected that the leachate flow would decrease during long extended periods of dry weather, and that the net impact would remain unchanged.
- Headspace gas concentrations in two shallow monitoring wells exceeded the LEL for methane. Surface measurements over the cover did not detect methane. There may be a need for additional monitoring of methane gas.



Based on an evaluation of several alternatives, the elements of corrective action recommended for regulatory review are those identified for Alternative 3 and include the following:

- Clear trees and brush from the approximately 3.3 acres of the refuse deposit footprint.
- Lay back the steep portions of the creek bank to a slope no steeper than 3H:1V (33.3%) by excavating the refuse and thin cover soil.
- Install a shallow groundwater/leachate collection trench to intercept ongoing discharges to Trail Creek. The intercepted leachate could be discharged to the sanitary sewer system for treatment.
- Remove Approximately 12,000 CY of refuse and existing cover soil to lay back the steep slope and to facilitate the installation of a shallow groundwater/leachate collection trench.
- Because pollutants appear to be entering the deteriorated 18-inch CMP, it may be necessary to grout and abandon it in place, or to line the inside of the 18-inch CMP to eliminate the direct migration pathway from the Site to Trail Creek.
- Place clean common borrow on the Site to re-grade the remaining low spots over approximately 2.1 acres of the existing cover to create a minimum upland slope of 2% to prevent ponding of surface water and promote runoff. Also, selectively remove exposures of refuse and place 2 ft. of common borrow over localized areas of the existing cover estimated to total about 1 acre. An estimated total of 12,000 CY of common borrow is needed for these purposes.
- Install a final cover system over approximately 1.2 acres along the creek bank. This system is considered to include a 2 ft. thick compacted clay liner overlain by 0.5 ft. of topsoil. An estimated 4,000 CY of compacted clay and 1,000 CY of topsoil are needed for this purpose.
- Install erosion control measures along the creek bank to prevent long term erosion and to protect the final cover from the rise and fall of creek waters. Erosion control measures will include permanent turf/vegetation reinforcement matting combined with tied concrete block mats, large riprap, glacier stone, or other hard armoring of select areas. An estimated 1.2 acres (6,000 SY) of



reinforcement matting and on the order of 1,000 tons of riprap or glacier stone are needed for this purpose.

- Re-vegetate approximately 4.3 acres to establish vegetative cover across all disturbed areas.
- Install a post-corrective action groundwater monitoring well network to augment existing wells that may be damaged or need to be relocated after construction. An estimated 10 groundwater monitoring wells are considered appropriate for this purpose.
- Implement post-corrective action operations, maintenance, and monitoring to include regular visual inspections of the cover and erosion control measures, annual repair of minor erosion damage, annual O&M on the leachate collection system, and semi-annual monitoring of groundwater for a broad range of analytes to include VOCs, SVOC, metals, and ammonia in 10 groundwater monitoring wells.

Weaver Consultants Group's preliminary opinion of probable cost to construct the recommended corrective action is on the order of **\$2.4 million**. Annual post-corrective action care costs are estimated at approximately \$26,500, indicating a total post-corrective action care expense of approximately \$795,000 (current dollars) for 30 years. The probable costs estimated herein do not specifically include amenities that may be considered appropriate by the District or the City to promote the beneficial use of the property as a recreation area and public fishing access.



## 9 QUALIFICATIONS AND LIMITATIONS

---

Weaver Consultants Group prepared this Site Characterization Report using a defined scope of services considered appropriate and agreed upon by all parties on the date the service was authorized. Weaver Boos has provided its services in accordance with generally accepted practices in a manner consistent with that level of care exercised by other members of our profession in the same locality and practicing under similar circumstances. Our professional opinions are based upon our review of historical information describing the Site, our visual observations of the subsurface conditions, and the results we obtained for widely spaced samples of soil, groundwater, sediment, surface water, and dumpsite gases. Conditions in areas not specifically sampled or analyzed may differ significantly from those inferred in this assessment. Although the scope of work specified in the Site Characterization Report is believed by Weaver Boos to be appropriate to address the stated objectives, we note that no environmental assessment can completely eliminate uncertainty with respect to the presence, concentration, or extent of contaminants of concern in soil, groundwater, sediment, surface water, or dumpsite gas. No such Site Characterization is likely to identify or anticipate all relevant environmental conditions that may be encountered as corrective action is implemented.

The probable corrective action costs estimated in this report are based primarily on WBC's experience with similar projects. Quantities are based on pre-design level concepts and thus subject to substantial upward or downward modification as actual design requirements are determined and design assumptions are verified. Unit prices are based primarily on WCG's recent experience and do not reflect firm pricing by any contractor, vendor, or disposal facility. The preliminary opinions of probable cost for the corrective action alternatives are intended mainly to support comparative evaluation of relative cost among the alternatives identified herein.



## 10 REFERENCES CITED

---

- ASTM, 2003. *Standard Guide for Developing Conceptual Site Models for Contaminated Sites*, E 1689-95 (Reapproved 2008), ASTM International.
- Buchman, M.F., 2008. NOAA Screening Quick Reference Tables, NOAA OR&R Report 08-1, Seattle WA, Office of Response and Restoration Division, National Oceanic and Atmospheric Administration, 34 pp.
- Gray, H.H., 1973. "Regional Geologic Map Series, Supplementary Chart No.1", Printed by the Authority of the State of Indiana, Department of Natural Resources.
- Hill, J.R., Carr, D.D., Hartke, E.J., and C.B. Rexroad, 1979. *Geology as a Contribution to Land Use Planning in LaPorte County, Indiana*, Department of Natural Resources, Geological Survey Special Report 14, Printed by Authority of the State of Indiana, Bloomington, Indiana. 28 pp.
- IDEM, 2012. *Remediation Closure Guide (Corrected and updated through 2014)*. Office of Land Quality, Indiana Department of Environmental Management (IDEM), Indianapolis, Indiana.
- IDNR, 1994. *Water Resource Availability in the Lake Michigan Region, Indiana*, Indiana Department of Natural Resources, Indianapolis, Indiana. 257 pp.
- Rosenshein, J.S., and Hunn, J.D., 1968. *Geohydrology and Ground-Water Potential of Porter and La Porte Counties, Indiana: Nat. Res., Div. Water Bull. 31*, 36 pp.
- Schneider, A.F. and Keller, S.J., 1970. "Regional Geologic Map No. 4, Chicago Sheet, Part A", Printed by the Authority of the State of Indiana, Department of Natural Resources.
- Schneider, A.F. and Keller, S.J., 1970. "Regional Geologic Map No. 4, Chicago Sheet, Part B", Printed by the Authority of the State of Indiana, Department of Natural Resources.
- USDA/SCS Soil Survey of La Porte County, issued January 1982.
- USEPA Region 5, 2003. *Ecological Screening Levels*, dated August 22, 2003.



Weaver Boos Consultants, 2014. Scoping Technical Memorandum (STM) dated August 8, 2014.

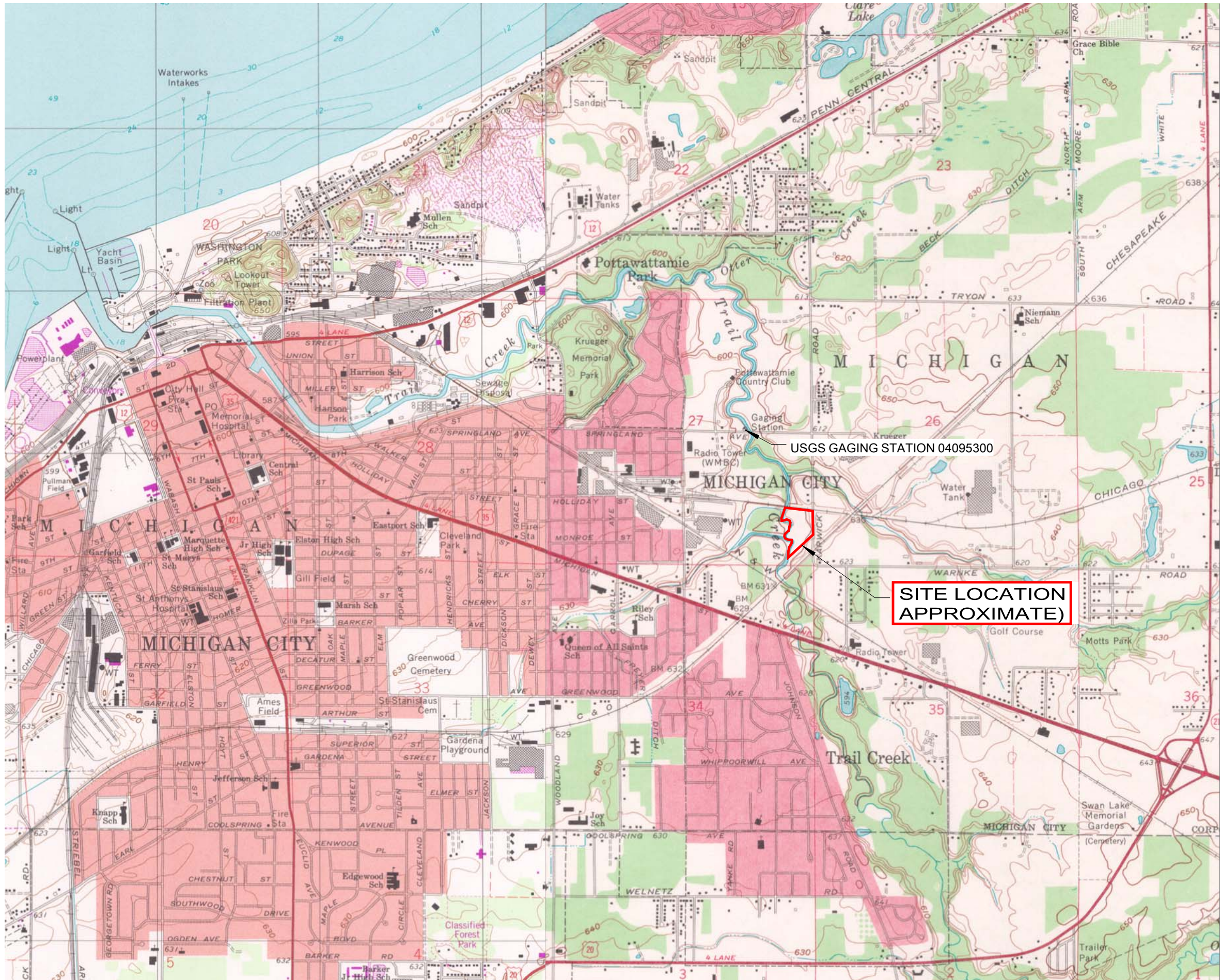
Weaver Boos Consultants, 2014. Quality Assurance Project Plan (QAPP) dated September 8, 2014

Weaver Boos Consultants, 2014. Site Characterization Plan (SCP) dated September 16, 2014.



## **FIGURES**

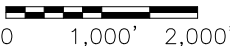




**NOTE:**  
1. MICHIGAN CITY WEST, INDIANA 7.5 MINUTE QUADRANGLE MAP, 1994.  
2. MICHIGAN CITY EAST, INDIANA 7.5 MINUTE QUADRANGLE MAP, 1969.



APPROX. SCALE  
1 INCH = 2,000 FEET



PREPARED FOR

SANITARY DISTRICT OF MICHIGAN CITY

SITE LOCATION MAP

KARWICK ROAD NATURE PARK

MICHIGAN CITY, INDIANA

NO.	DATE	REVISION DESCRIPTION	BY
1			
2			
3			
4			
5			
6			
7			
8			

7121 GRAPE ROAD  
GRANGER, IN 46530  
(574) 271-3447  
www.weaverboos.com

REUSE OF DOCUMENTS

This document, and the designs incorporated herein, as an instrument of professional service, is the property of Weaver Boos Consultants, and is not to be used in whole or in part, without the written authorization of Weaver Boos Consultants.

DRAWN BY:

SMS

DESIGNED BY:

SMS

REVIEWED BY:

AH

DATE:

01/30/2015

FILE:

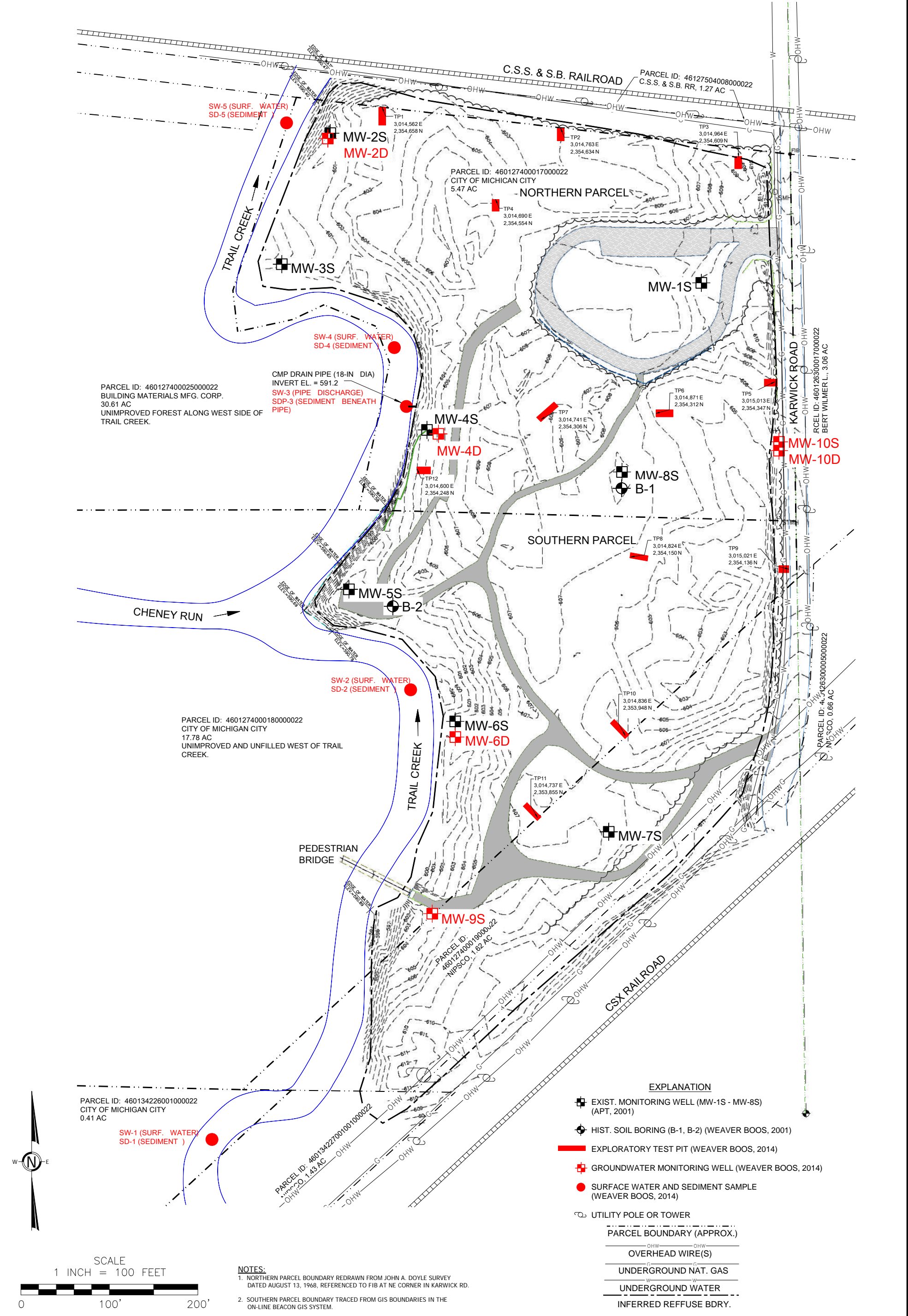
1873356-04

CAD:

1873356-04-FD.DWG

FIGURE 1





No.	DATE	REVISION DESCRIPTION	BY
1			
2			
3			
4			
5			
6			
7			
8			

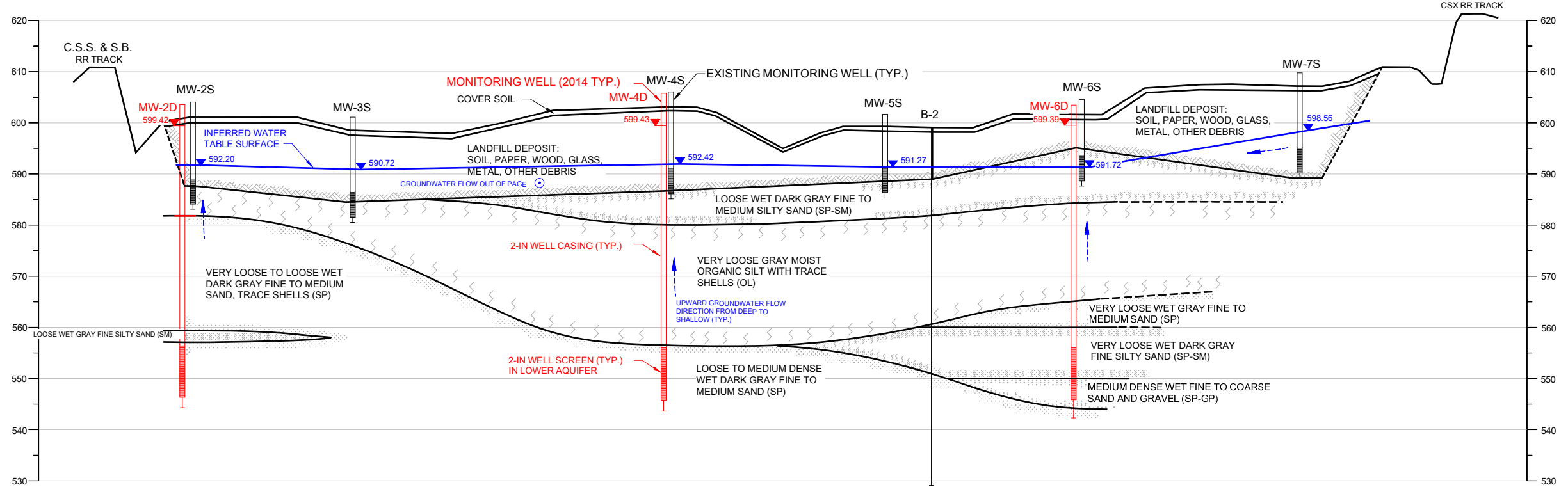
**SITE PLAN AND  
DATA COLLECTION LOCATIONS**  
KARWICK ROAD NATURE PARK  
MICHIGAN CITY, INDIANA

PREPARED FOR  
**SANITARY  
DISTRICT OF  
MICHIGAN CITY**



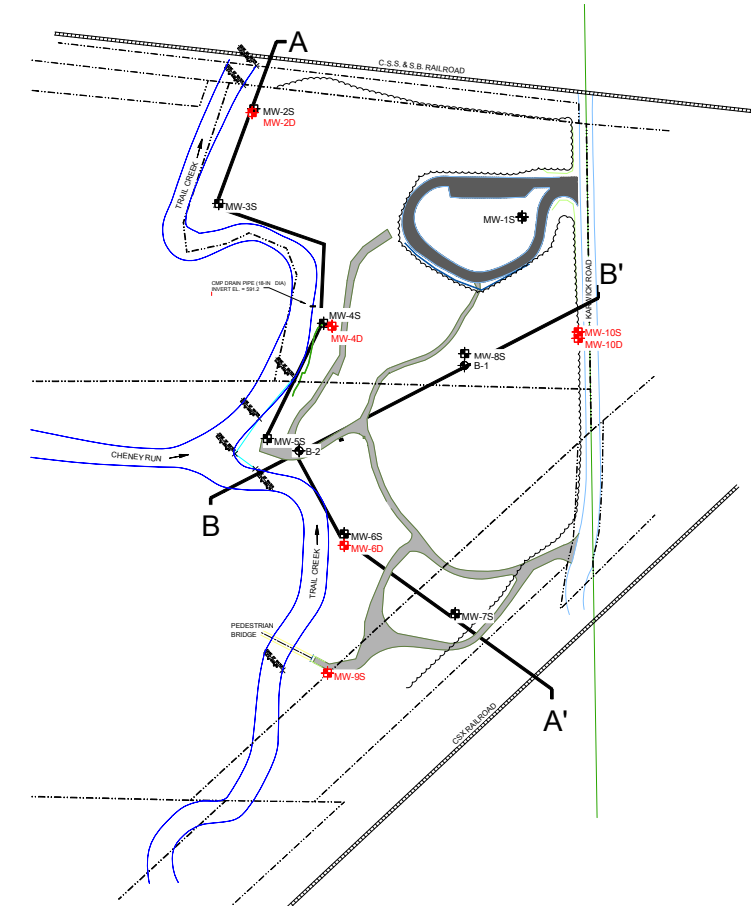
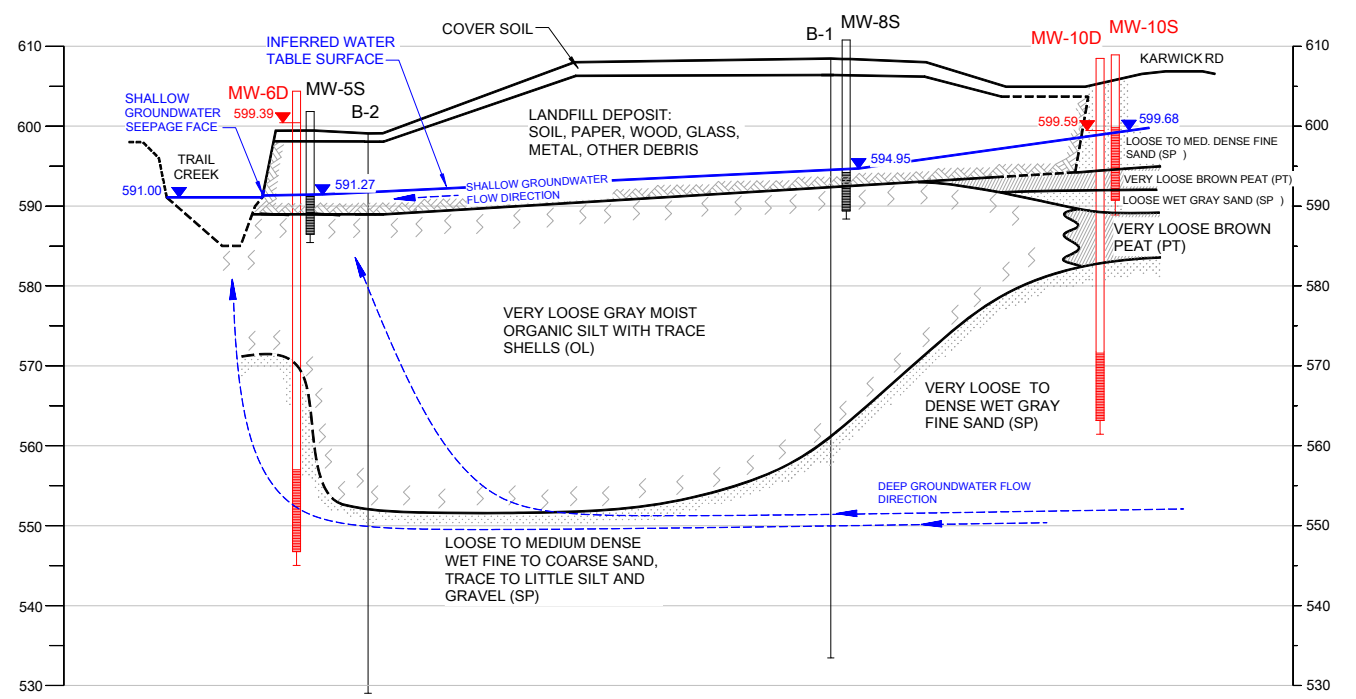
A (NORTH)

A' (SOUTH)

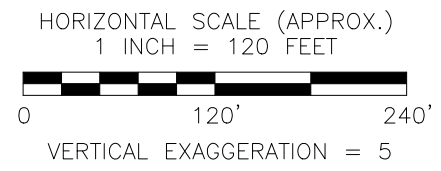


B (WEST)

B' (EAST)



**NOTE:**  
1. CROSS SECTION INFERRED FROM WIDELY-SPACED BORINGS USING GEOLOGICAL PRINCIPLES OF ORIGINAL HORIZONTALITY, CROSS-CUTTING RELATIONS, AND SUPERPOSITION. CONDITIONS BETWEEN BORINGS AND UNEXPLORED AREAS MAY VARY SIGNIFICANTLY FROM THE INFERENCES SHOWN.  
2. GROUNDWATER AND SURFACE WATER LEVEL ELEVATIONS MEASURED ON DECEMBER 1, 2014.



CROSS SECTION TRANSECTS  
HORIZONTAL SCALE (APPROX.)  
1 INCH = 300 FEET

PREPARED FOR

SANITARY DISTRICT OF MICHIGAN CITY

GEOLOGICAL CROSS SECTIONS

KARWICK ROAD NATURE PARK

MICHIGAN CITY, INDIANA

BY	REVISION DESCRIPTION	DATE	No.
			1
			2
			3
			4
			5
			6
			7
			8

7121 GRAPE ROAD  
GRANGER, IN 46530  
(574) 271-3447  
www.weaverboos.com

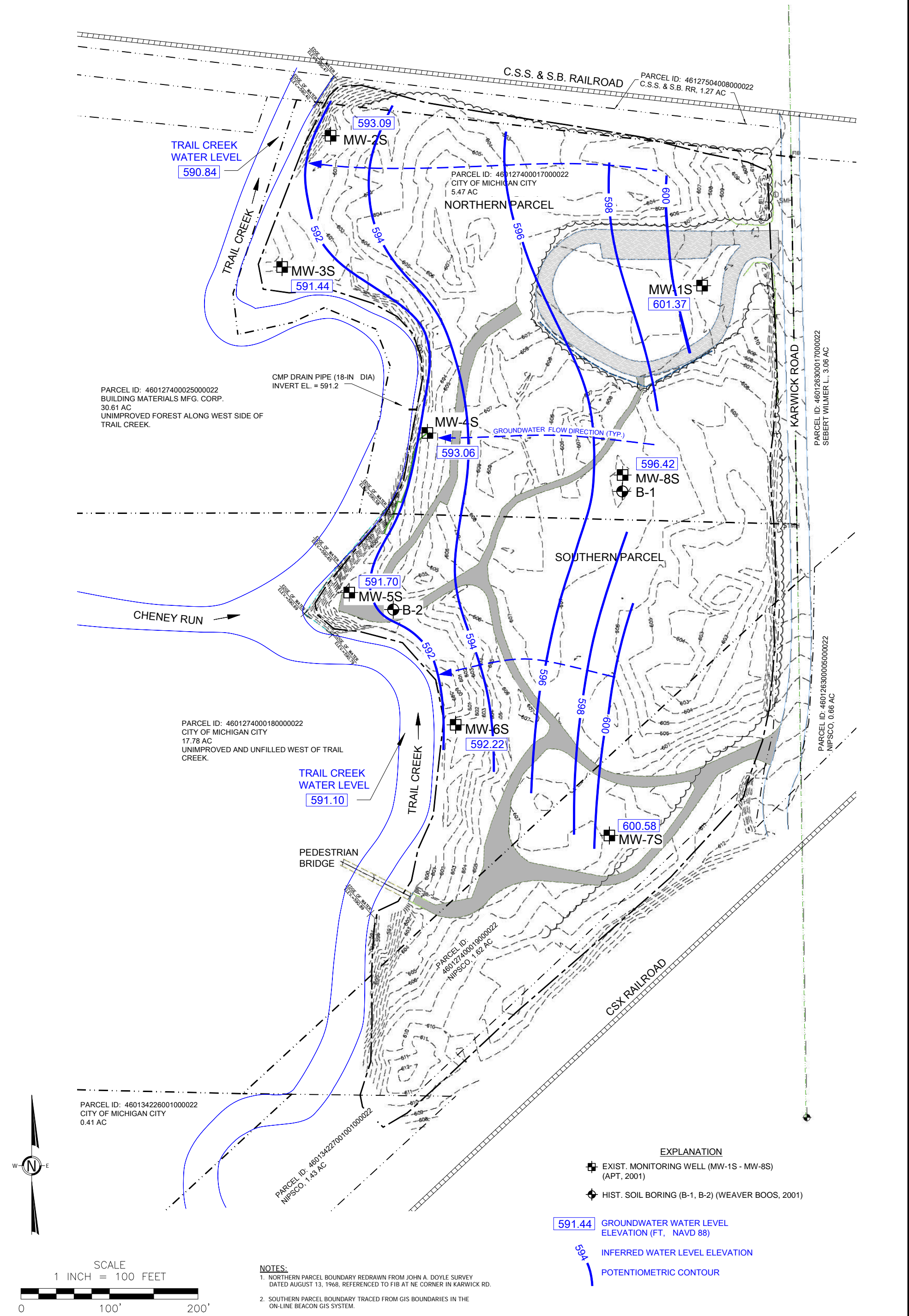
REUSE OF DOCUMENTS

This document, and the designs incorporated herein, as an instrument of professional service, is the property of Weaver Boos Consultants, and is not to be used in whole or in part, without the written authorization of Weaver Boos Consultants.

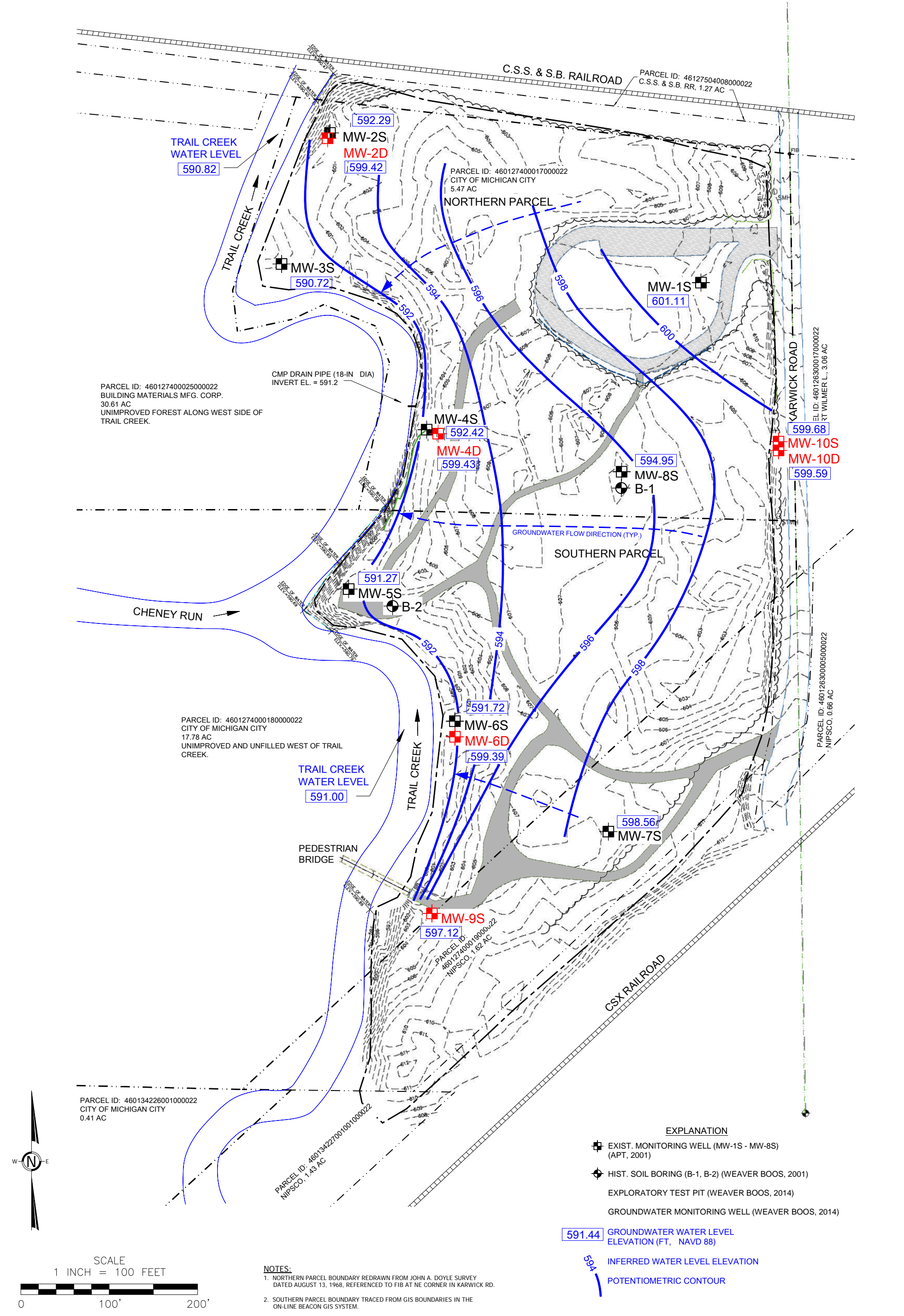
DRAWN BY:	SMS
DESIGNED BY:	SMS
REVIEWED BY:	AH
DATE:	1/25/2015
FILE:	1873356-04
CAD:	1873356-04-F2SCP.DWG

FIGURE 3

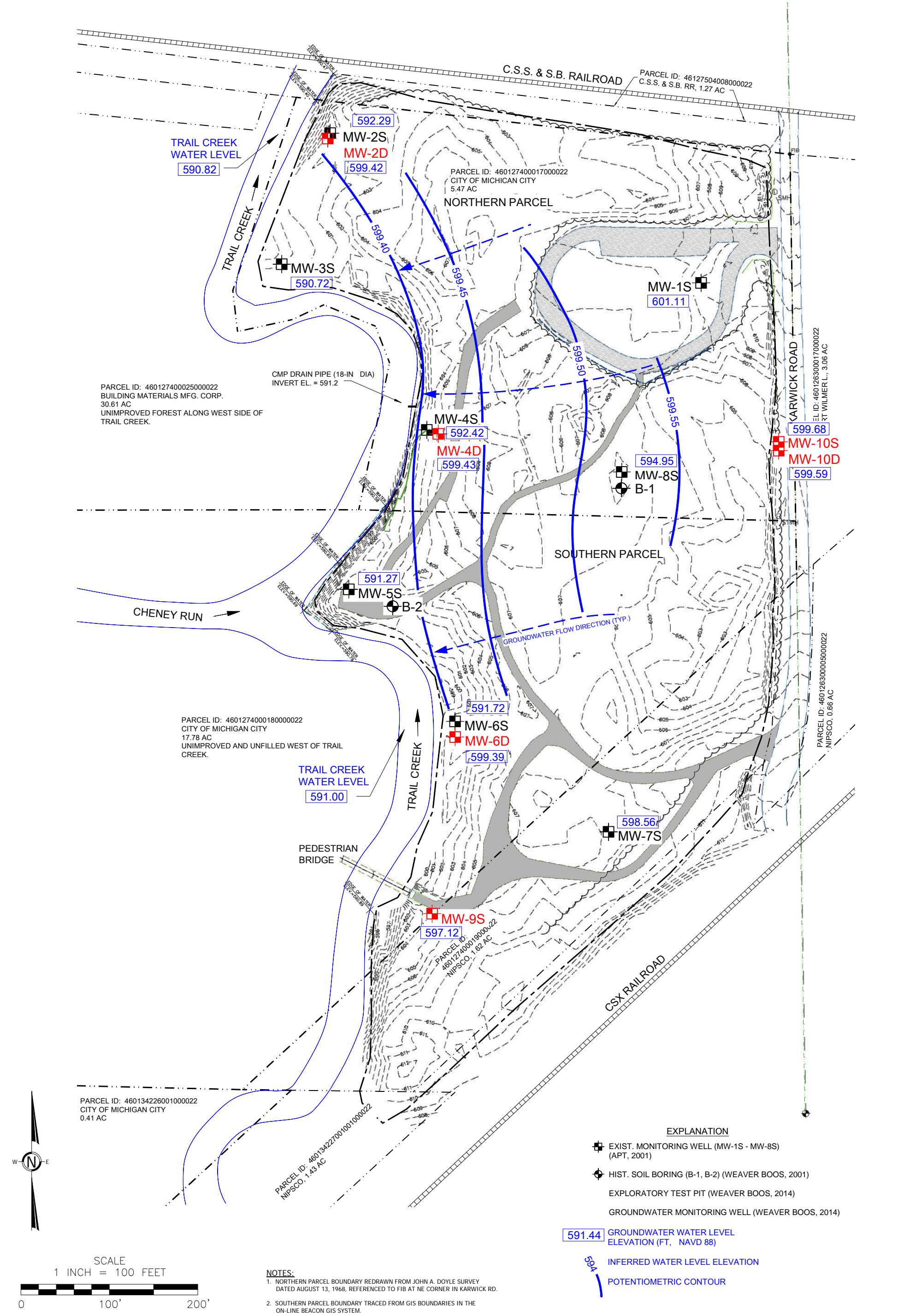










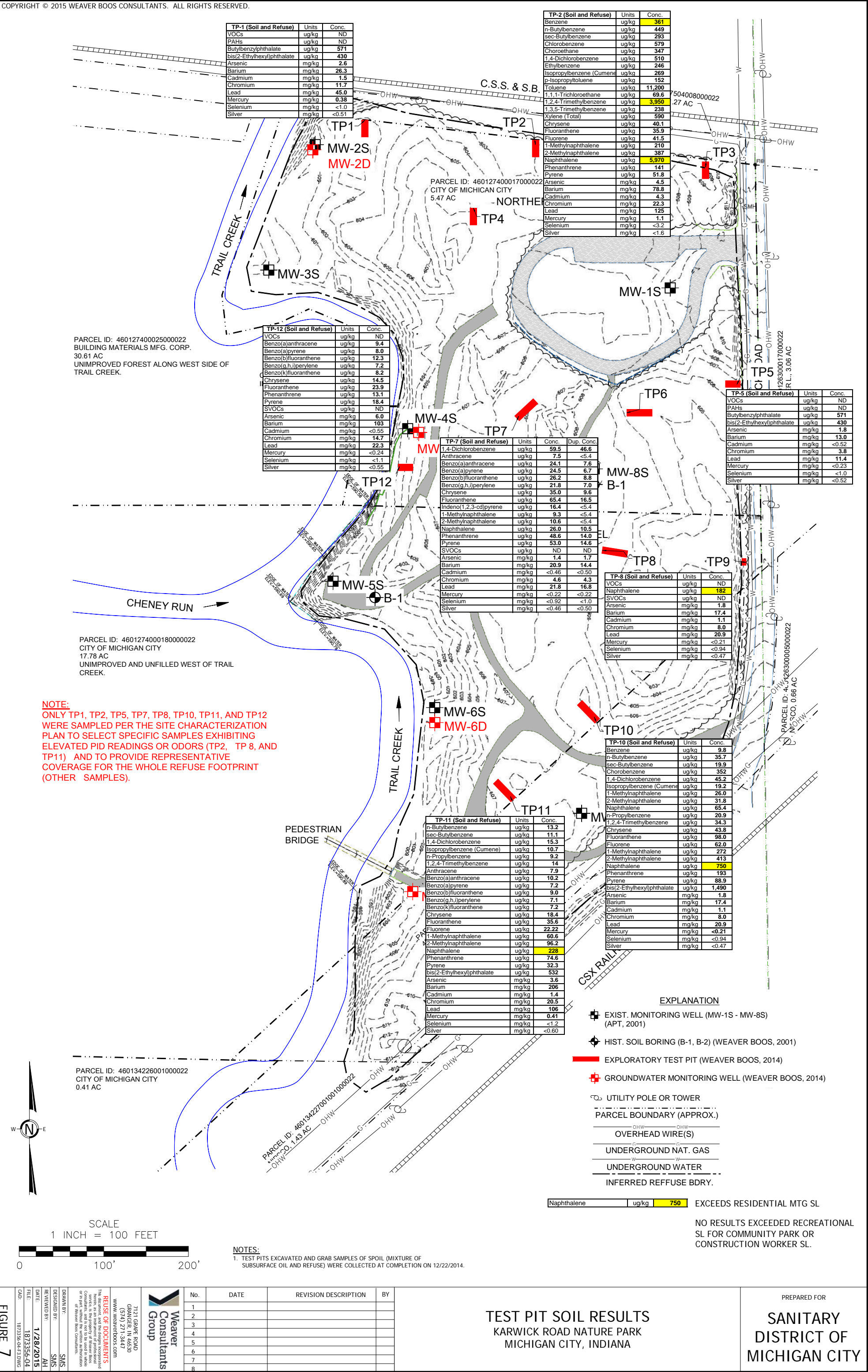


No.	DATE	REVISION DESCRIPTION	BY
1			
2			
3			
4			
5			
6			
7			
8			

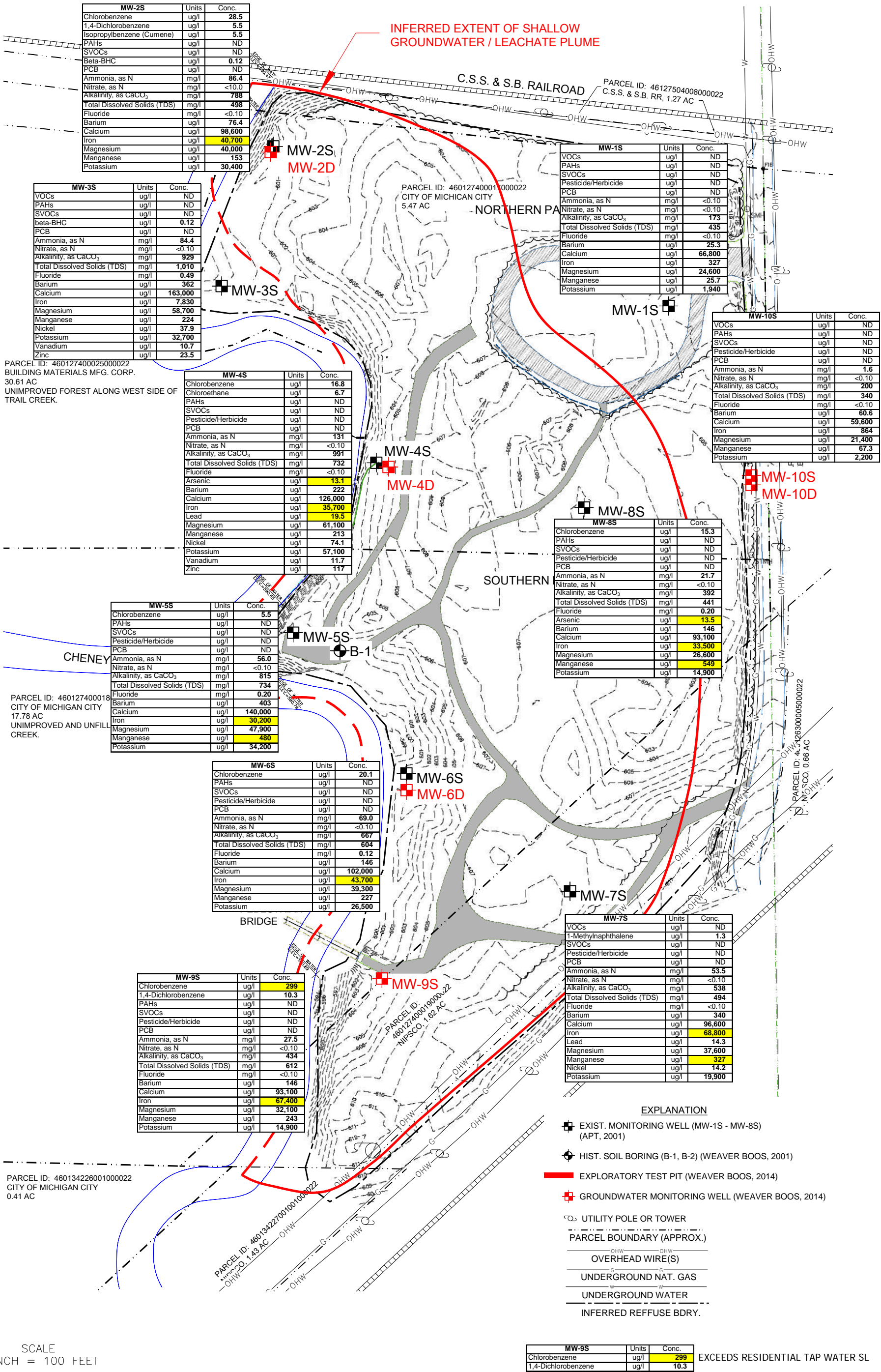
DEEP POTENTIOMETRIC SURFACE  
(DECEMBER 1, 2014)  
KARWICK ROAD NATURE PARK  
MICHIGAN CITY, INDIANA

PREPARED FOR  
**SANITARY DISTRICT OF MICHIGAN CITY**

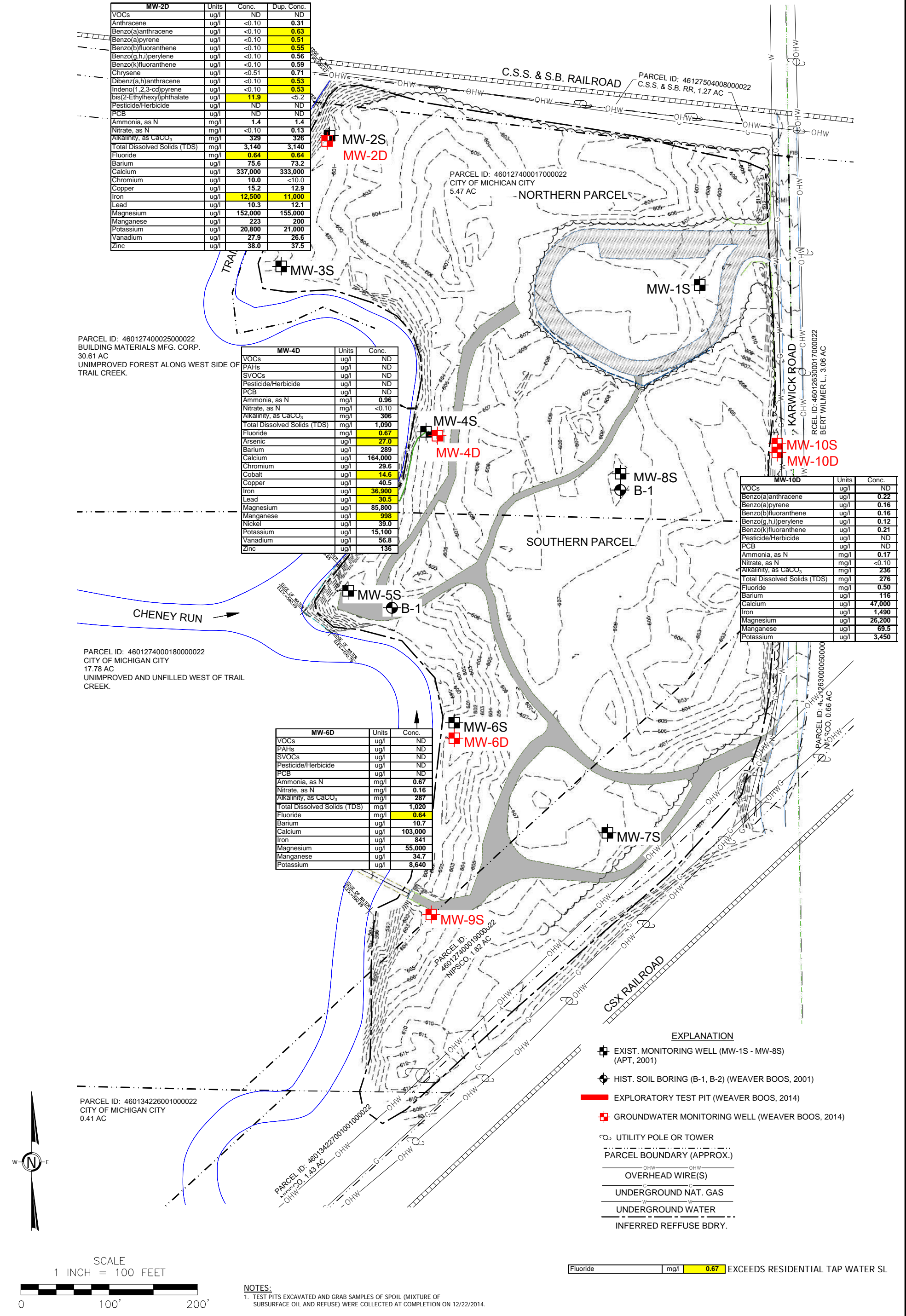




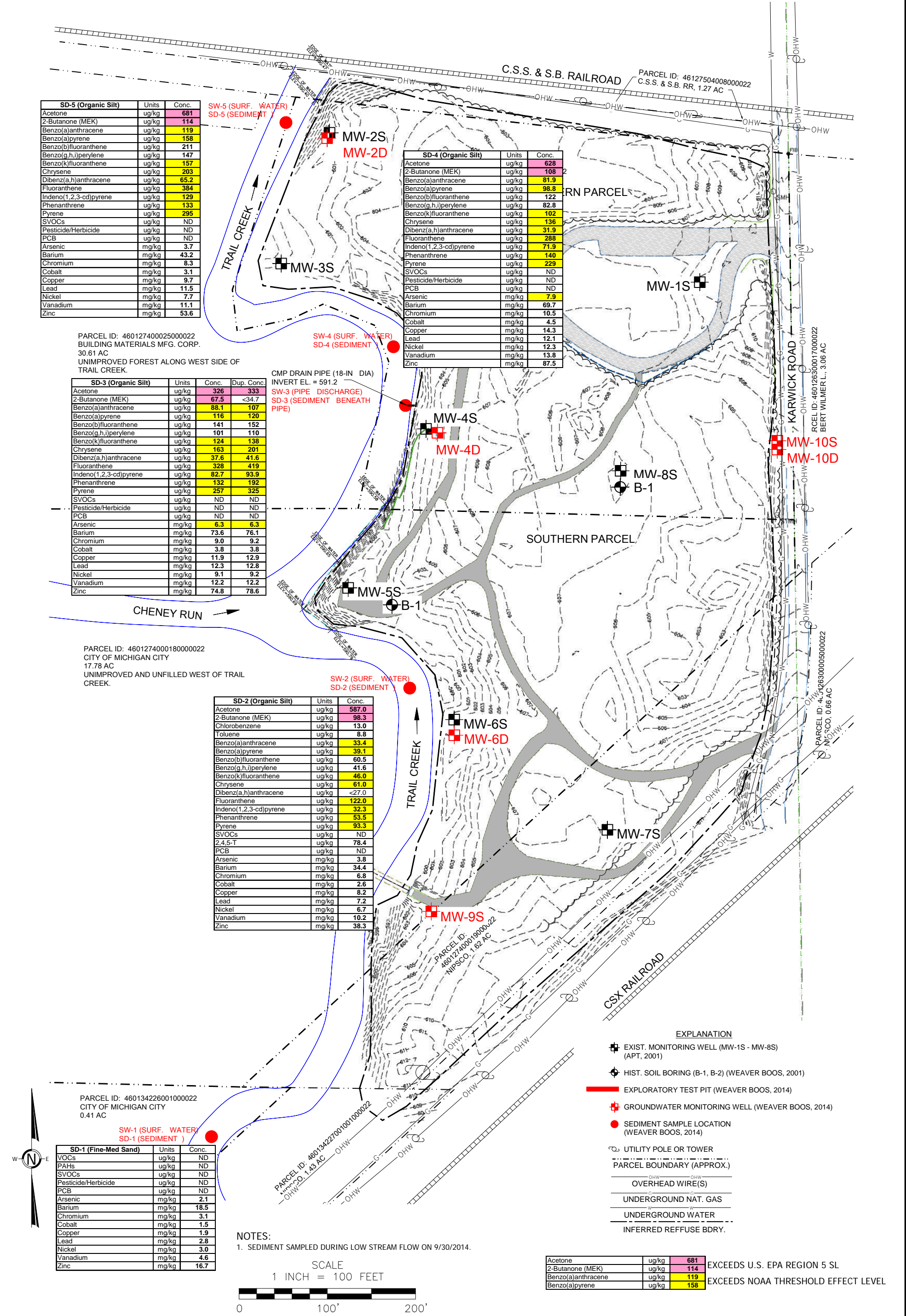




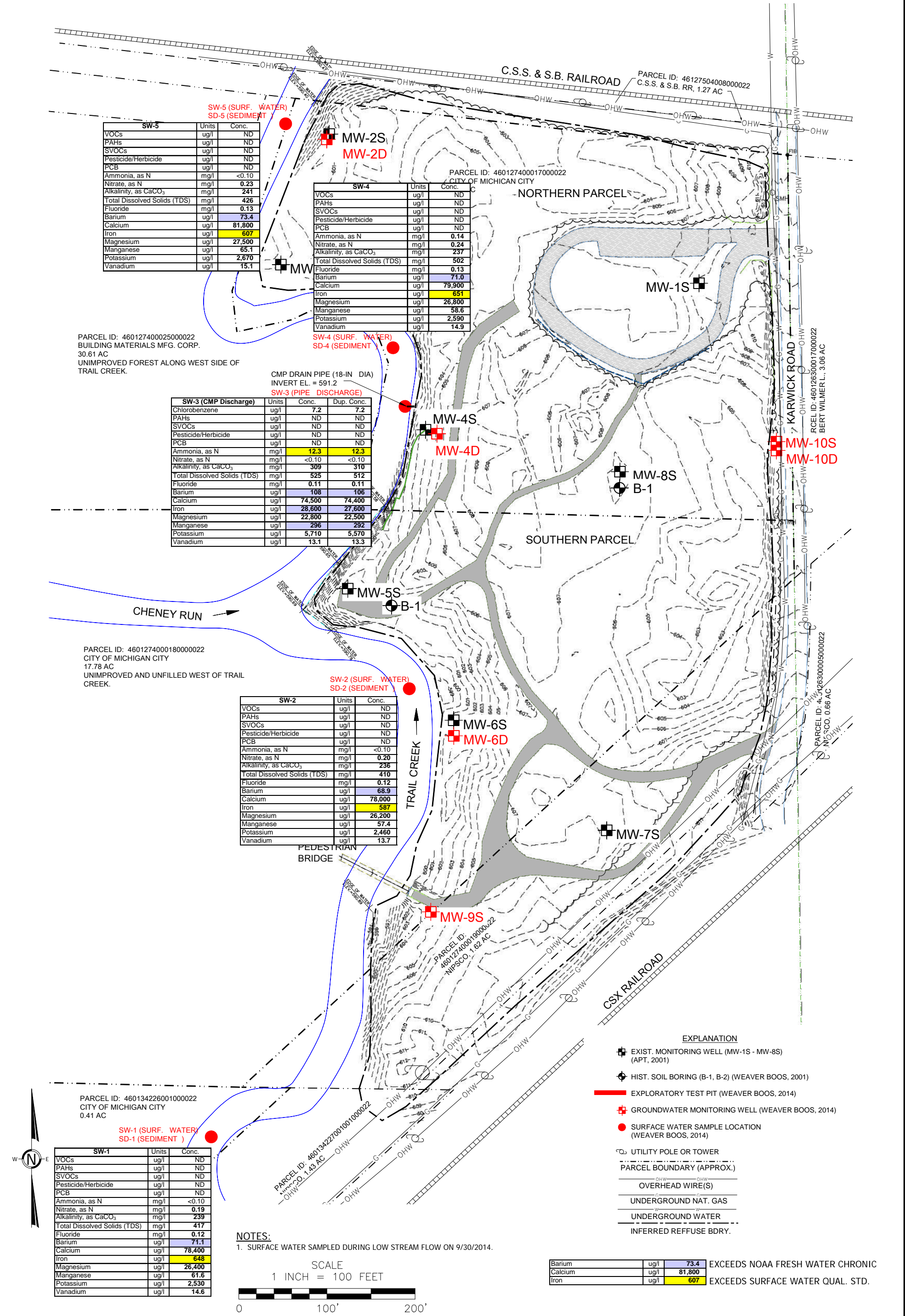










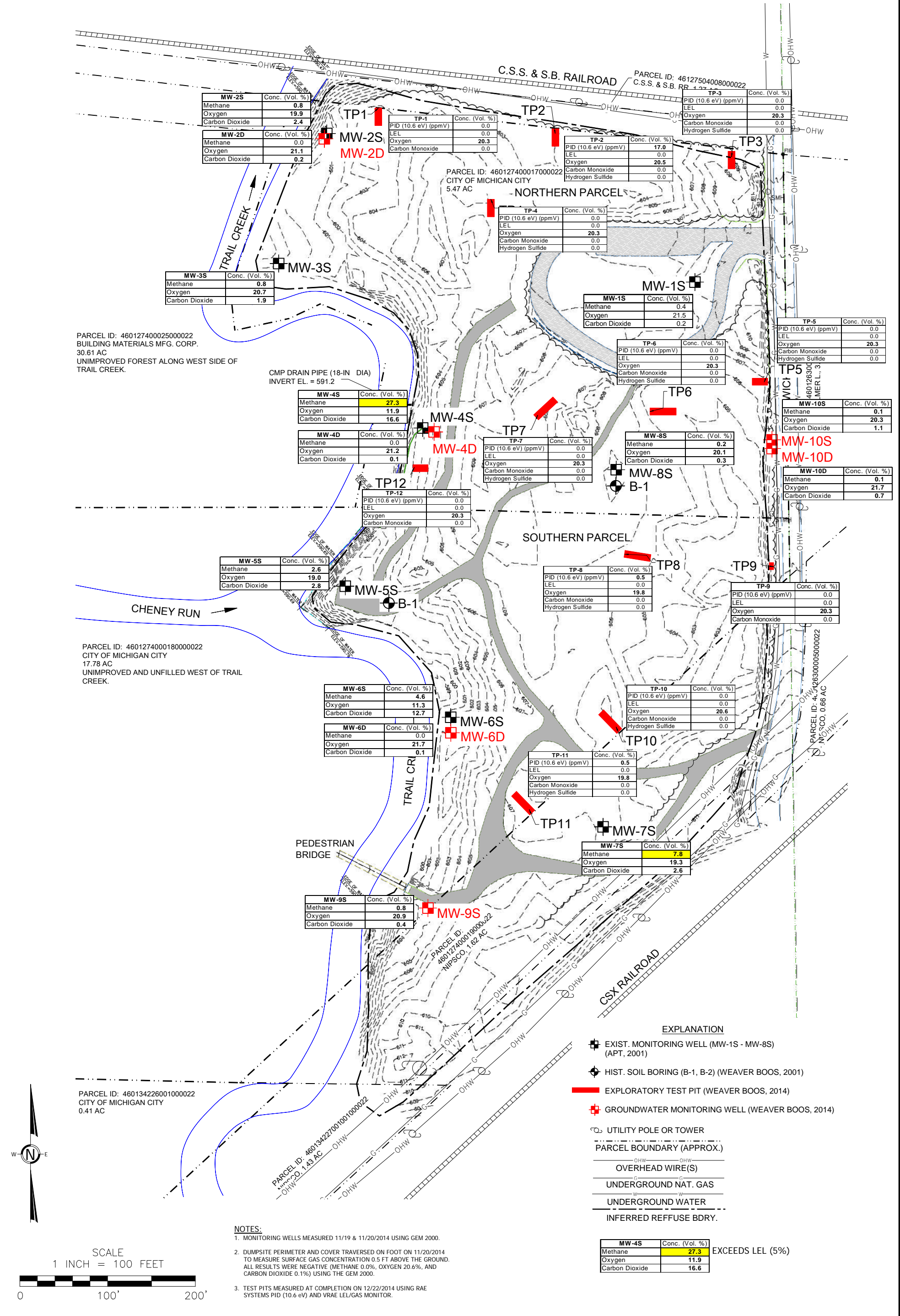


No.	DATE	REVISION DESCRIPTION	BY
1			
2			
3			
4			
5			
6			
7			
8			

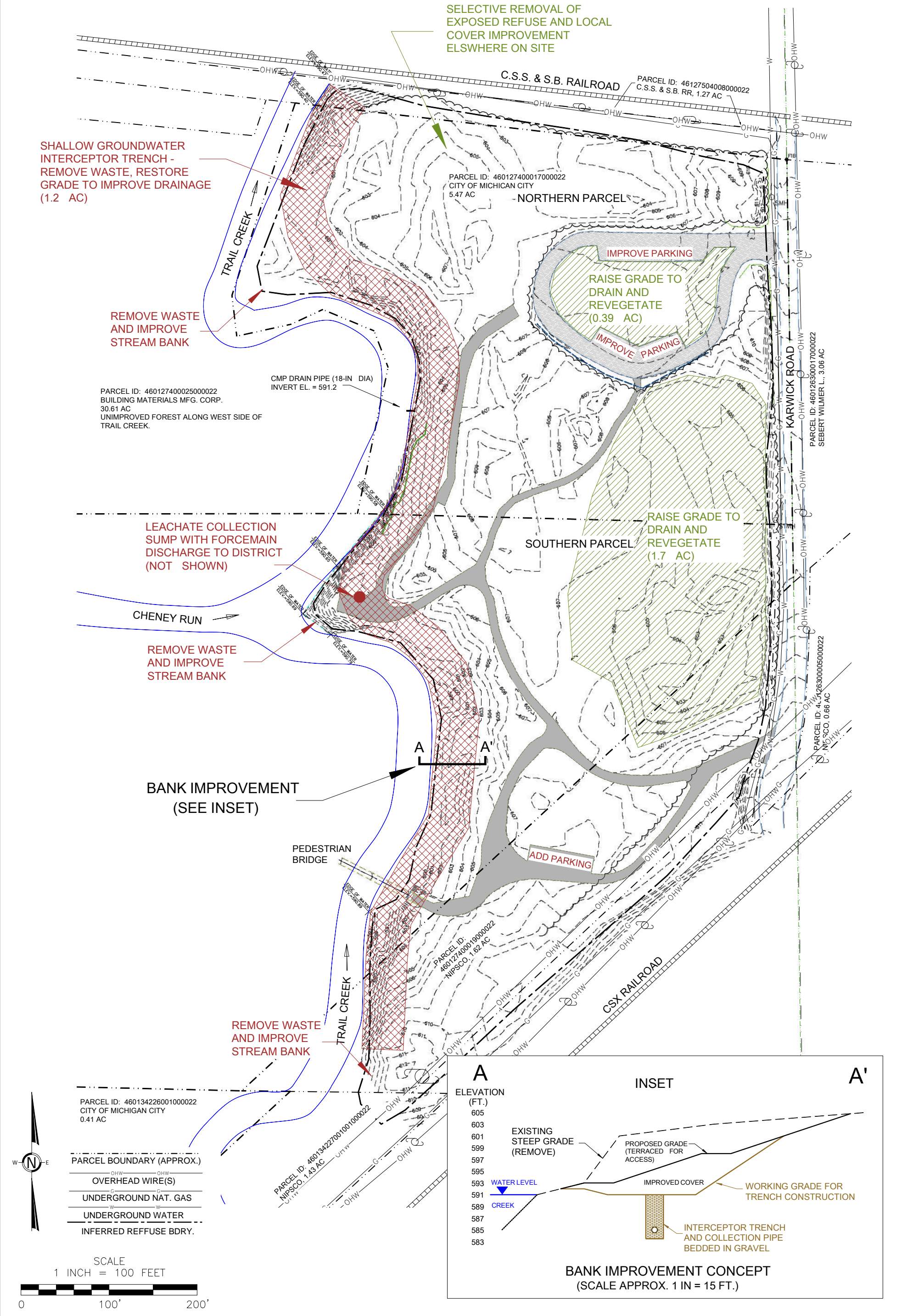
STREAM SURFACE WATER RESULTS  
KARWICK ROAD NATURE PARK  
MICHIGAN CITY, INDIANA

PREPARED FOR  
SANITARY DISTRICT OF  
MICHIGAN CITY









**FIGURE 13**

7121 GRAPE ROAD  
GRAND RAPIDS, MI 49507  
(616) 271-3447  
WWW.WEAVERBOOS.COM

**WEAVER BOOS CONSULTANTS**

This document is the property of Weaver Boos Consultants, Inc. and is loaned to the client for their use only. It is not to be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage and retrieval system, without the written authorization of Weaver Boos Consultants, Inc.

DESIGNED BY: SMS  
REVIEWED BY: SMS  
DATE: 2/10/2015  
FILE: 1873356-04  
CAD: 1873356-04.DWG

No.	DATE	REVISION DESCRIPTION	BY
1			
2			
3			
4			
5			
6			
7			
8			

**CONCEPTUAL  
CORRECTIVE ACTION PLAN**  
KARWICK ROAD NATURE PARK  
MICHIGAN CITY, INDIANA

PREPARED FOR  
**SANITARY  
DISTRICT OF  
MICHIGAN CITY**



## **TABLES**



**TABLE 1**  
Monitoring Well Information  
Karwick Road Nature Park  
Michigan City, Indiana

Well I.D.	Date Drilled	Easting (ft, NAD83)	Northing (ft, NAD83)	Ground Surface Elevation (ft, NAVD88)	Top of Pipe Elevation (ft, NAVD88)	Total Depth of Well (ft)	Length of Screen (ft)	Top of Screen (ft, NAVD88)	Bottom of Screen (ft, NAVD88)
MW-1S	11/26/2001	3,014,922	2,354,460	610.31	612.84	20.00	5.0	597.84	592.84
MW-2S	11/26/2001	3,014,503	2,354,629	601.51	604.44	20.06	5.0	589.38	584.38
MW-2D	11/7/2014	3,014,500	2,354,623	601.29	603.71	57.34	10.0	551.37	546.37
MW-3S	11/26/2001	3,014,448	2,354,481	598.76	601.34	20.05	5.0	586.29	581.29
MW-4S	11/26/2001	3,014,612	2,354,294	602.87	605.78	19.65	5.0	591.13	586.13
MW-4D	11/6/2014	3,014,625	2,354,289	606.06	608.64	63.19	10.0	550.45	545.45
MW-5S	11/27/2001	3,014,524	2,354,113	599.27	601.65	15.30	5.0	591.35	586.35
MW-6S	11/27/2001	3,014,644	2,353,964	601.50	604.45	16.15	5.0	593.30	588.30
MW-6D	11/5/2014	3,014,629	2,353,962	601.43	604.14	58.17	10.0	550.97	545.97
MW-7S	11/27/2001	3,014,818	2,353,839	607.22	609.81	19.94	5.0	594.87	589.87
MW-8S	11/27/2001	3,014,832	2,354,246	608.38	610.76	21.89	5.0	593.87	588.87
MW-9S	11/4/2014	3,014,618	2,353,758	604.45	606.95	22.96	10.0	588.99	583.99
MW-10S	11/7/2014	3,015,008	2,354,280	603.05	605.84	16.44	10.0	594.40	589.40
MW-10D	11/4/2014	3,015,022	2,354,276	603.47	605.93	42.93	10.0	568.00	563.00



**TABLE 2**  
Water Level Elevations  
Karwick Road Nature Park  
Michigan City, Indiana

Well I.D.	Top of Pipe Elevation (ft, NAVD88)	Top of Screen (ft, NAVD88)	Date of Measurement	Depth to Water (ft)	Groundwater or Surface Water Elevation (ft, NAVD88)
MW-1S	612.84	597.84	5/19/2014	11.47	601.37
			11/19/2014	11.16	601.68
			12/1/2014	11.73	601.11
MW-2S	604.44	589.38	5/20/2014	11.35	593.09
			11/19/2014	12.15	592.29
			12/1/2014	12.24	592.20
MW-2D	603.71	551.37	11/19/2014	4.26	599.45
			12/1/2014	4.29	599.42
MW-3S	601.34	586.29	5/20/2014	9.90	591.44
			11/19/2014	11.10	590.24
			12/1/2014	10.62	590.72
MW-4S	605.78	591.13	5/20/2014	12.72	593.06
			11/19/2014	13.25	592.53
			12/1/2014	13.36	592.42
MW-4D	608.64	550.45	11/19/2014	9.20	599.44
			12/1/2014	9.21	599.43
MW-5S	601.65	591.35	5/20/2014	9.95	591.70
			11/20/2014	10.71	590.94
			12/1/2014	10.38	591.27
MW-6S	604.45	593.30	5/20/2014	12.23	592.22
			11/20/2014	12.84	591.61
			12/1/2014	12.73	591.72
MW-6D	604.14	550.97	11/20/2014	4.77	599.37
			12/1/2014	4.75	599.39
MW-7S	609.81	594.87	5/20/2014	9.23	600.58
			11/20/2014	11.23	598.58
			12/1/2014	11.25	598.56
MW-8S	610.76	593.87	5/20/2014	14.34	596.42
			11/20/2014	15.70	595.06
			12/1/2014	15.81	594.95
MW-9S	606.95	588.99	11/20/2014	9.94	597.01
			12/1/2014	9.83	597.12
MW-10S	605.84	594.40	11/20/2014	7.03	598.81
			12/1/2014	6.16	599.68
MW-10D	605.93	568.00	11/20/2014	6.43	599.50
			12/1/2014	6.34	599.59
Creek at MW-2	---	---	5/19/2014	---	590.84
	---	---	12/1/2014	---	590.82
Creek at MW-6	---	---	5/19/2014	---	591.10
	---	---	12/1/2014	---	591.00



**TABLE 3**  
In-Situ Hydraulic Conductivity (Slug) Test Results  
Karwick Road Nature Park  
Michigan City, Indiana

Well I.D.	Date Well Drilled	Date of Slug Test	Aquifer Model	Solution Method	Horizontal Hydraulic Conductivity, $K_h$ , (cm/s)
<b>SHALLOW WELLS</b>					
MW-1S	11/26/2001	12/4/2014	Unconfined	Bouwer-Rice	1.97E-04
MW-2S	11/26/2001	12/5/2014	Unconfined	Bouwer-Rice	2.77E-03
MW-3S	11/26/2001	12/5/2014	Unconfined	Bouwer-Rice	2.71E-04
MW-4S	11/26/2001	12/5/2014	Unconfined	Bouwer-Rice	9.20E-05
MW-5S	11/27/2001	12/5/2014	Unconfined	Bouwer-Rice	8.59E-04
MW-6S	11/27/2001	12/4/2014	Unconfined	Bouwer-Rice	1.27E-02
MW-7S	11/27/2001	12/5/2014	Unconfined	Bouwer-Rice	1.35E-02
MW-8S	11/27/2001	12/4/2014	Unconfined	Bouwer-Rice	1.45E-03
MW-9S	11/4/2014	12/5/2014	Unconfined	Bouwer-Rice	7.67E-04
MW-10S	11/7/2014	12/5/2014	Unconfined	Bouwer-Rice	1.45E-03
<b>SHALLOW GEOMETRIC MEAN:</b>					<b>1.12E-03</b>
<b>DEEP WELLS</b>					
MW-2D	11/7/2014	12/4/2014	Confined	Bouwer-Rice	1.26E-02
MW-4D	11/6/2014	12/5/2014	Confined	Bouwer-Rice	6.57E-03
MW-6D	11/5/2014	12/4/2014	Confined	Bouwer-Rice	2.43E-02
MW-10D	11/4/2014	12/4/2014	Confined	Bouwer-Rice	5.93E-02
<b>DEEP GEOMETRIC MEAN:</b>					<b>1.86E-02</b>

**EXPLANATION:**

This table summarizes the results of in-situ slug testing of the monitoring wells and provides a geometric mean horizontal hydraulic conductivity for the refuse deposit (shallow geometric mean) and for the deeper confined sand and gravel aquifer (deep geometric mean). Both layers are relatively conductive to groundwater flow, but the deeper confined aquifer is approximately 17 times more conductive than the refuse.



**TABLE 4**  
Ex-Situ Hydraulic Conductivity (Lab) Test Results  
Karwick Road Nature Park  
Michigan City, Indiana

Well I.D.	Date Well Drilled	Shelby Tube Sample Interval (ft bgs)	Cell Pressure (psi)	Test Pressure (psi)	Back Pressure (psi)	Differential Head (psi)	Vertical Hydraulic Conductivity, $K_v$ , (cm/s)
<b>SEMI-CONFINING LAYER</b>							
MW-4D	11/6/2014	48 to 49	30.0	20.0	14.9	5.1	6.21E-07
MW-6D	11/5/2014	28 to 30	30.0	20.0	14.7	5.3	2.38E-07
<b>SEMI-CONFINING LAYER GEOMETRIC MEAN:</b>							<b>3.84E-07</b>

**EXPLANATION:**

This table summarizes the results of laboratory-measured vertical hydraulic conductivity of undisturbed soil specimens collected using 3-inch diameter thin-wall Shelby Tube samplers. It shows that the organic silt semi-confining layer is characterized by a very low vertical hydraulic conductivity and will not easily conduct the vertical flow of groundwater beneath the refuse.



**TABLE 5**  
Test Pit Soil Results  
Karwick Road Nature Park  
Michigan City, Indiana

		Volatile Organic Compounds (VOCs)																	
Sample ID	Date Collected	Benzene	n-Butylbenzene	sec-Butylbenzene	Chlorobenzene	Chloroethane	1,4-Dichlorobenzene	Ethylbenzene	Isopropylbenzene (Cumene)	p-Isopropyltoluene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	n-Propylbenzene	Toluene	1,1,1-Trichloroethane	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Xylene (Total)
		Units:	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
TP-1	12/22/2014	<9.4	<9.4	<9.4	<9.4	<9.4	<9.4	<9.4	<9.4	<9.4	<28.6	<28.6	<9.4	<9.4	<9.4	<9.4	<9.4	<9.4	<18.7
TP-2	12/22/2014	361	449	293	579	347	510	246	269	152	<91.2	387	5970	429	11200	69.6	3950	238	590
TP-5	12/22/2014	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5	<5.4	<5.4	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5	<11.0
TP-7	12/22/2014	<5.9	<5.9	<5.9	<5.9	<5.9	59.5	<5.9	<5.9	<5.9	9.3	10.6	26.0	<5.9	<5.9	<5.9	<5.9	<5.9	<11.8
FD (TP-7)	12/22/2014	<5.7	<5.7	<5.7	<5.7	<5.7	46.6	<5.7	<5.7	<5.7	<5.4	<5.4	10.5	<5.7	<5.7	<5.7	<5.7	<5.7	<11.5
TP-8	12/22/2014	<5.4	<5.4	<5.4	<5.4	<5.4	<5.4	<5.4	<5.4	<5.4	<27.7	<27.7	182	<5.4	<5.4	<5.4	<5.4	<5.4	<10.8
TP-10	12/22/2014	9.8	35.7	19.9	352	<8.8	45.2	<8.8	19.2	<8.8	272	413	750	20.9	<8.8	<8.8	34.3	<8.8	<17.7
TP-11	12/22/2014	<6.6	13.2	11.1	<6.6	<6.6	15.3	<6.6	10.7	<6.6	60.6	96.2	228	9.2	<6.6	<6.6	14.2	<6.6	<13.3
TP-12	12/22/2014	<5.3	<5.3	<5.3	<5.3	<5.3	<5.3	<5.3	<5.3	<5.3	<6.4	<6.4	<6.4	<5.3	<5.3	<5.3	<5.3	<5.3	<10.7
Trip Blank	12/22/2014	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0
Residential Soil MTG		51	50000	94000	1400	120000	1400	16000	13000	---	1000	2800	92	20000	14000	1400	440	2500	200000
Rec. Community Park		420000	33300000	66700000	7810000	---	10100000	480000	45700000	---	805000	1540000	1640000	---	820000	3.54E+08	2790000	6670000	260000
Excavation Direct		750000	110000	150000	9100000	2100000	17000000	480000	270000	---	33000000	3700000	1000000	260000	820000	640000	220000	180000	260000

**120.8** Bold values are parameters measured above the detection limit.

**250.9** Highlighted values are concentrations that exceed the Screening Level of the corresponding color.

MTG and Excavation Screening Levels from Indiana Department of Environmental Management's (IDEM's) Remediation Closure Guide (RCG), Appendix A, revised through 2014.

Recreational Community Park Screening Levels were taken from table A-7 of the IDEM's RCG if available, or calculated using the USEPA's site-specific RSL Calculator with target risk = 10<sup>-5</sup> if not available.



**TABLE 5**  
Test Pit Soil Results  
Karwick Road Nature Park  
Michigan City, Indiana

		Semi-volatile Organic Compounds (SVOCs)															Metals							
Sample ID	Date Collected	Butylbenzylphthalate	bis(2-Ethylhexyl)phthalate	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Percent Moisture	
		Units:	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		%
TP-1	12/22/2014	571	430	<28.6	<28.6	<28.6	<28.6	<28.6	<28.6	<28.6	<28.6	<28.6	<28.6	<28.6	<28.6	<28.6	2.6	26.3	1.5	11.7	45.0	0.38	13.4	
TP-2	12/22/2014	<1180	3990	<17.9	<17.9	<17.9	<17.9	<17.9	<17.9	40.1	<17.9	35.9	41.5	<17.9	141	51.8	4.5	78.8	4.3	22.3	125	1.1	72.2	
TP-5	12/22/2014	<355	<355	<5.4	<5.4	<5.4	<5.4	<5.4	<5.4	<5.4	<5.4	<5.4	<5.4	<5.4	<5.4	<5.4	1.8	13.0	<0.52	3.8	11.4	<0.23	7.4	
TP-7	12/22/2014	<359	<359	7.5	24.1	24.5	26.2	21.8	20.3	35.0	11.2	65.4	5.9	16.4	48.6	53.0	1.4	20.9	<0.46	4.6	21.8	<0.22	9.0	
FD (TP-7)	12/22/2014	<354	<354	<5.4	7.6	6.7	8.8	7.0	<5.4	9.6	<5.4	16.5	<5.4	<5.4	14.0	14.6	1.7	14.4	<0.50	4.3	16.8	<0.22	7.7	
TP-8	12/22/2014	<363	<363	<27.7	<27.7	<27.7	<27.7	<27.7	<27.7	<27.7	<27.7	<27.7	<27.7	<27.7	<27.7	<27.7	1.8	17.4	1.1	8.0	20.9	<0.21	9.7	
TP-10	12/22/2014	<570	1490	<43.3	<43.3	<43.3	<43.3	<43.3	<43.3	43.8	<43.3	98.0	62.0	<43.3	193	88.9	5.8	93.9	2.1	29.2	170	0.44	42.4	
TP-11	12/22/2014	<450	532	7.9	10.2	7.2	9.0	7.1	7.2	18.4	<6.8	35.6	22.2	<6.8	74.6	32.3	3.6	206	1.4	20.5	106	0.41	27.0	
TP-12	12/22/2014	<423	<423	<6.4	9.4	8.0	12.3	7.2	8.2	14.5	<6.4	23.9	<6.4	<6.4	13.1	18.4	6.0	103	<0.55	14.7	22.3	<0.24	22.2	
Trip Blank	12/22/2014	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Residential Soil MTG		41000	29000	860000	2100	4700	7000	---	270000	210000	2200	1400000	81000	40000	---	190000	5.9	1700	7.5	1000000	270	2.1		
Rec. Community Park		1.4E+07	1880000	1.2E+08	63000	1000	63000	---	---	630000	---	1.5E+07	1.5E+07	---	---	1.2E+07	40	133000	544	---	800	455		
Excavation Direct		1E+08	2E+07	1E+08	1300000	130000	1300000	---	1E+08	1E+08	130000	3.7E+07	3.7E+07	13000000	---	2.8E+07	640	100000	1300	1000000	1000	3.1		

**120.8** Bold values are parameters measured above the detection limit.

**250.9** Highlighted values are concentrations that exceed the Screening Level of the corresponding color.

MTG and Excavation Screening Levels from Indiana Department of Environmental Management's (IDEM's) Remediation Closure Guide (RCG), Appendix A, revised through 2014.

Recreational Community Park Screening Levels were taken from table A-7 of the IDEM's RCG if available, or calculated using the USEPA's site-specific RSL Calculator with target risk = 10<sup>-5</sup> if not available.



**TABLE 6**  
Groundwater Results  
Karwick Road Nature Park  
Michigan City, Indiana

		Volatile Organic Compounds (VOCs)							Semi-volatile Organic Compounds (SVOCs)														
Sample ID	Date Collected	Acetone	2-Butanone (MEK)	Chlorobenzene	Chloroethane	1,4-Dichlorobenzene	Isopropylbenzene (Cumene)	Toluene	bis(2-Ethylhexyl)phthalate	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Phenanthrene	Pyrene
Units:		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-1S	11/19/2014	<100	<25.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.52	<0.10	<1.0	<0.10	<1.0	<1.0	<1.0	<1.0
MW-2S	11/19/2014	<100	<25.0	28.5	<5.0	5.5	5.5	<5.0	5.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.52	<0.10	<1.0	<0.10	<1.0	<1.0	<1.0	<1.0
MW-2D	11/19/2014	<100	<25.0	<5.0	<5.0	<5.0	<5.0	<5.0	11.9	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.51	<0.10	<1.0	<0.10	<1.0	<1.0	<1.0	<1.0
F.D. (MW-2D)	11/19/2014	<100	<25.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.2	0.31	0.63	0.51	0.55	0.56	0.59	0.71	0.53	<1.0	0.53	<1.0	<1.0	<1.0	<1.0
MW-3S	11/19/2014	<100	<25.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.52	<0.10	<1.0	<0.10	<1.0	<1.0	<1.0	<1.0
MW-4S	11/20/2014	<100	<25.0	16.8	6.7	<5.0	<5.0	<5.0	<5.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.51	<0.10	<1.0	<0.10	<1.0	<1.0	<1.0	<1.0
MW-4D	11/19/2014	<100	<25.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.3	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.53	<0.11	<1.1	<0.11	<1.0	<1.0	<1.1	<1.1
MW-5S	11/20/2014	<100	<25.0	5.5	<5.0	<5.0	<5.0	<5.0	<5.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.51	<0.10	<1.0	<0.10	<1.0	<1.0	<1.0	<1.0
MW-6S	11/20/2014	<100	<25.0	20.1	<5.0	<5.0	<5.0	<5.0	<5.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.52	<0.10	<1.0	<0.10	<1.0	<1.0	<1.0	<1.0
MW-6D	11/20/2014	<100	<25.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.52	<0.10	<1.0	<0.10	<1.0	<1.0	<1.0	<1.0
MW-7S	11/20/2014	<100	<25.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.50	<0.10	<1.0	<0.10	1.3	<1.0	<1.0	<1.0
MW-8S	11/20/2014	<100	<25.0	15.3	<5.0	<5.0	<5.0	<5.0	<5.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.52	<0.10	<1.0	<0.10	<1.0	<1.0	<1.0	<1.0
MW-9S	11/20/2014	<100	<25.0	299	<5.0	10.3	<5.0	<5.0	<5.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.51	<0.10	<1.0	<0.10	<1.0	<1.0	<1.0	<1.0
MW-10S	11/20/2014	<100	<25.0	<5.0	<5.0	<5.0	<5.0	<5.0	<6.2	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.62	<0.12	<1.2	<0.12	<1.0	<1.0	<1.2	<1.2
MW-10D	11/20/2014	<100	<25.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.1	<0.10	0.22	0.16	0.16	0.12	0.21	<0.51	<0.10	<1.0	<0.10	<1.0	<1.0	<1.0	<1.0
Trip Blank	11/20/2014	<100	<25.0	<5.0	<5.0	<5.0	<5.0	<5.0	---	---	---	---	---	---	---	---	---	---	---	<5.0	<10.0	---	---
Residential Tap Water		---	---	100	21000	75	390	---	6	1300	0.29	0.2	0.29	---	2.9	29	0.029	---	0.29	9.7	---	---	---

**121** Bold values are parameters measured above the detection limit.

**251** Highlighted values are concentrations that exceed the Screening Level of the corresponding color.

Screening Levels from Indiana Department of Environmental Management's (IDEM's) Remediation Closure Guide (RCG), Appendix A, revised through 2014.



**TABLE 6**  
Groundwater Results  
Karwick Road Nature Park  
Michigan City, Indiana

		PCBs, Pesticides, Herbicides, Inorganics, & Miscellaneous										Metals												
Sample ID	Date Collected	beta-BHC	2,4,5-T	Cyanide	Nitrogen, Ammonia	Nitrogen, Nitrate	Alkalinity, Total as CaCO3	Total Dissolved Solids	Sulfide	Fluoride	Arsenic	Barium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Vanadium	Zinc
		Units:	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-1S	11/19/2014	<0.050	<2.0	<0.010	<0.10	<0.10	173	435	<0.10	<0.10	<10.0	25.3	66800	<10.0	<10.0	<10.0	372	<10.0	24600	25.7	<10.0	1940	<10.0	<20.0
MW-2S	11/19/2014	0.12	<2.0	<0.010	86.4	<0.10	788	498	<0.10	<0.10	<10.0	76.4	98600	<10.0	<10.0	<10.0	40700	<10.0	40000	153	<10.0	30400	<10.0	<20.0
MW-2D	11/19/2014	<0.050	<2.0	<0.010	1.4	<0.10	329	3140	<0.10	0.64	<10.0	75.6	337000	10.0	<10.0	15.2	12500	10.3	152000	223	<10.0	20800	27.9	38.0
F.D. (MW-2D)	11/19/2014	<0.050	<2.0	<0.010	1.4	0.13	326	3140	<0.10	0.64	<10.0	73.2	333000	<10.0	<10.0	12.9	11000	12.1	155000	200	<10.0	21000	26.6	37.5
MW-3S	11/19/2014	0.12	<2.0	<0.010	84.4	<0.10	929	1010	<0.10	0.49	<10.0	362	163000	<10.0	<10.0	<10.0	7830	<10.0	58700	224	37.9	32700	10.7	23.5
MW-4S	11/20/2014	<0.050	<2.0	<0.010	131	<0.10	991	732	<0.10	<0.10	13.1	222	126000	<10.0	<10.0	<10.0	35700	19.5	61100	213	74.1	57100	11.7	117
MW-4D	11/19/2014	<0.050	<2.0	<0.010	0.96	<0.10	306	1090	<0.10	0.67	27.0	289	164000	29.6	14.6	40.5	36900	30.5	85800	998	39.0	15100	56.8	136
MW-5S	11/20/2014	<0.050	<2.0	<0.010	56.0	<0.10	815	734	<0.10	0.20	<10.0	403	140000	<10.0	<10.0	<10.0	30200	<10.0	47900	480	<10.0	34200	<10.0	<20.0
MW-6S	11/20/2014	<0.050	<2.0	<0.010	69.0	<0.10	667	604	<0.10	0.12	<10.0	146	102000	<10.0	<10.0	<10.0	43700	<10.0	39300	227	<10.0	26500	<10.0	<20.0
MW-6D	11/20/2014	<0.050	<2.0	<0.010	0.67	0.16	287	1020	<0.10	0.64	<10.0	10.7	103000	<10.0	<10.0	<10.0	841	<10.0	55000	34.7	<10.0	8640	<10.0	<20.0
MW-7S	11/20/2014	<0.050	<2.0	<0.010	53.5	<0.10	538	494	<0.10	<0.10	<10.0	340	96600	<10.0	<10.0	<10.0	68800	14.3	37600	327	14.2	19900	<10.0	<20.0
MW-8S	11/20/2014	<0.050	<2.0	<0.010	21.7	<0.10	392	441	<0.10	0.20	13.5	146	93100	<10.0	<10.0	<10.0	33500	<10.0	26600	549	<10.0	14900	<10.0	<20.0
MW-9S	11/20/2014	<0.050	<2.0	<0.010	27.5	<0.10	434	612	<0.10	<0.10	<10.0	146	97000	<10.0	<10.0	<10.0	67400	<10.0	32100	243	<10.0	11300	<10.0	<20.0
MW-10S	11/20/2014	<0.050	<2.0	<0.010	1.6	<0.10	200	340	2.3	<0.10	<10.0	60.6	59600	<10.0	<10.0	<10.0	864	<10.0	21400	67.3	<10.0	2200	<10.0	<20.0
MW-10D	11/20/2014	<0.050	<2.0	<0.010	0.17	<0.10	236	276	<0.10	0.50	<10.0	116	47000	<10.0	<10.0	<10.0	1490	<10.0	26200	69.5	<10.0	3450	<10.0	<20.0
Trip Blank	11/20/2014	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Residential Tap Water		0.22	---	---	---	10	---	---	---	0.62	10	2000	---	100	4.7	1300	11000	15	---	320	300	---	63	4700

**121** Bold values are parameters measured above the detection limit.

**251** Highlighted values are concentrations that exceed the Screening Level of the corresponding color.

Screening Levels from Indiana Department of Environmental Management's (IDEM's) Remediation Closure Guide (RCG), Appendix A, revised through 2014.



**TABLE 7**  
Streambed Sediment Results  
Karwick Road Nature Park  
Michigan City, Indiana

		Volatile Organic Compounds (VOCs)*							Semi-volatile Organic Compounds (SVOCs)†														
Sample ID	Date Collected	Acetone	2-Butanone (MEK)	Chlorobenzene	Chloroethane	1,4-Dichlorobenzene	Isopropylbenzene (Cumene)	Toluene	bis(2-Ethylhexyl)phthalate	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Phenanthrene	Pyrene
Units:		µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
SD-1	09/30/2014	<92.1	<23.0	<4.6	<4.6	<4.6	<4.6	<4.6	<401	<6.1	<6.1	<6.1	<6.1	<6.1	<6.1	<6.1	<6.1	6.5	<6.1	<9.2	<9.2	<6.1	<6.1
SD-2	09/30/2014	587	98.3	13.0	<8.2	<8.2	<8.2	8.8	<602	<27.1	33.4	39.1	60.5	41.6	46.0	61.0	<27.1	122	32.3	<27.1	<27.1	53.5	93.3
SD-3	09/30/2014	326	67.5	<6.9	<6.9	<6.9	<6.9	<6.9	<574	<25.7	88.1	116	141	101	124	163	37.6	328	82.7	<25.7	<25.7	132	257
F.D. (SD-3)	09/30/2014	333	<34.7	<6.9	<6.9	<6.9	<6.9	<6.9	<585	<26.5	107	120	152	110	138	201	41.6	419	93.9	<26.5	<26.5	192	325
SD-4	09/30/2014	628	108	18.5	<7.2	<7.2	<7.2	<7.2	<553	<24.6	81.9	98.8	122	82.8	102	136	31.9	288	71.9	<24.6	<24.6	140	229
SD-5	09/30/2014	681	114	<8.3	<8.3	<8.3	<8.3	<8.3	<560	<24.6	119	158	211	147	157	203	65.2	384	129	<24.6	<24.6	133	295
Background		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Threshold Effects Level		---	---	---	---	---	---	---	---	46.9	31.7	31.9	---	---	---	27.2	57.1	6.22	111	17.32	---	---	41.9 53
Probable Effects Level		---	---	---	---	---	---	---	---	245	385	782	---	---	---	862	135	2355	---	---	---	---	515 875
Upper Effects Threshold		---	---	---	---	---	---	---	---	260	500	700	---	300	13400	800	100	1500	330	---	---	---	800 1000
Severe Effect Level		---	---	---	---	---	---	---	---	3700	14800	14400	---	3200	13400	4600	1300	10200	3200	---	---	---	9500 8500
U.S. EPA Region 5 SLs		9.9	42.4	291	---	---	---	1220	---	---	---	---	1040	170	240	---	---	---	200	---	---	---	---

**120.8** Bold values are parameters measured above the detection limit.

**250.9** Highlighted values are concentrations that exceed the Screening Level of the corresponding color.

\* The National Oceanic and Atmospheric Administration's (NOAA's) Screening Quick Reference Tables (SQUIRTs) did not provide screening levels for VOCs concentrations in Freshwater Sediment.

\* Instead, the U.S. EPA Region 5 Ecological Screening Levels (<http://epa.gov/region5/waste/cars/pdfs/ecological-screening-levels-200308.pdf>) are provided for comparison.

† Screening Levels are from the National Oceanic and Atmospheric Administration's (NOAA's) Screening Quick Reference Tables (SQUIRTs) for Freshwater Sediment.

† If the SQUIRTs' listings were incomplete, the U.S. EPA Region 5 Ecological Screening Levels (<http://epa.gov/region5/waste/cars/pdfs/ecological-screening-levels-200308.pdf>) were included for comparison.



**TABLE 7**  
Streambed Sediment Results  
Karwick Road Nature Park  
Michigan City, Indiana

		Polychlorinated biphenyls (PCBs), Pesticides, Herbicides, and Metals†												
Sample ID	Date Collected	beta-BHC	2,4,5-T	Cyanide	Arsenic	Barium	Chromium	Cobalt	Copper	Lead	Nickel	Vanadium	Zinc	Percent Moisture
Units:		µg/kg	µg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%
SD-1	09/30/2014	<1.6	<64.6	<0.62	2.1	18.5	3.1	1.5	1.9	2.8	3.0	4.6	16.7	18.9
SD-2	09/30/2014	<1.7	78.4	<0.88	3.8	34.4	6.8	2.6	8.2	7.2	6.7	10.2	38.3	45.8
SD-3	09/30/2014	<1.6	<64.5	<0.83	6.3	73.6	9.0	3.8	11.9	12.3	9.1	12.2	74.8	42.8
F.D. (SD-3)	09/30/2014	<1.7	<65.8	<0.89	6.3	76.1	9.2	3.8	12.9	12.8	9.2	12.2	78.6	44.0
SD-4	09/30/2014	<1.7	<63.6	<0.82	7.9	69.7	10.5	4.5	14.3	12.1	12.3	13.8	87.5	40.3
SD-5	09/30/2014	<1.7	<63.2	<0.83	3.7	43.2	8.3	3.1	9.7	11.5	7.7	11.1	53.6	41.3

Background	---	---	---	1.1	0.7	7 - 13	10	10 - 25	4 - 17	9.9	50	7 - 38
Threshold Effects Level	---	---	---	5.9	---	37.3	---	35.7	35	18	---	123
Probable Effects Level	---	---	---	17	---	90	---	197	91.3	36	---	315
Upper Effects Threshold	---	---	---	17	---	95	---	86	127	43	---	520
Severe Effect Level	210	---	---	33	---	110	---	110	250	75	---	820

U.S. EPA Region 5 SLs	---	5870	---	---	---	---	---	---	---	---	---	---
-----------------------	-----	------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

**120.8** Bold values are parameters measured above the detection limit.

**250.9** Highlighted values are concentrations that exceed the Screening Level of the corresponding color.

\* The National Oceanic and Atmospheric Administration's (NOAA's) Screening Quick Reference Tables (SQuiRTs) did not provide screening levels for VOCs concentrations in Freshwater Sediment.

\* Instead, the U.S. EPA Region 5 Ecological Screening Levels (<http://epa.gov/region5/waste/cars/pdfs/ecological-screening-levels-200308.pdf>) are provided for comparison.

† Screening Levels are from the National Oceanic and Atmospheric Administration's (NOAA's) Screening Quick Reference Tables (SQuiRTs) for Freshwater Sediment.

‡ If the SQiRTs' listings were incomplete, the U.S. EPA Region 5 Ecological Screening Levels (<http://epa.gov/region5/waste/cars/pdfs/ecological-screening-levels-200308.pdf>) were included for comparison.



**TABLE 8**  
Stream Surface Water Results  
Karwick Road Nature Park  
Michigan City, Indiana

		Volatile Organic Compounds (VOCs)							Semi-volatile Organic Compounds (SVOCs)														
Sample ID	Date Collected																						
		Acetone	2-Butanone (MEK)	Chlorobenzene	Chloroethane	1,4-Dichlorobenzene	Isopropylbenzene (Cumene)	Toluene	bis(2-Ethylhexyl)phthalate	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Phenanthrene	Pyrene
Units:		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
SW-1	09/30/2014	<100	<25.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.51	<0.10	<1.0	<0.10	<5.0	<10.0	<1.0	<1.0
SW-2	09/30/2014	<100	<25.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.51	<0.10	<1.0	<0.10	<5.0	<10.0	<1.0	<1.0
SW-3 (CMP Disch.)	09/30/2014	<100	<25.0	7.2	<5.0	<5.0	<5.0	<5.0	<5.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.51	<0.10	<1.0	<0.10	<5.0	<10.0	<1.0	<1.0
F.D. (SW-3)	09/30/2014	<100	<25.0	7.2	<5.0	<5.0	<5.0	<5.0	<5.3	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.53	<0.11	<1.1	<0.11	<5.0	<10.0	<1.1	<1.1
SW-4	09/30/2014	<100	<25.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.51	<0.10	<1.0	<0.10	<5.0	<10.0	<1.0	<1.0
SW-5	09/30/2014	<100	<25.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.52	<0.10	<1.0	<0.10	<5.0	<10.0	<1.0	<1.0
Trip Blank	09/30/2014	<100	<25.0	<5.0	<5.0	<5.0	<5.0	<5.0	---	---	---	---	---	---	---	---	---	---	---	<5.0	<10.0	---	---
Surface Water Quality Stds.		---	---	470	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
NOAA (Fresh Wat. Chronic)		---	---	47	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
NOAA (Fresh Wat. Acute)		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

**121** Bold values are parameters measured above the detection limit.

**251** Highlighted values are concentrations that exceed the Screening Level of the corresponding color.

Surface water quality standards from 327 IAC 2-1.5: "Water Quality Standards Applicable to All Waters Within the Great Lakes System."  
NOAA screening levels from Screening Quick Reference Tables, last modified February 2, 2009.



**TABLE 8**  
Stream Surface Water Results  
Karwick Road Nature Park  
Michigan City, Indiana

		PCBs, Pesticides, Herbicides, Inorganics, & Miscellaneous										Metals												
Sample ID	Date Collected	beta-BHC	2,4,5-T	Cyanide	Nitrogen, Ammonia	Nitrogen, Nitrate	Alkalinity, Total as CaCO3	Total Dissolved Solids	Sulfide	Fluoride														
Units:		µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
SW-1	09/30/2014	<0.050	<2.0	<0.010	<0.10	0.19	239	417	<0.10	0.12	<10.0	71.1	78400	<10.0	<10.0	<10.0	648	<10.0	26400	61.6	<10.0	2530	14.6	<20.0
SW-2	09/30/2014	<0.050	<2.0	<0.010	<0.10	0.20	236	410	<0.10	0.12	<10.0	68.9	78000	<10.0	<10.0	<10.0	587	<10.0	26200	57.4	<10.0	2460	13.7	<20.0
SW-3 (CMP Disch.)	09/30/2014	<0.050	<2.0	<0.010	12.3	<0.10	309	525	<0.10	0.11	<10.0	108	74500	<10.0	<10.0	<10.0	28600	<10.0	22800	296	<10.0	5710	13.1	<20.0
F.D. (SW-3)	09/30/2014	<0.050	<2.0	0.012	12.1	<0.10	310	512	<0.10	0.11	<10.0	106	74400	<10.0	<10.0	<10.0	27600	<10.0	22500	292	<10.0	5570	13.3	<20.0
SW-4	09/30/2014	<0.050	<2.0	<0.010	0.14	0.24	237	502	<0.10	0.13	<10.0	71.0	79900	<10.0	<10.0	<10.0	651	<10.0	26800	58.6	<10.0	2590	14.9	<20.0
SW-5	09/30/2014	<0.050	<2.0	<0.010	<0.10	0.23	241	426	<0.10	0.13	<10.0	73.4	81800	<10.0	<10.0	<10.0	607	<10.0	27500	65.1	<10.0	2670	15.1	<20.0
Trip Blank	09/30/2014	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Surface Water Quality Stds.	---	---	600	0.43	1	---	750	---	1	---	---	---	---	---	---	300	---	---	---	---	---	---	---
NOAA (Fresh Wat. Chronic)	---	---	0.0052	---	---	---	---	---	---	---	---	3.9	---	---	---	1000	---	---	80	---	---	19	---
NOAA (Fresh Wat. Acute)	---	---	0.022	---	---	---	---	---	0.2	---	---	110	---	---	---	---	---	---	2300	---	373000	280	---

**121** Bold values are parameters measured above the detection limit.

**251** Highlighted values are concentrations that exceed the Screening Level of the corresponding color.

Surface water quality standards from 327 IAC 2-1.5: "Water Quality Standards Applicable to All Waters Within the Great Lakes System."

For Nitrogen, Ammonia, the Water Quality Standard is the continuous permissible concentration at pH = 8.5 and temperature = 15°C measured during sampling.

NOAA screening levels from Screening Quick Reference Tables, last modified February 2, 2009.

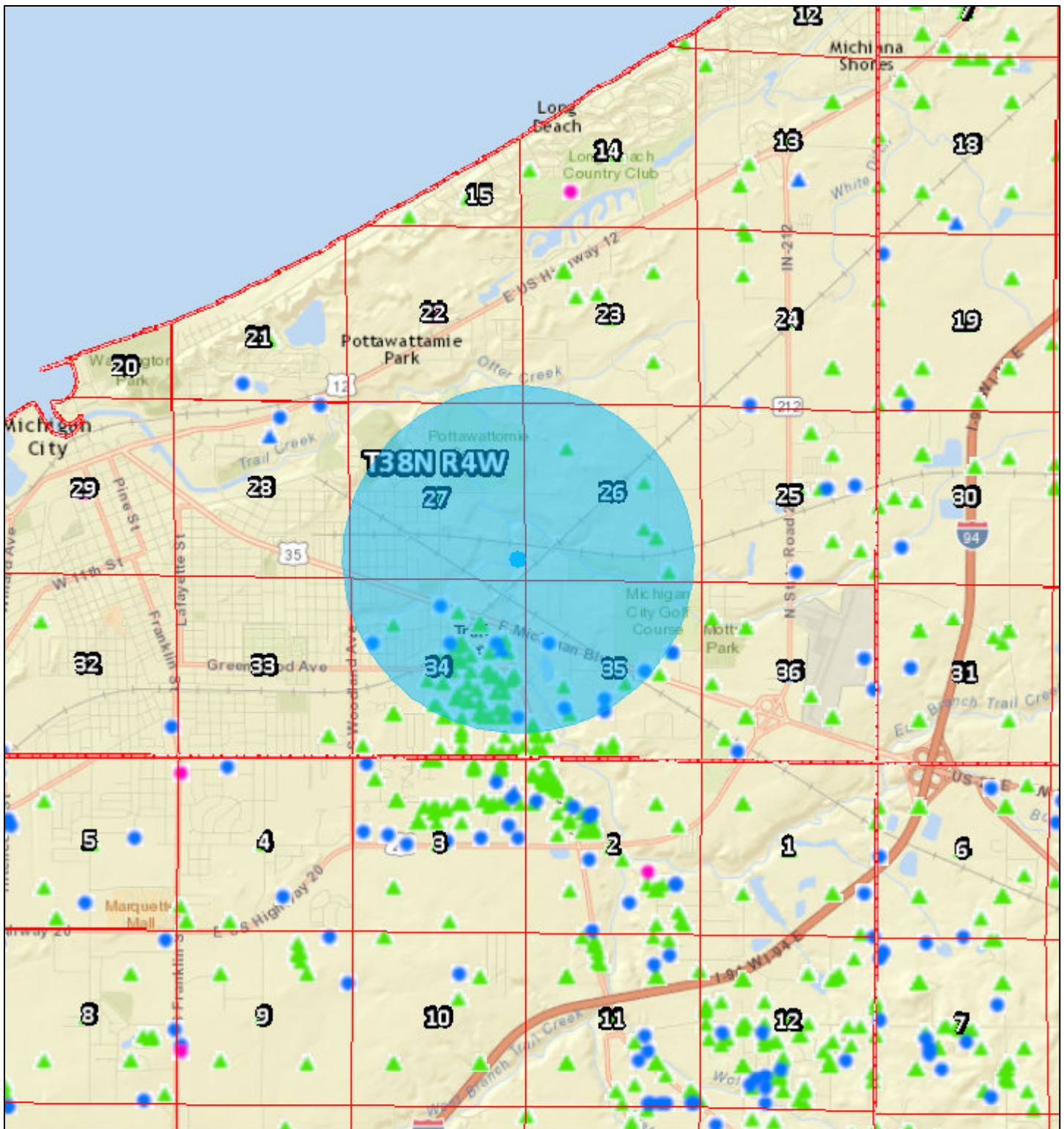


# **APPENDIX A**

Water Well Survey



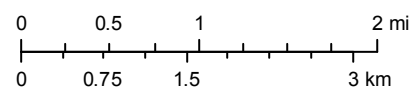
# Karwick Nature Park 1-Mile Radius



August 7, 2014

Discussed in Section 2.3 of report.

1:68,512



State Mask 102100

Township/Range

Sections

Water Wells

Actual Location

Estimated Location/Geocoding addresses; Estimated Location/TRS\_quarter sections\_county

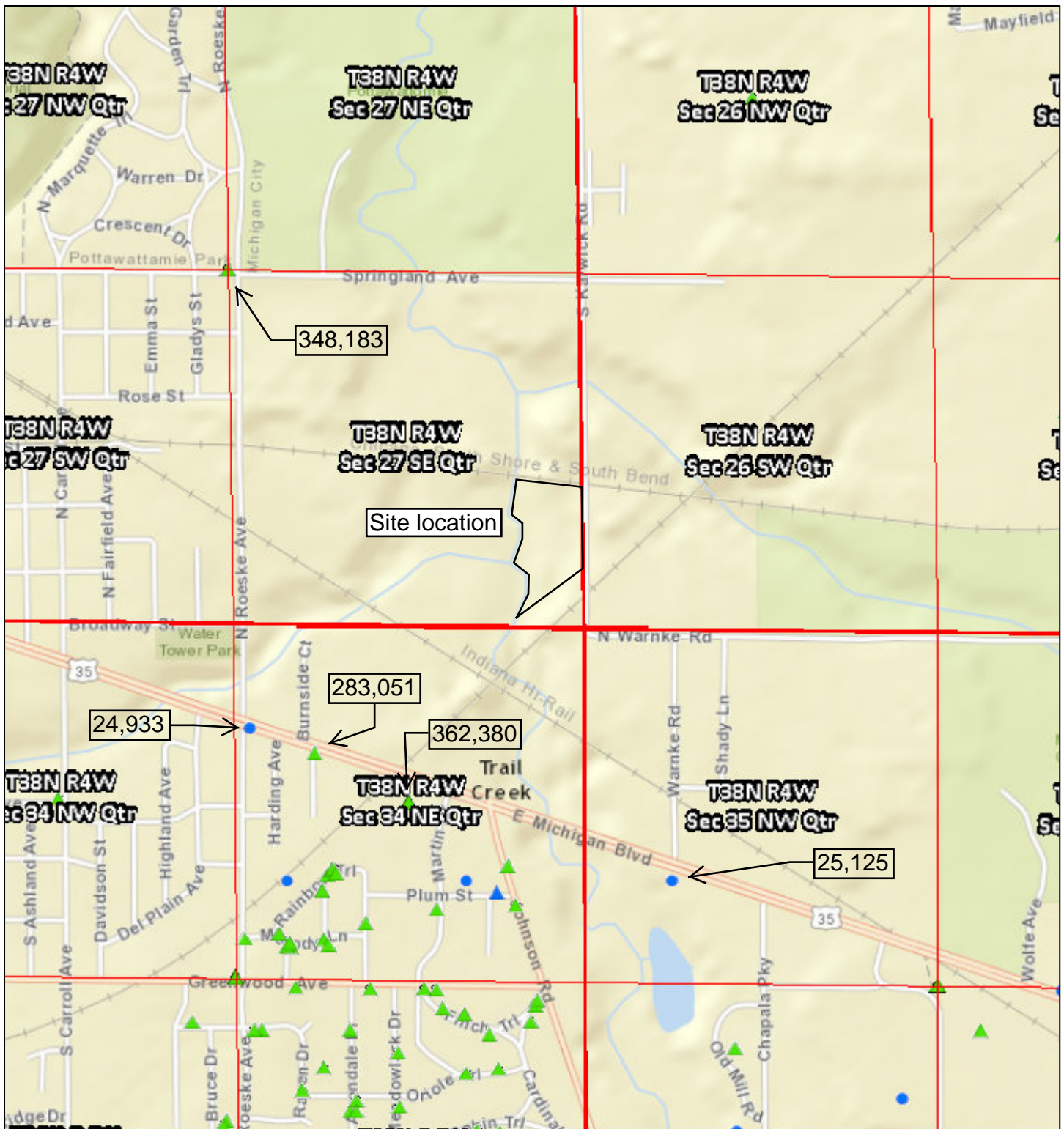
Actual Location

Indiana Department of Natural Resources  
Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

S. Stanford, LPG  
Copyright 2014 Indiana DNR



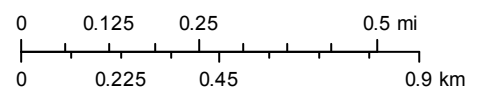
# Karwick Nature Park Nearest Water Wells



August 7, 2014

Discussed in Section 2.3 of report.

1:17,128



State Mask 102100

Sections

Quarter Sections

Water Wells

Actual Location

Estimated Location/Geocoding addresses; Estimated Location/TRS\_quarter sections\_county

Actual Location

Indiana Department of Natural Resources  
Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp.,  
NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand),  
TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User  
Community

S. Stanford, LPG  
Copyright 2014 Indiana DNR



All wells within 1 mile of the Site

Well Log ID	Pump Rate (gpm)	Screen Length (ft)	Static Water Level (ft)	Owner	Owner Address	UTM Northing (NAD83)	UTM Easting (NAD83)	Latitude	Longitude
24941	450	20	4	ROYAL METAL MFG CO	COOK RD MICH CITY IN	4618025.565	513153.2784	41.7139243	-86.84189
72318	200	5	8	ELMER J KONKEY	695 WARNKE RD MICH CITY IN	4617922.567	513256.28	41.71299488	-86.840654
72317	100	5	20	ELMER KONKEY	691 WARNKE RD MICH CITY IN	4617922.567	513256.28	41.71299488	-86.840654
330249	100	5	8	BUD WALL	213 GOLF LANE, MICHIGAN CITY, IN	4616871.562	513391.2946	41.70352612	-86.839054
362066	100	5	0	ED SCOTT	1300N SR 212 MICH CITY IN	4617098.58	514075.2925	41.70555908	-86.830828
330197	75	5	8	HAROLD SHEPPERSON	687 WARNKE RD., MICH. CITY, IN	4617616.567	513363.2843	41.71023692	-86.839374
380972	50	5	10	JOE ALINSKI	104 RAINBOW TR MICH CITY, IN	4616958.519	511470.2903	41.70433937	-86.862141
392697	50	5	12	JOHN HELLER	4862 LENDSON LANE MICHIGAN CITY, IN	4616731.476	509623.2904	41.70231885	-86.884344
397924	50	5	8	PETE PIZAREK	201 RAINBOW TR T.C. MICH CITY, IN	4616791.516	511356.2924	41.70283679	-86.863515
25130	45	8	38	ROBERT ROGERS	RR 1 BOX 606 MICH CITY IN	4616944.5	510620.8891	41.70422489	-86.872351
135297	40	5	25	LAROCCO	128 SARAH-JO AVE, MICHIGAN CITY, IN	4616844.52	511539.2919	41.70331157	-86.861314
250111	40	3	11	JAMES BLOCK	111 WHIPPOORWILL MICH CITY	4616720.513	511239.2931	41.70219891	-86.864922
283051	40	5	8	BOB KONDA	105 WILLOW CT, MICH CITY IN	4617235.52	511421.2865	41.70683505	-86.862725
25050	35	7	17	WOODRUFF AND SONS	3123 MICH AVE MICH CITY IN	4616720.513	511239.2931	41.70219891	-86.864922
25125	30	15	15	DANIEL BOOTCHECK	3015 E MICH BLVD	4616942.537	512247.2918	41.70418383	-86.852803
145442	30	5	16	REX A BAILEY DVM	2525 E MICH BLVD MICH CTY IN	4617130.506	510829.287	41.70589746	-86.869843
348183	30	5	15	PAT KUBIK	111 RAINBOW TR T.C., MICH. CITY, IN	4618349.522	511217.2711	41.71687188	-86.865156
405705	30	0	5	BRIAN SCHWANKE	117 MELODY LANE MICHIGAN CITY, IN	4616796.518	511451.2925	41.70288048	-86.862373
369425	25	5	0	KURT KRASSOW	2809 GREENWOOD AVE., MICH. CITY, IN	4617122.524	511638.2883	41.70581414	-86.860119
392775	25	5	12	LARRY SIGMOND	130 JOHSON RD MICHIGAN CITY, IN	4617122.524	511638.2883	41.70581414	-86.860119
413143	25	5	8	MARK SMITH	110 MELODY LN MICH CITY, I	4616800.516	511364.2923	41.70291774	-86.863418
25080	20	3	10	ARTHUR F CAGNON	200 EDGEWOOD DR TRAIL CREEK MICH CITY IN	4616720.513	511239.2931	41.70219891	-86.864922
252440	20	4	8	THOMAS L CHECOLO	307 TRAIL ST, MICH CITY IN	4616720.513	511239.2931	41.70219891	-86.864922
270099	20	5	10	JIM COX	112 MELODY LN MICH CITY	4616807.518	511442.2923	41.70297969	-86.862481
327468	20	5	10	TOM PIOTROWSKI	106 STARLING D.R, T.C. MICH. CITY, IN	4617122.524	511638.2883	41.70581414	-86.860119
337312	20	5	20	MIKE SMITH	103 RAINBOW TRAIL MICH CITY IN	4616970.519	511464.2901	41.70444754	-86.862213
390567	20	5	10	TONY LEVENDOUSKI	119 JOHNSON RD., MICHIGAN CITY, IN	4617122.524	511638.2883	41.70581414	-86.860119
412689	20	5	6	ANGELA KNIOLA	206 MEADOWLARK MICHIGAN CITY, IN	4617122.524	511638.2883	41.70581414	-86.860119
24943	18	3	20	TRAIL CREEK TOWN	TRAIL CREEK	4616942.517	511357.2903	41.70419685	-86.8635
24904	15	3	12	NORMAN SMITH	201 RADTHE DR	4616720.513	511239.2931	41.70219891	-86.864922
25035	15	3	17	A J BRUCE CONST CO	201 GARFIELD AVE	4616720.513	511239.2931	41.70219891	-86.864922
25040	15	6	2.5			4616720.513	511239.2931	41.70219891	-86.864922
250041	15	5	10	MICHAEL M TARMA	2818 GREENWOOD AVE MICH CITY	4616720.513	511239.2931	41.70219891	-86.864922
252615	15	10	15	L E POLLNOW	136 SARA JO, MICH CITY IN	4616720.513	511239.2931	41.70219891	-86.864922
386431	15	5	12	LARRY LEMON	112 JOHNSON DR MICHIGAN CITY, IN	4616978.529	511868.2907	41.70451376	-86.857357
390568	15	5	10	CHRISTOPHER POLLOCK	128 JOHNSON RD., MICHIGAN CITY, IN	4617122.524	511638.2883	41.70581414	-86.860119
25117	12	8	1	BLAINE HEINZ	MICH CITY	4617204.573	513771.2906	41.7065191	-86.834479
25134	12	5	12	WILLIAM SCHMIDT	201 JOHNSON RD MICH CITY	4616720.513	511239.2931	41.70219891	-86.864922
135440	12	5	12	ROGER WESTPHAL	112 WLIPPOORWILL AVE, MICHIGAN CITY IN	4616920.518	511439.2908	41.70399754	-86.862515
135463	12	5	7	JAMES BALDWIN	LOT 123 SARAH JO MICH CTY	4616920.518	511439.2908	41.70399754	-86.862515
226415	12	5	15	1ST. CITIZENS BANK	ROESKE & MICHIGAN BLVD. MICHIGAN CITY,IN.	4616720.513	511239.2931	41.70219891	-86.864922
278689	12	5	9	WANDA WILKEK	202 RAINBOW TR, MICHIGAN CITY, IN	4616789.516	511368.2924	41.7028186	-86.86337
305968	12	10	5	JOHN EVANS	337 JOHNSON RD., MICHIGAN CITY, IN	4617122.524	511638.2883	41.70581414	-86.860119
327309	12	5	14	KINTCO INC.	105 RAINBOW TR., MICHIGAN CITY, IN	4616967.519	511461.2902	41.70442056	-86.862249
359477	12	5	12	REED MELNELK	215 WREN MICHIGAN CITY IN	4617122.524	511638.2883	41.70581414	-86.860119
362380	12	5	13	LEMMONS	100 PLUM ST MICHIGAN CITY, IN	4617122.524	511638.2883	41.70581414	-86.860119
368898	12	5	12	JULIE DORAN	110 WILLOW CT., MICHIGAN CITY, IN	4617122.524	511638.2883	41.70581414	-86.860119
382635	12	5	10	BUTCH WINELAND	210 PLUM ST MICHIGAN CITY, IN	4617122.524	511638.2883	41.70581414	-86.860119
24910	10	3	10	A J BRUCE CONST CO	201 GARFIELD AVE	4616720.513	511239.2931	41.70219891	-86.864922
24928	10	4	15	HENRY BLICK	RR 3 BOX 100	4616720.513	511239.2931	41.70219891	-86.864922
24929	10	3	10	A J BRUCE CONST CO	201 GARFIELD AVE	4616720.513	511239.2931	41.70219891	-86.864922
24948	10	8	21	THADDUS PUDLO		4616720.513	511239.2931	41.70219891	-86.864922
252465	10	5	8	ROBERT PLUSKEY	NO # RAINBOW TR	4616720.513	511239.2931	41.70219891	-86.864922
252475	10	10	6	JJ WRIGHT CHEVROLET INC	3502 E MICHIGAN BLVD, MICH CITY IN	4616720.513	511239.2931	41.70219891	-86.864922
252584	10	10	0	DICK GILLON	405 SPRUCE DR MICH CITY	4616720.513	511239.2931	41.70219891	-86.864922
282220	10	5	15	KINKO CO.	113 RAINBOW TR, MICHIGAN CITY, IN	4616955.519	511449.2903	41.70431265	-86.862394



All wells within 1 mile of the Site

Well Log ID	Pump Rate (gpm)	Screen Length (ft)	Static Water Level (ft)	Owner	Owner Address	UTM Northing (NAD83)	UTM Easting (NAD83)	Latitude	Longitude
282226	10	5	15	LEE KROEHLER	2012 E COOLSPRING AVE, TRAIL CREEK, IN	4616720.513	511239.2931	41.70219891	-86.864922
282230	10	5	20	JOHN PACE	101 MELODY LN, MICHIGAN CITY, IN	4616809.514	511258.292	41.70300029	-86.864692
305963	10	5	15	DALE HUBERTZ	328 TRAIL ST., MICH. CITY, IN	4616720.513	511239.2931	41.70219891	-86.864922
320687	10	5	15	GAIL KILLINGSWORTH	121 MARTIN DR., MICH. CITY, IN	4616876.524	511704.2918	41.70359742	-86.85933
351782	10	5	15	ANN BAUNO	208 PLUM ST., MICH. CITY, IN	4617122.524	511638.2883	41.70581414	-86.860119
353877	10	5	8	DON EMBREE	125 JOHNSON RD MICH CITY IN	4616886.528	511885.2919	41.70368485	-86.857155
25121	9.5	8	0	DON CRAMER	RT 5 LAPORTE	4617098.58	514075.2925	41.70555908	-86.830828
226324	8	5	15	SYLVIA THOMAS	108 HUMMINGBIRD MICH. CITY,IN.	4618349.522	511217.2711	41.71687188	-86.865156
24919	0	4	9	ANDERSON CONST	9923 W 499 S LAPORTE IN	4616916.528	511842.2915	41.7039557	-86.857671
24920	0	5	5	BARNETT REALTY CO	108 RAINBOW DR TRAIL CREEK MICH CITY IN	4616720.513	511239.2931	41.70219891	-86.864922
24925	0	2	5	JOS LADRA	2805 E MICHIGAN ST TRAIL CREEK MICH CITY IN	4616720.513	511239.2931	41.70219891	-86.864922
24930	0	3	14	CLYDE LUCAS	116 ROESKE AVE MICH CITY IN	4616720.513	511239.2931	41.70219891	-86.864922
24934	0	5	12	HARRY H WESTPHAL	203 JOHNSON RD MICH CITY IN	4616720.513	511239.2931	41.70219891	-86.864922
24935	0	5	14	ROBERT GRANT	633 S ASHLAND AVE MICH CITY IN	4616720.513	511239.2931	41.70219891	-86.864922
24936	0	4	10	FISH AND GAME CLUB	MICH CITY	4618432.568	513147.2728	41.71759031	-86.841953
24939	0	5	7	LENNY DEUTSCHER	205 WIPPERWILL ST	4616720.513	511239.2931	41.70219891	-86.864922
24940	0	5	7	PAUL KRANTZ	1814 COOLSPRING AVE	4616720.513	511239.2931	41.70219891	-86.864922
24944	0	4	22	WALTER KIESZKOWSKI	RR 3 MICH CITY	4616720.513	511239.2931	41.70219891	-86.864922
24949	0	4	14	CARL SCHNEIDER	110 ROESKE AVE MICH CITY IN	4616720.513	511239.2931	41.70219891	-86.864922
24950	0	3	9	BARNETT REALTY CO	108 RAINBOW TRAIL TRAIL CREEK MICH CITY IN	4616819.515	511339.292	41.70308923	-86.863718
24953	0	3	20	TONN AND BLANK INC	MICH CITY IN	4616720.513	511239.2931	41.70219891	-86.864922
24954	0	3	6	WAYNE MAGNUSON	124 JOHNSON RD TRAIL CREEK MICH CITY	4616720.513	511239.2931	41.70219891	-86.864922
24955	0	3	6	BARNETT REALTY CO	108 RAINBOW DR TRAILCREEK MICH CITY IN	4616819.515	511339.292	41.70308923	-86.863718
24958	0	5	18	GUST J CHAKOS	R 1 TRAIL CREEK IN	4617122.524	511638.2883	41.70581414	-86.860119
24959	0	6	9	JOHN SWINDELL	102 PARKLAND TRAIL CREEK IN	4616720.513	511239.2931	41.70219891	-86.864922
24964	0	3	30	ART RIDTKE	R 3 BOX 401 MICH CITY	4616720.513	511239.2931	41.70219891	-86.864922
24969	0	6	8	ROBERT JACKSON	RR MICH CITY	4616720.513	511239.2931	41.70219891	-86.864922
25025	0	4	6	ZILLA	MICH CITY IN	4616720.513	511239.2931	41.70219891	-86.864922
25060	0	3	45	BILL WOODRUFF	131 JOHNSON RD M CITY IN	4616720.513	511239.2931	41.70219891	-86.864922
25065	0	3	7	ED LESTER BUILDERS	RR 7 VALPARAISO IN	4616720.513	511239.2931	41.70219891	-86.864922
25075	0	3	8	ROBERT BLUE	902 YORK ST MICH CITY IN	4616720.513	511239.2931	41.70219891	-86.864922
25135	0	6	10	WILSON OIL CO	MICH CITY IN	4616720.513	511239.2931	41.70219891	-86.864922
25139	0	3	14	BARNETT REALTY	34 RAINBOW TR CR MICH CITY	4616720.513	511239.2931	41.70219891	-86.864922
25140	0	5	12	ROBERT DOBSKI	2616 COOLSPRING AVE	4616720.513	511239.2931	41.70219891	-86.864922
61800	0	3	10	HENERY KONDA	105 WILLOW, MICHIGAN CITY IN	4617122.524	511638.2883	41.70581414	-86.860119
250106	0	3	15	BARB STOPPER	100 JOHNSON RD, MICHIGAN CITY IN	4616720.513	511239.2931	41.70219891	-86.864922
252589	0	10	0	HANS KUNZE	403 SPRUCE DR MICH CITY	4616720.513	511239.2931	41.70219891	-86.864922
24933		3	8	CITIZENS BANK	MICH CITY	4617292.517	511272.2855	41.70735055	-86.864515
24963		3		JOSEPH FOLDENAU	213 PLUM	4616942.526	511772.291	41.70419091	-86.858512
25105		8	10	JACK ALLEN JR	MICH CITY	4616870.563	513405.2946	41.70351688	-86.838886

Note: Plotted on map for 1-mile radius.

Well nearest to the Site (approximately 0.4 mile).



## Record of Water Well

### Indiana Department of Natural Resources

<b>Reference Number</b>	<b>Driving Direction to Well</b>	<b>Date Completed</b>
362380	FROM US 35 AND JOHNSON RD TO 16 JOHNSON RD, WOUTH TO PLUM ST, TURN WEST TO HOUSE ON NORTH SIDE	5/14/2002

<b>Owner-Contractor</b>	<b>Name</b>	<b>Address</b>	<b>Telephone</b>
Owner	LEMMONS	100 PLUM ST MICHIGAN CITY, IN	Not available
Driller	CLEARWATER WELL & PUMP	P O BOX 314 ROLLING PRAIRIE, IN	(219)778-2368
Operator	GREG HUNT	License: 132	

**Construction Details**

Well	Use: Home	Drilling Method: Rotary	Pump Type: Submersible
	Depth: 26.0	Pump Setting Depth: 21.0	Water Quality: CLEAR
Casing	Length: 21.0	Material: PVC	Diameter: 4.0
Screen	Length: 5.0	Material: PVC	Diameter: 4.0
	Slot Size: .016		

<b>Well Capacity Test</b>	Type of Test: Air	Test Rate: 12.0 gpm	Bail Test Rate: Not available
	Drawdown: Not available	Static Water Level: 13.0 ft.	Bailer Drawdown: Not available

<b>Grouting Information</b>	Material: BNSL	Depth: From 16.0 To 0.0
	Installation Method: PRESS	Number of Bags Used: 1.0

<b>Well Abandonment</b>	Sealing Material: Not available	Depth: From (not available) To (not available)
	Installation Method: Not available	Number of Bags Used: Not available

<b>Administrative</b>	<b>County:</b> LAPORTE <b>Range:</b> 4W <b>Topo Map:</b> MICHIGAN CITY EAST <b>Field Located By:</b> Not available <b>Courthouse Location By:</b> Not available <b>Location Accepted w/o Verification By:</b> Not available <b>Subdivision Name:</b> Not available <b>Ft W of EL:</b> Not available <b>Ft E of WL:</b> Not available <b>Ground Elevation:</b> Not available <b>Bedrock Elevation:</b> Not available <b>UTM Easting:</b> Not available	<b>Township:</b> 38N <b>Section:</b> NE of Section 34 <b>Grant:</b> Not available <b>Field Located On:</b> Not available <b>Courthouse Location On:</b> Not available <b>Location Accepted w/o Verification On:</b> Not available <b>Lot Number:</b> Not available <b>Ft N of SL:</b> Not available <b>Ft S of NL:</b> Not available <b>Depth of Bedrock:</b> Not available <b>Aquifer Elevation:</b> Not available <b>UTM Northing:</b> Not available
-----------------------	--	---

**Well Log**

Top	Bottom	Formation
0.0	24.0	BROWN SAND
24.0	26.0	GREY SAND

**Comments**



SEE MAP;  
VARIANCE 02-  
46-988;



## Record of Water Well

### Indiana Department of Natural Resources

<b>Reference Number</b>	<b>Driving Direction to Well</b>	<b>Date Completed</b>
24933	TAKE US 20 AND 35 INTO MICH CITY CORNER OF MICH AND RISKIE AVE	5/29/1980

<b>Owner-Contractor</b>	<b>Name</b>	<b>Address</b>	<b>Telephone</b>
Owner	CITIZENS BANK	MICH CITY	Not available
Driller	HUNTS INC	ROLLING PRAIRIE	Not available
Operator	JOE BENNITT	License Not available	

**Construction Details**

Well	Use: Not available	Drilling Method: Jet	Pump Type: Not available
	Depth: 18.0	Pump Setting Depth: Not available	Water Quality: Not available
Casing	Length: 18.0	Material: Not available	Diameter: 2.0
Screen	Length: 3.0	Material: Not available	Diameter: 1.3
	Slot Size: 7		

<b>Well Capacity Test</b>	Type of Test: Not available	Test Rate: Not available	Bail Test Rate: Not available
	Drawdown: Not available	Static Water Level: 8.0 ft.	Bailer Drawdown: Not available

<b>Grouting Information</b>	Material: Not available	Depth: From (not available) To (not available)
	Installation Method: Not available	Number of Bags Used: Not available

<b>Well Abandonment</b>	Sealing Material: Not available	Depth: From (not available) To (not available)
	Installation Method: Not available	Number of Bags Used: Not available

<b>Administrative</b>	<b>County:</b> LAPORTE <b>Range:</b> 4W <b>Topo Map:</b> MICHIGAN CITY EAST <b>Field Located By:</b> MM <b>Courthouse Location By:</b> Not available <b>Location Accepted w/o Verification By:</b> Not available <b>Subdivision Name:</b> Not available <b>Ft W of EL:</b> 2,500.0 <b>Ft E of WL:</b> Not available <b>Ground Elevation:</b> 623.0 <b>Bedrock Elevation:</b> Not available <b>UTM Easting:</b> 511275	<b>Township:</b> 38N <b>Section:</b> SW of the NW of the NE of Section 34 <b>Grant:</b> Not available <b>Field Located On:</b> 7/6/1987 <b>Courthouse Location On:</b> Not available <b>Location Accepted w/o Verification On:</b> Not available <b>Lot Number:</b> Not available <b>Ft N of SL:</b> Not available <b>Ft S of NL:</b> 800.0 <b>Depth of Bedrock:</b> Not available <b>Aquifer Elevation:</b> 602.0 <b>UTM Northing:</b> 4617075
-----------------------	--	--

**Well Log**

Top	Bottom	Formation
0.0	18.0	BR SAND
18.0	21.0	SHARP FINE BR SAND

**Comments**



VERIFIED BY  
SIGN.



## Record of Water Well

### Indiana Department of Natural Resources

<b>Reference Number</b>	<b>Driving Direction to Well</b>	<b>Date Completed</b>
25125	HWY 20 TO MICH BLVD HEAD N 1/2 MILE ACROSS C AND O RR TAVERN ON L ACROSS FROM CAR DEALER	10/8/1983

<b>Owner-Contractor</b>	<b>Name</b>	<b>Address</b>	<b>Telephone</b>
Owner	DANIEL BOOTCHECK	3015 E MICH BLVD	Not available
Driller	HENRICH WELL DRILLING	8657 N 600W MC	Not available
Operator	TIM HENRICH	License Not available	

**Construction Details**

Well	Use: Other	Drilling Method: Rotary	Pump Type: Submersible
	Depth: 125.0	Pump Setting Depth: 100.0	Water Quality: CLEAR
Casing	Length: 110.0	Material: Not available	Diameter: 4.0
Screen	Length: 15.0	Material: Not available	Diameter: 4.0
	Slot Size: 12		

<b>Well Capacity Test</b>	Type of Test: Not available	Test Rate: 30.0 gpm for 2.0 hrs.	Bail Test Rate: Not available
	Drawdown: 20.0 ft.	Static Water Level: 15.0 ft.	Bailer Drawdown: Not available

<b>Grouting Information</b>	Material: Not available	Depth: From (not available) To (not available)	
	Installation Method: Not available	Number of Bags Used: Not available	

<b>Well Abandonment</b>	Sealing Material: Not available	Depth: From (not available) To (not available)	
	Installation Method: Not available	Number of Bags Used: Not available	

<b>Administrative</b>	County: LAPORTE	Township: 38N
	Range: 4W	Section: NW of the SW of the NW of Section 35
	Topo Map: MICHIGAN CITY EAST	Grant: Not available
	Field Located By: MH	Field Located On: 7/6/1987
	Courthouse Location By: Not available	Courthouse Location On: Not available
	Location Accepted w/o Verification By: SIGN	Location Accepted w/o Verification On: Not available
	Subdivision Name: Not available	Lot Number: Not available
	Ft W of EL: Not available	Ft N of SL: Not available
	Ft E of WL: 650.0	Ft S of NL: 1,850.0
	Ground Elevation: 622.0	Depth of Bedrock: 135.0
	Bedrock Elevation: 487.0	Aquifer Elevation: 487.0
	UTM Easting: 512250	UTM Northing: 4616725

**Well Log**

Top	Bottom	Formation
0.0	8.0	S&G
8.0	12.0	SURFACE WATER
12.0	75.0	BLUE CLAY



75.0	97.0	BLUE CLAY & FINE SAND
97.0	105.0	BLACK SHALE
105.0	135.0	GRAY WATER SAND
135.0		SHALE

**Comments**

None



## Record of Water Well

### Indiana Department of Natural Resources

<b>Reference Number</b>	<b>Driving Direction to Well</b>	<b>Date Completed</b>
283051	MICHIGAN BLVD AND JOHNSON RD, MICHIGAN N/W TO WILLOW CT, WILLOW CT S 100 FT ON W SIDE	12/30/1996

<b>Owner-Contractor</b>	<b>Name</b>	<b>Address</b>	<b>Telephone</b>
Owner	BOB KONDA	105 WILLOW CT, MICH CITY IN	Not available
Driller	HENRICH WELL DRLG	8657 N 600 W, MICH CITY IN	(219)874-5086
Operator	TIM HENRICH	License: 380	

**Construction Details**

Well	<b>Use:</b> Home <b>Depth:</b> 32.0	<b>Drilling Method:</b> Rotary <b>Pump Setting Depth:</b> Not available	<b>Pump Type:</b> Submersible <b>Water Quality:</b> CLEAR
Casing	<b>Length:</b> 27.0	<b>Material:</b> PVC	<b>Diameter:</b> 5.0
Screen	<b>Length:</b> 5.0 <b>Slot Size:</b> .010	<b>Material:</b> PVC	<b>Diameter:</b> 5.0

<b>Well Capacity Test</b>	<b>Type of Test:</b> Air  <b>Drawdown:</b> Not available	<b>Test Rate:</b> 40.0 gpm for 0.5 hrs.  <b>Static Water Level:</b> 8.0 ft.	<b>Bail Test Rate:</b> Not available  <b>Bailer Drawdown:</b> Not available
---------------------------	--	---	---

<b>Grouting Information</b>	<b>Material:</b> QUICK GROUT <b>Installation Method:</b> PUMP	<b>Depth:</b> From 25.0 To 0.0 <b>Number of Bags Used:</b> 2.0
-----------------------------	--	---

<b>Well Abandonment</b>	<b>Sealing Material:</b> Not available <b>Installation Method:</b> Not available	<b>Depth:</b> From (not available) To (not available) <b>Number of Bags Used:</b> Not available
-------------------------	---	--

<b>Administrative</b>	<b>County:</b> LAPORTE <b>Range:</b> 4W <b>Topo Map:</b> MICHIGAN CITY EAST <b>Field Located By:</b> Not available <b>Courthouse Location By:</b> Not available <b>Location Accepted w/o Verification By:</b> Not available <b>Subdivision Name:</b> Not available <b>Ft W of EL:</b> Not available <b>Ft E of WL:</b> Not available <b>Ground Elevation:</b> Not available <b>Bedrock Elevation:</b> Not available <b>UTM Easting:</b> Not available	<b>Township:</b> 38N <b>Section:</b> NE of Section 34 <b>Grant:</b> Not available <b>Field Located On:</b> Not available <b>Courthouse Location On:</b> Not available <b>Location Accepted w/o Verification On:</b> Not available <b>Lot Number:</b> Not available <b>Ft N of SL:</b> Not available <b>Ft S of NL:</b> Not available <b>Depth of Bedrock:</b> Not available <b>Aquifer Elevation:</b> Not available <b>UTM Northing:</b> Not available
-----------------------	--	---

**Well Log**

Top	Bottom	Formation
0.0	6.0	SAND/ CLAY
6.0	12.0	CLAY
12.0	22.0	CRS DUNE SAND
22.0	32.0	CRS GRAY SAND



**Comments**

None



## Record of Water Well

### Indiana Department of Natural Resources

<b>Reference Number</b>	<b>Driving Direction to Well</b>	<b>Date Completed</b>
348183	GREENWOOD & SHARADOE, SHARDOE N TO RAINBOW, RAINBOW .5 MI WEST SD	12/1/2000

<b>Owner-Contractor</b>	<b>Name</b>	<b>Address</b>	<b>Telephone</b>
Owner	PAT KUBIK	111 RAINBOW TR T.C., MICH. CITY, IN	Not available
Driller	HENRICH WELL DRILLING	8657 N 600 W MICH. CITY, IN	Not available
Operator	TIM HENRICH	License: 380	

**Construction Details**

Well	<b>Use:</b> Home <b>Depth:</b> 32.0	<b>Drilling Method:</b> Rotary <b>Pump Setting Depth:</b> Not available <b>Material:</b> PVC	<b>Pump Type:</b> Submersible <b>Water Quality:</b> CLEAR <b>Diameter:</b> 5.0
Casing	<b>Length:</b> 27.0	<b>Material:</b> PVC	<b>Diameter:</b> 5.0
Screen	<b>Length:</b> 5.0 <b>Slot Size:</b> 10	<b>Material:</b> PVC	<b>Diameter:</b> 5.0

<b>Well Capacity Test</b>	<b>Type of Test:</b> Air <b>Drawdown:</b> Not available	<b>Test Rate:</b> 30.0 gpm for 0.5 hrs. <b>Static Water Level:</b> 15.0 ft.	<b>Bail Test Rate:</b> Not available <b>Bailer Drawdown:</b> Not available
---------------------------	--	--	---

<b>Grouting Information</b>	<b>Material:</b> QUIK GROUT <b>Installation Method:</b> PUMP	<b>Depth:</b> From 25.0 To 0.0 <b>Number of Bags Used:</b> 2.5
-----------------------------	---	---

<b>Well Abandonment</b>	<b>Sealing Material:</b> Not available <b>Installation Method:</b> Not available	<b>Depth:</b> From (not available) To (not available) <b>Number of Bags Used:</b> Not available
-------------------------	---	--

<b>Administrative</b>	<b>County:</b> LAPORTE <b>Range:</b> 4W <b>Topo Map:</b> MICHIGAN CITY EAST <b>Field Located By:</b> Not available <b>Courthouse Location By:</b> Not available <b>Location Accepted w/o Verification By:</b> Not available <b>Subdivision Name:</b> Not available <b>Ft W of EL:</b> Not available <b>Ft E of WL:</b> Not available <b>Ground Elevation:</b> Not available <b>Bedrock Elevation:</b> Not available <b>UTM Easting:</b> Not available	<b>Township:</b> 38N <b>Section:</b> 27 <b>Grant:</b> Not available <b>Field Located On:</b> Not available <b>Courthouse Location On:</b> Not available <b>Location Accepted w/o Verification On:</b> Not available <b>Lot Number:</b> Not available <b>Ft N of SL:</b> Not available <b>Ft S of NL:</b> Not available <b>Depth of Bedrock:</b> Not available <b>Aquifer Elevation:</b> Not available <b>UTM Northing:</b> Not available
-----------------------	--	---

**Well Log**

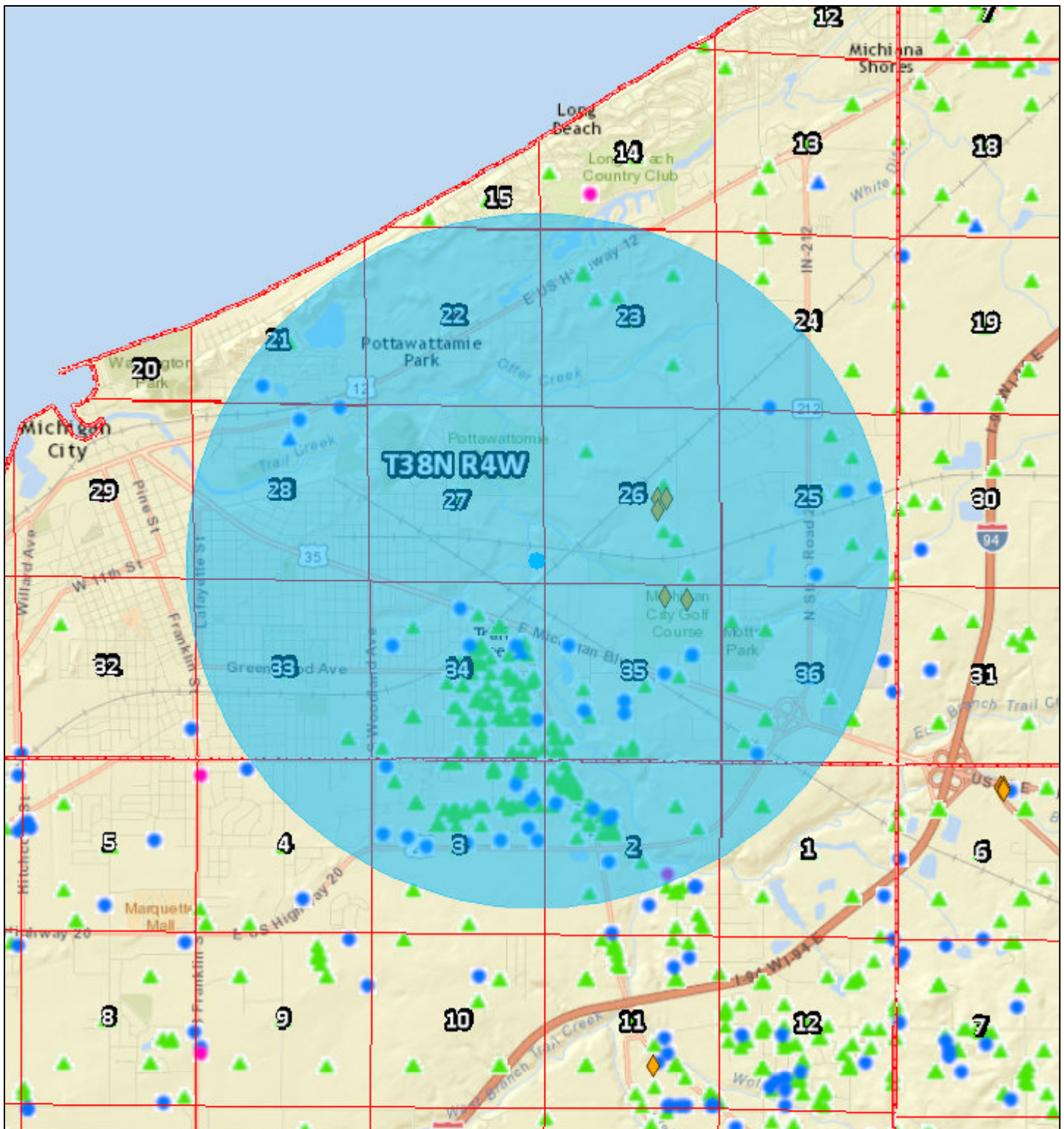
Top	Bottom	Formation
0.0	16.0	SANDY CLAY
16.0	23.0	CRS BRN SAND
23.0	32.0	CRS GRAY SAND



	32.0		CLAY
<b>Comments</b>			
None			



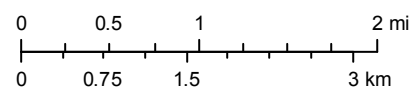
# Karwick Nature Park 2-Mile Radius



August 7, 2014

Discussed in Section 2.3 of report.

1:68,512



- State Mask 102100
- Township/Range
- Sections
- Significant Withdraw Wells

Indiana Department of Natural Resources  
Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



All wells within 1 mile of the Site

Well Log ID	Pump Rate (gpm)	Screen Length (ft)	Static Water Level (ft)	Owner	Owner Address	UTM Northing (NAD83)	UTM Easting (NAD83)	Latitude	Longitude
24941	450	20	4	ROYAL METAL MFG CO	COOK RD MICH CITY IN	4618025.565	513153.2784	41.7139243	-86.8418895
72318	200	5	8	ELMER J KONKEY	695 WARNKE RD MICH CITY IN	4617922.567	513256.28	41.71299488	-86.8406537
268108	200	5	4	MARQUETTE FABRICATORS	600 LUMBER CENTER RD MICHIGAN CITY, IND	4617831.61	515150.2841	41.7121418	-86.8178885
362375	200	5	20	R. J. GIFFORD	6545 N 600W MICH CITY, IN	4617090.616	515693.2952	41.70545708	-86.8113807
366225	200	5	2	MARY JANE BUTTS	100 BROOKDALE, MICH. CITY, IN	4616314.501	510841.298	41.69854744	-86.869713
278690	150	5	20	SWAN LAKE MEMORIAL GARDEN	5700E US 20, MICH CITY, IN	4616080.568	513875.3062	41.69639326	-86.8332553
348178	150	5	6	MARY JANE BUTTS	100 BROOKDALE MICH. CITY, IN	4615986.509	511270.3031	41.69558722	-86.8645633
24974	120	5	5	WEIL MCLAIN CO INC	MICHIGAN CITY	4619345.486	509426.5551	41.72586586	-86.8866676
330206	120	5	20	WALTER URYCKI	305 D MENKE RD., MICH. CITY, IN	4616703.549	512859.296	41.70202159	-86.845452
24961	100	14	2	ED BANCROFT		4618396.605	514779.2757	41.71723774	-86.8223343
24968	100	14	1	ED BANCROFT		4618401.601	514575.2754	41.71728649	-86.8247865
72316	100	10	8	KEITH SWITZER	100 JULIANNA DR MICH CITY IN	4616271.592	514886.3052	41.69809556	-86.8211007
72317	100	5	20	ELMER KONKEY	691 WARNKE RD MICH CITY IN	4617922.567	513256.28	41.71299488	-86.8406537
72367	100	10	0	MAXINE MITCHELL	5633 W WARNKE RD MICH CITY IN	4617079.635	516508.2966	41.70534168	-86.8015852
330249	100	5	8	BUD WALL	213 GOLF LANE, MICHIGAN CITY, IN	4616871.562	513391.2946	41.70352612	-86.8390543
334877	100	5	8	CLAUDE ZIMMERLE	6022 WARNKE RD., MICH. CITY, IN	4617893.604	514881.2828	41.71270526	-86.8211205
340154	100	5	30	PHIL DABOGIA	6605 N 600W MICH CITY IN	4617090.616	515693.2952	41.70545708	-86.8113807
340166	100	5	13	JOHN CHESTNUT	5765 W WARNKE MICH CITY IN	4618293.635	516106.2791	41.71628451	-86.8063844
342138	100	10	8	JOHN JAMES	6252 N 525W MICH CITY IN	4616261.628	516503.308	41.69797393	-86.8016678
351376	100	0	12	NORTHERN IN. PUBLIC SVC. CO.	MICHIGAN CITY, IN	4618355.447	507984.2662	41.71696428	-86.9040219
362066	100	5	0	ED SCOTT	1300N SR 212 MICH CITY IN	4617098.58	514075.2925	41.70555908	-86.8308279
382628	100	5	40	JERRY HALL	5766 WARNKE RD MICH CITY, IN	4617031.631	516366.2971	41.70491224	-86.8032932
392740	100	5	5	ROBERT WOODBURN	5814 E MICH CITY, IN	4616271.592	514886.3052	41.69809556	-86.8211007
394269	100	5	50	WILLIAM MEER	5805 W WARNKE RD MICHIGAN CITY, INC	4616956.633	516468.2983	41.70423462	-86.8020693
397972	100	5	18	SWAN LAKE MEMORIAL GARDENS	5700 E US HWY 20 MICHIGAN CITY, IN	4616281.574	514077.3038	41.69820019	-86.830823
405742	100	5	30	JAMES EVANS	6444 N MEER RD MICHIGAN CITY, IN	4616271.592	514886.3052	41.69809556	-86.8211007
25110	98	10	20	BILL WOODRUFF	200 MENKE RD MICHIGAN CITY	4616442.546	512777.2994	41.69967202	-86.8464431
334875	80	5	5	ROBERT RABY	8033 N 600 W MICH. CITY, IN	4619163.623	515300.2659	41.72413646	-86.8160514
324577	75	5	20	JOE JUHASZ	7585 N 500 W MICH. CITY, IN	4618396.655	516931.2789	41.71719528	-86.7964638
330197	75	5	8	HAROLD SHEPPERSON	687 WARNKE RD., MICH. CITY, IN	4617616.567	513363.2843	41.71023692	-86.8393742
330248	75	5	10	JIM DIERDORF	102 WIPPORWILL MICH. CITY, IN	4616285.511	511293.2991	41.69828004	-86.8642813
304689	70	5	15	ARCHIE SCHERRILL	303B MEINKE RD, MICH. CITY, IN	4616046.545	512860.305	41.69610386	-86.8454541

Note: Plotted on map for 2-mile radius.



## **APPENDIX B**

Historical Aerial Photographs





Karwick Road Nature Park  
Michigan City, IN



**2012**

HIG Project # 1411185

Client Project # 1873-356-04-00-03

Approximate Scale 1:6000 (1"=500')







Karwick Road Nature Park  
Michigan City, IN



**2008**

HIG Project # 1411185

Client Project # 1873-356-04-00-03

Approximate Scale 1:6000 (1"=500')







Karwick Road Nature Park  
Michigan City, IN



**2003**

HIG Project # 1411185

Client Project # 1873-356-04-00-03

Approximate Scale 1:6000 (1"=500')







Karwick Road Nature Park  
Michigan City, IN



**1997**

HIG Project # 1411185

Client Project # 1873-356-04-00-03

Approximate Scale 1:6000 (1"=500')







[historicalinfo.com](http://historicalinfo.com)

Karwick Road Nature Park  
Michigan City, IN



**1992**

HIG Project # 1411185

Client Project # 1873-356-04-00-03

Approximate Scale 1:9600 (1"=800')







[historicalinfo.com](http://historicalinfo.com)

Karwick Road Nature Park  
Michigan City, IN



**1988**

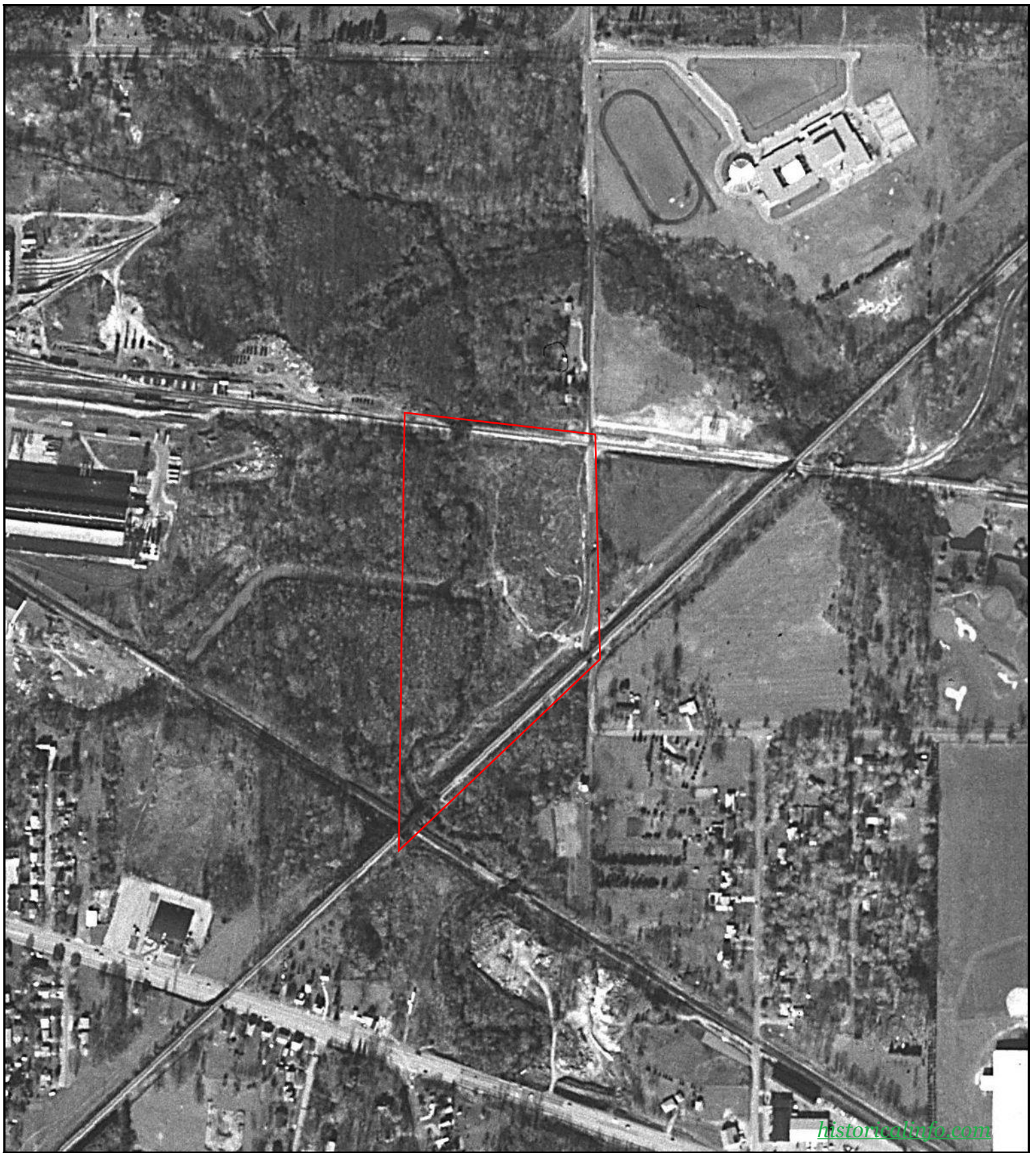
HIG Project # 1411185

Client Project # 1873-356-04-00-03

Approximate Scale 1:6000 (1"=500')







Karwick Road Nature Park  
Michigan City, IN



**1981**

HIG Project # 1411185

Client Project # 1873-356-04-00-03

Approximate Scale 1:6000 (1"=500')







MAY 3, 1980





Karwick Road Nature Park  
Michigan City, IN



**1977**

HIG Project # 1411185

Client Project # 1873-356-04-00-03

Approximate Scale 1:6000 (1"=500')







Karwick Road Nature Park  
Michigan City, IN



**1972**

HIG Project # 1411185

Client Project # 1873-356-04-00-03

Approximate Scale 1:6000 (1"=500')







6-27-1970





Karwick Road Nature Park  
Michigan City, IN



**1965**

HIG Project # 1411185

Client Project # 1873-356-04-00-03

Approximate Scale 1:6000 (1"=500')







Karwick Road Nature Park  
Michigan City, IN



**1958**

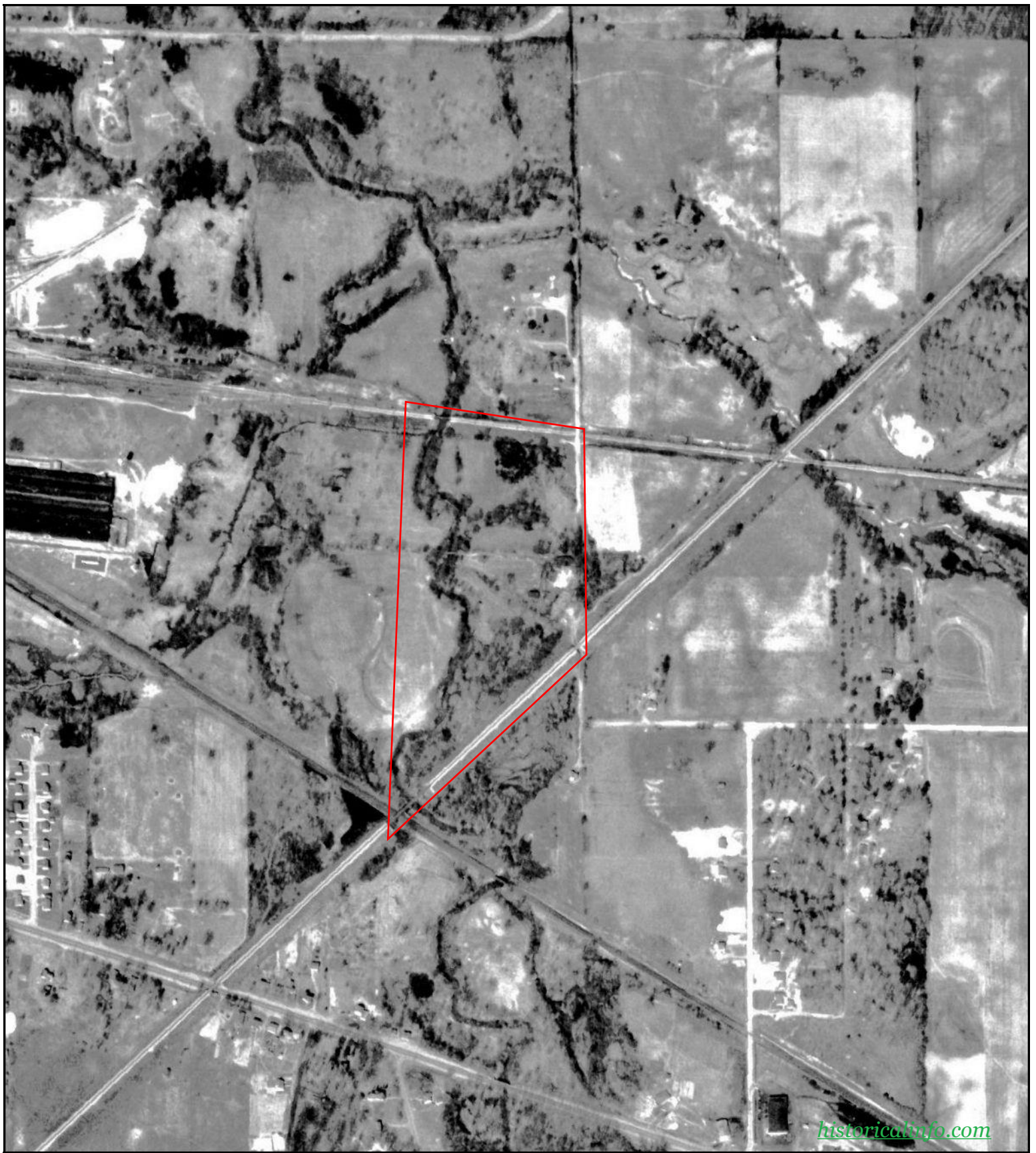
HIG Project # 1411185

Client Project # 1873-356-04-00-03

Approximate Scale 1:6000 (1"=500')







Karwick Road Nature Park  
Michigan City, IN



**1952**

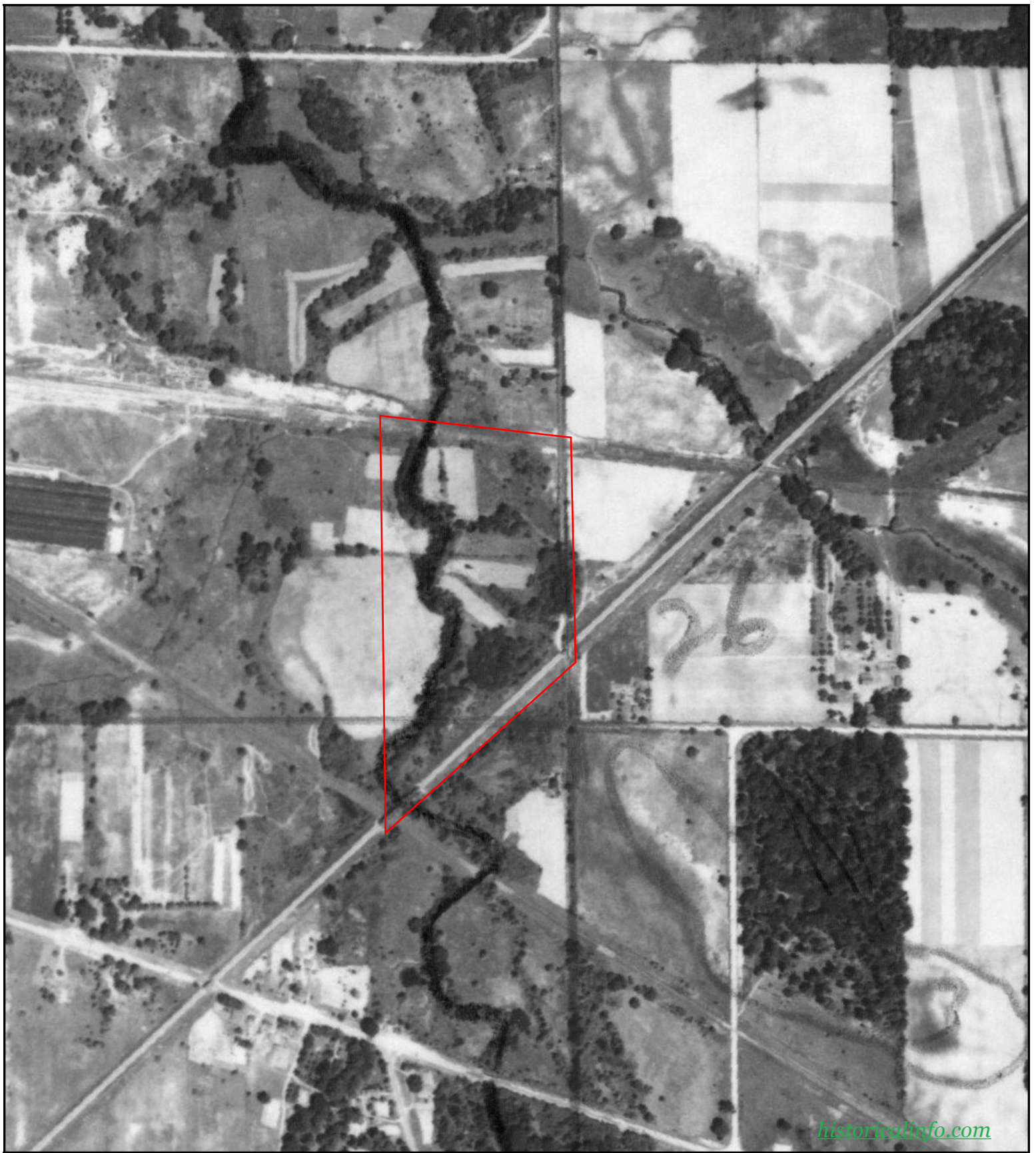
HIG Project # 1411185

Client Project # 1873-356-04-00-03

Approximate Scale 1:6000 (1"=500')







Karwick Road Nature Park  
Michigan City, IN



**1939**

HIG Project # 1411185

Client Project # 1873-356-04-00-03

Approximate Scale 1:6000 (1"=500')





## **APPENDIX C**

1. Test Pit Logs
2. Photographic Log
3. Soil Boring Logs
4. Monitoring Well Details



# WEAVER BOOS CONSULTANTS

- |   |                  |
|---|------------------|
| □ 200 S. Michigan Avenue, Suite 900, Chicago, IL 60604      | • (312) 922-1030 |
| □ 1944 N. Griffith Blvd., Unit A, Griffith, IN 46319        | • (219) 923-9609 |
| □ 213 S. Camino Del Pueblo, Bernalillo, NM 8704             | • (505) 867-6990 |
| □ 6420 Southwest Boulevard, Suite 206, Fort Worth, TX 76109 | • (817) 735-9770 |
| □ 7121 Grape Road, Granger, IN 46530                        | • (574) 271-3447 |

## UNIFIED SOIL CLASSIFICATION SYSTEM

Major Divisions			Group Symbol	Typical Names	Classification on basis of percentage of fines by dry wt.	Laboratory Classification Criteria				
COARSE-GRAINED SOILS	GRAVELS	Clean Gravels	GW	Well-graded gravels and gravel-sand mixtures, little or no fines	< 5% passing #200 sieve= GW, GP, SW, SP	$C_u = D_{60}/D_{10}$ Greater Than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3				
			GP	Poorly-graded gravels and gravel-sand mixtures, little or no fines		Not meeting both criteria for GW				
		Gravels w/fines	GM	Silty gravels, gravel-sand-silt mixtures		> 12% passing #200 sieve= GM, GC, SM, SC	Atterberg limits plot below "A" line or plasticity index less than 4	Atterberg limits plotting in hatched area are borderline classification requiring use of dual symbols		
			GC	Clayey gravels and gravel-sand-clay mixtures			Atterberg limits plot above "A" line and plasticity index greater than 7			
	SANDS	Clean Sands	SW	Well-graded sands and gravelly sands, little or no fines	5% to 12% passing #200 sieve= Borderline Classifications requiring use of dual symbols	$C_u = D_{60}/D_{10}$ Greater Than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3				
			SP	Poorly-graded sands and gravelly sands, little or no fines		Not meeting both criteria for SW				
		Sands w/fines	SM	Silty sands and sand-silt mixtures			Atterberg limits plot below "A" line and platicity index less than 4	Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols		
			SC	Clayey sands and sand-clay mixtures			Atterberg limits plot above "A" line and plasticity index greater than 7			
	FINE-GRAINED SOILS	SILTS & CLAYS	Liquid Limit 50% or less	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands	<div>Equation of "A" line: <math>PI = 0.73 (LL - 20)</math></div> <div>For classification of fine-grained soils and fine fraction of coarse-grained soils, Atterberg limits plotting in the hatched area are boderline classifications requiring the use of dual symbols.</div>				
				CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays silty clays, lean clays					
OL				Organic silts and organic silty clays of low plasticity						
SILTS & CLAYS		Liquid Limit greater than 50%	MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts						
			CH	Inorganic clays of high plasticity Fat clays						
			OH	Organic clays of medium to high plasticity						
HIGHLY ORGANIC SOILS		PT	Peat, Muck and other highly organic soils							

Plasticity Chart



## **1. Test Pit Logs**



WEAVER

BOOS

CONSULTANTS

7121 Grape Road

Granger, Indiana 46530

Phone (574) 271-3447 / Fax (574) 271-3343

TEST PIT NUMBER:

TP-1

PROJECT NAME:

Karwick Road Nature Park

PROJECT NUMBER:

1873-356-04-00-03



DATE:

December 22, 2014

## TEST PIT FIELD LOG TP-

Job Name/Location: Karwick Road Nature Park, Karwick Road, Michigan City, Indiana	
Architect: Not Applicable	WBC Geologist: S. Stanford, LPG
Date: December 22, 2014	
Weather: Cloudy, 40° F	
EXCAVATION EQUIPMENT	
Time Started: 8:15	contractor: D&M Excavating, Inc.
Time Completed: 8:40	operator: Brian Biggs
Easting: 3,014,562	model: 310SG (rubber tire combo)
Ground Elevation*: 602	reach: 14.5 ft

DEPTH	SOIL DESCRIPTION	PHOTOGRAPH(S)/NOTES
0	0 - 0.5 ft TOPSOIL - Light brown SILTY SAND TOPSOIL	
1'		
2'		
3'		
4'		
6'	0.5 - 13.0 ft REFUSE - Wood, paper, rubber, plastic, concrete, bottles, cans, and dark brown ORGANIC SILTY SAND	
7'		
8'		
9'		
10'		
13'	13.0 - 14.5 ft Loose, brown, moist fine to medium SAND, trace silt (SP-SM)	PID Reading at Completion = 0.0 ppm. VRAE Readings at Completion = 0.0% LEL, 0.0 ppm CO, 0.0 ppm H <sub>2</sub> S, 20.3% O <sub>2</sub> .
14'	END OF TEST PIT 14.5 ft.	
15'		

REMARKS:	PROPORTIONS	ABBREVIATION	EXCAVATION EFFORT
Q <sub>p</sub> = Calibrated Penetrometer (tons/ft <sup>2</sup> )	trace(tr.)	0-10%	F-Fine
LOI = Loss on Ignition	little(lt.)	10-20%	M-Medium
	some(sm)	20-35%	C-Coarse
	and	35-50%	V-Very
		Gr.-Gray	
		Bn.-Brown	
		Yel.-Yellow	

\* Interpolated from site topographic survey map.



WEAVER

BOOS

CONSULTANTS

7121 Grape Road

Granger, Indiana 46530

Phone (574) 271-3447 / Fax (574) 271-3343

TEST PIT NUMBER:

TP-2

PROJECT NAME:

Karwick Road Nature Park

PROJECT NUMBER:

1873-356-04-00-03



DATE:

December 22, 2014

## TEST PIT FIELD LOG TP-

Job Name/Location: Karwick Road Nature Park, Karwick Road, Michigan City, Indiana	
Architect: Not Applicable	WBC Geologist: S. Stanford, LPG
Date: December 22, 2014	
Weather: Cloudy, 40° F	
EXCAVATION EQUIPMENT	
Time Started: 8:45	contractor: D&M Excavating, Inc.
Time Completed: 9:10	operator: Brian Biggs
Easting: 3,014,763	model: 310SG (rubber tire combo)
Ground Elevation*: 604	reach: 14.5 ft
capacity: 1/4 c.y.	

DEPTH	SOIL DESCRIPTION	PHOTOGRAPH(S)/NOTES
0	0 - 1.0 ft TOPSOIL - Light brown SILTY SAND TOPSOIL	
1'	1.0 - 10.0 ft REFUSE - Wood, paper, rubber, plastic, concrete, bottles, cans, and dark brown ORGANIC SILTY SAND	
2'		
3'		
4'		
5'	Note: January 29, 1970 News Dispatch newspaper encountered.	
6'		
7'	Note: Moderate chemical odor encountered.	
8'	Note: Groundwater entered excavation beginning 10 ft, test pit terminated.	
9'	END OF TEST PIT 10.0 ft.	
10'		
11'		
12'		
13'		
14'		
15'		

REMARKS:	PROPORTIONS	ABBREVIATION	EXCAVATION EFFORT
	Q <sub>p</sub> = Calibrated Penetrometer (tons/ft <sup>2</sup> )	trace(tr.) 0-10%	F-Fine
LOI = Loss on Ignition	little(lt.) 10-20%	M-Medium	M-Moderate
	some(sm) 20-35%	C-Coarse	D-Difficult
	and 35-50%	V-Very	GROUNDWATER
		Gr.-Gray	
		Bn.-Brown	
		Yel.-Yellow	

\* Interpolated from site topographic survey map.



**WEAVER  
BOOS  
CONSULTANTS**

7121 Grape Road

Granger, Indiana 46530

Phone (574) 271-3447 / Fax (574) 271-3343

TEST PIT NUMBER:

**TP-3**

PROJECT NAME:

Karwick Road Nature Park

PROJECT NUMBER:

1873-356-04-00-03

DATE:

December 22, 2014

# **TEST PIT FIELD LOG TP-**

Job Name/Location: Karwick Road Nature Park, Karwick Road, Michigan City, Indiana			
Architect	Not Applicable	WBC Geologist	S. Stanford, LPG
		Date	December 22, 2014
Weather: Cloudy, 40° F		<b>EXCAVATION EQUIPMENT</b>	
Time Started:	9:30	contractor:	D&M Excavating, Inc.
Time Completed:	9:40	operator:	Brian Biggs
Easting:	3,014,964	Northing:	2,354,609
Ground Elevation*	609	capacity:	1/4 c.y.
		reach:	14.5 ft

DEPTH	SOIL DESCRIPTION	PHOTOGRAPH(S)/NOTES
0	0 - 3 ft TOPSOIL - Light brown SILTY SAND TOPSOIL	
1'		
2'		
3'	3.0 - 4.0 ft REFUSE - Wood, paper, rubber, plastic, concrete, bottles, cans, and dark brown ORGANIC SILTY SAND	
4'		
5'	4.0 - 6.0 ft Loose, light brown damp fine to medium SAND (SP)	
6'	END OF TEST PIT 6.0 ft.	<p>PID Reading at Completion = 0.0 ppm.</p> <p>VRAE Readings at Completion = 0.0% LEL, 0.0 ppm CO, 0.0 ppm H<sub>2</sub>S, 20.3% O<sub>2</sub>.</p>
7'		
8'		
9'		
10'		
11'		
12'		
13'		
14'		
15'		

**REMARKS:**

Q<sub>p</sub> = Calibrated Penetrometer (tons/ft<sup>2</sup>)  
LOI = Loss on Ignition

**PROPORTIONS**

trace(tr.) 0-10%  
little(lt.) 10-20%  
some(sm) 20-35%  
and 35-50%

**ABBREVIATION**

F-Fine  
M-Medium  
C-Coarse  
V-Very  
Gr.-Gray  
Bn.-Brown  
Yel.-Yellow

**EXCAVATION EFFORT**

E-Easy  
M-Moderate  
D-Difficult

**GROUNDWATER**

\* Interpolated from site topographic survey map.





**WEAVER  
BOOS  
CONSULTANTS**

7121 Grape Road  
Granger, Indiana 46530  
Phone (574) 271-3447 / Fax (574) 271-3343

TEST PIT NUMBER: **TP-4**  
PROJECT NAME: Karwick Road Nature Park  
PROJECT NUMBER: 1873-356-04-00-03  
DATE: December 22, 2014

**TEST PIT FIELD LOG TP-**

Job Name/Location: Karwick Road Nature Park, Karwick Road, Michigan City, Indiana			
Architect	Not Applicable	WBC Geologist	S. Stanford, LPG
Weather: Cloudy, 40° F		EXCAVATION EQUIPMENT	
Time Started:	9:45	contractor:	D&M Excavating, Inc.
Time Completed:	10:10	operator:	Brian Biggs
Easting:	3,014,690	Northing:	2,354,554
Ground Elevation*	606	capacity:	1/4 c.y.
		reach:	14.5 ft
		make:	John Deere
		model:	310SG (rubber tire combo)

DEPTH	SOIL DESCRIPTION	PHOTOGRAPH(S)/NOTES
0	0 - 1.0 ft TOPSOIL - Light brown SILTY SAND TOPSOIL	
1'		
2'		
3'		
4'		
6'	1.0 - 14.5 ft REFUSE - Wood, paper, rubber, plastic, concrete, bottles, cans, and dark brown ORGANIC SILTY SAND	
7'		
8'		
9'		
10'		
11'	Note: February 7, 1970 Chicago Tribune newspaper encountered.	PID Reading at Completion = 0.0 ppm. VRAE Readings at Completion = 0.0% LEL, 0.0 ppm CO, 0.0 ppm H <sub>2</sub> S, 20.3% O <sub>2</sub> .
12'		
13'		
14'		
15'	END OF TEST PIT 14.5 ft.	

**REMARKS:**

Q<sub>p</sub> = Calibrated Penetrometer (tons/ft<sup>2</sup>)  
LOI = Loss on Ignition

**PROPORTIONS**

trace(tr.) 0-10%  
little(lt.) 10-20%  
some(sm) 20-35%  
and 35-50%

**ABBREVIATION**

F-Fine  
M-Medium  
C-Coarse  
V-Very  
Gr.-Gray  
Bn.-Brown  
Yel.-Yellow

**EXCAVATION EFFORT**

E-Easy  
M-Moderate  
D-Difficult

**GROUNDWATER**

\* Interpolated from site topographic survey map.



WEAVER

BOOS

CONSULTANTS

7121 Grape Road

Granger, Indiana 46530

Phone (574) 271-3447 / Fax (574) 271-3343

TEST PIT NUMBER:

TP-5

PROJECT NAME:

Karwick Road Nature Park

PROJECT NUMBER:

1873-356-04-00-03



DATE:

December 22, 2014

## TEST PIT FIELD LOG TP-

Job Name/Location: Karwick Road Nature Park, Karwick Road, Michigan City, Indiana	
Architect: Not Applicable	WBC Geologist: S. Stanford, LPG
Date: December 22, 2014	
Weather: Cloudy, 40° F	
EXCAVATION EQUIPMENT	
Time Started: 10:30	contractor: D&M Excavating, Inc.
Time Completed: 10:45	operator: Brian Biggs
Easting: 3,015,013	model: 310SG (rubber tire combo)
Ground Elevation*: 607	reach: 14.5 ft

DEPTH	SOIL DESCRIPTION	PHOTOGRAPH(S)/NOTES
0	0 - 3.0 ft TOPSOIL - Light brown SILTY SAND TOPSOIL	
1'		
2'		
3'		
4'		
5'		
6'		
7'		
8'		
9'		
9.0 - 10.0 ft Firm, damp, black PEAT (PT) and fine to medium SAND (SP)		
10'		
11'		
12'		
13'		
14'		
15'	PID Reading at Completion = 0.0 ppm. VRAE Readings at Completion = 0.0% LEL, 0.0 ppm CO, 0.0 ppm H <sub>2</sub> S, 20.3% O <sub>2</sub> .	

REMARKS:	PROPORTIONS	ABBREVIATION	EXCAVATION EFFORT
Q <sub>p</sub> = Calibrated Penetrometer (tons/ft <sup>2</sup> )	trace(tr.)	0-10%	F-Fine
LOI = Loss on Ignition	little(lt.)	10-20%	M-Medium
	some(sm)	20-35%	C-Coarse
	and	35-50%	V-Very
			Gr.-Gray
			Bn.-Brown
			Yel.-Yellow

\* Interpolated from site topographic survey map.



**WEAVER****BOOS****CONSULTANTS**

7121 Grape Road

Granger, Indiana 46530

Phone (574) 271-3447 / Fax (574) 271-3343

TEST PIT NUMBER:

**TP-6**

PROJECT NAME:

Karwick Road Nature Park

PROJECT NUMBER:

1873-356-04-00-03




DATE:

December 22, 2014

**TEST PIT FIELD LOG TP-**

Job Name/Location:	Karwick Road Nature Park, Karwick Road, Michigan City, Indiana		
Architect	Not Applicable	WBC Geologist	S. Stanford, LPG
Date	December 22, 2014		
Weather:	Cloudy, 40° F		
Time Started:	10:50	contractor:	D&M Excavating, Inc.
Time Completed:	11:10	operator:	Brian Biggs
Easting:	3,014,871	Northing:	2,354,312
Ground Elevation*	608	capacity:	1/4 c.y.
		reach:	14.5 ft

**EXCAVATION EQUIPMENT**

DEPTH	SOIL DESCRIPTION	PHOTOGRAPH(S)/NOTES
0	0 - 1.0 ft TOPSOIL - Light brown SILTY SAND TOPSOIL	
1'		
2'		
3'		
4'		
6'	1.0 - 14.5 ft REFUSE - Wood, paper, rubber, plastic, concrete, bottles, cans, and dark brown ORGANIC SILTY SAND	
7'		
8'		
9'		
10'		
12'	Note: October 10, 1970 newspaper encountered.	
13'		
14'	END OF TEST PIT 14.5 ft.	
15'		

PID Reading at Completion = 0.0 ppm.

VRAE Readings at Completion = 0.0% LEL, 0.0 ppm CO,

0.0 ppm H<sub>2</sub>S, 20.3% O<sub>2</sub>.**REMARKS:**Q<sub>p</sub> = Calibrated Penetrometer (tons/ft<sup>2</sup>)

LOI = Loss on Ignition

**PROPORTIONS**

trace(tr.)	0-10%
little(lt.)	10-20%
some(sm)	20-35%
and	35-50%

**ABBREVIATION**

F-Fine
M-Medium
C-Coarse
V-Very
Gr.-Gray
Bn.-Brown
Yel.-Yellow

**EXCAVATION EFFORT**

E-Easy
M-Moderate
D-Difficult

**GROUNDWATER**

\* Interpolated from site topographic survey map.



WEAVER

BOOS

CONSULTANTS

7121 Grape Road

Granger, Indiana 46530

Phone (574) 271-3447 / Fax (574) 271-3343

TEST PIT NUMBER:

TP-7

PROJECT NAME:

Karwick Road Nature Park

PROJECT NUMBER:

1873-356-04-00-03



DATE:

December 22, 2014

## TEST PIT FIELD LOG TP-

Job Name/Location: Karwick Road Nature Park, Karwick Road, Michigan City, Indiana	
Architect: Not Applicable	WBC Geologist: S. Stanford, LPG Date: December 22, 2014
Weather: Cloudy, 40° F	
EXCAVATION EQUIPMENT	
Time Started: 11:15	contractor: D&M Excavating, Inc. make: John Deere
Time Completed: 11:30	operator: Brian Biggs model: 310SG (rubber tire combo)
Easting: 3,014,741 Northing: 2,354,306	
Ground Elevation*: 606	capacity: 1/4 c.y. reach: 14.5 ft

DEPTH	SOIL DESCRIPTION	PHOTOGRAPH(S)/NOTES
0	0 - 1.0 ft TOPSOIL - Light brown SILTY SAND TOPSOIL	
1'		
2'		
3'		
4'	1.0 - 9.0 ft REFUSE - Wood, paper, rubber, plastic, concrete, bottles, cans, and dark brown ORGANIC SILTY SAND	
5'		
6'		
7'	Note: October 19, 1970 South Bend Tribune newspaper encountered.	
8'		
9'	9.0 - 10.0 Loose, brown, damp, fine to medium SAND (SP)	
10'	END OF TEST PIT 10.0 ft.	
11'		
12'		
13'		
14'		
15'		

REMARKS:	PROPORTIONS	ABBREVIATION	EXCAVATION EFFORT
	Q <sub>p</sub> = Calibrated Penetrometer (tons/ft <sup>2</sup> ) LOI = Loss on Ignition	trace(tr.) 0-10% little(lt.) 10-20% some(sm) 20-35% and 35-50%	F-Fine M-Medium C-Coarse V-Very Gr.-Gray Bn.-Brown Yel.-Yellow

\* Interpolated from site topographic survey map.



WEAVER

BOOS

CONSULTANTS

7121 Grape Road

Granger, Indiana 46530

Phone (574) 271-3447 / Fax (574) 271-3343

TEST PIT NUMBER:

TP-8

PROJECT NAME:

Karwick Road Nature Park

PROJECT NUMBER:

1873-356-04-00-03

DATE:

December 22, 2014

## TEST PIT FIELD LOG TP-

Job Name/Location:	Karwick Road Nature Park, Karwick Road, Michigan City, Indiana		
Architect	Not Applicable	WBC Geologist	S. Stanford, LPG
		Date	December 22, 2014
Weather:	Cloudy, 40° F	EXCAVATION EQUIPMENT	
Time Started:	12:00	contractor:	D&M Excavating, Inc.
Time Completed:	12:30	operator:	Brian Biggs
Easting:	3,014,824	Northing:	2,354,150
Ground Elevation*	607	capacity:	1/4 c.y.
		reach:	14.5 ft
		make:	John Deere
		model:	310SG (rubber tire combo)

DEPTH	SOIL DESCRIPTION	PHOTOGRAPH(S)/NOTES
0	0 - 1.0 ft TOPSOIL - Light brown SILTY SAND TOPSOIL	
1'		
2'		
3'		
4'		
5'	1.0-14.0 ft REFUSE - Wood, paper, rubber, plastic, concrete, bottles, cans, and dark brown ORGANIC SILTY SAND	
6'		
7'		
8'		
9'		
10'		
11'	Note: Slight chemical odor encountered.	
12'		PID Reading at Completion = 0.5 ppm.  VRAE Readings at Completion = 0.0% LEL, 0.0 ppm CO,  0.0 ppm H <sub>2</sub> S, 19.8% O <sub>2</sub> .
13'	END OF TEST PIT 14.0 ft.	
14'		
15'		

## REMARKS:

Q<sub>p</sub> = Calibrated Penetrometer (tons/ft<sup>2</sup>)

LOI = Loss on Ignition

## PROPORTIONS

trace(tr.) 0-10%  
 little(lt.) 10-20%  
 some(sm) 20-35%  
 and 35-50%

## ABBREVIATION

F-Fine  
 M-Medium  
 C-Coarse  
 V-Very  
 Gr.-Gray  
 Bn.-Brown  
 Yel.-Yellow

## EXCAVATION EFFORT

E-Easy  
 M-Moderate  
 D-Difficult

## GROUNDWATER

\* Interpolated from site topographic survey map.



**WEAVER  
BOOS  
CONSULTANTS**

7121 Grape Road

Granger, Indiana 46530

Phone (574) 271-3447 / Fax (574) 271-3343

TEST PIT NUMBER:

**TP-9**

PROJECT NAME:

Karwick Road Nature Park

PROJECT NUMBER:

1873-356-04-00-03


DATE:

December 22, 2014

**TEST PIT FIELD LOG TP-**

Job Name/Location: Karwick Road Nature Park, Karwick Road, Michigan City, Indiana			
Architect	Not Applicable	WBC Geologist	S. Stanford, LPG
		Date	December 22, 2014
Weather: Cloudy, 40° F		<b>EXCAVATION EQUIPMENT</b>	
Time Started:	13:10	contractor:	D&M Excavating, Inc.
Time Completed:	13:20	operator:	Brian Biggs
Easting:	3,015,021	Northing:	354,136
Ground Elevation*	603	capacity:	1/4 c.y.
		reach:	14.5 ft

DEPTH	SOIL DESCRIPTION	PHOTOGRAPH(S)/NOTES
0	0 - 3.5 ft Loose, damp, brown and black organic silty SAND (SP-ML)	
1'		
2'		
3'	3.5 - 5.5 ft Loose, moist, black fine to medium organic silty SAND (SP-ML)	
4'	and moist, black PEAT (PT)	
5'	Note: Groundwater entered excavation beginning at 4.5 ft bgs.	
6'	END OF TEST PIT 5.5 ft	
7'		
8'		
9'		
10'		
11'		
12'		
13'		
14'		
15'		
		PID Reading at Completion = 0.0 ppm. VRAE Readings at Completion = 0.0% LEL, 0.0 ppm CO, 0.0 ppm H <sub>2</sub> S, 20.3% O <sub>2</sub> .

REMARKS:	PROPORTIONS	ABBREVIATION	EXCAVATION EFFORT
Q <sub>p</sub> = Calibrated Penetrometer (tons/ft <sup>2</sup> )	trace(tr.)	0-10%	F-Fine
LOI = Loss on Ignition	little(lt.)	10-20%	M-Medium
	some(sm)	20-35%	C-Coarse
	and	35-50%	V-Very
		Gr.-Gray	
		Bn.-Brown	
		Yel.-Yellow	
			<b>GROUNDWATER</b>

\* Interpolated from site topographic survey map.



WEAVER

BOOS

CONSULTANTS

7121 Grape Road

Granger, Indiana 46530

Phone (574) 271-3447 / Fax (574) 271-3343

TEST PIT NUMBER:

TP-10

PROJECT NAME:

Karwick Road Nature Park

PROJECT NUMBER:

1873-356-04-00-03



DATE:

December 22, 2014

## TEST PIT FIELD LOG TP-

Job Name/Location:	Karwick Road Nature Park, Karwick Road, Michigan City, Indiana		
Architect	Not Applicable	WBC Geologist	S. Stanford, LPG
		Date	December 22, 2014
Weather:	Cloudy, 40° F		
Time Started:	13:45	contractor:	D&M Excavating, Inc.
Time Completed:	14:00	operator:	Brian Biggs
Easting:	3,014,836	Northing:	2,353,948
Ground Elevation*	607	capacity:	1/4 c.y.
		reach:	14.5 ft

## EXCAVATION EQUIPMENT

DEPTH	SOIL DESCRIPTION	PHOTOGRAPH(S)/NOTES
0	0 - 1.0 ft TOPSOIL - Light brown SILTY SAND TOPSOIL	
1'		
2'		
3'		
4'		
5'	1.0 - 13.0 ft REFUSE - Wood, paper, rubber, plastic, concrete, bottles, cans, and dark brown ORGANIC SILTY SAND	
6'		
7'		
8'		
9'		
10'		
11'		
12'	Note: Excavation wet at bottom.	
13'	END OF TEST PIT 13.0 ft.	PID Reading at Completion = 0.0 ppm.
14'		VRAE Readings at Completion = 0.0% LEL, 0.0 ppm CO,
15'		0.0 ppm H <sub>2</sub> S, 20.6% O <sub>2</sub> .

## REMARKS:

Q<sub>p</sub> = Calibrated Penetrometer (tons/ft<sup>2</sup>)

LOI = Loss on Ignition

## PROPORTIONS

trace(tr.) 0-10%  
 little(lt.) 10-20%  
 some(sm) 20-35%  
 and 35-50%

## ABBREVIATION

F-Fine  
 M-Medium  
 C-Coarse  
 V-Very  
 Gr.-Gray  
 Bn.-Brown  
 Yel.-Yellow

## EXCAVATION EFFORT

E-Easy  
 M-Moderate  
 D-Difficult

## GROUNDWATER

\* Interpolated from site topographic survey map.



WEAVER

BOOS

CONSULTANTS

7121 Grape Road

Granger, Indiana 46530

Phone (574) 271-3447 / Fax (574) 271-3343

TEST PIT NUMBER:

TP-11

PROJECT NAME:

Karwick Road Nature Park

PROJECT NUMBER:

1873-356-04-00-03



DATE:

December 22, 2014

## TEST PIT FIELD LOG TP-

Job Name/Location: Karwick Road Nature Park, Karwick Road, Michigan City, Indiana	
Architect: Not Applicable	WBC Geologist: S. Stanford, LPG
Date: December 22, 2014	
Weather: Cloudy, 40° F	
EXCAVATION EQUIPMENT	
Time Started: 14:15	contractor: D&M Excavating, Inc.
Time Completed: 14:30	operator: Brian Biggs
Easting: 3,014,737	model: 310SG (rubber tire combo)
Ground Elevation*: 607	reach: 14.5 ft
capacity: 1/4 c.y.	

DEPTH	SOIL DESCRIPTION	PHOTOGRAPH(S)/NOTES
0	0 - 1.0 ft TOPSOIL - Light brown SILTY SAND TOPSOIL	
1'		
2'		
3'		
4'		
5'		
6'		
7'		
8'		
9'		
10'	1.0 - 13.0 ft REFUSE - Wood, paper, rubber, plastic, concrete, bottles, cans, and dark brown ORGANIC SILTY SAND	
11'		
12'		
13'		
14'		
15'	Note: Wet at bottom. END OF TEST PIT 13.0 ft.	PID Reading at Completion = 0.5 ppm.  VRAE Readings at Completion = 0.0% LEL, 0.0 ppm CO,  0.0 ppm H <sub>2</sub> S, 19.8% O <sub>2</sub> .

REMARKS:	PROPORTIONS	ABBREVIATION	EXCAVATION EFFORT
Q <sub>p</sub> = Calibrated Penetrometer (tons/ft <sup>2</sup> )	trace(tr.)	0-10%	F-Fine
LOI = Loss on Ignition	little(lt.)	10-20%	M-Medium
	some(sm)	20-35%	C-Coarse
	and	35-50%	V-Very
		Gr.-Gray	
		Bn.-Brown	
		Yel.-Yellow	

\* Interpolated from site topographic survey map.



**WEAVER  
BOOS****CONSULTANTS**

7121 Grape Road

Granger, Indiana 46530

Phone (574) 271-3447 / Fax (574) 271-3343

TEST PIT NUMBER:

**TP-12**

PROJECT NAME:

Karwick Road Nature Park

PROJECT NUMBER:



1873-356-04-00-03

DATE:

December 22, 2014

**TEST PIT FIELD LOG TP-**

Job Name/Location:	Karwick Road Nature Park, Karwick Road, Michigan City, Indiana		
Architect	Not Applicable	WBC Geologist	S. Stanford, LPG
		Date	December 22, 2014
Weather:	Cloudy, 40° F	<b>EXCAVATION EQUIPMENT</b>	
Time Started:	14:45	contractor:	D&M Excavating, Inc.
Time Completed:	14:55	operator:	Brian Biggs
Easting:	3,014,605	Northing:	2,354,248
Ground Elevation*	603	capacity:	1/4 c.y.
		reach:	14.5 ft

DEPTH	SOIL DESCRIPTION	PHOTOGRAPH(S)/NOTES
0	0 - 2.0 ft SILTY CLAY - Light brown SILTY CLAY (CL-ML)	
1'		
2'		
3'		
4'		
5'	2.0 - 14.0 ft REFUSE - Wood, paper, rubber, plastic, concrete, bottles, cans, and dark brown ORGANIC SILTY SAND	
6'		
7'		
8'		
9'		
10'	Note: January 20, 1968 News Dispatch newspaper encountered.	
11'		
12'		PID Reading at Completion = 0.0 ppm. VRAE Readings at Completion = 0.0% LEL, 0.0 ppm CO, 0.0 ppm H <sub>2</sub> S, 20.3% O <sub>2</sub> .
13'	14.0 - 14.5 ft Loose, brown, moist fine to medium organic SAND, trace silt (SP-SM-)	
14'	END OF TEST PIT 14.5 ft.	
15'		

**REMARKS:**Q<sub>p</sub> = Calibrated Penetrometer (tons/ft<sup>2</sup>)

LOI = Loss on Ignition

**PROPORTIONS**

trace(tr.)	0-10%
little(lt.)	10-20%
some(sm)	20-35%
and	35-50%

**ABBREVIATION**

F-Fine
M-Medium
C-Coarse
V-Very
Gr.-Gray
Bn.-Brown
Yel.-Yellow

**EXCAVATION  
EFFORT**

E-Easy
M-Moderate
D-Difficult

**GROUNDWATER**

\* Interpolated from site topographic survey map.



## **2. Photographic Log**



**Photographic Log of Test Pits Excavated  
December 22, 2014  
S. Stanford**



Test Pit TP1



Test Pit TP1



**Photographic Log of Test Pits Excavated  
December 22, 2014  
S. Stanford**



Test Pit TP2



Test Pit TP2



**Photographic Log of Test Pits Excavated**  
**December 22, 2014**  
**S. Stanford**



Test Pit TP3



**Photographic Log of Test Pits Excavated  
December 22, 2014  
S. Stanford**



Test Pit TP4



Test Pit TP4



**Photographic Log of Test Pits Excavated  
December 22, 2014  
S. Stanford**



Test Pit TP5



Test Pit 5



**Photographic Log of Test Pits Excavated  
December 22, 2014  
S. Stanford**



Test Pit TP6



Test Pit 6



**Photographic Log of Test Pits Excavated  
December 22, 2014  
S. Stanford**



Test Pit TP7



Test Pit TP7



**Photographic Log of Test Pits Excavated  
December 22, 2014  
S. Stanford**



Test Pit TP8



Test Pit TP8



**Photographic Log of Test Pits Excavated  
December 22, 2014  
S. Stanford**



Test Pit TP9



**Photographic Log of Test Pits Excavated  
December 22, 2014  
S. Stanford**



Test Pit TP10



Test Pit TP10



**Photographic Log of Test Pits Excavated  
December 22, 2014  
S. Stanford**



Test Pit TP11



Test Pit TP11



**Photographic Log of Test Pits Excavated  
December 22, 2014  
S. Stanford**



Test Pit TP12



Test Pit TP12



### **3. Boring Logs**



# Weaver Boos Consultants, LLC

7121 Grape Road, Granger, IN 46530  
574-271-3447(PHONE)/574-271-3343(FAX)

## LOG OF SOIL BORING NO.: MW-2D

Location:

File No.: 1873-356-04-00-03

Sheet 1 of 2

### WATER LEVEL DATA NE = Not Encountered

NE ft While Drilling  
NE ft At Completion\*\*  
BF ft At --- Hrs. A.D.\*  
--- ft At --- Days A.D.\*\*\*

Started: 11/6/2014

Completed: 11/6/2014

Engineer: \_\_\_\_\_

Driller: Shawn/EDAC

Drilling Equip.: Gus Pech, 1100 ATV

Drilling Method: HSA (4.25" I.D.)

PROJECT: Karwick Road Nature Park

Michigan City, Indiana

CLIENT: Sanitary District of Michigan City

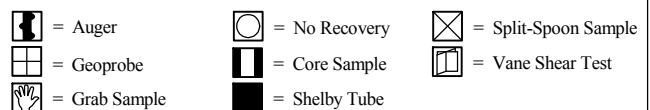
Michigan City, Indiana

Depth (ft)	DATUM: SURFACE ELEVATION (ft):		Strata Depth (ft)	Type	Recovery	Number	Standard Penetration Test-Blows/6" (#) = "N" Value	LOI (%)	Qp (tsf)	Moisture Content %	BORING AND SAMPLING NOTES	Elevations (ft)
	Symbol	SOIL DESCRIPTION, CLASSIFICATION and USCS or AASHTO GROUP SYMBOL										
		TOPSOIL - Moist, dark brown TOPSOIL										
						1	3/1/1 (2)					
3.5		REFUSE: plastic, wood chips, chords, and glass mixed with moist, dark brown, SILTY SAND				2	2/1/1 (2)					
						3	2/1/2 (3)					
						4	8/6/1 (7)					
						5	3/3/5 (8)					
						6	2/2/2 (4)					
19.0		Very loose, wet, gray, ORGANIC SILT, trace shells (OL)				7	4/3/1 (4)			102.2		
23.5		Very loose to loose, wet, dark gray, fine to medium SAND, trace shells (SP)				8	4/1/1 (2)			40.3		
						9	5/4/4 (8)					

### NOTES:

- Weather: 42° F
- Used wire line hammer
- Backfilled with auger cuttings

### LEGEND





# Weaver Boos Consultants, LLC

7121 Grape Road, Granger, IN 46530  
574-271-3447(PHONE)/574-271-3343(FAX)

## LOG OF SOIL BORING NO.: MW-2D

Location:

File No.: 1873-356-04-00-03

Sheet 2 of 2

Depth (ft)	DATUM: SURFACE ELEVATION (ft):		Strata Depth (ft)	Type	Recovery	Number	Standard Penetration Test-Blows/6" (#) = "N" Value	LOI (%)	Qp (tsf)	Moisture Content %	BORING AND SAMPLING NOTES	Elevations (ft)
	Symbol	SOIL DESCRIPTION, CLASSIFICATION and USCS or AASHTO GROUP SYMBOL										
		Very loose to loose, wet, dark gray, fine to medium SAND, trace shells (SP) <i>(continued)</i>										
35						10	1/0/1 (1)					
40						11	1/1/1 (2)					
45		Loose, wet, gray, fine SILTY SAND (SM)	44.0			12	5/3/6 (9)					
		Loose to medium dense, wet, gray, fine to medium SAND, trace gravel (SP)	45.0									
50						13	3/6/6 (12)			19.1		
55		Boring Terminated at 55 ft	55.0			14	5/8/15 (23)					
60												
65												



# Weaver Boos Consultants, LLC

7121 Grape Road, Granger, IN 46530  
574-271-3447(PHONE)/574-271-3343(FAX)

## LOG OF SOIL BORING NO.: MW-4D

Location:

File No.: 1873-356-04-00-03

Sheet 1 of 2

### WATER LEVEL DATA NE = Not Encountered

19 ft While Drilling ▼  
NE ft At Completion\*\*  
BF ft At --- Hrs. A.D.\*  
--- ft At --- Days A.D.\*\*\*

Started: 11/5/2014

Completed: 11/5/2014

Engineer:

Driller: Shawn/EDAC

Drilling Equip.: Gus Pech, 1100 ATV

Drilling Method: HSA (4.25" I.D.)

PROJECT: Karwick Road Nature Park

Michigan City, Indiana

CLIENT: Sanitary District of Michigan City

Michigan City, Indiana

Depth (ft)	DATUM: SURFACE ELEVATION (ft):		Strata Depth (ft)	Type	Recovery	Number	Standard Penetration Test-Blows/6" (#) = "N" Value	LOI (%)	Qp (tsf)	Moisture Content %	BORING AND SAMPLING NOTES	Elevations (ft)
	Symbol	SOIL DESCRIPTION, CLASSIFICATION and USCS or AASHTO GROUP SYMBOL										
		TOPSOIL - Dark brown SILTY SAND TOPSOIL	1.0									
		REFUSE - Wood, paper, rubber, plastic, concrete and dark brown, ORGANIC SILTY SAND				1	3/3/50/8"					
5						2	8/39/2"					
						3	4/3/1 (4)					
10						4	2/2/2 (4)					
						5	3/4/5 (9)					
15						6	8/2/5 (7)					
20		Loose, dark gray, wet, fine to medium SAND, trace silt (SP-SM)	19.5			7	4/3/3 (6)					
25		Very loose, dark gray, moist, SILTY SAND (SM)	24.5			8	1/1/3 (4)			32.2		
		Very loose, dark gray, moist, ORGANIC SILT with trace shells (OL)	26.0									
						9	2/1/1 (2)			45.1		

### NOTES:

- Weather: 45° F
- Used wire line hammer
- Backfilled with auger cuttings

### LEGEND



= Auger



= Geoprobe



= Grab Sample



= No Recovery



= Core Sample



= Shelby Tube



= Split-Spoon Sample



= Vane Shear Test







**Weaver Boos Consultants, LLC**7121 Grape Road, Granger, IN 46530  
574-271-3447(PHONE)/574-271-3343(FAX)**LOG OF SOIL BORING NO.: MW-6D****Location:**

File No.: 1873-356-04-00-03

Sheet 1 of 2

**WATER LEVEL DATA**  
NE = Not Encountered11.5 ft While Drilling ▼  
NE ft At Completion\*\*  
BF ft At --- Hrs. A.D.\*  
--- ft At --- Days A.D.\*\*\*

Started: 11/5/2014

Completed: 11/5/2014

Engineer:

Driller: Shawn/EDAC

Drilling Equip.: Gus Pech, 1100 ATV

Drilling Method: HSA (4.25" I.D.)

PROJECT: Karwick Road Nature Park

Michigan City, Indiana

CLIENT: Sanitary District of Michigan City

Michigan City, Indiana

Depth (ft)	DATUM: SURFACE ELEVATION (ft):		Strata Depth (ft)	Type	Recovery	Number	Standard Penetration Test-Blows/6" (#) = "N" Value	LOI (%)	Qp (tsf)	Moisture Content %	BORING AND SAMPLING NOTES	Elevations (ft)
	Symbol	SOIL DESCRIPTION, CLASSIFICATION and USCS or AASHTO GROUP SYMBOL										
		TOPSOIL - Dark brow, SILTY TOPSOIL	1.0									
		REFUSE - Plastic, wood, ORGANIC SILTY SAND				1	3/1/1 (2)					
5						2	7/3/3 (6)					
			6.5			3	6/3/7 (10)					
		Loose to very loose, gray, fine SILTY SAND (SM)				4	8/2/3 (5)					
10						5	4/1/1 (2)			38.8		
		Very loose, wet, dark brown, fine to medium SILTY SAND, trace organics (SM)	12.0			6	2/1/1 (2)					
15						7	1/0/1 (1)			81.2		
		Very loose, wet, dark gray, ORGANIC SILT (OL)	17.0			8	3/1/1 (2)			39.6		
20						9	--/--/--	4.8		52.8		
		Very loose, moist, dark gray, ORGANIC SILT, some clay, trace sand and shells (OL)	23.0									
25												

**NOTES:**

- Weather: Cloudy, 45° F
- Used wire line hammer
- Backfilled with auger cuttings

**LEGEND**

= Auger



= Geoprobe



= Grab Sample



= No Recovery



= Core Sample



= Shelby Tube



= Split-Spoon Sample



= Vane Shear Test



# Weaver Boos Consultants, LLC

7121 Grape Road, Granger, IN 46530  
574-271-3447(PHONE)/574-271-3343(FAX)

## LOG OF SOIL BORING NO.: MW-6D

Location:

File No.: 1873-356-04-00-03

Sheet 2 of 2

Depth (ft)	DATUM: SURFACE ELEVATION (ft):		Strata Depth (ft)	Type	Recovery	Number	Standard Penetration Test-Blows/6" (#) = "N" Value	LOI (%)	Qp (tsf)	Moisture Content %	BORING AND SAMPLING NOTES	Elevations (ft)
	Symbol	SOIL DESCRIPTION, CLASSIFICATION and USCS or AASHTO GROUP SYMBOL										
31.0		Very loose, wet, gray, fine to medium SAND (SP)	31.0									
35.0		Very loose, wet, dark gray, fine SILTY SAND (SM)	35.0			10	2/1/1 (2)					
40.0			40.0			11	1/1/1 (2)					
45.0		Medium dense, wet, brown, fine to coarse SAND and GRAVEL (SP-GP)	45.0			12	1/1/1 (2)					
50.0			50.0			13	8/13/13 (26)					
52.0		Dense, wet, brown, fine to medium SAND (SP)	52.0									
55.0		Boring Terminated at 55 ft	55.0			14	8/21/39 (60)					
60.0			60.0									
65.0			65.0									



**Weaver Boos Consultants, LLC**7121 Grape Road, Granger, IN 46530  
574-271-3447(PHONE)/574-271-3343(FAX)**LOG OF SOIL BORING NO.: MW-9S****Location:**

File No.: 1873-356-04-00-03

Sheet 1 of 1

**WATER LEVEL DATA**  
NE = Not Encountered

13.0	ft	While Drilling	▼
NE	ft	At Completion**	
BF	ft	At --- Hrs. A.D.*	
---	ft	At --- Days A.D.***	

Started: 11/4/2014  
 Completed: 11/4/2014  
 Engineer: \_\_\_\_\_  
 Driller: Shawn/EDAC  
 Drilling Equip.: Gus Pech, 1100 ATV  
 Drilling Method: HSA (4.25" I.D.)

PROJECT: Karwick Road Nature Park  
 Michigan City, Indiana

CLIENT: Sanitary District of Michigan City  
 Michigan City, Indiana

Depth (ft)	DATUM: SURFACE ELEVATION (ft):		Strata Depth (ft)	Type	Recovery	Number	Standard Penetration Test-Blows/6" (#) = "N" Value	LOI (%)	Qp (tsf)	Moisture Content %	BORING AND SAMPLING NOTES	Elevations (ft)
	Symbol	SOIL DESCRIPTION, CLASSIFICATION and USCS or AASHTO GROUP SYMBOL										
		Dark brown, SILTY TOPSOIL	1.0									
		REFUSE - Rubble fill consisting of wood and plastic, ORGANIC SILTY SAND				1	3/27/32 (59)					
5						2	7/3/1 (4)					
						3	5/3/2 (5)					
10						4	9/3/5 (8)					
						5	6/4/4 (8)					
15						6	4/2/2 (4)					
		Very loose, dark gray, ORGANIC SILT with shells (OL)	15.5			7	6/1/1 (2)					
20						8	1/1/1 (2)			100.6		
		Boring Terminated at 20 ft	20.0									
25												

**NOTES:**

- Weather: 50° F
- Used wire line hammer
- Backfilled with auger cuttings

**LEGEND**

= Auger



= Geoprobe



= Grab Sample



= No Recovery



= Core Sample



= Shelby Tube



= Split-Spoon Sample



= Vane Shear Test



# Weaver Boos Consultants, LLC

7121 Grape Road, Granger, IN 46530  
574-271-3447(PHONE)/574-271-3343(FAX)

## LOG OF SOIL BORING NO.: MW-10D

Location:

File No.: 1873-356-04-00-03

Sheet 1 of 1

### WATER LEVEL DATA NE = Not Encountered

4.5 ft While Drilling ▼  
NE ft At Completion\*\*  
BF ft At --- Hrs. A.D.\*  
--- ft At --- Days A.D.\*\*\*

Started: 11/4/2014

Completed: 11/4/2014

Engineer:

Driller: Shawn/EDAC

Drilling Equip.: Gus Pech, 1100 ATV

Drilling Method: HSA (4.25" I.D.)

PROJECT: Karwick Road Nature Park

Michigan City, Indiana

CLIENT: Sanitary District of Michigan City

Michigan City, Indiana

Depth (ft)	DATUM: SURFACE ELEVATION (ft):		Strata Depth (ft)	Type	Recovery	Number	Standard Penetration Test-Blows/6" (#) = "N" Value	LOI (%)	Qp (tsf)	Moisture Content %	BORING AND SAMPLING NOTES	Elevations (ft)
	Symbol	SOIL DESCRIPTION, CLASSIFICATION and USCS or AASHTO GROUP SYMBOL										
		TOPSOIL - Dark brown, SILTY TOPSOIL										
		Loose, brown, fine SILTY SAND (SM)	1.5			1	1/3/6/7 (9)					
		Medium dense, moist to wet, light brown, FINE SAND (SP)	3.0			2	6/9/7/7 (16)					
5		Very loose, wet, dark gray, FINE SAND (SP)	6.5			3	1/0/1/1 (1)					
		Very loose, wet, dark brown to black, ORGANIC SILTY SAND (SM-OL)	7.8			4	1/0/1/2 (1)	21.2		112.8		
10		Very loose, wet, light brown to gray, fine SAND, trace organics (SP-OL)	9.0			4	1/0/1/2 (1)					
		Very loose to loose, dark brown PEAT (PT)	9.5			5	2/3/4/3 (7)					
		Loose, wet, gray, fine SAND, trace peat (SP)	12.0			6	2/2/2/2 (4)					
15		Very loose, brown, PEAT (PT)	14.5			7	1/0/1/1 (1)	5.2		52.0		
		Very loose, wet, dark brown to gray, FINE SAND (SP)	20.0			8	1/1/2/5 (3)					
20		Very loose to dense, wet, FINE SAND (SP)	22.0			9	3/12/23/30 (35)					
25						10	2/4/10/20 (14)					
30						11	5/18/30 (48)					
35												
40		Boring Terminated at 40 ft	40.0									

### NOTES:

- Weather: Cloudy, 55° F
- Used wire line hammer
- Backfilled with auger cuttings

### LEGEND



= Auger



= Geoprobe



= Grab Sample



= No Recovery



= Core Sample



= Shelby Tube



= Split-Spoon Sample



= Vane Shear Test



<b>Boring No.:</b> B-1	<b>File No.:</b> 0566-01-19	<b>Page</b> 1 of 1
<b>Project Name:</b> Nature Park 2000		
<b>Location of Project:</b> Michigan City, Indiana		
<b>Client Information:</b> Haas & Associates		

Depth (ft)	Soil Description	Soil Type	Moisture	Wet Weight (lb)	Moisture (%)	Wet Weight (lb)	Moisture (%)
0	FILL: loose brown sand and silty sand with roots mixed with brown and gray sandy silty clay	1	3-3-1 (4)				0
5	REFUSE: paper, cardboard, wood, bottles (odor), glass mixed with brown and dark brown sand to silty sand	2	3-2-2 (4)				0
10		3	3 5-5 (10)	moist	17.6	NA	5
15		4	5-7-7 (14)	moist	21.4		6
20		5	6-4-2 (6)				0
25		6	4-1-4 (5)		100.5		0
30	Very soft brown, gray, and dark gray ORGANIC SILT with trace to little clay, shells and gravel (OH)	7	1-0-1 (1)	wet	92.9	NA	16
35		8	1-1-0 (1)	wet	28.8	NA	18
40		9	1-0-1 (1)	moist	32.5	NA	18
45	Very soft brown, gray, and dark gray ORGANIC CLAYEY SILT with trace sand, peat and shells (OH)	10	1-1-1 (2)	moist	35.2	NA	16
50		11	1-1-2 (3)	moist	32.3	NA	18
55		12	1-2-2 (4)	wet	29.1	NA	12
60	Very loose to medium dense gray fine to medium SAND with little silt (SM)	13	3-1-2 (3)	wet	20.2	NA	8
65		14	2-4-6 (10)	wet	20.5	NA	12
70	Loose grayish brown fine to coarse SAND with trace silt (SP-SM)	15	4-5-4 (9)	wet	21.2	NA	18
75	Medium dense to dense gray fine to medium SAND with trace to little silt (SP-SM to SM)	16	7-11-22 (33)	wet	20.8	NA	6
80		17	6-13-16 (29)	wet	22.1	NA	18
85		18	7-10-12 (22)	wet	22.1	NA	16

Boring Terminated at 75 ft.



<b>Boring No.:</b> B-2	<b>File No.:</b> 0566-01-19	<b>Page 1 of 1</b>
<b>Project Name:</b> Nature Park 2000		
<b>Location of Project:</b> Michigan City, Indiana		
<b>Client Information:</b> Ilaas & Associates		

[illegible]



# APT SOIL BORING LOG

Client: MI City Parks & Recreation	Page: 1 of 1
Project #: 312-01	Date: 7/11/01
Boring Name: GB-01	Reference Datum: Ground Level
Bore location: Approximately 210' E of creek and 150' NW of south property line	Driller/Method: Top Flight/GEO Probe
	Geologist/Engineer: J. Klanke

Sample No.	Sample Type	Blows Per 6-inches	Recovery (%)	PIDOM (ppm)	Depth (Feet)	Sediment Description	Sample Collection/Analyses	Consistence	Munsell Color	USCS Classification	Moisture	Static GW	Well Construction	Soil Log
1	DP	NA	50	ND	Fill	- brown, silty, moderately well sorted, 80-90% sand		Loose	10YR 4/2	Fill	Dry			
				ND		- becoming darker brown silty sand as above			10YR 3/2		M			
				ND	1	- 1" thick zone of brick rubble								
				ND		- becoming siltier, 70% to 80% sand								
				ND	2	- wood fragments								
					3									
					4									
2	DP	NA	25	ND		- debris: mixed wood & paper								
				ND	5									
					6									
					7									
					8	- becoming wet								
3	DP	NA	25	ND		- small angular rocks, glass & paper					W			
				ND	9									
					10	Total Depth = 11.5 feet below ground surface								

COHESIVE SOILS	
N	Consistency
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Firm (Medium)
9 - 15	Stiff
16 - 30	Very Stiff
> 30	Hard

GRANULAR SOILS	
"N"	Relative Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
> 50	Very Dense

SAMPLE	MOISTURE
Dry	Dry
D	Damp
M	Moist
W	Wet

SAMPLE TYPE	
ST	Shelby Tube
SS	Split Spoon
AC	Auger Cuttings
RC	Rock Core
LBS	Long Bore Sampler
DP	Direct Push



# APT SOIL BORING LOG

Client: MI City Parks & Recreation Project #: 312-01 Boring Name: GB-02 Bore location: Approx. 70' W of Karwick Rd & 110' N of south property line	Page: 1 of 1 Date: 7/11/01 Reference Datum: Ground Level Driller/Method: Top Flight/GEO Probe Geologist/Engineer: J. Klanke
---	---

Sample No.	Sample Type	Blows Per 6-inches	Recovery (%)	PIDOVM (ppm)	Depth (Feet)	Sediment Description	Sample Collection/Analyses	Consistence	Munsell Color	USCS Classification	Moisture	Static GW	Well Construction	Soil Log
1	DP	NA	50			Fill - - light brown, fine grained sand; moderately well sorted; 80%-90% sand		Loose	10YR 5/4	Fill	M			
			ND											
			ND		1	- abrupt change in color to dark brown; root fragments & angular rock fragments			10YR 4/3					
			ND						10YR 2/1					
			ND		2	- paper debris								
					3									
					4									
2	DP	NA	0			- NO RECOVERY 4'-8' wet at bottom of sampler								
					5									
					6									
					7									
					8									
						Total Depth = 8 feet below ground surface								
					9									
					10									

COHESIVE SOILS		GRANULAR SOILS		SAMPLE	SAMPLE TYPE
N	Consistency	"N"	Relative Density	MOISTURE	
0 - 1	Very Soft	0 - 4 .....	Very Loose	Dry = Dry	ST = Shelby Tube
2 - 4	Soft	5 - 10 .....	Loose	D = Damp	SS = Split Spoon
5 - 8	Firm (Medium)	11 - 30 .....	Medium Dense	M = Moist	AC = Auger Cuttings
9 - 15	Stiff	31 - 50 ...	Dense	W = Wet	RC = Rock Core
16 - 30	Very Stiff	> 50 .....	Very Dense		LBS = Long Bore Sampler
> 30	Hard				DP = Direct Push

<b>SAMPLE TYPE</b>
ST = Shelby Tube
SS = Split Spoon
AC = Auger Cuttings
RC = Rock Core
LBS = Long Bore Sampler
DP = Direct Push



# APT SOIL BORING LOG

Client: MI City Parks & Recreation

Page: 1 of 1

Project #: 312-01

Date: 7/11/01

Boring Name: GB-03

Reference Datum: Ground Level

Bore location: Approximately 220' SE of boring B-2 and 320'W of Karwick Rd.

Driller/Method: Top Flight/GEO Probe

Geologist/Engineer: J. Klanke

Sample No.	Sample Type	Blows Per 6-inches	Recovery (%)	PID/OWN (ppm)	Depth (Feet)	Sediment Description	Sample Collection/Analyses	Consistence	Munsell Color	USCS Classification	Moisture	Static GW	Well Construction	Soil Log
1	DP	NA	50			Fill		Loose	10YR 4/3	Fill	Dry			
				ND										
				ND	1	- brown fine grained sand, moderately well sorted; 80%-90% sand; glass fragments			10YR 5/3		M			
				ND										
				ND	2									
					3									
					4									
2	DP	NA	50			- as above		Soft	10YR 2/1					
				ND										
				39	5	- becoming dark brown; wood & paper debris; glass fragments								
				48										
				57	6	- very dark brown to green-brown, becoming wet; strong petroleum odor								
				10000 +										
					7									
					8									
3	DP	NA					x				W			
					9									
					10	Refusal Total Depth = 9.5 feet below ground surface								

COHESIVE SOILS	
N	Consistency
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Firm (Medium)
9 - 15	Stiff
16 - 30	Very Stiff
> 30	Hard

GRANULAR SOILS	
"N"	Relative Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
> 50	Very Dense

SAMPLE MOISTURE
Dry = Dry
D = Damp
M = Moist
W = Wet

SAMPLE TYPE
ST = Shelby Tube
SS = Split Spoon
AC = Auger Cuttings
RC = Rock Core
LBS = Long Bore Sampler
DP = Direct Push



# APT SOIL BORING LOG

Client: MI City Parks & Recreation	Page: 1 of 2
Project #: 312-01	Date: 7/12/01
Boring Name: GB-05	Reference Datum: Ground Level
Bore location: Approx. 100' east of creek & 200' northeast of B-2/GB-04	Driller/Method: Top Flight/GEO Probe
	Geologist/Engineer: J. Klanke

Sample No.	Sample Type	Blows Per 6-Inches	Recovery (%)	PID/OVM (ppm)	Depth (Feet)	Sediment Description	Sample Collection/Analyses	Consistence	Munsell Color	USCS Classification	Moisture	Static GW	Well Construction	Soil Log
1	DP	NA	75	ND		Fill	- brown silty sand; poorly sorted; approximately 70%-80% sand; fine grained	Loose	10YR 5/3	Fill	Dry			
				ND	1									
				ND			- becoming orange-brown color; moist; fine grained; moderately well sorted		10YR 4/4		M			
				ND	2									
				ND										
				ND	3									
				ND			- sand becoming brown glass debris, wood fragments & paper.		10YR 4/2					
2	DP	NA	25	4	4									
				68			- mixed brown fill sand; debris: fabric, paper, & glass							
				10	5									
					6									
					7									
					8									
3	DP	NA	0	NA			- NO RECOVERY - except in drive head which contained debris (paper & wood); very base of sampler wet							
					9									
					10									

COHESIVE SOILS		GRANULAR SOILS		SAMPLE	SAMPLE TYPE
N	Consistency	"N"	Relative Density	MOISTURE	
0 - 1	Very Soft	0 - 4	Very Loose	Dry = Dry	ST = Shelby Tube
2 - 4	Soft	5 - 10	Loose	D = Damp	SS = Split Spoon
5 - 8	Firm (Medium)	11 - 30	Medium Dense	M = Moist	AC = Auger Cuttings
9 - 15	Stiff	31 - 50	Dense	W = Wet	RC = Rock Core
16 - 30	Very Stiff	> 50	Very Dense		LBS = Long Bore Sampler
> 30	Hard				DP = Direct Push



# APT SOIL BORING LOG

Project #: 312-01						Page: 2 of 2								
Boring Name: GB-05						Date: 7/12/01								
Sample No.	Sample Type	Blows Per 6-inches	Recovery (%)	PID/OVM (ppm)	Depth (Feet)	Sediment Description	Sample Collection/Analyses	Consistence	Munsell Color	USCS Classification	Moisture	Static GW	Well Construction	Soil Log
3	(Continued)													
					11	- NO RECOVERY								
					12									
4	DP	NA	0	NA		- NO RECOVERY								
					13									
					14									
					15									
					16									
						Total Depth = 16 feet below ground surface								
					17									
					18									
					19									
					20									

COHESIVE SOILS		GRANULAR SOILS		SAMPLE	SAMPLE TYPE
N	Consistency	"N"	Relative Density	MOISTURE	
0 - 1	Very Soft	0 - 4 .....	Very Loose	Dry = Dry	ST = Shelby Tube
2 - 4	Soft	5 - 10 .....	Loose	D = Damp	SS = Split Spoon
5 - 8	Firm (Medium)	11 - 30 ...	Medium Dense	M = Moist	AC = Auger Cuttings
9 - 15	Stiff	31 - 50 ...	Dense	W = Wet	RC = Rock Core
16 - 30	Very Stiff	> 50 .....	Very Dense		LBS = Long Bore Sampler
> 30	Hard				DP = Direct Push



# APT SOIL BORING LOG

Client: MI City Parks and Recreation	Page: 1 of 2
Project #: 312-01	Date: 11-26-01
Boring Name: MW-1	Reference Datum: GL
Bore location: Approximately 95 feet west of Karwick Road and 160 feet south of fence line near railroad track.	Driller/Method: H.S.A
	Geologist/Engineer: K. Lechtanski
	Driller: Top Flight

Sample No.	Sample Type	Blows Per 6-Inches	Recovery (%)	PID/OVM (ppm)	Depth (Feet)	Sediment Description	Sample Collection/Analyses	Consistence	Munsell Color	USCS Classification	Moisture	Static GW	Well Construction	Soil Log
1	SS	3	50	ND		FILL	- Brown sand, fine to medium grained. Poorly sorted.	Loose	10 YR 3/2	SM	Dry			
		3		ND	1		- Light brown, medium grained, poorly sorted		2.5 Y 4/5					
		2		ND										
		4		ND	2									
2	SS	3	25	ND			- Silty sand		10 YR 3/6					
		2		ND	3		- Black stain							
		2		ND			- Plastic debris jamming cutter head.							
		2		ND	4									
3	SS	2	50	ND					10 YR 4/3		M			
		4		ND	5		- Plastic debris							
		4		ND					2.5 Y 4/3					
		6		ND	6		- Paper debris, black stain							
4	SS	21	0	NA			NO RECOVERY							
		49			7									
		50 (3")												
					8									
5	SS	12	0	NA			NO RECOVERY							
		14			9									
		5												
		1			10									

COHESIVE SOILS		GRANULAR SOILS		SAMPLE	SAMPLE TYPE
N	Consistency	"N"	Relative Density	MOISTURE	
0 - 1	Very Soft	0 - 4	Very Loose	Dry = Dry	ST = Shelby Tube
2 - 4	Soft	5 - 10	Loose	D = Damp	SS = Split Spoon
5 - 8	Firm (Medium)	11 - 30	Medium Dense	M = Moist	AC = Auger Cuttings
9 - 15	Stiff	31 - 50	Dense	W = Wet	RC = Rock Core
16 - 30	Very Stiff	> 50	Very Dense		LBS = Long Bore Sampler
> 30	Hard				



# APT SOIL BORING LOG

Project #: 312-01  
Boring Name: MW-1

Page: 2 of 2  
Date: 11-26-01

Sample No.	Sample Type	Blows Per 5-inches	Recovery (%)	PI/OVM (ppm)	Depth (Feet)	Sediment Description	Sample Collection/Analyses	Consistence	Munsell Color	USCS Classification	Moisture	Static GW	Well Construction	Soil Log
6	SS	25	ND			FILL		Loose	2.5 Y 5/3	SM	M			
		11	ND			- Brown silty sand, poorly sorted, fine to medium grained.								
		9	ND		11	- Plastic debris, wood fragments								
		4	ND											
		4	ND		12									
7	SS	75												
		3	ND											
		1	ND		13									
		2	ND											
		4	ND		14	SILT		Loose	2.5 Y 2/1	ML	M			
						- Dark brown, organic, little or no sand (<10%). Root fragments.								
8	SS	100	NA			SAND		Loose	2.5 Y 5/2	SW	W			
		2												
		2			15	- Organic zone 1 inch thick.								
		7												
		9			16									
9	SS		NA											
		4				SILT		Stiff	2.5 Y 4/1	ML	M			
						- Grayish brown, slightly sandy (10-20%), clayey.								
		4			17									
		5				CLAY		Stiff	2.5 Y 4/1	CL	M			
						- gray, silty.								
		6			18	SILT		Stiff	2.5 Y 4/1	ML	M			
						- Becoming wet lower most 2 inches.								
						- Gray, slightly sandy.					W			
						TOTAL DEPTH = 18 feet								
					19									
					20									

COHESIVE SOILS	
N	Consistency
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Firm (Medium)
9 - 15	Stiff
16 - 30	Very Stiff
> 30	Hard

GRANULAR SOILS	
"N"	Relative Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
> 50	Very Dense

SAMPLE
MOISTURE
Dry = Dry
D = Damp
M = Moist
W = Wet

SAMPLE TYPE
ST = Shelby Tube
SS = Split Spoon
AC = Auger Cuttings
RC = Rock Core
LBS = Long Bore Sampler



# APT SOIL BORING LOG

Client: MI City Parks and Recreation

Page: 1 of 2

Project #: 312-01

Date: 11-26-01

Boring Name: MW-2

Reference Datum: GL

Bore location: 50 feet southwest of last fence post by C.S.S. & S.B. Railroad  
25 feet east of river

Driller/Method: H.S.A.

Geologist/Engineer: K. Lechtanski

Driller: Top Flight

Sample No.	Sample Type	Blows Per 6-Inches	Recovery (%)	PI/DOYM (ppm)	Depth (Feet)	Sediment Description	Sample Collection/Analyses	Consistence	Munsell Color	USCS Classification	Moisture	Static GW	Well Construction	Soil Log
1	SS	50				FILL								
		1		ND		- Light brown tan sand, well sorted, minor electrical debris.		Very Loose	10 YR 5/4	SW	Dry			
		1		ND	1									
		1		ND										
		1		ND	2									
2	SS	25							10 YR 4/4					
		2		ND		- Paper & plastic debris jamming cutter head.								
		2		ND	3									
		4		ND										
		1		ND	4									
3	SS	0		NA		NO RECOVERY								
		2												
		2			5									
		4												
		1			6									
4	SS	10				FILL								
		3		ND		- Tan, brown sand, moderately sorted, with minor/trace amounts of silt. Wood debris.		Very Loose	10 YR 4/4	SM	Dry			
		1		ND	7									
		3		ND										
		5		ND	8									
5	SS	0		NA		NO RECOVERY								
		3												
		4			9									
		2												
		2			10									

COHESIVE SOILS	
N	Consistency
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Firm (Medium)
9 - 15	Stiff
16 - 30	Very Stiff
> 30	Hard

GRANULAR SOILS	
"N"	Relative Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
> 50	Very Dense

SAMPLE
MOISTURE
Dry = Dry
D = Damp
M = Moist
W = Wet

SAMPLE TYPE
ST = Shelby Tube
SS = Split Spoon
AC = Auger Cuttings
RC = Rock Core
LBS = Long Bore Sampler



# APT SOIL BORING LOG

Project #: 312-01						Page: 2 of 2								
Boring Name: MW-2						Date: 11-26-01								
Sample No.	Sample Type	Blows Per 6-inches	Recovery (%)	PID/OVM (ppm)	Depth (Feet)	Sediment Description	Sample Collection/Analyses	Consistence	Munsell Color	USCS Classification	Moisture	Static GW	Well Construction	Soil Log
6	SS		0			NO RECOVERY (split tube is dry)								
		3		ND										
		3		ND	11									
		3		ND										
		3		ND	12									
7	SS		50			FILL - Brown sand, metal & glass debris.		Loose	10 YR 4/4	SM	Dry			
		4		ND							M			
		1		ND	13									
		2		ND		SAND - Gray silty sand, minor natural wood debris.		Loose	10 YR 2/1	SM	M			
		2		ND	14									
8	SS		25	NA							W			
		2												
		1			15									
		2												
		2			16									
9	SS		0	NA		NO RECOVERY								
					17									
					18									
TOTAL DEPTH = 18 feet														
					19									
					20									

COHESIVE SOILS		GRANULAR SOILS		SAMPLE	SAMPLE TYPE
N	Consistency	"N"	Relative Density	MOISTURE	
0 - 1	Very Soft	0 - 4	Very Loose	Dry = Dry	ST = Shelby Tube
2 - 4	Soft	5 - 10	Loose	D = Damp	SS = Split Spoon
5 - 8	Firm (Medium)	11 - 30	Medium Dense	M = Moist	AC = Auger Cuttings
9 - 15	Stiff	31 - 50	Dense	W = Wet	RC = Rock Core
16 - 30	Very Stiff	> 50	Very Dense		LBS = Long Bore Sampler
> 30	Hard				



# APT SOIL BORING LOG

Client: MI City Parks and Recreation	Page: 1 of 2
Project #: 312-01	Date: 11-26-01
Boring Name: MW-3	Reference Datum: GL
Bore location: Approximately 160 feet south of MW-2	Driller/Method: H.S.A.
	Geologist/Engineer: K. Lechtanski
	Driller: Top Flight

Sample No.	Sample Type	Blows Per 6 inches	Recovery (%)	PID/OM (ppm)	Depth (Feet)	Sediment Description	Sample Collection/Analyses	Consistence	Munsell Color	USCS Classification	Moisture	Static GW	Well Construction	Soil Log
1	SS	2	50	ND		FILL		Loose	10 YR 2/2	SM	Dry			
		4		ND	1				10 YR 3/3					
		6		ND										
		6		ND	2									
2	SS	10	0	NA		NO RECOVERY								
		5			3									
		5												
		2			4									
3	SS	5	10	ND		FILL		Loose	10 YR 3/3	SM	Dry			
		6		ND	5									
		50 (5")		ND										
					6									
4	SS	4	0	NA		NO RECOVERY (Due to lost cap of split tube in hole.)								
		4			7									
		4												
		7			8									
5	SS	12	25	ND		FILL		Loose	10 YR 3/3	SM	M			
		14		ND	9									
		14		ND										
		12			10				10 YR 2/1		W			

COHESIVE SOILS		GRANULAR SOILS		SAMPLE MOISTURE		SAMPLE TYPE	
N	Consistency	"N"	Relative Density				
0 - 1	Very Soft	0 - 4	Very Loose	Dry = Dry		ST = Shelby Tube	
2 - 4	Soft	5 - 10	Loose	D = Damp		SS = Split Spoon	
5 - 8	Firm (Medium)	11 - 30	Medium Dense	M = Moist		AC = Auger Cuttings	
9 - 15	Stiff	31 - 50	Dense	W = Wet		RC = Rock Core	
16 - 30	Very Stiff	> 50	Very Dense			LBS = Long Bore Sampler	
> 30	Hard						



# APT SOIL BORING LOG

Project #: 312-01  
Boring Name: MW-3

Page: 2 of 2  
Date: 11-26-01

Sample No	Sample Type	Blows Per 6-inches	Recovery (%)	P/D/O/V/M (ppm)	Depth (Feet)	Sediment Description	Sample Collection/Analyses	Consistence	Munsell Color	USCS Classification	Moisture	Static GW	Well Construction	Soil Log
6	SS	25	NA		FILL	- Brown silty sand, 50-60% sand, abundant silt. Paper debris.		Loose	10 YR 2/1	SM	W			
		5												
		7			11									
		9												
		4			12									
7	SS	0	NA			NO RECOVERY								
		2												
		0			13									
		1												
		0			14									
8	SS	75	NA			SILT	- Gray sandy silt, moderately well sorted, with minor clay and interbeds of organic material.	Very Loose	5 Y 4/2	MS	W			
		1												
		0			15									
		1												
		0			16									
9	SS	100	NA			CLAY	- Gray sandy silty clay, trace amounts of organic material	Very Loose	5 Y 4/2	CS	W			
		0												
		0			17									
		0												
		0			18									
						TOTAL DEPTH = 18 feet								
					19									
					20									

COHESIVE SOILS	
N	Consistency
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Firm (Medium)
9 - 15	Stiff
16 - 30	Very Stiff
> 30	Hard

GRANULAR SOILS	
"N"	Relative Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
> 50	Very Dense

SAMPLE
MOISTURE
Dry = Dry
D = Damp
M = Moist
W = Wet

SAMPLE TYPE
ST = Shelby Tube
SS = Split Spoon
AC = Auger Cuttings
RC = Rock Core
LBS = Long Bore Sampler



# APT SOIL BORING LOG

Client: MI City Parks and Recreation

Page: 1 of 2

Project #: 312-01

Date: 11-26-01

Boring Name: MW-4

Reference Datum: GL

Bore location: Approximately 280 feet south of MW-3 following the creek and 20 feet east of the creek.

Driller/Method: H.S.A

Geologist/Engineer: K. Lechtanski

Driller: Top Flight

Sample No.	Sample Type	Blows Per 6 inches	Recovery (%)	PI/DIVM (ppm)	Depth (Feet)	Sediment Description	Sample Collection/Analyses	Consistence	Munsell Color	USCS Classification	Moisture	Static GW	Well Construction	Soil Log
1	SS	75	ND			FILL - Redish brown, iron stained, sandy silt, medium grained.		Firm	7.5 YR 4/3	MS	Dry			
		2												
		3			1									
		2												
2	SS	25	ND		2			Loose	7.5 YR 4/2					
		3												
		5			3									
		5												
3	SS	10	ND		4	- Paper and plastic debris - Brown silty sand, medium grained, moderately well sorted.			7.5 YR 3/2	SM				
		7												
		2			5									
		2												
4	SS	50	ND		6	- Plastic, paper, and metal debris.					M			
		5												
		2			7	- Newsprint, paper, and glass.								
		3												
5	SS	25	ND		8	- Newsprint, wood, plastic, and metal debris.								
		7												
		2			9									
		3												
		4			10									

COHESIVE SOILS	
N	Consistency
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Firm (Medium)
9 - 15	Stiff
16 - 30	Very Stiff
> 30	Hard

GRANULAR SOILS	
"N"	Relative Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
> 50	Very Dense

SAMPLE MOISTURE	
ST	Shelby Tube
SS	Split Spoon
AC	Auger Cuttings
RC	Rock Core
LBS	Long Bore Sampler

SAMPLE TYPE	
ST	Shelby Tube
SS	Split Spoon
AC	Auger Cuttings
RC	Rock Core
LBS	Long Bore Sampler



# APT SOIL BORING LOG

Project #: 312-01						Page: 2 of 2								
Boring Name: MW-4						Date: 11-26-01								
Sample No.	Sample Type	Blows Per 6-Inches	Recovery (%)	PI/OVM (ppm)	Depth (Feet)	Sediment Description	Sample Collection/Analyses	Consistence	Munsell Color	USCS Classification	Moisture	Static GW	Well Construction	Soil Log
6	SS	5	0	NA		NO RECOVERY								
		3			11									
		3												
		4			12									
7	SS	6	0	NA		NO RECOVERY								
		3			13									
		4												
		6			14									
8	SS	5	50	NA	FILL	- Gray silty sand.		Loose	10 YR 3/1	SM	W			
		5			15									
		6												
		5			16									
9	SS	3	100	NA	CLAY	- Sandy clay, poorly sorted, occasional clean sandy interbeds.		Soft	2.5Y 3/1	CS	W			
		2			17									
		1												
		1			18									
TOTAL DEPTH = 18 feet														
					19									
					20									

COHESIVE SOILS		GRANULAR SOILS		SAMPLE	SAMPLE TYPE
N	Consistency	"N"	Relative Density	MOISTURE	
0 - 1	Very Soft	0 - 4	Very Loose	Dry = Dry	ST = Shelby Tube
2 - 4	Soft	5 - 10	Loose	D = Damp	SS = Split Spoon
5 - 8	Firm (Medium)	11 - 30	Medium Dense	M = Moist	AC = Auger Cuttings
9 - 15	Stiff	31 - 50	Dense	W = Wet	RC = Rock Core
16 - 30	Very Stiff	> 50	Very Dense		LBS = Long Bore Sampler
> 30	Hard				



# APT SOIL BORING LOG

Client: MI City Parks and Recreation	Page: 1 of 2
Project #: 312-01	Date: 11-27-01
Boring Name: MW-5	Reference Datum: GL
Bore location: Approximately 220 ft south of MW-4 following the creek.	Driller/Method: H.S.A.
	Geologist/Engineer: K. Lechtanski
	Driller: Top Flight

Sample No.	Sample Type	Blows Per 6-inches	Recovery (%)	PID/O'N (ppm)	Depth (Feet)	Sediment Description	Sample Collection/Analyses	Consistence	Munsell Color	USCS Classification	Moisture	Static GW	Well Construction	Soil Log
1	SS		50			FILL		Loose	7.5 YR 2.5/2	MS	Dry			
		1		ND		- Brown sandy silt, fine grained, roots, plastic, and wood debris.								
		3		ND	1									
		2		ND										
		1		ND	2									
2	SS		35											
		1		ND										
		3		ND	3	- Brown sandy silt, fine to medium grained, glass, wood, and plastic debris.			10 YR 3/4					
		2		ND										
		1		ND	4									
3	SS		10								M			
		3		ND										
		1		ND	5	- plastic debris				10 YR 2/1				
		1		ND										
		2		ND	6									
4	SS		50											
		6		ND										
		4		ND	7	- paper glass and plastic debris								
		6		0.7		- Charcoal gray sand, fine grained.	X		GLEI 1 2.5 M	S				
		5		ND	8									
5	SS		70			- Brown sandy silt, fine grained, metal and plastic debris.								
		8		ND						10 YR 2/2	MS			
		7		ND	9	- Silty sand, fine to medium grained.								
		6		ND						10 YR 4/1	SM			
		6		ND	10									

COHESIVE SOILS		GRANULAR SOILS		SAMPLE	SAMPLE TYPE
N	Consistency	"N"	Relative Density	MOISTURE	
0 - 1	Very Soft	0 - 4	Very Loose	Dry = Dry	ST = Shelby Tube
2 - 4	Soft	5 - 10	Loose	D = Damp	SS = Split Spoon
5 - 8	Firm (Medium)	11 - 30	Medium Dense	M = Moist	AC = Auger Cuttings
9 - 15	Stiff	31 - 50	Dense	W = Wet	RC = Rock Core
16 - 30	Very Stiff	> 50	Very Dense		LBS = Long Bore Sampler
> 30	Hard				



# APT SOIL BORING LOG

Project #: 312-01  
Boring Name: MW-5

Page: 2 of 2  
Date: 11-27-01

Sample No.	Sample Type	Blows Per 6-inches	Recovery (%)	PI/OVM (ppm)	Depth (Feet)	Sediment Description	Sample Collection/Analyses	Consistence	Munsell Color	USCS Classification	Moisture	Static GW	Well Construction	Soil Log
6	SS	5	10	NA	11	SAND - Silty sand, medium grained, moderately well sorted. Animal burrows filled with sandy silt.		Loose	10 YR 4/1	SM	W			
		2			12									
		2			13									
7	SS	1	0	NA	14	NO RECOVERY								
		2			15									
		1			16									
		0			17									
		1			18									
					19									
					20									
						TOTAL DEPTH = 14 feet								

COHESIVE SOILS	
N	Consistency
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Firm (Medium)
9 - 15	Stiff
16 - 30	Very Stiff
> 30	Hard

GRANULAR SOILS	
"N"	Relative Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
> 50	Very Dense

SAMPLE
Dry = Dry
D = Damp
M = Moist
W = Wet

SAMPLE TYPE
ST = Shelby Tube
SS = Split Spoon
AC = Auger Cuttings
RC = Rock Core
LBS = Long Bore Sampler



# APT SOIL BORING LOG

Client: MI City Parks and Recreation	Page: 1 of 2
Project #: 312-01	Date: 11-27-01
Boring Name: MW-6	Reference Datum: GL
Bore location: 25 feet east of creek and 210 feet south of MW-5 following the creek.	Driller/Method: H.S.A
	Geologist/Engineer: K. Lechtanski
	Driller: Top Flight

Sample No.	Sample Type	Blows Per 6 Inches	Recovery (%)	PI/DO/WM (ppm)	Depth (Feet)	Sediment Description	Sample Collection/Analyses	Consistence	Munsell Color	USCS Classification	Moisture	Static GW	Well Construction	Soil Log
1	SS		25			FILL		Loose	7.5 YR 3/4	SM	Dry			
		1		ND		- Brown silty sand, fine to medium grained, moderately well sorted.								
		0		ND	1	- Roots, and plastic debris.								
		2		ND										
		3		ND	2									
2	SS		10			- Plastic, organic, and paper debris.								
		1		ND										
		2		ND	3									
		3		ND										
		8		ND	4	- Plastic debris plugged split spoon.								
3	SS		80			- Glass debris.			7.5 YR 5/6		M			
		2		ND										
		2		ND	5	- Gray silty sand.			10 YR 4/1					
		3		ND										
		6		ND	6				7.5 YR 5/6					
4	SS		100			- Brown sand, fine to medium grained, moderately well sorted.								
		5		ND		CLAY		Firm	2.5 Y 4/1	C	M			
		6		ND	7	- Gray/brown clay, 10-15% sand.								
		7		0.7		SAND		Loose	2.5 Y 5/1	SW	M			
		7		ND	8	- Fine grained, well sorted.								
5	SS		60											
		6		ND										
		5		ND	9									
		4		ND										
		3			10						W			

COHESIVE SOILS	
N	Consistency
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Firm (Medium)
9 - 15	Stiff
16 - 30	Very Stiff
> 30	Hard

GRANULAR SOILS	
"N"	Relative Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
> 50	Very Dense

SAMPLE MOISTURE	
Dry	= Dry
D	= Damp
M	= Moist
W	= Wet

SAMPLE TYPE	
ST	= Shelby Tube
SS	= Split Spoon
AC	= Auger Cuttings
RC	= Rock Core
LBS	= Long Bore Sampler



# APT SOIL BORING LOG

Project #: 312-01						Page: 2 of 2								
Boring Name: MW-6						Date: 11-27-01								
Sample No.	Sample Type	Blows Per 6-Inches	Recovery (%)	PI/OVM (ppm)	Depth (Feet)	Sediment Description	Sample Collection/Analyses	Consistence	Munsell Color	USCS Classification	Moisture	Static GW	Well Construction	Soil Log
6	SS		80	NA		SAND		Loose	2.5 Y 4/1	G	W			
		4				- Gray fine grained sand, moderately well sorted, gray clay nodules.								
		3			11									
		2												
		2			12									
7	SS		40	NA		- Silty sand, medium grained, poorly sorted, clay nodules.			2.5 Y 5/1	SM				
		2												
		1			13									
		1												
		2			14									
						TOTAL DEPTH = 14 feet								
					15									
					16									
					17									
					18									
					19									
					20									



# APT SOIL BORING LOG

Client: MI City Parks and Recreation	Page: 1 of 3
Project #: 312-01	Date: 11-27-01
Boring Name: MW-7	Reference Datum: GL
Bore location: 135 feet west of Kanwick Road and 115 north from bottom of ditch along the souther railroad track (Norfolk and Western).	Driller/Method: H.S.A
	Geologist/Engineer: K. Lechtanski
	Driller: Top Flight

Sample No.	Sample Type	Blows Per 6-inches	Recovery (%)	PIDOWN (ppm)	Depth (Feet)	Sediment Description	Sample Collection/Analysis	Consistence	Munsell Color	USCS Classification	Moisture	Static GW	Well Construction	Soil Log
1	SS	60	ND			FILL - Brown sand, fine to medium grained, concrete and plant debris.		Loose	10 YR 3/6	S	Dry			
		1	ND											
		4	ND		1									
		4	ND											
		4	ND		2									
2	SS	0	NA			NO RECOVERY (Might be wet. Scrap of metal blocking split spoon.)								
		3												
		3			3									
		2												
		3			4									
3	SS	20	NA			FILL - Brown sand, fine to medium grained.		Loose	10 YR 3/3	S	W			
		5												
		3			5									
		2												
		2			6									
4	SS	0	NA			NO RECOVERY								
		4												
		4			7									
		1												
		3			8									
5	SS	0	NA			NO RECOVERY (Scrap of metal blocking split spoon.)								
		4												
		5			9									
		9												
		20			10									

COHESIVE SOILS	
N	Consistency
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Firm (Medium)
9 - 15	Stiff
16 - 30	Very Stiff
> 30	Hard

GRANULAR SOILS	
"N"	Relative Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
> 50	Very Dense

SAMPLE
MOISTURE
Dry = Dry
D = Damp
M = Moist
W = Wet

SAMPLE TYPE
ST = Shelby Tube
SS = Split Spoon
AC = Auger Cuttings
RC = Rock Core
LBS = Long Bore Sampler



# APT SOIL BORING LOG

Project #: 312-01						Page: 2 of 3								
Boring Name: MW-7						Date: 11-27-01								
Sample No.	Sample Type	Blows Per 6-inches	Recovery (%)	PID/OVM (ppm)	Depth (Feet)	Sediment Description	Sample Collection/Analyses	Consistence	Munsell Color	USCS Classification	Moisture	Static GW	Well Construction	Soil Log
6	SS		10	NA	FILL	- Dark brown silty sand, fine to medium grained, poorly sorted, glass and metal debris.		Loose	10 YR 3/3	SM	W			
		8												
		12			11									
		3												
		3			12									
7	SS		0	NA		NO RECOVERY								
		6												
		5			13									
		4												
		4			14									
8	SS		10	NA	FILL	- Dark brown silty sand, fine to medium grained, poorly sorted. Ceramic, paper, and glass debris.		Loose	10 YR 2/2	SM	W			
		4												
		3			15									
		2												
		6			16									
9	SS		0	NA		NO RECOVERY								
		2												
		3			17									
		3												
10	SS		0	NA		NO RECOVERY								
		8												
		4			19									
		3												
		3			20									

COHESIVE SOILS		GRANULAR SOILS		SAMPLE MOISTURE	SAMPLE TYPE
N	Consistency	"N"	Relative Density		
0 - 1	Very Soft	0 - 4	Very Loose	Dry = Dry	ST = Shelby Tube
2 - 4	Soft	5 - 10	Loose	D = Damp	SS = Split Spoon
5 - 8	Firm (Medium)	11 - 30	Medium Dense	M = Moist	AC = Auger Cuttings
9 - 15	Stiff	31 - 50	Dense	W = Wet	RC = Rock Core
16 - 30	Very Stiff	> 50	Very Dense		LBS = Long Bore Sampler
> 30	Hard				



# APT SOIL BORING LOG

Project #: 312-01						Page: 3 of 3								
Boring Name: MW-7						Date: 11-27-01								
Sample No.	Sample Type	Blows Per 6-inches	Recovery (%)	PID/DOVM (ppm)	Depth (Feet)	Sediment Description	Sample Collection/Analyses	Consistence	Munsell Color	USCS Classification	Moisture	Static GW	Well Construction	Soil Log
13	SS		25	NA		SILT		Soft	2.5 Y 3/1	CM	W			
		4												
		4			21									
		1												
		2			22									
						TOTAL DEPTH = 22 feet								
					23									
					24									
					25									
					26									
					27									
					28									
					29									
					30									

COHESIVE SOILS		GRANULAR SOILS		SAMPLE	SAMPLE TYPE
N	Consistency	"N"	Relative Density	MOISTURE	
0 - 1	Very Soft	0 - 4	Very Loose	Dry = Dry	ST = Shelby Tube
2 - 4	Soft	5 - 10	Loose	D = Damp	SS = Split Spoon
5 - 8	Firm (Medium)	11 - 30	Medium Dense	M = Moist	AC = Auger Cuttings
9 - 15	Stiff	31 - 50	Dense	W = Wet	RC = Rock Core
16 - 30	Very Stiff	> 50	Very Dense		LBS = Long Bore Sampler
> 30	Hard				



# APT SOIL BORING LOG

Client: MI City Parks and Recreation

Page: 1 of 2

Project #: 312-01

Date: 11-27-01

Boring Name: MW-8

Reference Datum: GL

Bore location:

Driller/Method: H.S.A

Geologist/Engineer: K. Lechtanski

Driller: Top Flight

Sample No.	Sample Type	Blows Per 6-Inches	Recovery (%)	PI/DOVM (ppm)	Depth (Feet)	Sediment Description	Sample Collection/Analyses	Consistence	Munsell Color	USCS Classification	Moisture	Static GW	Well Construction	Soil Log
1	SS	50				FILL - Brown clayey silt, some pebbles, poorly sorted, concrete debris.		Firm	10 YR 4/2	MC	Dry			
		7		ND										
		6		ND	1									
		7		ND										
		5		ND	2									
2	SS	25				- Brown sand, fine to medium grained, well sorted.		Loose		SW				
		3		ND										
		9		ND	3									
		5		ND										
		5		ND	4									
3	SS	10				- Brown sand, fine to medium grained, well sorted, plastic and paper debris.			10 YR 3/1		M			
		3		ND										
		2		ND	5									
		2		ND										
		3		ND	6									
4	SS	10				- 100% newsprint and some glass and metal.								
		4		ND										
		5		ND	7									
		5		ND										
		4		ND	8									
5	SS	10				- Brown sand, fine to medium grained, moderately well sorted, paper and glass debris.								
		4		ND										
		6		ND	9									
		2		ND										
		4		ND	10									

COHESIVE SOILS	
N	Consistency
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Firm (Medium)
9 - 15	Stiff
16 - 30	Very Stiff
> 30	Hard

GRANULAR SOILS	
"N"	Relative Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
> 50	Very Dense

SAMPLE MOISTURE
Dry = Dry
D = Damp
M = Moist
W = Wet

SAMPLE TYPE
ST = Shelby Tube
SS = Split Spoon
AC = Auger Cuttings
RC = Rock Core
LBS = Long Bore Sampler



# APT SOIL BORING LOG

Project #: 312-01						Page: 2 of 2								
Boring Name: MW-8						Date: 11-27-01								
Sample No.	Sample Type	Blows Per 6-inches	Recovery (%)	PID/OVM (ppm)	Depth (Feet)	Sediment Description	Sample Collection/Analyses	Consistence	Munsell Color	USCS Classification	Moisture	Static GW	Well Construction	Soil Log
6	SS	4	25	ND	11	FILL - Brown sand, fine to medium grained, moderately well sorted, newsprint, glass and metal debris.		Loose	10 YR 3/1	MC	M			
		4		ND	11									
		4		ND	11									
		4		ND	12									
7	SS	5	20	ND	13	- newprint and glass debris.			10 YR 4/1					
		4		ND	13									
		2		ND	14									
		3		ND	14									
8	SS	4	100	ND	15	SILT - Clayey silt, paper, glass and metal debris.		Firm	7.5 YR 3/2	MC	M			
		4		ND	15									
		5		NA	16	SAND - Silty sand, fine to medium grained, moderately well sorted.		Loose	7.5 YR 3/2	SM	W			
		6		NA	16									
9	SS	3	50	NA	17	- Brown sand, fine to medium grained, poorly sorted, clay nodules				S				
		2			17									
		1			18									
		2			18									
10	SS	3	50	NA	19	- same as above, but more peat.								
		3			19									
		1			20									
		2			20									
TOTAL DEPTH = 20 feet														

COHESIVE SOILS		GRANULAR SOILS		SAMPLE	SAMPLE TYPE
N	Consistency	"N"	Relative Density	MOISTURE	
0 - 1	Very Soft	0 - 4	Very Loose	Dry = Dry	ST = Shelby Tube
2 - 4	Soft	5 - 10	Loose	D = Damp	SS = Split Spoon
5 - 8	Firm (Medium)	11 - 30	Medium Dense	M = Moist	AC = Auger Cuttings
9 - 15	Stiff	31 - 50	Dense	W = Wet	RC = Rock Core
16 - 30	Very Stiff	> 50	Very Dense		LBS = Long Bore Sampler
> 30	Hard				



#### **4. Monitoring Well Details**



# MONITORING WELL COMPLETION REPORT

Site Name: Karwick Nature County: LaPorte Well Number: **MW-2D**  
 Site Location: Mich. City, IN Northing: 2,354,623 Easting: 3,014,500  
 Drilling Contractor: EDAC Date Started: 11/6/2014  
 Head Driller: Shawn Helper: Rick Date Completed: 11/7/2014  
 Drilling Method: 4.25" ID HSA, SPT Drilling Fluids 'Type': Water as needed  
 Water Level at 0 Hours: 13 (ft. from top of PVC) Time Started: 12:47  
 Water Level at 24 hours: 4.26 (ft. from top of PVC) Time Completed: 9:30

## Annular Space Details

Type of Surface Seal: Concrete  
 Amount of Concrete: 0.33 bag(s) 80 lbs. per bag  
 Type of Annular Seal: Quick Grout  
 Type of Bentonite Seal: Holeplug bentonite chips  
 Amount of Bentonite: 4 bag(s) 50 lbs. per bag  
 Type of Sand Pack: Silica, K&E #1/Global #5 gradation  
 Source of Sand: K & E  
 Amount of Sand: 7 bag(s) 50 lbs. per bag

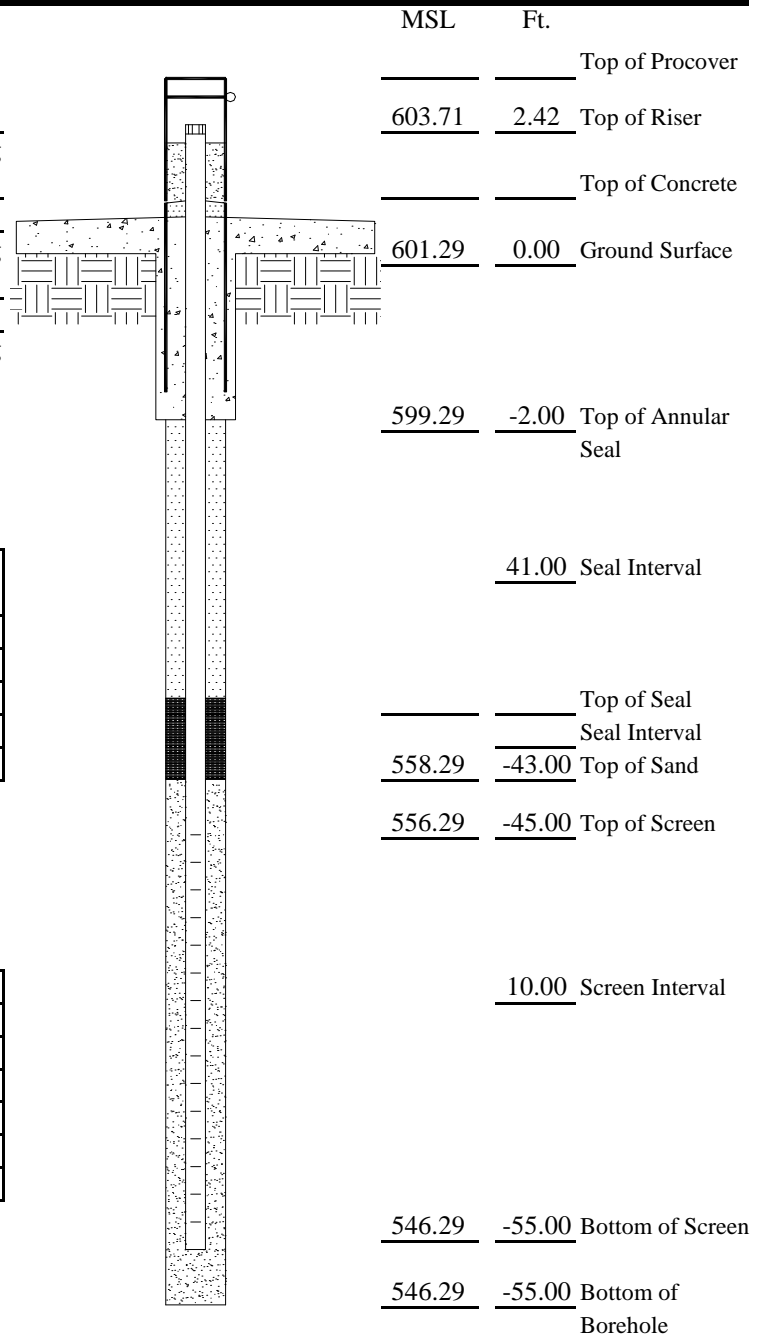
## Piezometer Construction Materials

	PVC	Stainless Steel	Teflon	Other (specify)
Riser Coupling Joint	X			
Riser Pipe Above W.T.	X			
Riser Pipe Below W.T.	X			
Screen	X			
Protective Casing				Steel

Riser Pipe Length	2.42
Protective Procover Length	2.72
Screen Length	10'
Total Length of Casing	47.42
Screen Slot Size	#10
Diameter of borehole - inches	8.25 O.D. 4.25 ID
ID of Riser Pipe - inches	2"

### Notes:

1) PVC screen and riser pipe sections are flush-threaded.



Completed by: Alex Huang  
 Surveyed by: Weaver Boos Consultants, LLC  
 Job Number: 1873-356-04-00

## Weaver Boos Consultants, LLC

7121 Grape Rd.  
 Granger, IN 46530  
 Phone: (574) 271-3447  
 Fax: (574) 271-3343



# MONITORING WELL COMPLETION REPORT

Site Name:	Karwick Nature	County:	LaPorte	Well Number:	<b>MW-4D</b>
Site Location:	Mich. City, IN	Northing:	2,354,289	Easting:	3,014,625
Drilling Contractor:	EDAC			Date Started:	11/5/2014
Head Driller:	Shawn	Helper:	Rick	Date Completed:	11/6/2014
Drilling Method:	4.25" ID HSA, SPT			Drilling Fluids Type:	Water as needed
Water Level at 0 Hours:	19	(ft. from top of PVC)		Time Started:	15:00
Water Level at 24 hours:	9.2	(ft. from top of PVC)		Time Completed:	10:00

## Annular Space Details

Type of Surface Seal:	Concrete
Amount of Concrete	0.33 bag(s) 80 lbs. per bag
Type of Annular Seal:	Quick Grout
Type of Bentonite Seal:	Holeplug bentonite chips
Amount of Bentonite:	4 bag(s) 50 lbs. per bag
Type of Sand Pack	Silica, K&E #1/Global #5 gradation
Source of Sand	K & E
Amount of Sand:	7 bag(s) 50 lbs. per bag

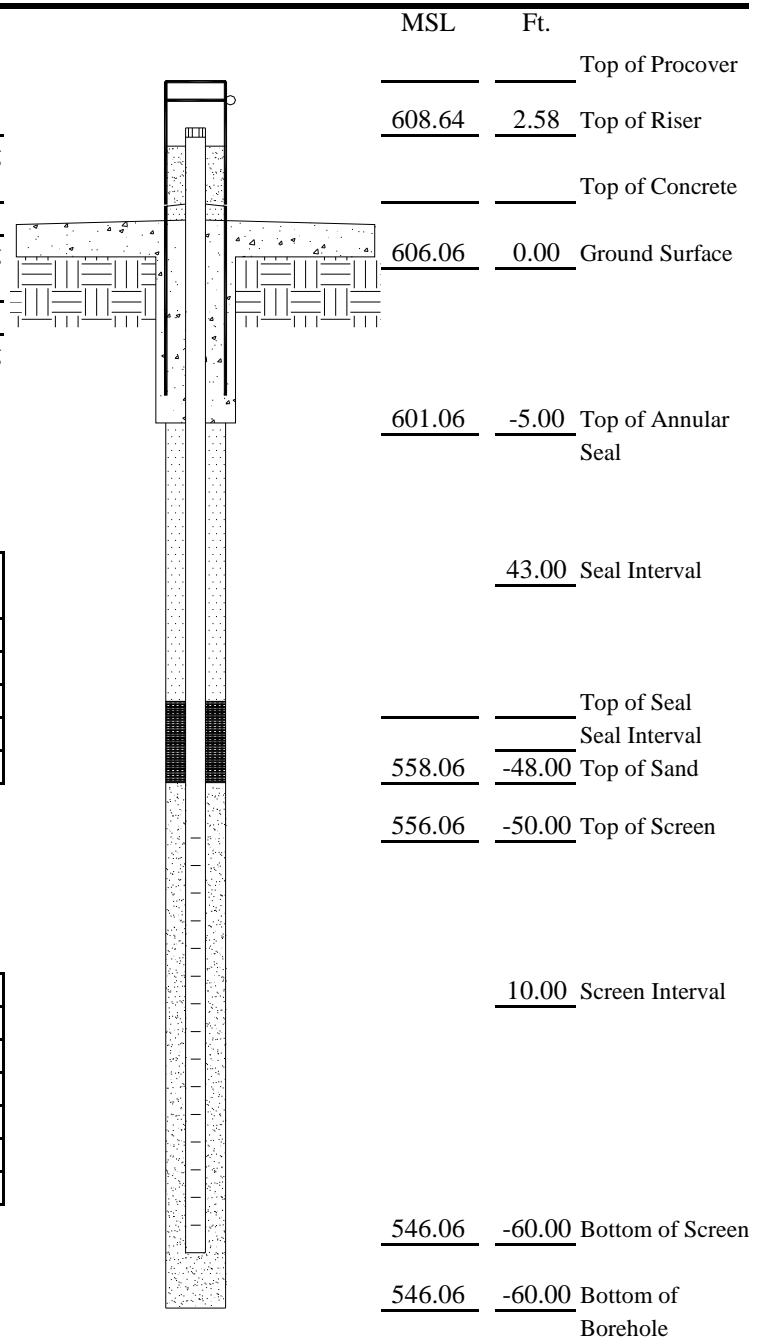
## Piezometer Construction Materials

	PVC	Stainless Steel	Teflon	Other (specify)
Riser Coupling Joint	X			
Riser Pipe Above W.T.	X			
Riser Pipe Below W.T.	X			
Screen	X			
Protective Casing				Steel

Riser Pipe Length	2.58
Protective Procover Length	2.88
Screen Length	10'
Total Length of Casing	52.58
Screen Slot Size	#10
Diameter of borehole - inches	8.25 O.D. 4.25 ID
ID of Riser Pipe - inches	2"

### Notes:

1) PVC screen and riser pipe sections are flush-threaded.



Completed by:	Alex Huang
Surveyed by:	Weaver Boos Consultants, LLC
Job Number:	1873-356-04-00

## Weaver Boos Consultants, LLC

7121 Grape Rd.  
Granger, IN 46530  
Phone: (574) 271-3447  
Fax: (574) 271-3343



# MONITORING WELL COMPLETION REPORT

Site Name:	Karwick Nature	County:	LaPorte	Well Number:	<b>MW-6D</b>
Site Location:	Mich. City, IN	Northing:	2,353,962	Easting:	3,014,629
Drilling Contractor:	EDAC			Date Started:	11/5/2014
Head Driller:	Shawn	Helper:	Rick	Date Completed:	11/5/2014
Drilling Method:	4.25" ID HSA, SPT			Drilling Fluids Type:	Water as needed
Water Level at 0 Hours:	11.5	(ft. from top of PVC)		Time Started:	7:45
Water Level at 24 hours:	4.77	(ft. from top of PVC)		Time Completed:	14:30

## Annular Space Details

Type of Surface Seal:	Concrete
Amount of Concrete	0.33 bag(s) 80 lbs. per bag
Type of Annular Seal:	Quick Grout
Type of Bentonite Seal:	Holeplug bentonite chips
Amount of Bentonite:	3 bag(s) 50 lbs. per bag
Type of Sand Pack	Silica, K&E #1/Global #5 gradation
Source of Sand	K & E
Amount of Sand:	6 bag(s) 50 lbs. per bag

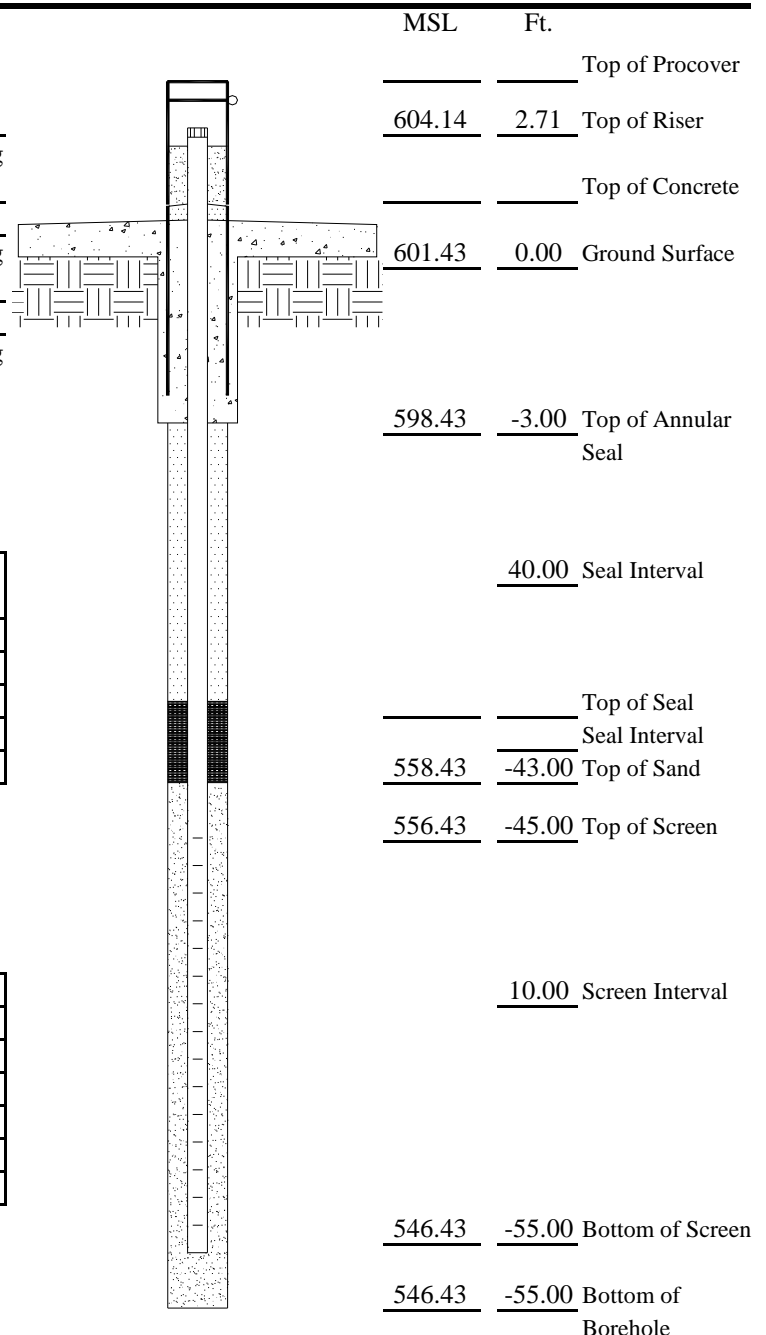
## Piezometer Construction Materials

	PVC	Stainless Steel	Teflon	Other (specify)
Riser Coupling Joint	X			
Riser Pipe Above W.T.	X			
Riser Pipe Below W.T.	X			
Screen	X			
Protective Casing				Steel

Riser Pipe Length	2.71
Protective Procover Length	3.01
Screen Length	10'
Total Length of Casing	47.71
Screen Slot Size	#10
Diameter of borehole - inches	8.25 O.D. 4.25 ID
ID of Riser Pipe - inches	2"

### Notes:

1) PVC screen and riser pipe sections are flush-threaded.



Completed by:	Alex Huang
Surveyed by:	Weaver Boos Consultants, LLC
Job Number:	1873-356-04-00

## Weaver Boos Consultants, LLC

7121 Grape Rd.  
Granger, IN 46530  
Phone: (574) 271-3447  
Fax: (574) 271-3343



# PIEZOMETER COMPLETION REPORT

Site Name:	Karwick Nature	County:	LaPorte	Well Number:	<b>MW-9S</b>
Site Location:	Mich. City, IN	Northing:	2,353,758	Easting:	3,014,618
Drilling Contractor:	EDAC			Date Started:	11/4/2014
Head Driller:	Shawn	Helper:	Rick	Date Completed:	11/4/2014
Drilling Method:	4.25" ID HSA, SPT			Drilling Fluids 'Type':	Water as needed
Water Level at 0 Hours:	13	(ft. from top of PVC)		Time Started:	13:30
Water Level at 24 hours:	9.94	(ft. from top of PVC)		Time Completed:	15:30

## Annular Space Details

Type of Surface Seal:	Concrete
Amount of Concrete	0.33 bag(s) 80 lbs. per bag
Type of Annular Seal:	Bentonite grout & cave-in sediment
Type of Bentonite Seal:	Holeplug bentonite chips
Amount of Bentonite:	0.75 bag(s) 50 lbs. per bag
Type of Sand Pack	Silica, K&E #1/Global #5 gradation
Source of Sand	K & E
Amount of Sand:	7 bag(s) 50 lbs. per bag

## Piezometer Construction Materials

	PVC	Stainless Steel	Teflon	Other (specify)
Riser Coupling Joint	X			
Riser Pipe Above W.T.	X			
Riser Pipe Below W.T.	X			
Screen	X			
Protective Casing				Steel

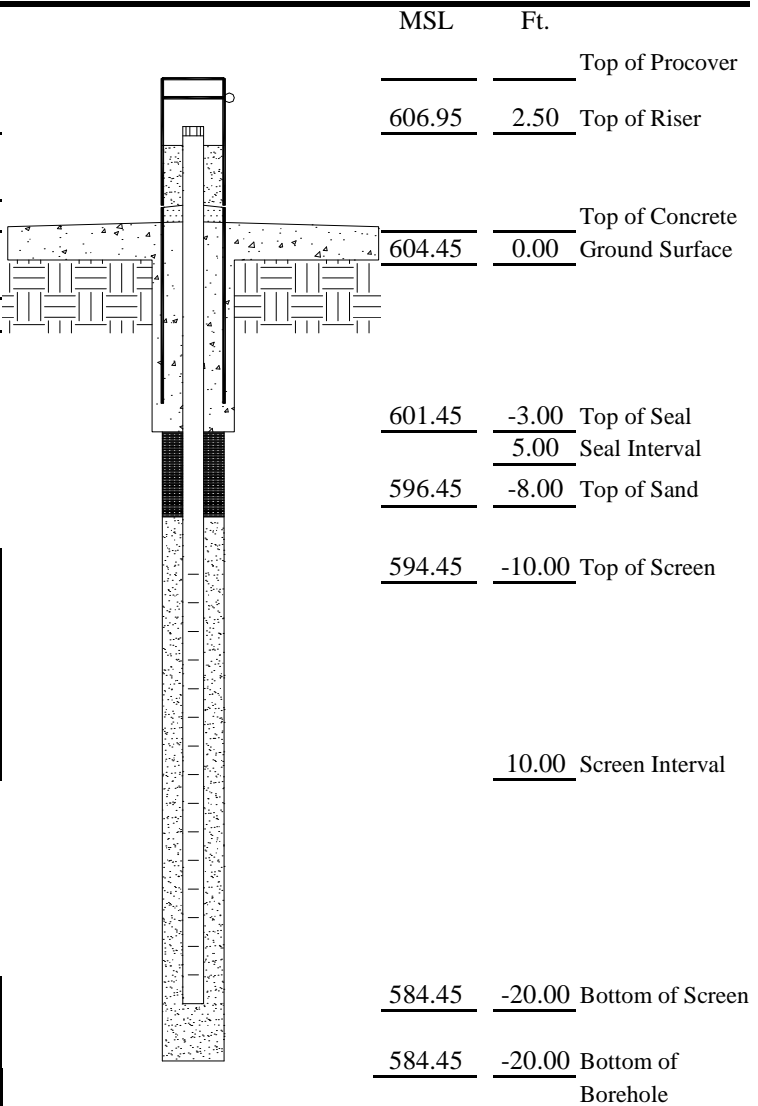
Riser Pipe Length	2.50
Protective Procover Length	2.80
Screen Length	10'
Total Length of Casing	12.50
Screen Slot Size	#10
Diameter of borehole - inches	8.25 O.D. 4.25 ID
ID of Riser Pipe - inches	2"

Notes: 1) PVC screen and riser pipe sections are flush-threaded.

Completed by: Alex Huang  
 Surveyed by: Weaver Boos Consultants, Inc.  
 Job Number: 1873-356-04-00

**Weaver Boos Consultants, LLC**

7121 Grape Rd.  
Granger, IN 46530  
Phone: (574) 271-3447  
Fax: (574) 271-3343





# MONITORING WELL COMPLETION REPORT

Site Name:	Karwick Nature	County:	LaPorte	Well Number:	<b>MW-10D</b>
Site Location:	Mich. City, IN	Northing:	2,354,276	Easting:	3,015,022
Drilling Contractor:	EDAC			Date Started:	11/4/2014
Head Driller:	Shawn	Helper:	Rick	Date Completed:	11/4/2014
Drilling Method:	4.25" ID HSA, SPT			Drilling Fluids 'Type':	Water as needed
Water Level at 0 Hours:	4.5	(ft. from top of PVC)		Time Started:	8:45
Water Level at 24 hours:	6.43	(ft. from top of PVC)		Time Completed:	10:40

## Annular Space Details

Type of Surface Seal:	Concrete
Amount of Concrete	0.33 bag(s) 80 lbs. per bag
Type of Annular Seal:	Quick Grout
Type of Bentonite Seal:	Holeplug bentonite chips
Amount of Bentonite:	3 bag(s) 50 lbs. per bag
Type of Sand Pack	Silica, K&E #1/Global #5 gradation
Source of Sand	K & E
Amount of Sand:	7 bag(s) 50 lbs. per bag

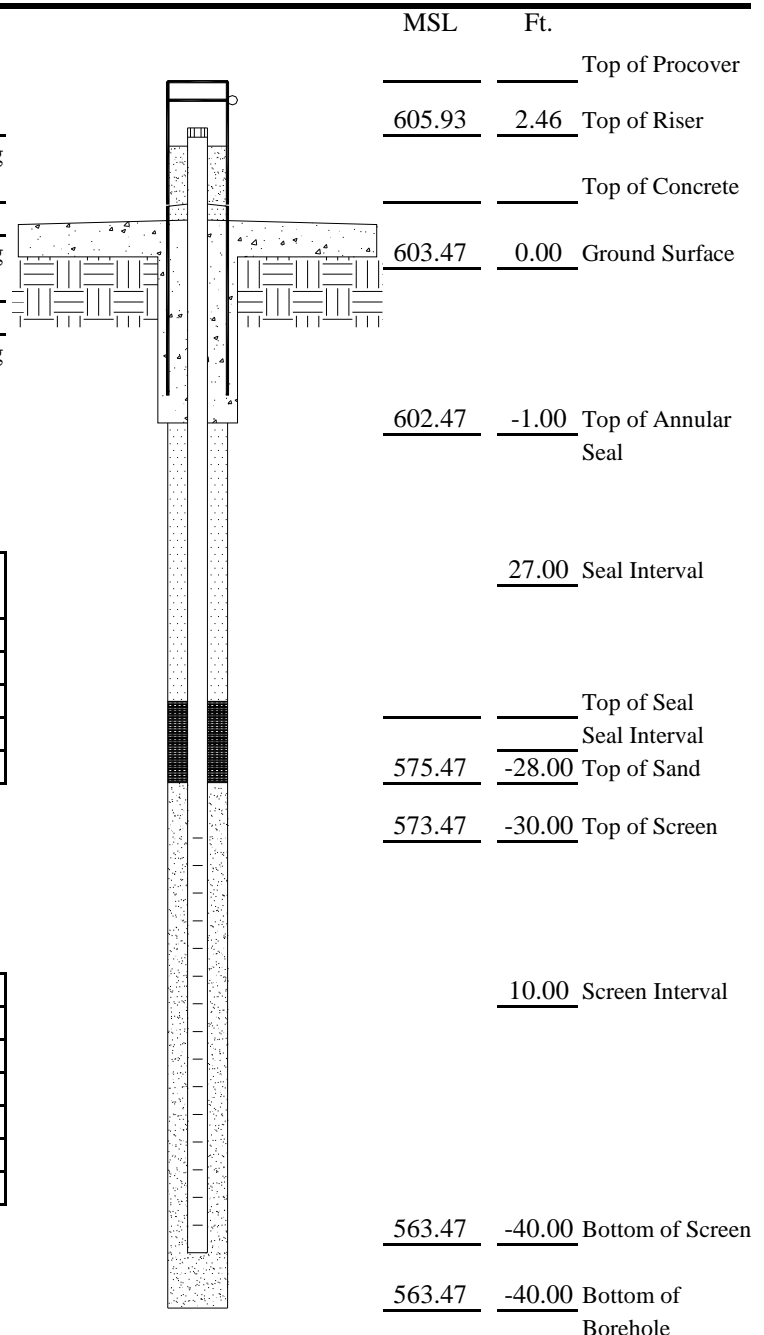
## Piezometer Construction Materials

	PVC	Stainless Steel	Teflon	Other (specify)
Riser Coupling Joint	X			
Riser Pipe Above W.T.	X			
Riser Pipe Below W.T.	X			
Screen	X			
Protective Casing				Steel

Riser Pipe Length	2.46
Protective Procover Length	2.76
Screen Length	10'
Total Length of Casing	32.46
Screen Slot Size	#10
Diameter of borehole - inches	8.25 O.D. 4.25 ID
ID of Riser Pipe - inches	2"

### Notes:

1) PVC screen and riser pipe sections are flush-threaded.



Completed by:	Alex Huang
Surveyed by:	Weaver Boos Consultants, LLC
Job Number:	1873-356-04-00

## Weaver Boos Consultants, LLC

7121 Grape Rd.  
Granger, IN 46530  
Phone: (574) 271-3447  
Fax: (574) 271-3343



# PIEZOMETER COMPLETION REPORT

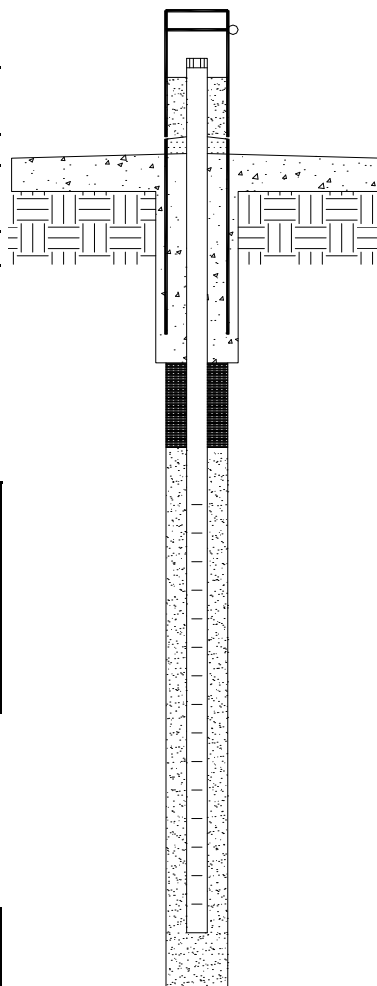
Site Name:	Karwick Nature	County:	LaPorte	Well Number:	MW-10S
Site Location:	Mich. City, IN	Northing:	2,354,280	Easting:	3,015,008
Drilling Contractor:	EDAC	Date Started:	11/7/2014		
Head Driller:	Shawn	Helper:	Rick	Date Completed:	11/7/2014
Drilling Method:	4.25" ID HSA, SPT		Drilling Fluids 'Type': Water as needed		
Water Level at 0 Hours:	4.5	(ft. from top of PVC)		Time Started:	10:15
Water Level at 24 hours:	7.03	(ft. from top of PVC)		Time Completed:	12:30

## Annular Space Details

Type of Surface Seal:	Concrete
Amount of Concrete	0.33 bag(s) 80 lbs. per bag
Type of Annular Seal:	Bentonite grout & cave-in sediment
Type of Bentonite Seal:	Holeplug bentonite chips
Amount of Bentonite:	0.25 bag(s) 50 lbs. per bag
Type of Sand Pack	Silica, K&E #1/Global #5 gradation
Source of Sand	K & E
Amount of Sand:	7 bag(s) 50 lbs. per bag

## Piezometer Construction Materials

	PVC	Stainless Steel	Teflon	Other (specify)
Riser Coupling Joint	X			
Riser Pipe Above W.T.	X			
Riser Pipe Below W.T.	X			
Screen	X			
Protective Casing				Steel



MSL	Ft.	
		Top of Procover
605.93	2.79	Top of Riser
		Top of Concrete
603.14	0.00	Ground Surface
603.14	0.00	Top of Seal
	1.00	Seal Interval
602.14	-1.00	Top of Sand
600.14	-3.00	Top of Screen
		10.00 Screen Interval
590.14	-13.00	Bottom of Screen
590.14	-13.00	Bottom of Borehole

Riser Pipe Length	2.79
Protective Procover Length	3.09
Screen Length	10'
Total Length of Casing	3.79
Screen Slot Size	#10
Diameter of borehole - inches	8.25 O.D. 4.25 ID
ID of Riser Pipe - inches	2"

Notes: 1) PVC screen and riser pipe sections are flush-threaded.

Completed by: Alex Huang  
 Surveyed by: Weaver Boos Consultants, I  
 Job Number: 1873-356-04-00

## Weaver Boos Consultants, LLC

7121 Grape Rd.  
 Granger, IN 46530  
 Phone: (574) 271-3447  
 Fax: (574) 271-3343



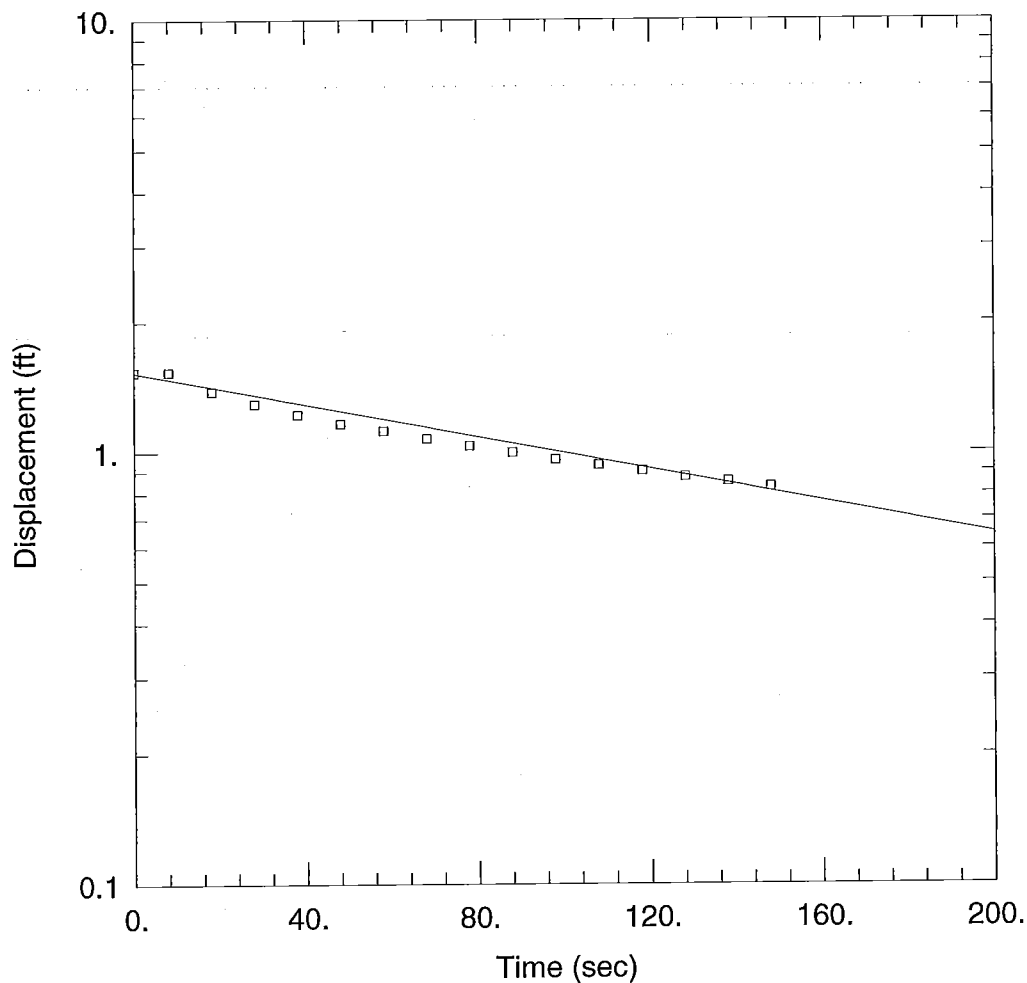
## **APPENDIX D**

1. Slug Test Reports
2. Geotechnical Test Reports



## **1. Slug Test Reports**





### MW-1S

Data Set: K:\...\MW-1S.aqt

Date: 12/08/14

Time: 10:48:18

### PROJECT INFORMATION

Company: Weaver Boos Consultants

Client: Mich. City Sanitary District

Project: 1873-356-04-00

Location: Karwick Road Nature Park

Test Well: MW-1S

Test Date: 12/4/2014

### AQUIFER DATA

Saturated Thickness: 8.53 ft

Anisotropy Ratio ( $K_z/K_r$ ): 1.

### WELL DATA (MW-1S)

Initial Displacement: 1.536 ft

Static Water Column Height: 8.53 ft

Total Well Penetration Depth: 8.53 ft

Screen Length: 5. ft

Casing Radius: 0.083 ft

Wellbore Radius: 0.375 ft

### SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 0.0001968$  cm/sec

$y_0 = 1.531$  ft



Data Set: K:\Wbgm\Client Information\1800-1899\1873\356\04-00\03 Site Car Imp\Karwick Slug Test Data\Analy  
 Title: MW-1S  
 Date: 12/08/14  
 Time: 10:48:25

### PROJECT INFORMATION

Company: Weaver Boos Consultants  
 Client: Mich. City Sanitary District  
 Project: 1873-356-04-00  
 Location: Karwick Road Nature Park  
 Test Date: 12/4/2014  
 Test Well: MW-1S

### AQUIFER DATA

Saturated Thickness: 8.53 ft  
 Anisotropy Ratio (Kz/Kr): 1.

### SLUG TEST WELL DATA

Test Well: : MW-1S

X Location: 0. ft  
 Y Location: 0. ft

Initial Displacement: 1.536 ft  
 Static Water Column Height: 8.53 ft  
 Casing Radius: 0.083 ft  
 Wellbore Radius: 0.375 ft  
 Well Skin Radius: 0.42 ft  
 Screen Length: 5. ft  
 Total Well Penetration Depth: 8.53 ft

No. of Observations: 15

Observation Data			
Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
8.	1.536	88.	0.998
18.	1.385	98.	0.96
28.	1.294	108.	0.931
38.	1.221	118.	0.903
48.	1.162	128.	0.875
58.	1.12	138.	0.852
68.	1.073	148.	0.828
78.	1.033		

### SOLUTION

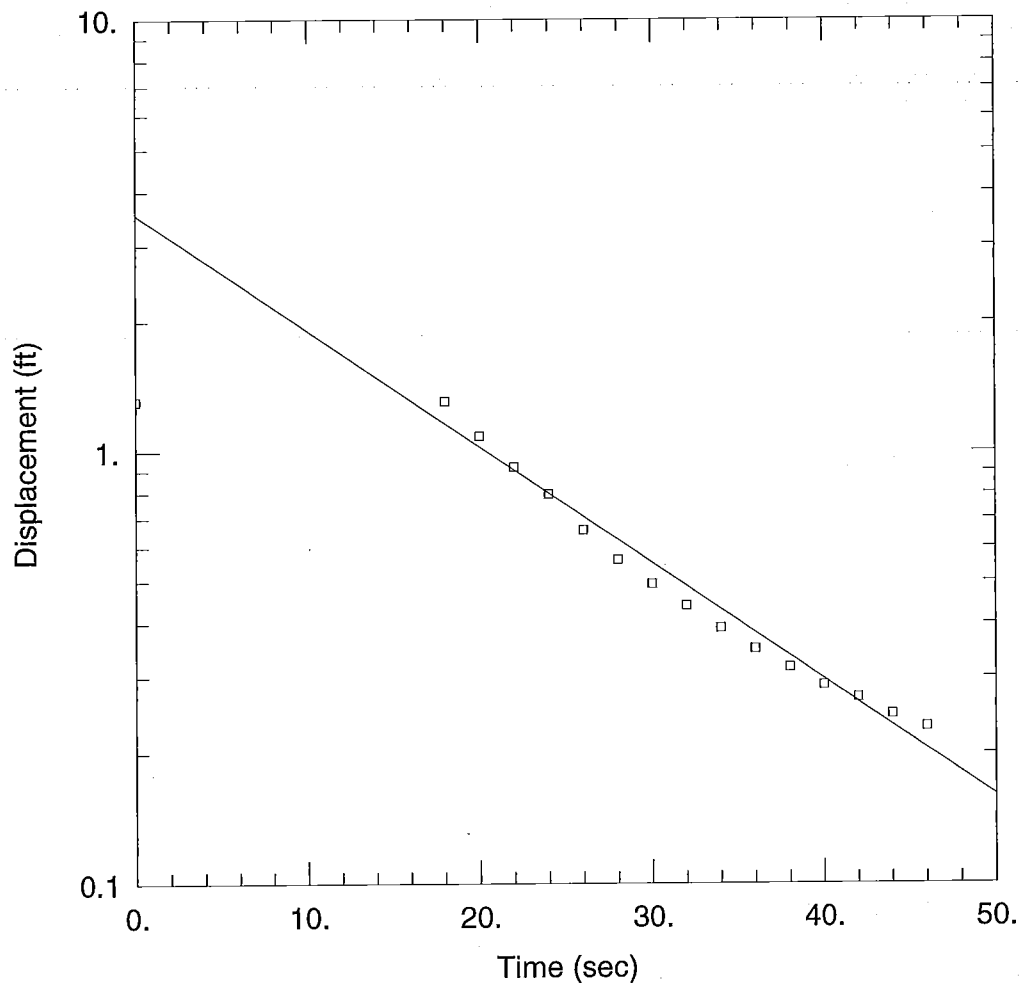
Aquifer Model: Unconfined  
 Solution Method: Bouwer-Rice  
 Shape Factor: 2.175

### VISUAL ESTIMATION RESULTS

#### Estimated Parameters

Parameter	Estimate	
K	0.0001968	cm/sec
y0	1.531	ft





#### MW-2S

Data Set: K:\...\MW-2S.aqt

Date: 12/08/14

Time: 10:48:51

#### PROJECT INFORMATION

Company: Weaver Boos Consultants

Client: Mich. City Sanitary District

Project: 1873-356-04-00

Location: Karwick Road Nature Park

Test Well: MW-2S

Test Date: 12/5/2014

#### AQUIFER DATA

Saturated Thickness: 7.82 ft

Anisotropy Ratio ( $K_z/K_r$ ): 1.

#### WELL DATA (MW-2S)

Initial Displacement: 1.308 ft

Static Water Column Height: 7.82 ft

Total Well Penetration Depth: 7.82 ft

Screen Length: 5. ft

Casing Radius: 0.083 ft

Wellbore Radius: 0.375 ft

#### SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 0.002768$  cm/sec

$y_0 = 3.539$  ft



Data Set: K:\Wbgn\Client Information\1800-1899\1873\356\04-00\03 Site Car Imp\Karwick Slug Test Data\Analy  
Title: MW-2S  
Date: 12/08/14  
Time: 10:49:00

---

### PROJECT INFORMATION

Company: Weaver Boos Consultants  
Client: Mich. City Sanitary District  
Project: 1873-356-04-00  
Location: Karwick Road Nature Park  
Test Date: 12/5/2014  
Test Well: MW-2S

---

### AQUIFER DATA

Saturated Thickness: 7.82 ft  
Anisotropy Ratio (Kz/Kr): 1.

---

### SLUG TEST WELL DATA

Test Well: : MW-2S

X Location: 0. ft  
Y Location: 0. ft

Initial Displacement: 1.308 ft  
Static Water Column Height: 7.82 ft  
Casing Radius: 0.083 ft  
Wellbore Radius: 0.375 ft  
Well Skin Radius: 0.42 ft  
Screen Length: 5. ft  
Total Well Penetration Depth: 7.82 ft

No. of Observations: 15

Observation Data			
Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
18.	1.308	34.	0.39
20.	1.087	36.	0.349
22.	0.921	38.	0.316
24.	0.797	40.	0.287
26.	0.658	42.	0.269
28.	0.561	44.	0.246
30.	0.493	46.	0.23
32.	0.439		

---

### SOLUTION

Aquifer Model: Unconfined  
Solution Method: Bouwer-Rice  
Shape Factor: 2.128

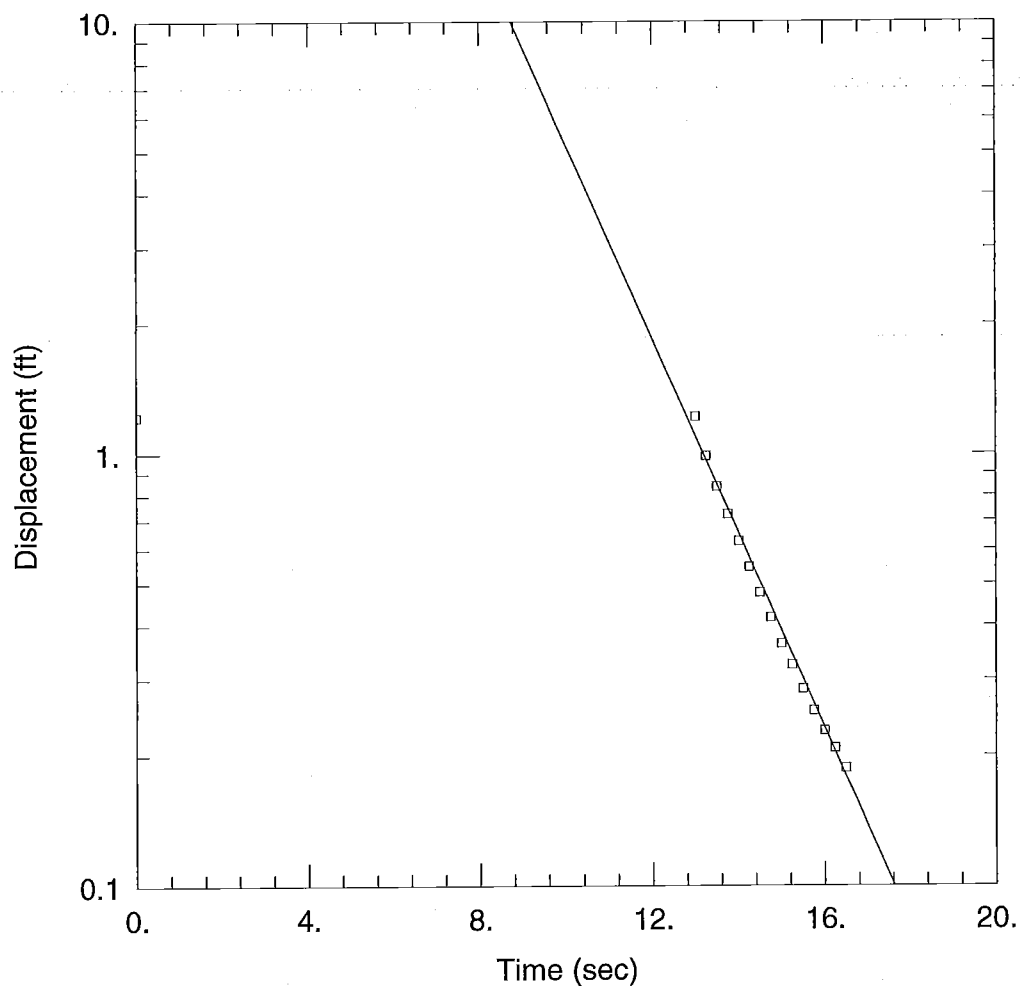
---

### VISUAL ESTIMATION RESULTS

#### Estimated Parameters

Parameter	Estimate	
K	0.002768	cm/sec
y0	3.539	ft





#### MW-2D

Data Set: K:\...\MW-2D.aqt

Date: 12/08/14

Time: 10:49:53

#### PROJECT INFORMATION

Company: Weaver Boos Consultants

Client: Mich. City Sanitary District

Project: 1873-356-04-00

Location: Karwick Road Nature Park

Test Well: MW-2D

Test Date: 12/5/2014

#### AQUIFER DATA

Saturated Thickness: 24. ft

Anisotropy Ratio ( $K_z/K_r$ ): 1.

#### WELL DATA (MW-2D)

Initial Displacement: 1.217 ft

Static Water Column Height: 53.05 ft

Total Well Penetration Depth: 15. ft

Screen Length: 10. ft

Casing Radius: 0.083 ft

Wellbore Radius: 0.375 ft

#### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

$K = 0.01263$  cm/sec

$y_0 = 934.7$  ft



Data Set: K:\Wb\gm\Client Information\1800-1899\1873\356\04-00\03 Site Car Imp\Karwick Slug Test Data\Analy  
 Title: MW-2D  
 Date: 12/08/14  
 Time: 10:49:56

### PROJECT INFORMATION

Company: Weaver Boos Consultants  
 Client: Mich. City Sanitary District  
 Project: 1873-356-04-00  
 Location: Karwick Road Nature Park  
 Test Date: 12/5/2014  
 Test Well: MW-2D

### AQUIFER DATA

Saturated Thickness: 24. ft  
 Anisotropy Ratio (Kz/Kr): 1.

### SLUG TEST WELL DATA

Test Well: : MW-2D

X Location: 0. ft  
 Y Location: 0. ft

Initial Displacement: 1.217 ft  
 Static Water Column Height: 53.05 ft  
 Casing Radius: 0.083 ft  
 Wellbore Radius: 0.375 ft  
 Well Skin Radius: 0.42 ft  
 Screen Length: 10. ft  
 Total Well Penetration Depth: 15. ft

No. of Observations: 15

Observation Data			
Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
13.	1.217	15.	0.363
13.25	0.987	15.25	0.324
13.5	0.838	15.5	0.285
13.75	0.724	15.75	0.254
14.	0.627	16.	0.228
14.25	0.546	16.25	0.208
14.5	0.477	16.5	0.187
14.75	0.417		

### SOLUTION

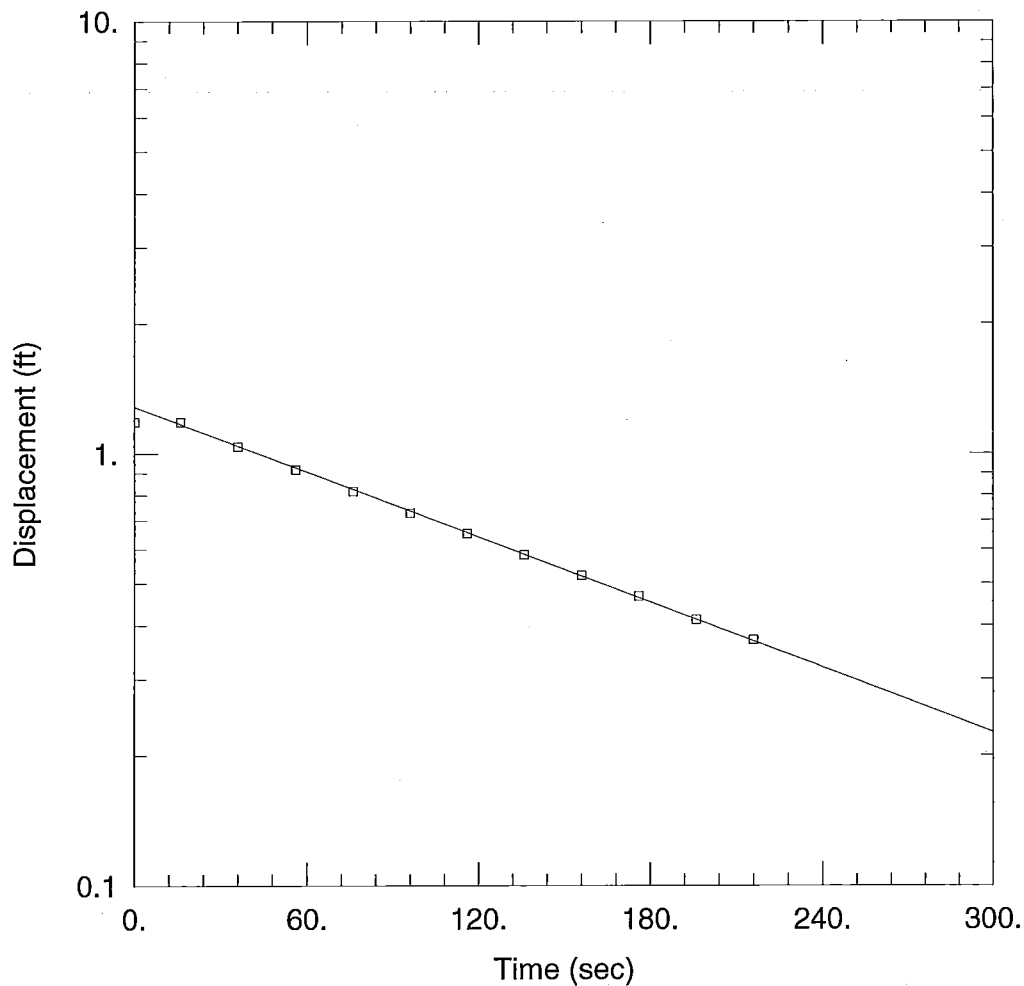
Aquifer Model: Confined  
 Solution Method: Bouwer-Rice  
 Shape Factor: 2.319

### VISUAL ESTIMATION RESULTS

#### Estimated Parameters

Parameter	Estimate	
K	0.01263	cm/sec
y0	934.7	ft





### MW-3S

Data Set: K:\...\MW-3S.aqt

Date: 12/08/14

Time: 10:58:10

### PROJECT INFORMATION

Company: Weaver Boos Consultants

Client: Mich. City Sanitary District

Project: 1873-356-04-00

Location: Karwick Road Nature Park

Test Well: MW-3S

Test Date: 12/5/2014

### AQUIFER DATA

Saturated Thickness: 9.43 ft

Anisotropy Ratio ( $K_z/K_r$ ): 1

### WELL DATA (MW-3S)

Initial Displacement: 1.182 ft

Static Water Column Height: 9.43 ft

Total Well Penetration Depth: 9.43 ft

Screen Length: 5 ft

Casing Radius: 0.083 ft

Wellbore Radius: 0.375 ft

### SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 0.0002707$  cm/sec

$y_0 = 1.283$  ft



Data Set: K:\Wbgm\Client Information\1800-1899\1873\356\04-00\03 Site Car Impl\Karwick Slug Test Data\Analy  
Title: MW-3S  
Date: 12/08/14  
Time: 10:58:16

### PROJECT INFORMATION

Company: Weaver Boos Consultants  
Client: Mich. City Sanitary District  
Project: 1873-356-04-00  
Location: Karwick Road Nature Park  
Test Date: 12/5/2014  
Test Well: MW-3S

### AQUIFER DATA

Saturated Thickness: 9.43 ft  
Anisotropy Ratio (Kz/Kr): 1.

### SLUG TEST WELL DATA

Test Well: : MW-3S

X Location: 0. ft  
Y Location: 0. ft

Initial Displacement: 1.182 ft  
Static Water Column Height: 9.43 ft  
Casing Radius: 0.083 ft  
Wellbore Radius: 0.375 ft  
Well Skin Radius: 0.42 ft  
Screen Length: 5. ft  
Total Well Penetration Depth: 9.43 ft

No. of Observations: 11

Observation Data			
Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
16.	1.182	136.	0.583
36.	1.038	156.	0.522
56.	0.918	176.	0.467
76.	0.817	196.	0.412
96.	0.727	216.	0.37
116.	0.652		

### SOLUTION

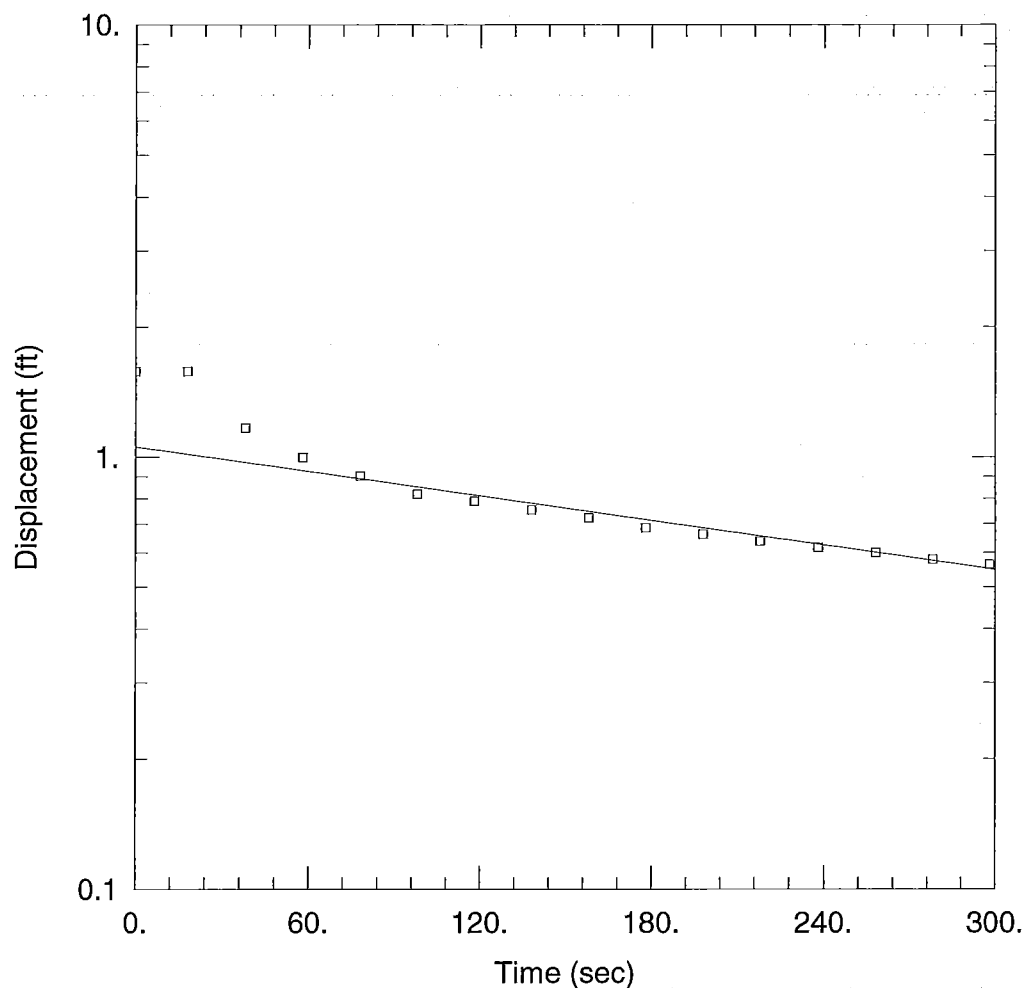
Aquifer Model: Unconfined  
Solution Method: Bouwer-Rice  
Shape Factor: 2.228

### VISUAL ESTIMATION RESULTS

#### Estimated Parameters

Parameter	Estimate	
K	0.0002707	cm/sec
y0	1.283	ft





#### MW-4S

Data Set: K:\...\MW-4S.aqt

Date: 12/08/14

Time: 11:05:12

#### PROJECT INFORMATION

Company: Weaver Boos Consultants

Client: Mich. City Sanitary District

Project: 1873-356-04-00

Location: Karwick Road Nature Park

Test Well: MW-4S

Test Date: 11/5/2014

#### AQUIFER DATA

Saturated Thickness: 6.29 ft

Anisotropy Ratio ( $K_z/K_r$ ): 1.

#### WELL DATA (MW-4S)

Initial Displacement: 1.577 ft

Static Water Column Height: 6.29 ft

Total Well Penetration Depth: 6.29 ft

Screen Length: 5. ft

Casing Radius: 0.083 ft

Wellbore Radius: 0.375 ft

#### SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 9.201E-05$  cm/sec

$y_0 = 1.055$  ft



Data Set: K:\Wbgn\Client Information\1800-1899\1873\356\04-00\03 Site Car Impl\Karwick Slug Test Data\Analy  
 Title: MW-4S  
 Date: 12/08/14  
 Time: 11:05:16

### PROJECT INFORMATION

Company: Weaver Boos Consultants  
 Client: Mich. City Sanitary District  
 Project: 1873-356-04-00  
 Location: Karwick Road Nature Park  
 Test Date: 11/5/2014  
 Test Well: MW-4S

### AQUIFER DATA

Saturated Thickness: 6.29 ft  
 Anisotropy Ratio (Kz/Kr): 1.

### SLUG TEST WELL DATA

Test Well: : MW-4S

X Location: 0. ft  
 Y Location: 0. ft

Initial Displacement: 1.577 ft  
 Static Water Column Height: 6.29 ft  
 Casing Radius: 0.083 ft  
 Wellbore Radius: 0.375 ft  
 Well Skin Radius: 0.42 ft  
 Screen Length: 5. ft  
 Total Well Penetration Depth: 6.29 ft

No. of Observations: 15

Observation Data			
<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>
18.	1.577	178.	0.685
38.	1.167	198.	0.662
58.	0.997	218.	0.638
78.	0.903	238.	0.617
98.	0.82	258.	0.6
118.	0.79	278.	0.579
138.	0.754	298.	0.563
158.	0.723		

### SOLUTION

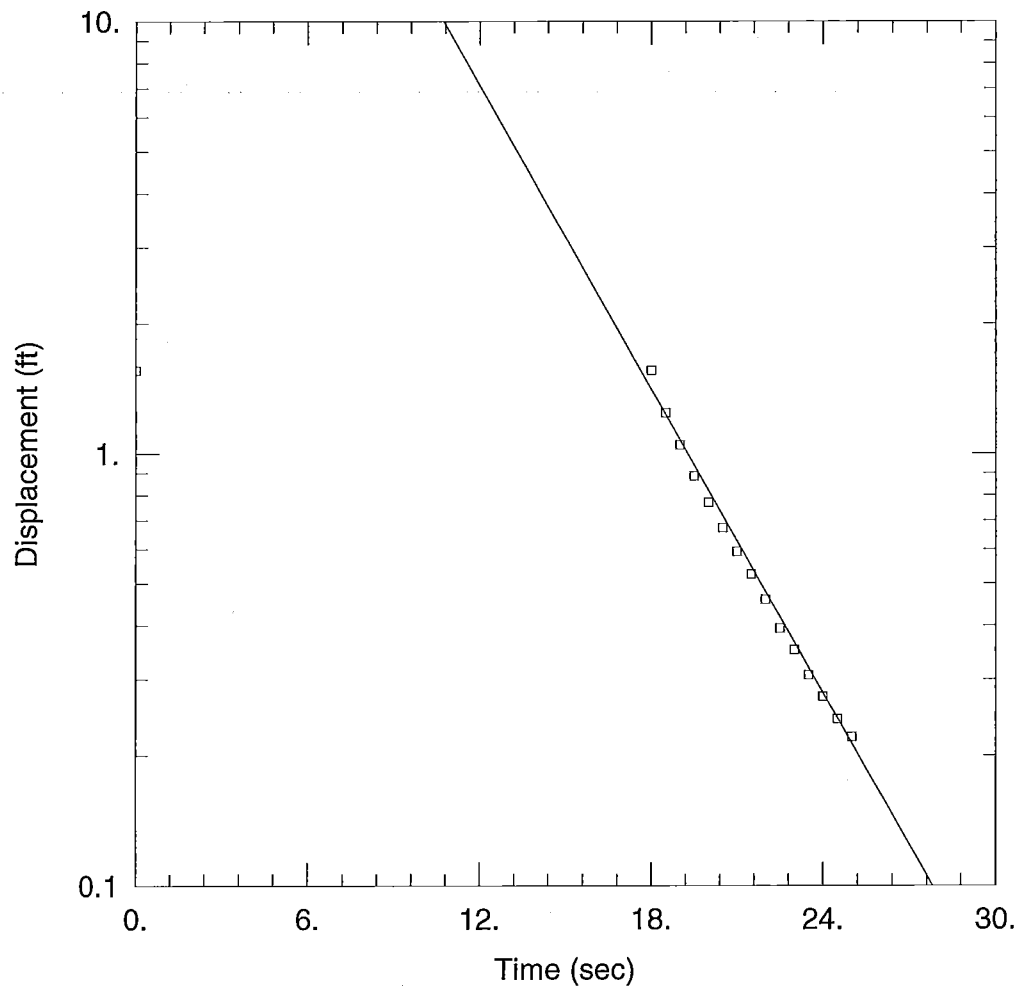
Aquifer Model: Unconfined  
 Solution Method: Bouwer-Rice  
 Shape Factor: 2.009

### VISUAL ESTIMATION RESULTS

#### Estimated Parameters

<u>Parameter</u>	<u>Estimate</u>	
K	9.201E-05	cm/sec
y0	1.055	ft





#### MW-4D

Data Set: K:\...\MW-4D.aqt

Date: 12/08/14

Time: 11:32:28

#### PROJECT INFORMATION

Company: Weaver Boos Consultants

Client: Mich. City Sanitary District

Project: 1873-356-04-00

Location: Karwick Road Nature Park

Test Well: MW-4D

Test Date: 12/5/2014

#### AQUIFER DATA

Saturated Thickness: 24. ft

Anisotropy Ratio (Kz/Kr): 1.

#### WELL DATA (MW-4D)

Initial Displacement: 1.556 ft

Static Water Column Height: 53.98 ft

Total Well Penetration Depth: 15. ft

Screen Length: 10. ft

Casing Radius: 0.083 ft

Wellbore Radius: 0.375 ft

#### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 0.006568 cm/sec

y0 = 180.9 ft



Data Set: K:\Wbgn\Client Information\1800-1899\1873\356\04-00\03 Site Car Impl\Karwick Slug Test Data\Analy  
 Title: MW-4D  
 Date: 12/08/14  
 Time: 11:32:33

### PROJECT INFORMATION

Company: Weaver Boos Consultants  
 Client: Mich. City Sanitary District  
 Project: 1873-356-04-00  
 Location: Karwick Road Nature Park  
 Test Date: 12/5/2014  
 Test Well: MW-4D

### AQUIFER DATA

Saturated Thickness: 24. ft  
 Anisotropy Ratio (Kz/Kr): 1.

### SLUG TEST WELL DATA

Test Well: : MW-4D

X Location: 0. ft  
 Y Location: 0. ft

Initial Displacement: 1.556 ft  
 Static Water Column Height: 53.98 ft  
 Casing Radius: 0.083 ft  
 Wellbore Radius: 0.375 ft  
 Well Skin Radius: 0.42 ft  
 Screen Length: 10. ft  
 Total Well Penetration Depth: 15. ft

No. of Observations: 15

Observation Data			
Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
18.	1.556	22.	0.459
18.5	1.24	22.5	0.394
19.	1.047	23.	0.351
19.5	0.886	23.5	0.307
20.	0.77	24.	0.274
20.5	0.673	24.5	0.243
21.	0.593	25.	0.221
21.5	0.525		

### SOLUTION

Aquifer Model: Confined  
 Solution Method: Bouwer-Rice  
 Shape Factor: 2.319

### VISUAL ESTIMATION RESULTS

#### Estimated Parameters

Parameter	Estimate	
K	0.006568	cm/sec
y0	180.9	ft

### AUTOMATIC ESTIMATION RESULTS

#### Estimated Parameters

Parameter	Estimate	Std. Error	
K	0.007248	0.0002392	cm/sec
y0	311.3	57.65	ft



Parameter Correlations

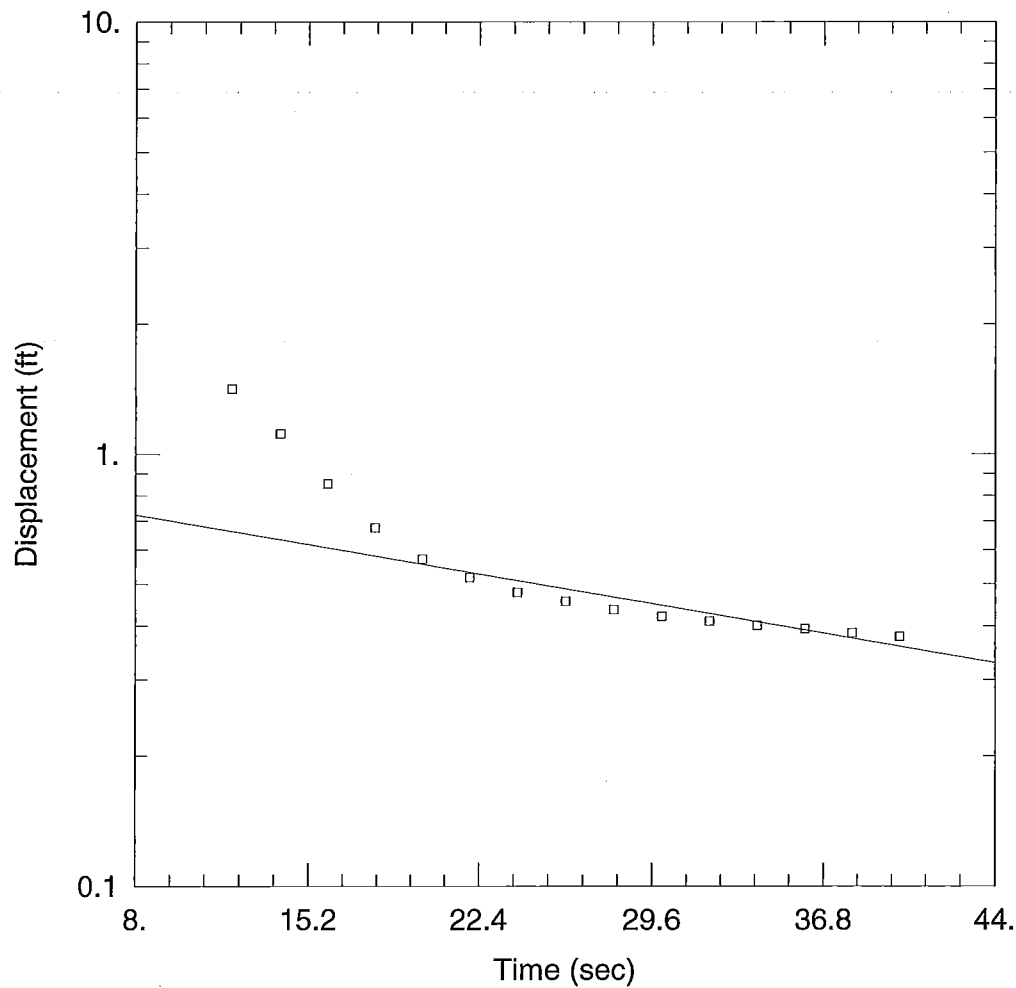
	K	y0
K	1.00	1.00
y0	1.00	1.00

Residual Statistics

for weighted residuals

Sum of Squares . . . . . 0.01962 ft<sup>2</sup>  
Variance . . . . . 0.00151 ft<sup>2</sup>  
Std. Deviation . . . . . 0.03885 ft  
Mean . . . . . 0.004684 ft  
No. of Residuals . . . . . 15  
No. of Estimates . . . . . 2





#### MW-5S

Data Set: K:\...\MW-5S.aqt

Date: 12/08/14

Time: 11:44:15

#### PROJECT INFORMATION

Company: Weaver Boos Consultants

Client: Mich. City Sanitary District

Project: 1873-356-04-00

Location: Karwick Road Nature Park

Test Well: MW-5S

Test Date: 12/5/2014

#### AQUIFER DATA

Saturated Thickness: 4.92 ft

Anisotropy Ratio ( $K_z/K_r$ ): 1.

#### WELL DATA (MW-5S)

Initial Displacement: 1.566 ft

Static Water Column Height: 4.92 ft

Total Well Penetration Depth: 4.92 ft

Screen Length: 5. ft

Casing Radius: 0.083 ft

Wellbore Radius: 0.375 ft

#### SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 0.0008589$  cm/sec

$y_0 = 0.8609$  ft



Data Set: K:\Wb\gm\Client Information\1800-1899\1873\356\04-00\03 Site Car Impl\Karwick Slug Test Data\Analy  
 Title: MW-5S  
 Date: 12/08/14  
 Time: 11:44:19

### PROJECT INFORMATION

Company: Weaver Boos Consultants  
 Client: Mich. City Sanitary District  
 Project: 1873-356-04-00  
 Location: Karwick Road Nature Park  
 Test Date: 12/5/2014  
 Test Well: MW-5S

### AQUIFER DATA

Saturated Thickness: 4.92 ft  
 Anisotropy Ratio (Kz/Kr): 1.

### SLUG TEST WELL DATA

Test Well: : MW-5S

X Location: 0. ft  
 Y Location: 0. ft

Initial Displacement: 1.566 ft  
 Static Water Column Height: 4.92 ft  
 Casing Radius: 0.083 ft  
 Wellbore Radius: 0.375 ft  
 Well Skin Radius: 0.42 ft  
 Screen Length: 5. ft  
 Total Well Penetration Depth: 4.92 ft

No. of Observations: 15

Observation Data			
Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
12.	1.415	28.	0.436
14.	1.114	30.	0.421
16.	0.853	32.	0.41
18.	0.675	34.	0.401
20.	0.571	36.	0.394
22.	0.517	38.	0.385
24.	0.478	40.	0.378
26.	0.456		

### SOLUTION

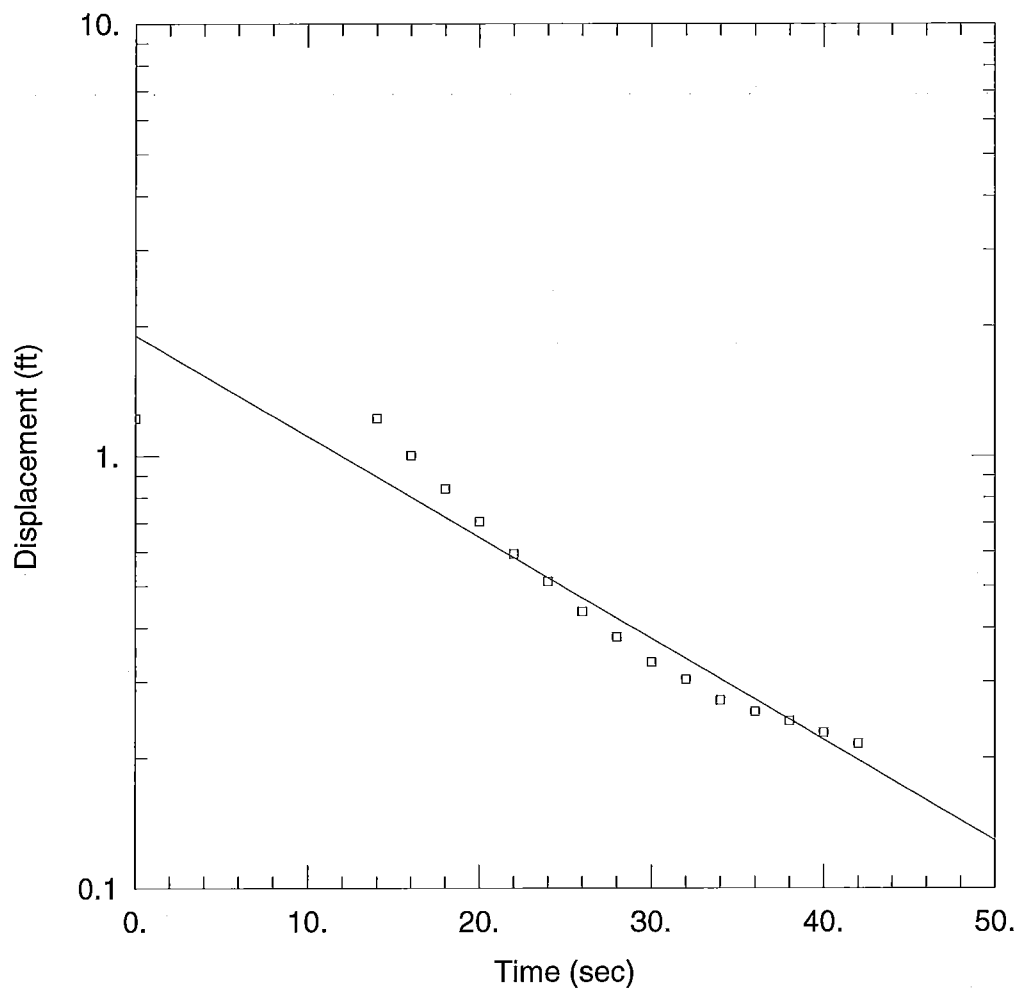
Aquifer Model: Unconfined  
 Solution Method: Bouwer-Rice  
 Shape Factor: 1.869

### VISUAL ESTIMATION RESULTS

#### Estimated Parameters

Parameter	Estimate	
K	0.0008589	cm/sec
y0	0.8609	ft





#### MW-6S

Data Set: K:\...\MW-6S.aqt

Date: 12/08/14

Time: 11:50:46

#### PROJECT INFORMATION

Company: Weaver Boos Consultants

Client: Mich. City Sanitary District

Project: 1873-356-04-00

Location: Karwick Road Nature Park

Test Well: MW-6S

Test Date: 12/4/2014

#### AQUIFER DATA

Saturated Thickness: 3.42 ft

Anisotropy Ratio ( $K_z/K_r$ ): 1.

#### WELL DATA (MW-6S)

Initial Displacement: 1.221 ft

Static Water Column Height: 3.42 ft

Total Well Penetration Depth: 3.42 ft

Screen Length: 5. ft

Casing Radius: 0.083 ft

Wellbore Radius: 0.375 ft

Gravel Pack Porosity: 0.3

#### SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 0.01274$  cm/sec

$y_0 = 1.901$  ft



Data Set: K:\Wb\gm\Client Information\1800-1899\1873\356\04-00\03 Site Car Impl\Karwick Slug Test Data\Analy  
 Title: MW-6S  
 Date: 12/08/14  
 Time: 11:50:48

### PROJECT INFORMATION

Company: Weaver Boos Consultants  
 Client: Mich. City Sanitary District  
 Project: 1873-356-04-00  
 Location: Karwick Road Nature Park  
 Test Date: 12/4/2014  
 Test Well: MW-6S

### AQUIFER DATA

Saturated Thickness: 3.42 ft  
 Anisotropy Ratio (Kz/Kr): 1.

### SLUG TEST WELL DATA

Test Well: : MW-6S

X Location: 0. ft  
 Y Location: 0. ft

Initial Displacement: 1.221 ft  
 Static Water Column Height: 3.42 ft  
 Casing Radius: 0.083 ft  
 Wellbore Radius: 0.375 ft  
 Well Skin Radius: 0.42 ft  
 Screen Length: 5. ft  
 Total Well Penetration Depth: 3.42 ft  
 Corrected Casing Radius (Bouwer-Rice Method): 0.2168 ft  
 Gravel Pack Porosity: 0.3

No. of Observations: 15

Observation Data			
Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
14.	1.221	30.	0.333
16.	1.002	32.	0.304
18.	0.839	34.	0.272
20.	0.704	36.	0.256
22.	0.593	38.	0.244
24.	0.512	40.	0.229
26.	0.436	42.	0.216
28.	0.381		

### SOLUTION

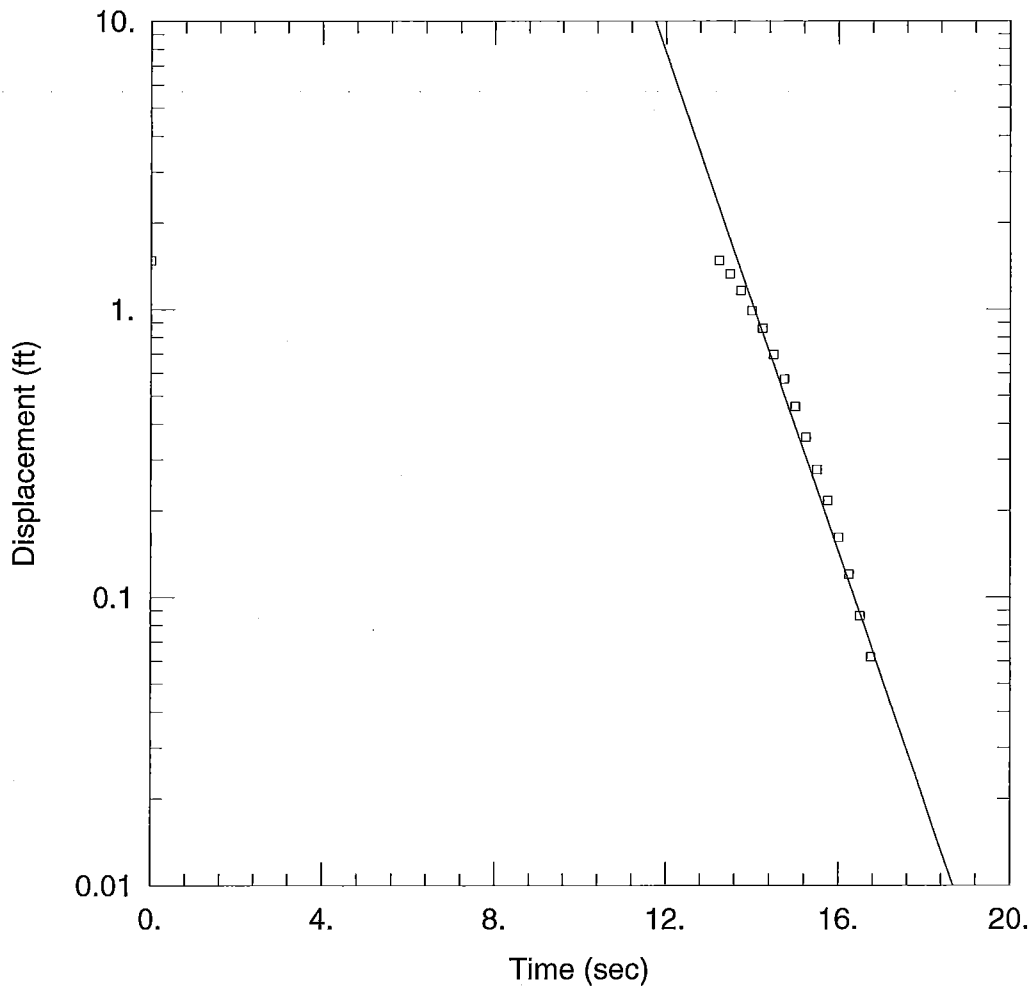
Aquifer Model: Unconfined  
 Solution Method: Bouwer-Rice  
 Shape Factor: 1.652

### VISUAL ESTIMATION RESULTS

#### Estimated Parameters

Parameter	Estimate	
K	0.01274	cm/sec
y0	1.901	ft





#### MW-6D

Data Set: K:\...\MW-6D.aqt

Date: 12/08/14

Time: 11:56:10

#### PROJECT INFORMATION

Company: Weaver Boos Consultants

Client: Mich. City Sanitary District

Project: 1873-356-04-00

Location: Karwick Road Nature Park

Test Well: MW-6D

Test Date: 12/4/2014

#### AQUIFER DATA

Saturated Thickness: 24. ft

Anisotropy Ratio ( $K_z/K_r$ ): 1.

#### WELL DATA (MW-6D)

Initial Displacement: 1.478 ft

Static Water Column Height: 53.42 ft

Total Well Penetration Depth: 15. ft

Screen Length: 10. ft

Casing Radius: 0.083 ft

Wellbore Radius: 0.375 ft

#### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

$K = 0.02429$  cm/sec

$y_0 = 1.239E+06$  ft



Data Set: K:\Wb\gm\Client Information\1800-1899\1873\356\04-00\03 Site Car Imp\Karwick Slug Test Data\Analy  
 Title: MW-6D  
 Date: 12/08/14  
 Time: 11:56:13

### PROJECT INFORMATION

Company: Weaver Boos Consultants  
 Client: Mich. City Sanitary District  
 Project: 1873-356-04-00  
 Location: Karwick Road Nature Park  
 Test Date: 12/4/2014  
 Test Well: MW-6D

### AQUIFER DATA

Saturated Thickness: 24. ft  
 Anisotropy Ratio (Kz/Kr): 1.

### SLUG TEST WELL DATA

Test Well: : MW-6D

X Location: 0. ft  
 Y Location: 0. ft

Initial Displacement: 1.478 ft  
 Static Water Column Height: 53.42 ft  
 Casing Radius: 0.083 ft  
 Wellbore Radius: 0.375 ft  
 Well Skin Radius: 0.42 ft  
 Screen Length: 10. ft  
 Total Well Penetration Depth: 15. ft

No. of Observations: 15

Observation Data			
Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
13.25	1.478	15.25	0.359
13.5	1.328	15.5	0.277
13.75	1.16	15.75	0.216
14.	0.988	16.	0.161
14.25	0.859	16.25	0.12
14.5	0.696	16.5	0.086
14.75	0.572	16.75	0.062
15.	0.459		

### SOLUTION

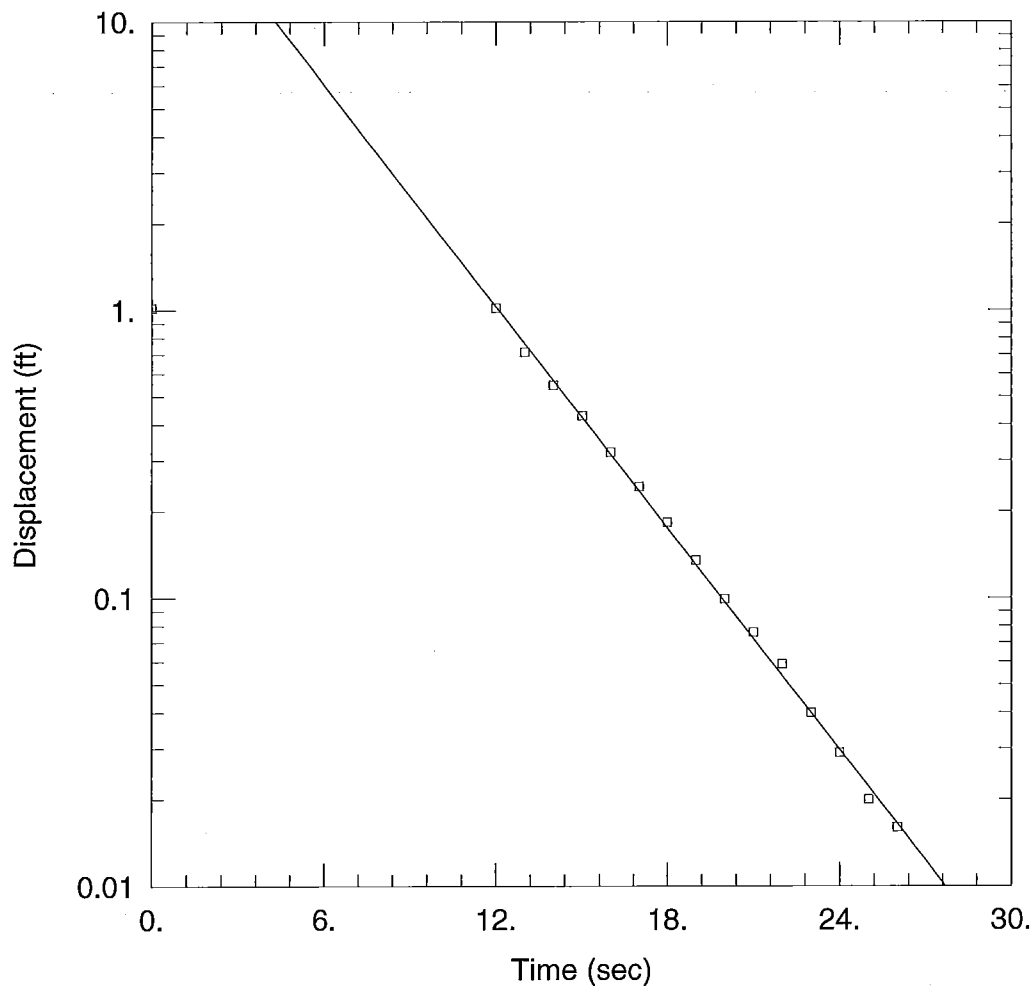
Aquifer Model: Confined  
 Solution Method: Bouwer-Rice  
 Shape Factor: 2.319

### VISUAL ESTIMATION RESULTS

#### Estimated Parameters

Parameter	Estimate	
K	0.02429	cm/sec
y0	1.239E+06	ft





### MW-7S

Data Set: K:\...MW-7S.aqt

Date: 12/08/14

Time: 12:03:05

### PROJECT INFORMATION

Company: Weaver Boos Consultants

Client: Mich. City Sanitary District

Project: 1873-356-04-00

Location: Karwick Road Nature Park

Test Well: MW-7S

Test Date: 12/5/2014

### AQUIFER DATA

Saturated Thickness: 8.69 ft

Anisotropy Ratio ( $K_z/K_r$ ): 1

### WELL DATA (MW-7S)

Initial Displacement: 1.016 ft

Static Water Column Height: 8.69 ft

Total Well Penetration Depth: 8.69 ft

Screen Length: 5 ft

Casing Radius: 0.083 ft

Wellbore Radius: 0.375 ft

### SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 0.01354$  cm/sec

$y_0 = 35.49$  ft



Data Set: K:\Wb\gm\Client Information\1800-1899\1873\356\04-00\03 Site Car Impl\Karwick Slug Test Data\Analy  
 Title: MW-7S  
 Date: 12/08/14  
 Time: 12:03:08

### PROJECT INFORMATION

Company: Weaver Boos Consultants  
 Client: Mich. City Sanitary District  
 Project: 1873-356-04-00  
 Location: Karwick Road Nature Park  
 Test Date: 12/5/2014  
 Test Well: MW-7S

### AQUIFER DATA

Saturated Thickness: 8.69 ft  
 Anisotropy Ratio (Kz/Kr): 1.

### SLUG TEST WELL DATA

Test Well: : MW-7S

X Location: 0. ft  
 Y Location: 0. ft

Initial Displacement: 1.016 ft  
 Static Water Column Height: 8.69 ft  
 Casing Radius: 0.083 ft  
 Wellbore Radius: 0.375 ft  
 Well Skin Radius: 0.42 ft  
 Screen Length: 5. ft  
 Total Well Penetration Depth: 8.69 ft

No. of Observations: 15

Observation Data			
Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
12.	1.016	20.	0.099
13.	0.714	21.	0.076
14.	0.548	22.	0.059
15.	0.429	23.	0.04
16.	0.321	24.	0.029
17.	0.243	25.	0.02
18.	0.183	26.	0.016
19.	0.135		

### SOLUTION

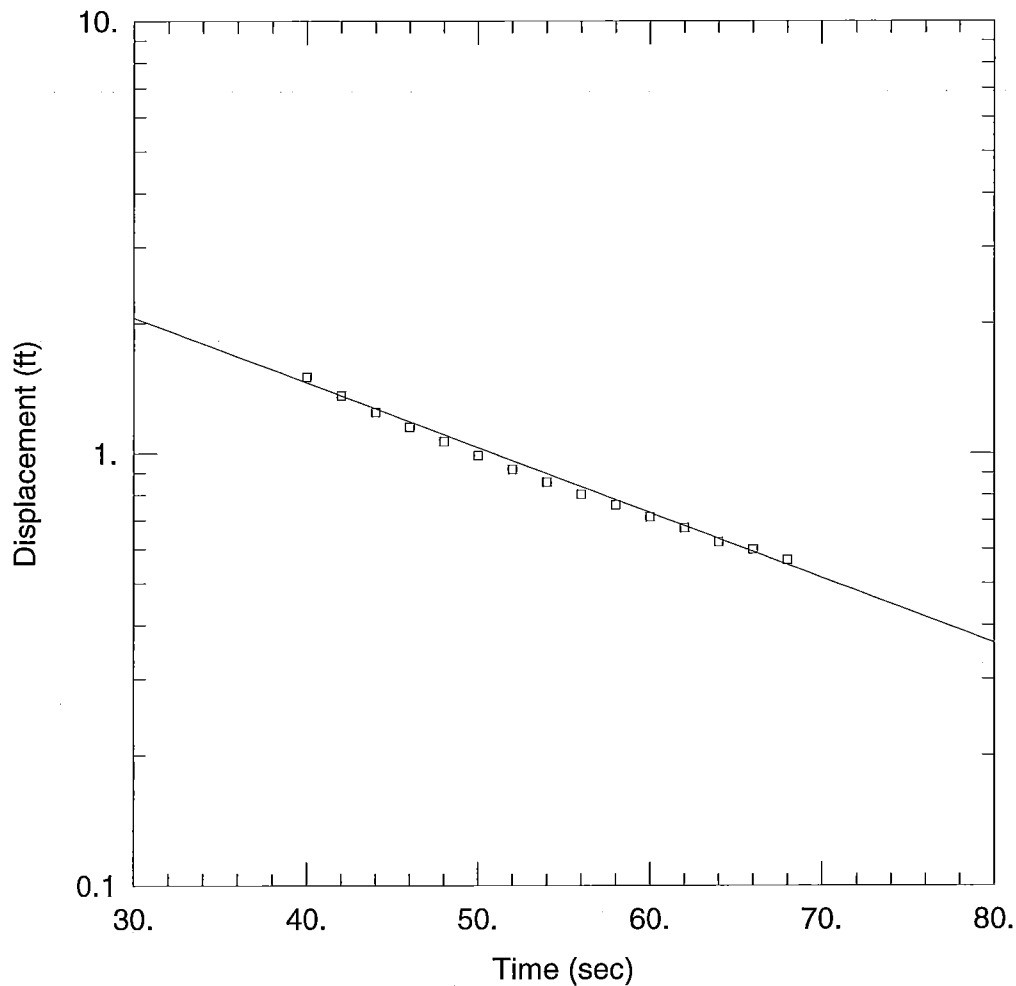
Aquifer Model: Unconfined  
 Solution Method: Bouwer-Rice  
 Shape Factor: 2.185

### VISUAL ESTIMATION RESULTS

#### Estimated Parameters

Parameter	Estimate	
K	0.01354	cm/sec
y0	35.49	ft





#### MW-8S

Data Set: K:\...\MW-8S.aqt

Date: 12/08/14

Time: 12:08:23

#### PROJECT INFORMATION

Company: Weaver Boos Consultants

Client: Mich. City Sanitary District

Project: 1873-356-04-00

Location: Karwick Road Nature Park

Test Well: MW-8S

Test Date: 12/4/2014

#### AQUIFER DATA

Saturated Thickness: 6.08 ft

Anisotropy Ratio ( $K_z/K_r$ ): 1.

#### WELL DATA (MW-8S)

Initial Displacement: 1.503 ft

Static Water Column Height: 6.08 ft

Total Well Penetration Depth: 6.08 ft

Screen Length: 5. ft

Casing Radius: 0.083 ft

Wellbore Radius: 0.375 ft

#### SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 0.001448$  cm/sec

$y_0 = 5.83$  ft



Data Set: K:\Wb\gm\Client Information\1800-1899\1873\356\04-00\03 Site Car Impl\Karwick Slug Test Data\Analy  
 Title: MW-8S  
 Date: 12/08/14  
 Time: 12:08:38

### PROJECT INFORMATION

Company: Weaver Boos Consultants  
 Client: Mich. City Sanitary District  
 Project: 1873-356-04-00  
 Location: Karwick Road Nature Park  
 Test Date: 12/4/2014  
 Test Well: MW-8S

### AQUIFER DATA

Saturated Thickness: 6.08 ft  
 Anisotropy Ratio (Kz/Kr): 1.

### SLUG TEST WELL DATA

Test Well: : MW-8S

X Location: 0. ft  
 Y Location: 0. ft

Initial Displacement: 1.503 ft  
 Static Water Column Height: 6.08 ft  
 Casing Radius: 0.083 ft  
 Wellbore Radius: 0.375 ft  
 Well Skin Radius: 0.42 ft  
 Screen Length: 5. ft  
 Total Well Penetration Depth: 6.08 ft

No. of Observations: 15

Observation Data			
Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
40.	1.503	56.	0.803
42.	1.361	58.	0.759
44.	1.246	60.	0.711
46.	1.15	62.	0.672
48.	1.065	64.	0.623
50.	0.987	66.	0.599
52.	0.917	68.	0.566
54.	0.857		

### SOLUTION

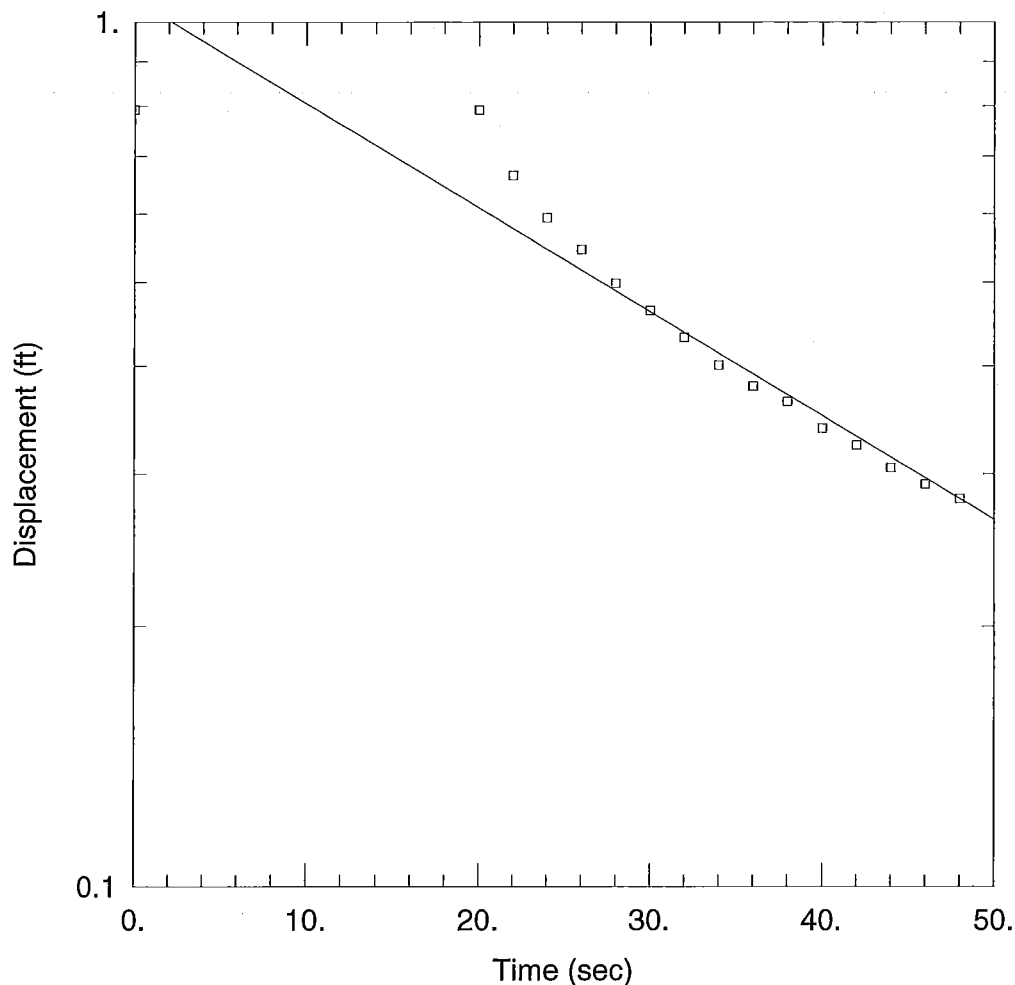
Aquifer Model: Unconfined  
 Solution Method: Bouwer-Rice  
 Shape Factor: 1.99

### VISUAL ESTIMATION RESULTS

#### Estimated Parameters

Parameter	Estimate	
K	0.001448	cm/sec
y0	5.83	ft





#### MW-9S

Data Set: K:\...\MW-9S.aqt

Date: 12/08/14

Time: 12:14:40

#### PROJECT INFORMATION

Company: Weaver Boos Consultants

Client: Mich. City Sanitary District

Project: 1873-356-04-00

Location: Karwick Road Nature Park

Test Well: MW-9S

Test Date: 12/5/2014

#### AQUIFER DATA

Saturated Thickness: 13.13 ft

Anisotropy Ratio ( $K_z/K_r$ ): 1.

#### WELL DATA (MW-9S)

Initial Displacement: 0.792 ft

Static Water Column Height: 13.13 ft

Total Well Penetration Depth: 13.13 ft

Screen Length: 10. ft

Casing Radius: 0.083 ft

Wellbore Radius: 0.375 ft

#### SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 0.0007667$  cm/sec

$y_0 = 1.062$  ft



Data Set: K:\Wbgn\Client Information\1800-1899\1873\356\04-00\03 Site Car Impl\Karwick Slug Test Data\Analy  
 Title: MW-9S  
 Date: 12/08/14  
 Time: 12:14:44

### PROJECT INFORMATION

Company: Weaver Boos Consultants  
 Client: Mich. City Sanitary District  
 Project: 1873-356-04-00  
 Location: Karwick Road Nature Park  
 Test Date: 12/5/2014  
 Test Well: MW-9S

### AQUIFER DATA

Saturated Thickness: 13.13 ft  
 Anisotropy Ratio (Kz/Kr): 1.

### SLUG TEST WELL DATA

Test Well: : MW-9S

X Location: 0. ft  
 Y Location: 0. ft

Initial Displacement: 0.792 ft  
 Static Water Column Height: 13.13 ft  
 Casing Radius: 0.083 ft  
 Wellbore Radius: 0.375 ft  
 Well Skin Radius: 0.42 ft  
 Screen Length: 10. ft  
 Total Well Penetration Depth: 13.13 ft

No. of Observations: 15

Observation Data			
Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
20.	0.792	36.	0.379
22.	0.665	38.	0.364
24.	0.594	40.	0.339
26.	0.546	42.	0.324
28.	0.499	44.	0.305
30.	0.464	46.	0.292
32.	0.432	48.	0.281
34.	0.401		

### SOLUTION

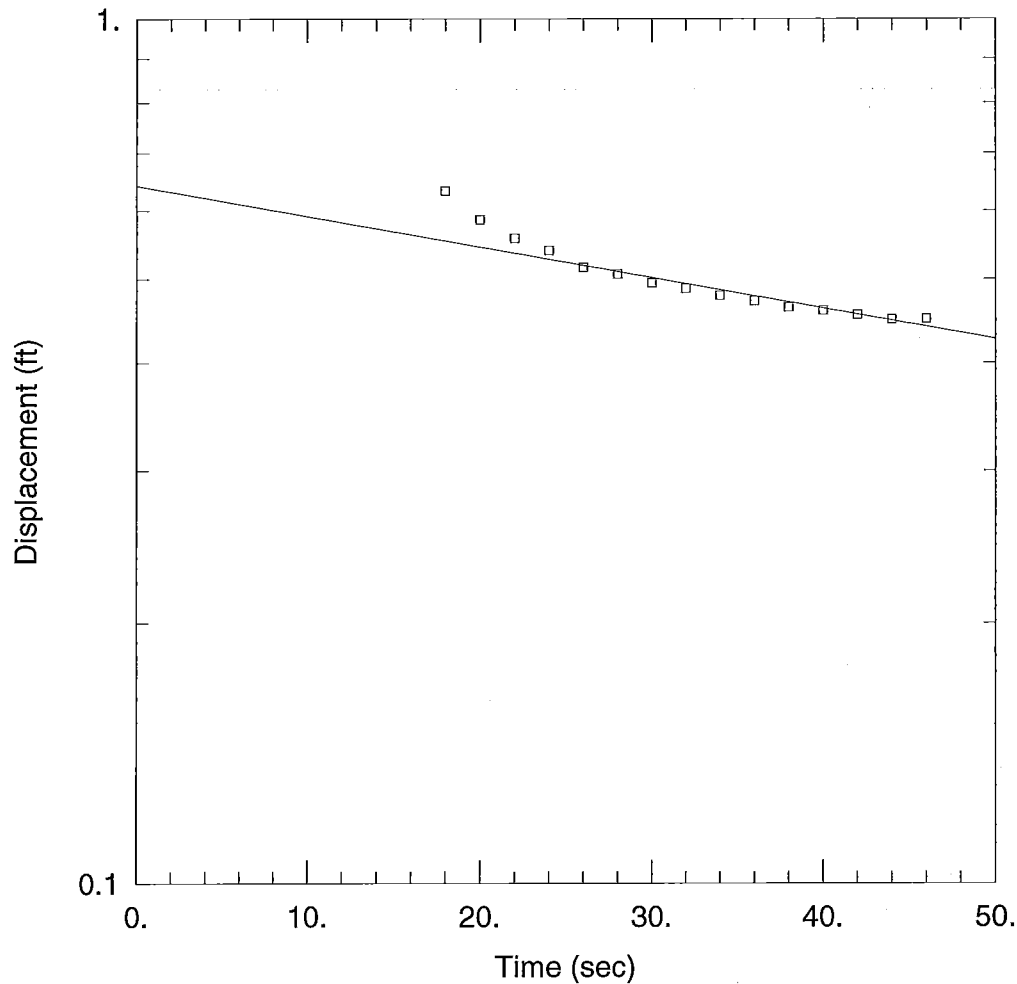
Aquifer Model: Unconfined  
 Solution Method: Bouwer-Rice  
 Shape Factor: 2.637

### VISUAL ESTIMATION RESULTS

#### Estimated Parameters

Parameter	Estimate	
K	0.0007667	cm/sec
y0	1.062	ft





#### MW-10S

Data Set: K:\...\MW-10S.aqt

Date: 12/08/14

Time: 12:22:34

#### PROJECT INFORMATION

Company: Weaver Boos Consultants

Client: Mich. City Sanitary District

Project: 1873-356-04-00

Location: Karwick Road Nature Park

Test Well: MW-10S

Test Date: 12/4/2014

#### AQUIFER DATA

Saturated Thickness: 10.28 ft

Anisotropy Ratio (Kz/Kr): 1.

#### WELL DATA (MW-10S)

Initial Displacement: 1.5 ft

Static Water Column Height: 10.28 ft

Total Well Penetration Depth: 10.28 ft

Screen Length: 10. ft

Casing Radius: 0.083 ft

Wellbore Radius: 0.375 ft

Gravel Pack Porosity: 0.3

#### SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 0.001454 cm/sec

y0 = 0.6415 ft



Data Set: K:\Wbqm\Client Information\1800-1899\1873\356\04-00\03 Site Car Imp\Karwick Slug Test Data\Analy  
Title: MW-10S  
Date: 12/08/14  
Time: 12:22:38

### PROJECT INFORMATION

Company: Weaver Boos Consultants  
Client: Mich. City Sanitary District  
Project: 1873-356-04-00  
Location: Karwick Road Nature Park  
Test Date: 12/4/2014  
Test Well: MW-10S

### AQUIFER DATA

Saturated Thickness: 10.28 ft  
Anisotropy Ratio (Kz/Kr): 1.

### SLUG TEST WELL DATA

Test Well: : MW-10S

X Location: 0. ft  
Y Location: 0. ft

Initial Displacement: 1.5 ft  
Static Water Column Height: 10.28 ft  
Casing Radius: 0.083 ft  
Wellbore Radius: 0.375 ft  
Well Skin Radius: 0.42 ft  
Screen Length: 10. ft  
Total Well Penetration Depth: 10.28 ft  
Corrected Casing Radius (Bouwer-Rice Method): 0.2168 ft  
Gravel Pack Porosity: 0.3

No. of Observations: 15

Observation Data			
Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
18.	0.633	34.	0.479
20.	0.586	36.	0.472
22.	0.558	38.	0.464
24.	0.54	40.	0.46
26.	0.516	42.	0.455
28.	0.507	44.	0.449
30.	0.495	46.	0.45
32.	0.488		

### SOLUTION

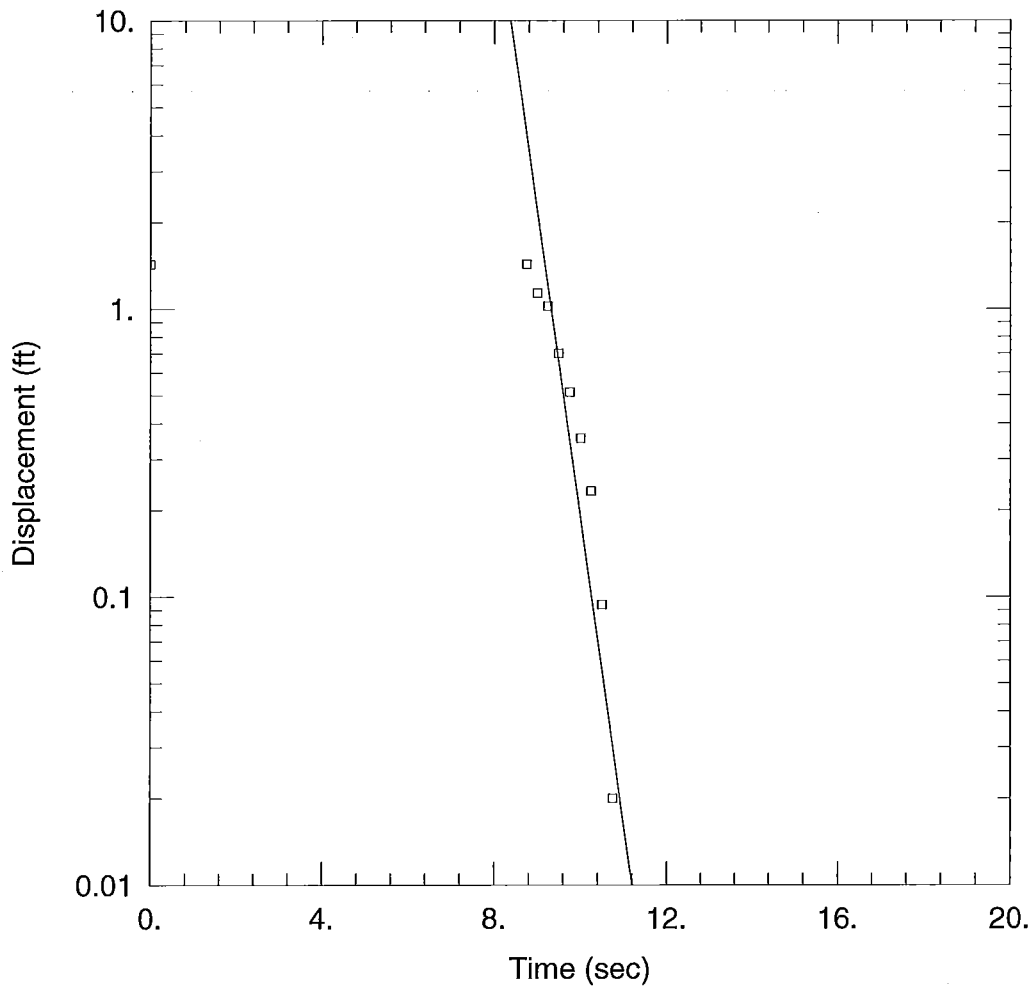
Aquifer Model: Unconfined  
Solution Method: Bouwer-Rice  
Shape Factor: 2.487

### VISUAL ESTIMATION RESULTS

#### Estimated Parameters

Parameter	Estimate	
K	0.001454	cm/sec
y0	0.6415	ft





#### MW-10D

Data Set: K:\...\MW-10D.aqt

Date: 12/08/14

Time: 12:28:48

#### PROJECT INFORMATION

Company: Weaver Boos Consultants

Client: Mich. City Sanitary District

Project: 1873-356-04-00

Location: Karwick Road Nature Park

Test Well: MW-10D

Test Date: 12/4/2014

#### AQUIFER DATA

Saturated Thickness: 24. ft

Anisotropy Ratio ( $K_z/K_r$ ): 1.

#### WELL DATA (MW-10D)

Initial Displacement: 1.428 ft

Static Water Column Height: 36.59 ft

Total Well Penetration Depth: 15. ft

Screen Length: 10. ft

Casing Radius: 0.083 ft

Wellbore Radius: 0.375 ft

#### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

$K = 0.05934$  cm/sec

$y_0 = 7.304E+09$  ft



Data Set: K:\Wbgrm\Client Information\1800-1899\1873\356\04-00\03 Site Car Impl\Karwick Slug Test Data\Analy  
Title: MW-10D  
Date: 12/08/14  
Time: 12:28:52

### PROJECT INFORMATION

Company: Weaver Boos Consultants  
Client: Mich. City Sanitary District  
Project: 1873-356-04-00  
Location: Karwick Road Nature Park  
Test Date: 12/4/2014  
Test Well: MW-10D

### AQUIFER DATA

Saturated Thickness: 24. ft  
Anisotropy Ratio (Kz/Kr): 1.

### SLUG TEST WELL DATA

Test Well: : MW-10D

X Location: 0. ft  
Y Location: 0. ft

Initial Displacement: 1.428 ft  
Static Water Column Height: 36.59 ft  
Casing Radius: 0.083 ft  
Wellbore Radius: 0.375 ft  
Well Skin Radius: 0.42 ft  
Screen Length: 10. ft  
Total Well Penetration Depth: 15. ft

No. of Observations: 9

Observation Data			
Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
8.75	1.428	10.	0.355
9.	1.135	10.25	0.233
9.25	1.021	10.5	0.094
9.5	0.699	10.75	0.02
9.75	0.514		

### SOLUTION

Aquifer Model: Confined  
Solution Method: Bouwer-Rice  
Shape Factor: 2.319

### VISUAL ESTIMATION RESULTS

#### Estimated Parameters

Parameter	Estimate	
K	0.05934	cm/sec
y0	7.304E+09	ft



## **2. Geotechnical Test Reports**



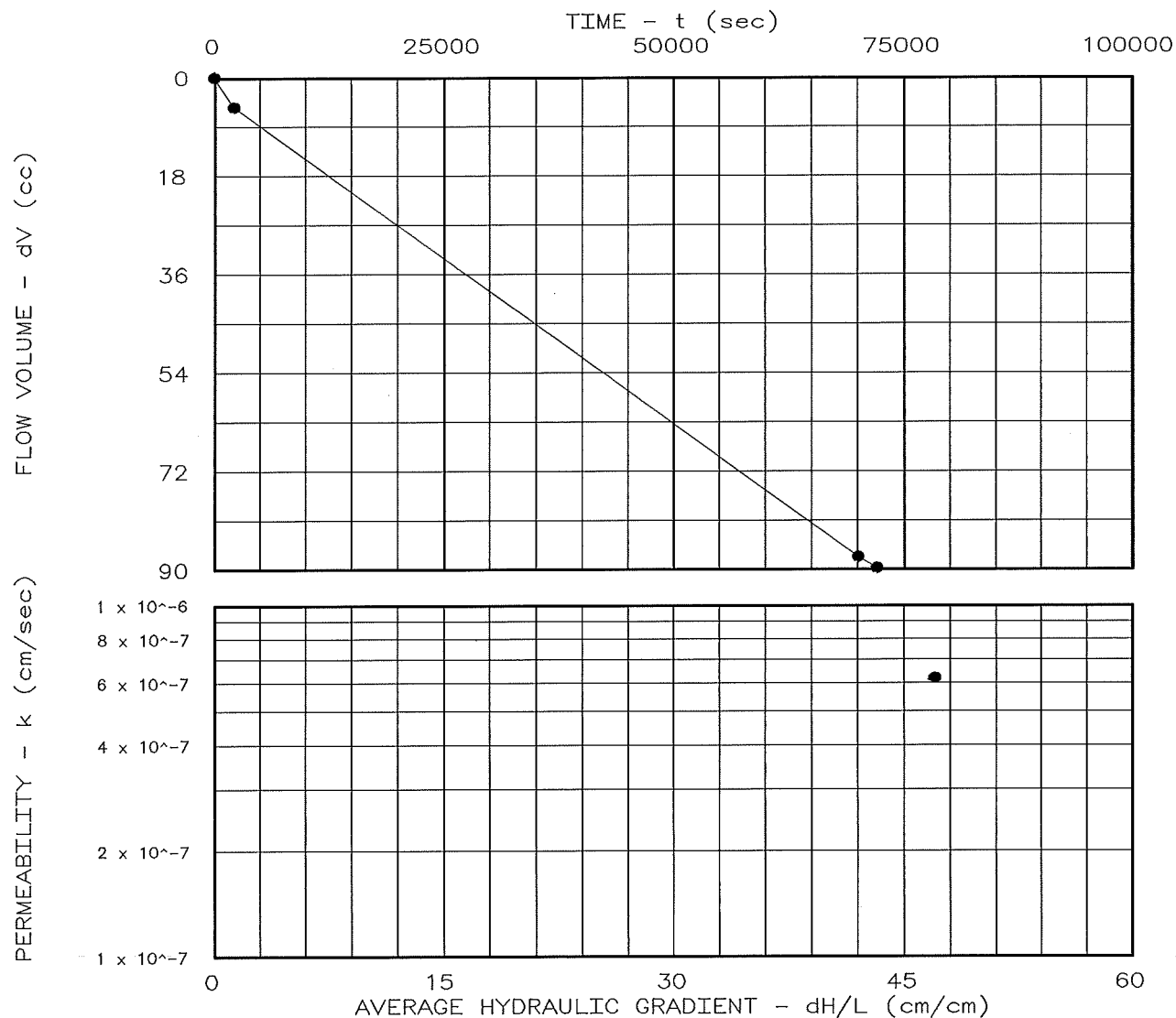
# PERMEABILITY TEST REPORT

## TEST DATA:

Specimen Height (cm): 7.64  
 Specimen Diameter (cm): 7.32  
 Dry Unit Weight (pcf): 95.7  
 Moisture Before Test (%): 28.5  
 Moisture After Test (%): 23.3  
 Run Number: 1 • 2 ▲  
 Cell Pressure (psi): 30.0  
 Test Pressure (psi): 20.0  
 Back Pressure (psi): 14.9  
 Diff. Head (psi): 5.1  
 Flow Rate (cc/sec):  $1.23 \times 10^{-3}$   
 Perm. (cm/sec):  $6.21 \times 10^{-7}$

## SAMPLE DATA:

Sample Identification: MW 4D  
 48.0 - 49.0 ft.  
 Visual Description: Dark Gray,  
 SANDY ORGANIC SILT  
 Remarks:  
 Maximum Dry Density (pcf):  
 Optimum Moisture Content (%):  
 Percent Compaction:  
 Permeameter type: Flexible Wall  
 Sample type: Shelby Tube



Project: Karwick Road Nature Park  
 Location: Michigan City, Indiana  
 Date: 11-25-14

Project No.:  
 File No.: 1873-356-04-0  
 Lab No.:  
 Tested by: jjw  
 Checked by:  
 Test: CH - Constant head

PERMEABILITY TEST REPORT

**Weaver Boos Consultants**



=====

CONSTANT HEAD PERMEABILITY TEST RESULTS ASTM D5084

PROJECT NAME: Karwick Road Nature Park  
PROJECT LOCATION: Michigan City, Indiana  
SAMPLE IDENTIFICATION: MW 4D  
48.0 - 49.0 ft.

FILE NO.: 1873-356-04-0  
PROJECT NO.:  
LAB NO.:

DESCRIPTION: Dark Gray,  
SANDY ORGANIC SILT

SAMPLE TYPE: Shelby Tube

MAX. DRY DENS.:

OPT. WATER CONTENT:

DATE: 11-25-14

-----

SPECIMEN DATA

INITIAL PARAMETERS:

HEIGHT: 7.64 cm  
DIAMETER: 7.32 cm  
WET WEIGHT: 633.1 g  
MOISTURE CONTENT: 28.5 %  
DRY DENSITY: 95.7 pcf  
PERCENT COMPACTION:

FINAL PARAMETERS:

HEIGHT: 7.46 cm  
DIAMETER: 7.03 cm  
WET WEIGHT: 607.4 g  
MOISTURE CONTENT: 23.3 %  
DRY DENSITY: 106.4 pcf

-----

TEST PARAMETERS

CELL NO.: 16

PANEL NO.:

POSITIONS:

CELL PRESSURE:

RUN NO. 1

RUN NO. 2

TEST PRESSURE:

BACK PRESSURE:

/ 0.0 psi

DIFFERENTIAL HEAD:

30.0 psi

20.0 psi

14.9 psi /

5.1 psi

-----

PERMEABILITY DATA

AVERAGE FLOW RATE:

1.23E-03 cc/sec

COEFFICIENT OF CORRELATION:

0.99948

AVERAGE GRADIENT:

47.0

TEMPERATURE:

20.0 deg C

PERMEABILITY, K, at 20 deg C: 6.21E-07 cm/sec



=====

**PERMEABILITY TEST DATA**

=====

**PROJECT DATA**

Project Name: Karwick Road Nature Park  
 File No.: 1873-356-04-0  
 Project Location: Michigan City, Indiana  
 Project No.:  
 Sample Identification: MW 6D  
                                   28.0 - 30.0 ft.  
 Lab No.:  
 Description: Dark Gray,  
                                   SANDY ORGANIC SILT  
 Sample Type: Shelby Tube  
 Max. Dry Dens.:  
 Method (D1557/D698):  
 Opt. Water Content:  
 Date: 11-25-14  
 Remarks:  
 Permeameter Type: Flexible Wall  
 Tested by: jjw  
 Checked by:  
 Test type: CH - Constant head

-----

**PERMEABILITY TEST SPECIMEN DATA**

Before test:

After test:

Diameter:	1	2		1	2		
Top:	2.872 in	2.875 in		2.660 in	2.715 in		
Middle:	2.849 in	2.891 in		2.683 in	2.661 in		
Bottom:	2.882 in	2.898 in		2.782 in	2.762 in		
Average:	2.88 in	7.30 cm		2.70 in	6.86 cm		

Length:	1	2	3	1	2	3	
	3.105 in	3.113 in	3.105 in	2.938 in	2.948 in	2.950 in	
Average:	3.11 in	7.89 cm		2.95 in	7.48 cm		

Moisture, Density and Sample Parameters:

Specific Gravity:	2.54		
Wet Wt. & Tare:	550.20		490.00
Dry Wt. & Tare:	335.30		335.30
Tare Wt.:	0.00		0.00
Moisture Content:	64.1 %		46.1 %
Dry Unit Weight:	63.3 pcf		75.7 pcf
Porosity:	0.6009		0.5226
Saturation:	108.1 %		107.0 %



-----  
**CONSTANT HEAD PERMEABILITY TEST CONDITIONS DATA**

Cell No.: 15	Panel No.:	Positions:
Run Number:	1	2
Cell Pressure:	30.0 psi	0.0 psi
Saturation Pressure:	25.0 psi	0.0 psi
Inflow Corr. Factor:	1.00	1.00
Outflow Corr. Factor:	1.00	1.00
Test Temperature:	20.0 °C	0.0 °C

-----

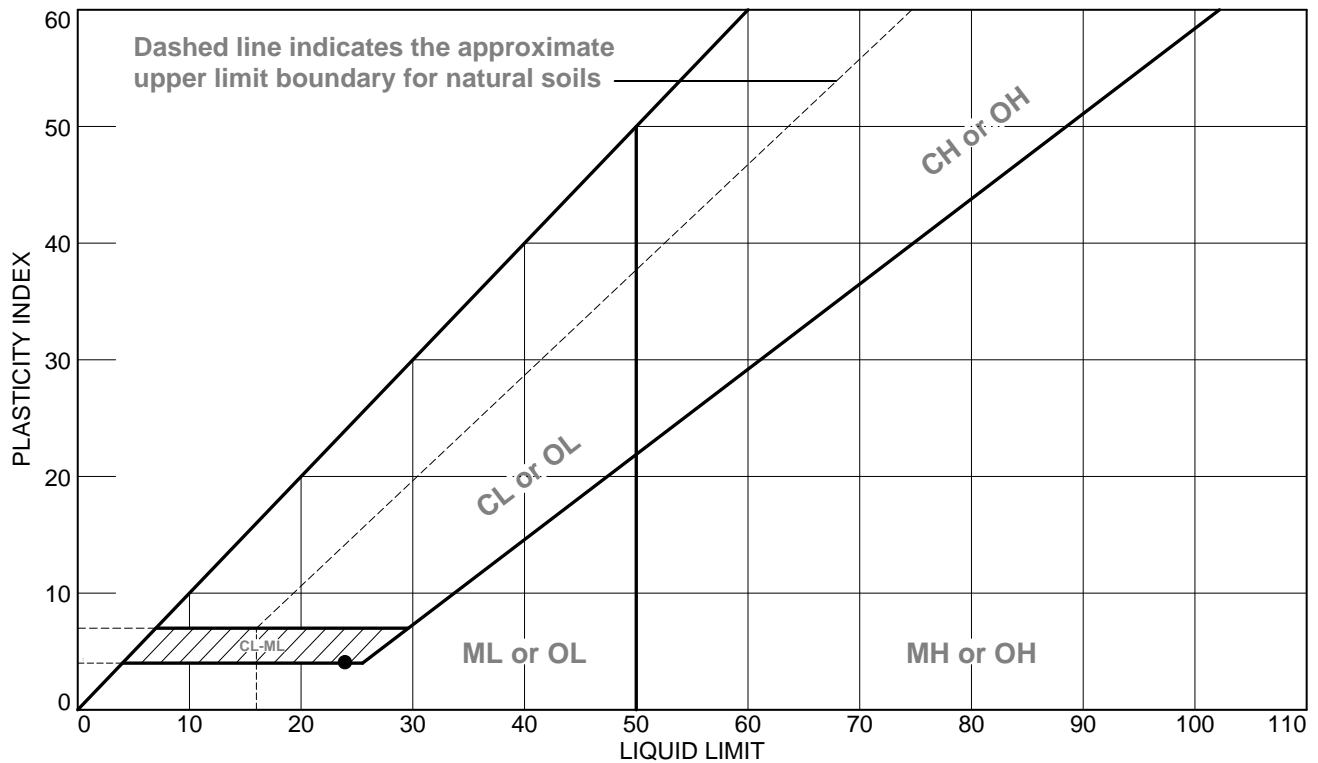
**PERMEABILITY TEST READINGS DATA**

CASE	DATE	TIME	ELAPSED	GAUGE		BURET		OUTFLOW/
D X		(24 hr)	TIME-sec	PRESSURE-psi		READING-cc		INFLOW
S R				IN	OUT	IN	OUT	RATIO
S	11/22/14	13:20:00	0	20.0	15.0	3.00	78.00	0.00
	11/23/14	8:08:00	67,680	20.0	15.0	35.00	45.50	1.02
	11/23/14	8:42:00	69,720	20.0	15.0	35.80	44.60	1.13
	11/23/14	12:28:00	83,280	20.0	15.0	41.60	38.70	1.02
	11/23/14	13:27:00	86,820	20.0	15.0	43.00	37.20	1.07

Test Pressure = 20.0 psi    Differential Head = 5.3 psi, 371.0 cm H<sub>2</sub>O  
 Gradient = 4.700E 01    Flow rate = 4.682E-04 cc/sec    R squared = 0.99956  
 Permeability, K<sub>20.0°</sub> = 2.377E-07 cm/sec,    K<sub>20°</sub> = 2.377E-07 cm/sec



# LIQUID AND PLASTIC LIMITS TEST REPORT ASTM D 4318



## SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	LIQUIDITY INDEX	USCS
●	MW-4 D	Shelby Tube	48.0 - 49.0	30.1	20	24	4	2.5	CL-ML

**Weaver Boos Consultants**

**GRANGER, IN**

**Client:** Sanitary District of Michigan City

**Project:** Karwick Road Nature Park  
Michigan City, Indiana

**Project No.:** 1873-356-04-00-03

**Figure**

Tested By: dc Checked By: jjw



# LIQUID AND PLASTIC LIMIT TEST DATA

12/8/2014

**Client:** Sanitary District of Michigan City

**Project:** Karwick Road Nature Park

Michigan City, Indiana

**Project Number:** 1873-356-04-00-03

**Location:** MW-4 D

**Depth:** 48.0 - 49.0

**Sample Number:** Shelby Tube

**Material Description:** Dark Gray SILTY CLAY with sand

**USCS:** CL-ML

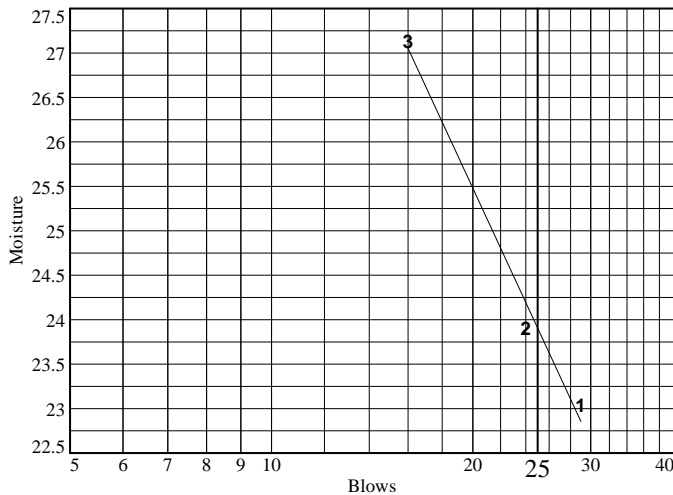
**AASHTO:** A-4(1)

**Tested by:** dc

**Checked by:** jjw

## Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	25.05	26.89	25.33			
Dry+Tare	22.87	24.63	23.11			
Tare	13.41	15.18	14.93			
# Blows	29	24	16			
Moisture	23.0	23.9	27.1			



Liquid Limit=	24
Plastic Limit=	20
Plasticity Index=	4
Natural Moisture=	30.1
Liquidity Index=	2.5

## Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	21.53	21.79	23.29		
Dry+Tare	20.45	20.74	22.01		
Tare	15.11	15.10	15.55		
Moisture	20.2	18.6	19.8		

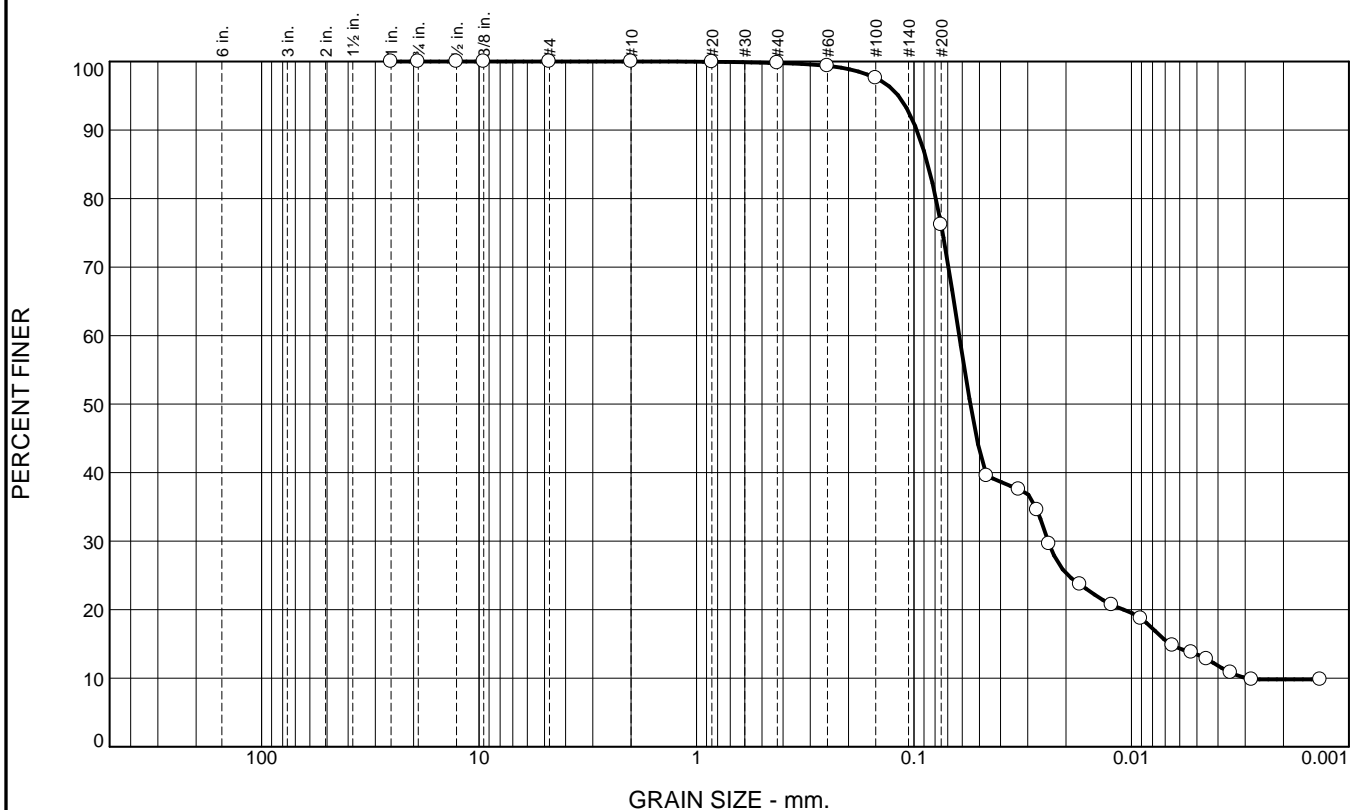
## Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
67.82	52.99	3.64	30.1

Weaver Boos Consultants



# Particle Size Distribution Report ASTM D 422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.2	23.6	62.7	13.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
.75"	100.0		
.50"	100.0		
.375"	100.0		
#4	100.0		
#10	100.0		
#20	100.0		
#40	99.8		
#60	99.4		
#100	97.6		
#200	76.2		
0.0463 mm.	39.5		
0.030 mm.	37.5		
0.0272 mm.	34.6		
0.0239 mm.	29.6		
0.0173 mm.	23.7		
0.0123 mm.	20.7		
0.0090 mm.	18.7		
0.0065 mm.	14.8		
0.0053 mm.	13.8		
0.0045 mm.	12.8		
0.0035 mm.	10.8		
0.0028 mm.	9.8		
0.0014 mm.	9.8		

\* (no specification provided)

**Soil Description**  
Dark Gray SILTY CLAY with sand

**Atterberg Limits**  
PL= 20 LL= 24 PI= 4

**Coefficients**  
D<sub>90</sub>= 0.0970 D<sub>85</sub>= 0.0864 D<sub>60</sub>= 0.0620  
D<sub>50</sub>= 0.0551 D<sub>30</sub>= 0.0242 D<sub>15</sub>= 0.0066  
D<sub>10</sub>= 0.0030 C<sub>u</sub>= 20.88 C<sub>c</sub>= 3.18

**Classification**  
USCS= CL-ML AASHTO= A-4(1)

**Remarks**  
Moisture Content = 30.1%  
Loss On Ignition = 1.5%

Source of Sample: MW-4 D Depth: 48.0 - 49.0  
Sample Number: Shelby Tube

Date: 11-26-14

**Weaver Boos Consultants**  
**GRANGER, IN**

**Client:** Sanitary District of Michigan City  
**Project:** Karwick Road Nature Park  
Michigan City, Indiana  
**Project No:** 1873-356-04-00-03

**Figure**

Tested By: dc Checked By: jjw



**GRAIN SIZE DISTRIBUTION TEST DATA**

12/8/2014

**Client:** Sanitary District of Michigan City**Project:** Karwick Road Nature Park

Michigan City, Indiana

**Project Number:** 1873-356-04-00-03**Location:** MW-4 D**Depth:** 48.0 - 49.0**Sample Number:** Shelby Tube**Material Description:** Dark Gray SILTY CLAY with sand**Date:** 11-26-14**PL:** 20**LL:** 24**PI:** 4**USCS Classification:** CL-ML**AASHTO Classification:** A-4(1)**Testing Remarks:** Moisture Content = 30.1%

Loss On Ignition = 1.5%

**Tested by:** dc**Checked by:** jjw**Sieve Test Data**

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
273.17	0.00	0.00	1"	0.00	100.0
			.75"	0.00	100.0
			.50"	0.00	100.0
			.375"	0.00	100.0
			#4	0.00	100.0
			#10	0.00	100.0
50.17	0.00	0.00	#20	0.02	100.0
			#40	0.11	99.8
			#60	0.32	99.4
			#100	1.21	97.6
			#200	11.95	76.2

**Hydrometer Test Data****Hydrometer test uses material passing #10****Percent passing #10 based upon complete sample = 100.0****Weight of hydrometer sample = 50.17****Hygroscopic moisture correction:**

Moist weight and tare = 38.69

Dry weight and tare = 38.58

Tare weight = 14.52

Hygroscopic moisture = 0.5%

**Automatic temperature correction**

Composite correction (fluid density and meniscus height) at 20 deg. C = -6

**Meniscus correction only = 1.0****Specific gravity of solids = 2.70****Hydrometer type = 152H****Hydrometer effective depth equation:  $L = 16.294964 - 0.164 \times R_m$** **Weaver Boos Consultants**



### Hydrometer Test Data (continued)

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1.00	20.0	26.0	20.0	0.0134	27.0	11.9	0.0463	39.5
2.00	20.0	25.0	19.0	0.0134	26.0	12.0	0.0330	37.5
3.00	20.0	23.5	17.5	0.0134	24.5	12.3	0.0272	34.6
4.00	20.0	21.0	15.0	0.0134	22.0	12.7	0.0239	29.6
8.00	20.0	18.0	12.0	0.0134	19.0	13.2	0.0173	23.7
16.00	20.0	16.5	10.5	0.0134	17.5	13.4	0.0123	20.7
30.00	20.0	15.5	9.5	0.0134	16.5	13.6	0.0090	18.7
60.00	20.0	13.5	7.5	0.0134	14.5	13.9	0.0065	14.8
90.00	20.0	13.0	7.0	0.0134	14.0	14.0	0.0053	13.8
125.00	20.0	12.5	6.5	0.0134	13.5	14.1	0.0045	12.8
210.00	20.0	11.5	5.5	0.0134	12.5	14.2	0.0035	10.8
330.00	20.0	11.0	5.0	0.0134	12.0	14.3	0.0028	9.8
1410.00	20.0	11.0	5.0	0.0134	12.0	14.3	0.0014	9.8

### Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.0	0.2	23.6	23.8	62.7	13.5	76.2

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
0.0030	0.0066	0.0108	0.0242	0.0551	0.0620	0.0793	0.0864	0.0970	0.1178

Fineness Modulus	C <sub>u</sub>	C <sub>c</sub>
0.03	20.88	3.18



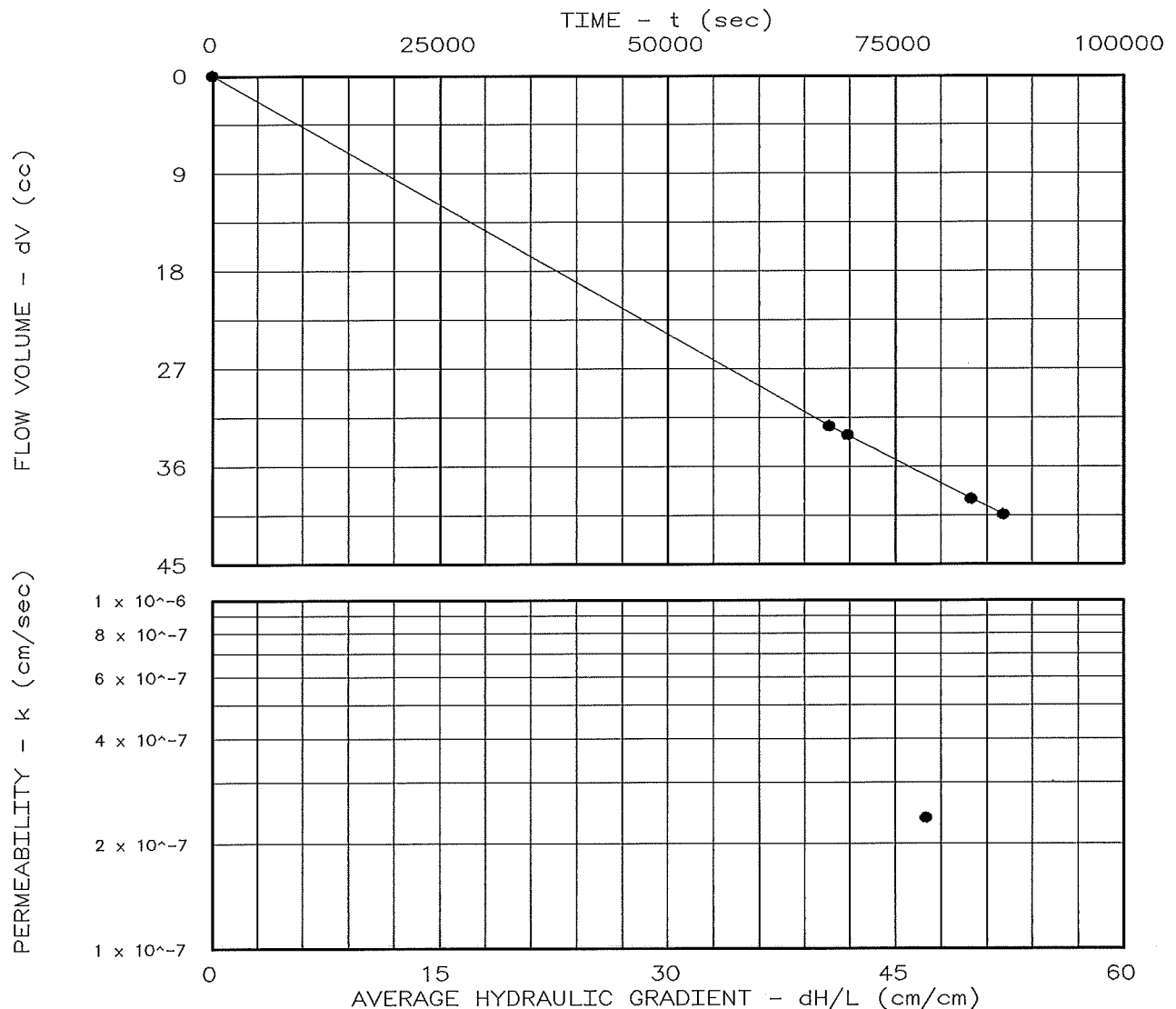
# PERMEABILITY TEST REPORT

## TEST DATA:

Specimen Height (cm): 7.89  
 Specimen Diameter (cm): 7.30  
 Dry Unit Weight (pcf): 63.3  
 Moisture Before Test (%): 64.1  
 Moisture After Test (%): 46.1  
 Run Number: 1 ● 2 ▲  
 Cell Pressure (psi): 30.0  
 Test Pressure (psi): 20.0  
 Back Pressure (psi): 14.7  
 Diff. Head (psi): 5.3  
 Flow Rate (cc/sec):  $4.68 \times 10^{-4}$   
 Perm. (cm/sec):  $2.38 \times 10^{-7}$

## SAMPLE DATA:

Sample Identification: MW 6D  
 28.0 - 30.0 ft.  
 Visual Description: Dark Gray,  
 SANDY ORGANIC SILT  
 Remarks:  
 Maximum Dry Density (pcf):  
 Optimum Moisture Content (%):  
 Percent Compaction:  
 Permeameter type: Flexible Wall  
 Sample type: Shelby Tube



Project: Karwick Road Nature Park  
 Location: Michigan City, Indiana  
 Date: 11-25-14

Project No.:  
 File No.: 1873-356-04-0  
 Lab No.:  
 Tested by: jjw  
 Checked by:  
 Test: CH - Constant head

PERMEABILITY TEST REPORT

**Weaver Boos Consultants**



=====

CONSTANT HEAD PERMEABILITY TEST RESULTS ASTM D5084

PROJECT NAME: Karwick Road Nature Park  
PROJECT LOCATION: Michigan City, Indiana  
SAMPLE IDENTIFICATION: MW 6D  
28.0 - 30.0 ft.

FILE NO.: 1873-356-04-0  
PROJECT NO.:  
LAB NO.:

DESCRIPTION: Dark Gray,  
SANDY ORGANIC SILT

SAMPLE TYPE: Shelby Tube

MAX. DRY DENS.: OPT. WATER CONTENT: DATE: 11-25-14

-----

SPECIMEN DATA

INITIAL PARAMETERS:

HEIGHT: 7.89 cm  
DIAMETER: 7.30 cm  
WET WEIGHT: 550.2 g  
MOISTURE CONTENT: 64.1 %  
DRY DENSITY: 63.3 pcf  
PERCENT COMPACTION:

FINAL PARAMETERS:

HEIGHT: 7.48 cm  
DIAMETER: 6.86 cm  
WET WEIGHT: 490.0 g  
MOISTURE CONTENT: 46.1 %  
DRY DENSITY: 75.7 pcf

-----

TEST PARAMETERS

CELL NO.: 15

PANEL NO.:

POSITIONS:

CELL PRESSURE: 30.0 psi  
TEST PRESSURE: 20.0 psi  
BACK PRESSURE: 14.7 psi /  
/ 0.0 psi  
DIFFERENTIAL HEAD: 5.3 psi

-----

PERMEABILITY DATA

	RUN NO. 1	RUN NO. 2
AVERAGE FLOW RATE:	4.68E-04 cc/sec	
COEFFICIENT OF CORRELATION:	0.99956	
AVERAGE GRADIENT:	47.0	
TEMPERATURE:	20.0 deg C	
PERMEABILITY, K, at 20 deg C:	2.38E-07 cm/sec	



=====

**PERMEABILITY TEST DATA**

=====

**PROJECT DATA**

Project Name: Karwick Road Nature Park  
 File No.: 1873-356-04-0  
 Project Location: Michigan City, Indiana  
 Project No.:  
 Sample Identification: MW 6D  
                                   28.0 - 30.0 ft.  
 Lab No.:  
 Description: Dark Gray,  
                                   SANDY ORGANIC SILT  
 Sample Type: Shelby Tube  
 Max. Dry Dens.:  
 Method (D1557/D698):  
 Opt. Water Content:  
 Date: 11-25-14  
 Remarks:  
  
 Permeameter Type: Flexible Wall  
 Tested by: jjw  
 Checked by:  
 Test type: CH - Constant head

-----

**PERMEABILITY TEST SPECIMEN DATA**

Before test:

After test:

Diameter:	1	2		1	2	
Top:	2.872 in	2.875 in		2.660 in	2.715 in	
Middle:	2.849 in	2.891 in		2.683 in	2.661 in	
Bottom:	2.882 in	2.898 in		2.782 in	2.762 in	
Average:	2.88 in	7.30 cm		2.70 in	6.86 cm	
Length:	1	2	3	1	2	3
	3.105 in	3.113 in	3.105 in	2.938 in	2.948 in	2.950 in
Average:	3.11 in	7.89 cm		2.95 in	7.48 cm	

Moisture, Density and Sample Parameters:

Specific Gravity:	2.54		
Wet Wt. & Tare:	550.20		490.00
Dry Wt. & Tare:	335.30		335.30
Tare Wt.:	0.00		0.00
Moisture Content:	64.1 %		46.1 %
Dry Unit Weight:	63.3 pcf		75.7 pcf
Porosity:	0.6009		0.5226
Saturation:	108.1 %		107.0 %



-----  
CONSTANT HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.: 15                      Panel No.:                      Positions:

Run Number:                      1                      2

Cell Pressure:                      30.0 psi                      0.0 psi

Saturation Pressure:                      25.0 psi                      0.0 psi

Inflow Corr. Factor:                      1.00                      1.00

Outflow Corr. Factor:                      1.00                      1.00

Test Temperature:                      20.0 °C                      0.0 °C

-----

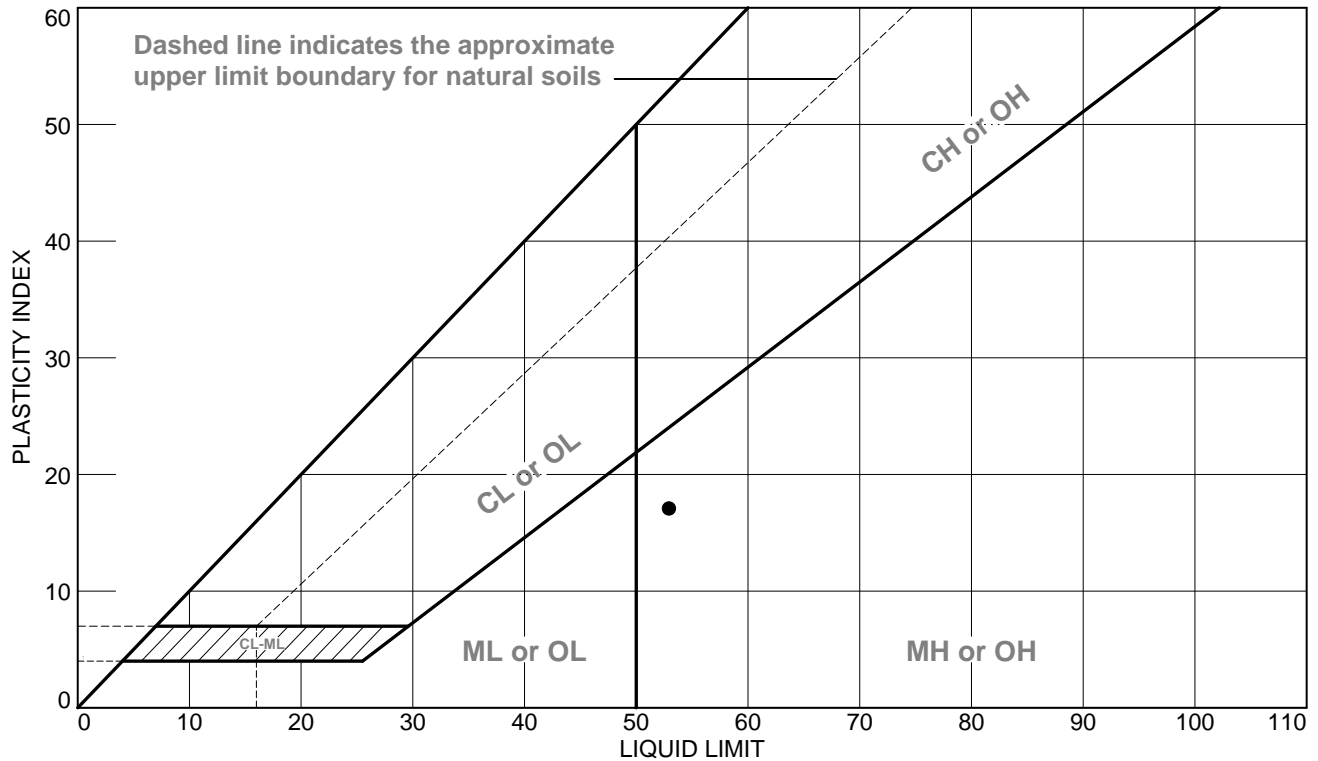
PERMEABILITY TEST READINGS DATA

CASE	DATE	TIME	ELAPSED	GAUGE	BURET	OUTFLOW/
D X		(24 hr)	TIME-sec	PRESSURE-psi	READING-cc	INFLOW
S R				IN      OUT	IN      OUT	RATIO
S	11/22/14	13:20:00	0	20.0   15.0	3.00   78.00	0.00
	11/23/14	8:08:00	67,680	20.0   15.0	35.00   45.50	1.02
	11/23/14	8:42:00	69,720	20.0   15.0	35.80   44.60	1.13
	11/23/14	12:28:00	83,280	20.0   15.0	41.60   38.70	1.02
	11/23/14	13:27:00	86,820	20.0   15.0	43.00   37.20	1.07

Test Pressure = 20.0 psi    Differential Head = 5.3 psi, 371.0 cm H2O  
Gradient = 4.700E 01      Flow rate = 4.682E-04 cc/sec    R squared = 0.99956  
Permeability, K20.0° = 2.377E-07 cm/sec,    K20° = 2.377E-07 cm/sec



# LIQUID AND PLASTIC LIMITS TEST REPORT ASTM D 4318



## SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	LIQUIDITY INDEX	USCS
●	MW-6 D	Shelby Tube	28.0 - 30.0	52.8	36	53	17	1.0	MH

**Weaver Boos Consultants**

**GRANGER, IN**

**Client:** Sanitary District of Michigan City

**Project:** Karwick Road Nature Park  
Michigan City, Indiana

**Project No.:** 1873-356-04-00-03

**Figure**

Tested By: dc Checked By: jjw



# LIQUID AND PLASTIC LIMIT TEST DATA

12/8/2014

**Client:** Sanitary District of Michigan City

**Project:** Karwick Road Nature Park

Michigan City, Indiana

**Project Number:** 1873-356-04-00-03

**Location:** MW-6 D

**Depth:** 28.0 - 30.0

**Sample Number:** Shelby Tube

**Material Description:** Dark Gray ELASTIC SILT with sand

**USCS:** MH

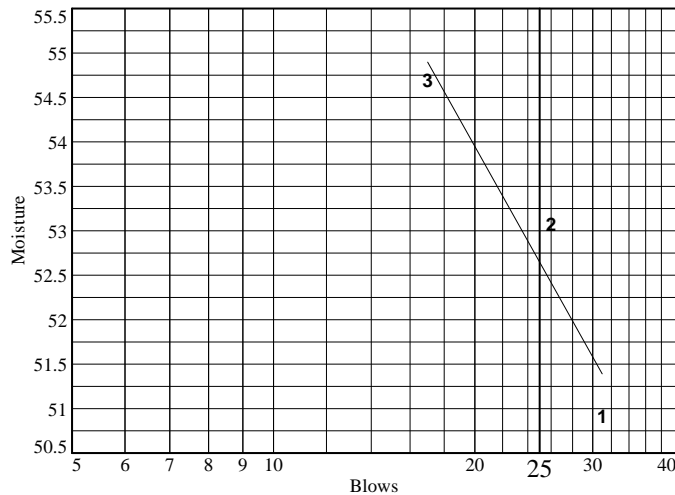
**AASHTO:** A-7-5(13)

**Tested by:** dc

**Checked by:** jjw

## Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	27.44	23.63	25.03			
Dry+Tare	23.28	20.36	21.54			
Tare	15.11	14.20	15.16			
# Blows	31	26	17			
Moisture	50.9	53.1	54.7			



Liquid Limit= 53  
 Plastic Limit= 36  
 Plasticity Index= 17  
 Natural Moisture= 52.8  
 Liquidity Index= 1.0

## Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	16.82	17.72	19.08		
Dry+Tare	15.45	16.16	17.59		
Tare	11.60	11.95	13.42		
Moisture	35.6	37.1	35.7		

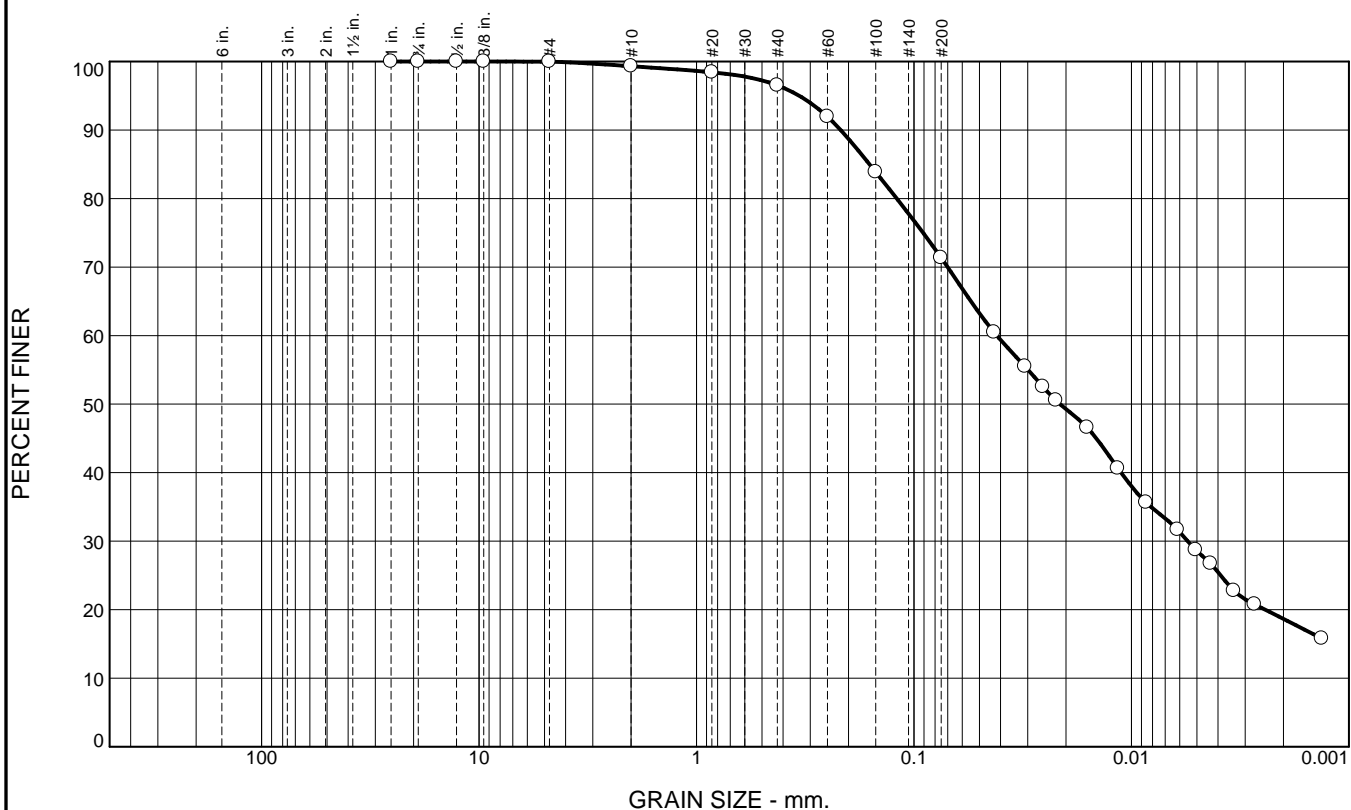
## Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
180.81	119.87	4.44	52.8

Weaver Boos Consultants



# Particle Size Distribution Report ASTM D 422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.7	2.8	25.1	42.9	28.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
.75"	100.0		
.50"	100.0		
.375"	100.0		
#4	100.0		
#10	99.3		
#20	98.4		
#40	96.5		
#60	91.9		
#100	83.9		
#200	71.4		
0.0428 mm.	60.5		
0.0309 mm.	55.5		
0.0255 mm.	52.5		
0.0223 mm.	50.5		
0.0160 mm.	46.6		
0.0115 mm.	40.6		
0.0086 mm.	35.7		
0.0061 mm.	31.7		
0.0051 mm.	28.7		
0.0043 mm.	26.7		
0.0034 mm.	22.7		
0.0027 mm.	20.8		
0.0013 mm.	15.8		

\* (no specification provided)

<b><u>Soil Description</u></b>		
Dark Gray ELASTIC SILT with sand		
<b><u>Atterberg Limits</u></b>		
PL= 36	LL= 53	PI= 17
<b><u>Coefficients</u></b>		
D <sub>90</sub> = 0.2174	D <sub>85</sub> = 0.1602	D <sub>60</sub> = 0.0416
D <sub>50</sub> = 0.0213	D <sub>30</sub> = 0.0055	D <sub>15</sub> =
D <sub>10</sub> =	C <sub>u</sub> =	C <sub>c</sub> =
<b><u>Classification</u></b>		
USCS= MH	AASHTO= A-7-5(13)	
<b><u>Remarks</u></b>		
Moisture Content = 52.8%		
Loss On Ignition = 4.8%		

Source of Sample: MW-6 D Depth: 28.0 - 30.0  
Sample Number: Shelby Tube

Date: 11-26-14

**Weaver Boos Consultants**

**GRANGER, IN**

Client: Sanitary District of Michigan City  
Project: Karwick Road Nature Park  
Michigan City, Indiana

Project No: 1873-356-04-00-03

Figure

Tested By: dc Checked By: jjw



**GRAIN SIZE DISTRIBUTION TEST DATA**

12/8/2014

**Client:** Sanitary District of Michigan City**Project:** Karwick Road Nature Park  
Michigan City, Indiana**Project Number:** 1873-356-04-00-03**Location:** MW-6 D**Depth:** 28.0 - 30.0**Sample Number:** Shelby Tube**Material Description:** Dark Gray ELASTIC SILT with sand**Date:** 11-26-14**PL:** 36**LL:** 53**PI:** 17**USCS Classification:** MH**AASHTO Classification:** A-7-5(13)**Testing Remarks:** Moisture Content = 52.8%  
Loss On Ignition = 4.8%**Tested by:** dc**Checked by:** jjw**Sieve Test Data**

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
189.91	0.00	0.00	1"	0.00	100.0
			.75"	0.00	100.0
			.50"	0.00	100.0
			.375"	0.00	100.0
			#4	0.05	100.0
			#10	1.30	99.3
50.12	0.00	0.00	#20	0.45	98.4
			#40	1.41	96.5
			#60	3.72	91.9
			#100	7.80	83.9
			#200	14.11	71.4

**Hydrometer Test Data****Hydrometer test uses material passing #10****Percent passing #10 based upon complete sample = 99.3****Weight of hydrometer sample = 50.12****Hygroscopic moisture correction:**

Moist weight and tare = 27.57

Dry weight and tare = 27.38

Tare weight = 12.88

Hygroscopic moisture = 1.3%

**Automatic temperature correction**

Composite correction (fluid density and meniscus height) at 20 deg. C = -6

**Meniscus correction only = 1.0****Specific gravity of solids = 2.70****Hydrometer type = 152H****Hydrometer effective depth equation:  $L = 16.294964 - 0.164 \times R_m$**



### Hydrometer Test Data (continued)

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1.00	20.0	36.5	30.5	0.0134	37.5	10.1	0.0428	60.5
2.00	20.0	34.0	28.0	0.0134	35.0	10.6	0.0309	55.5
3.00	20.0	32.5	26.5	0.0134	33.5	10.8	0.0255	52.5
4.00	20.0	31.5	25.5	0.0134	32.5	11.0	0.0223	50.5
8.00	20.0	29.5	23.5	0.0134	30.5	11.3	0.0160	46.6
16.00	20.0	26.5	20.5	0.0134	27.5	11.8	0.0115	40.6
30.00	20.0	24.0	18.0	0.0134	25.0	12.2	0.0086	35.7
60.00	20.0	22.0	16.0	0.0134	23.0	12.5	0.0061	31.7
90.00	20.0	20.5	14.5	0.0134	21.5	12.8	0.0051	28.7
125.00	20.0	19.5	13.5	0.0134	20.5	12.9	0.0043	26.7
210.00	20.0	17.5	11.5	0.0134	18.5	13.3	0.0034	22.7
330.00	20.0	16.5	10.5	0.0134	17.5	13.4	0.0027	20.8
1410.00	20.0	14.0	8.0	0.0134	15.0	13.8	0.0013	15.8

### Fractional Components

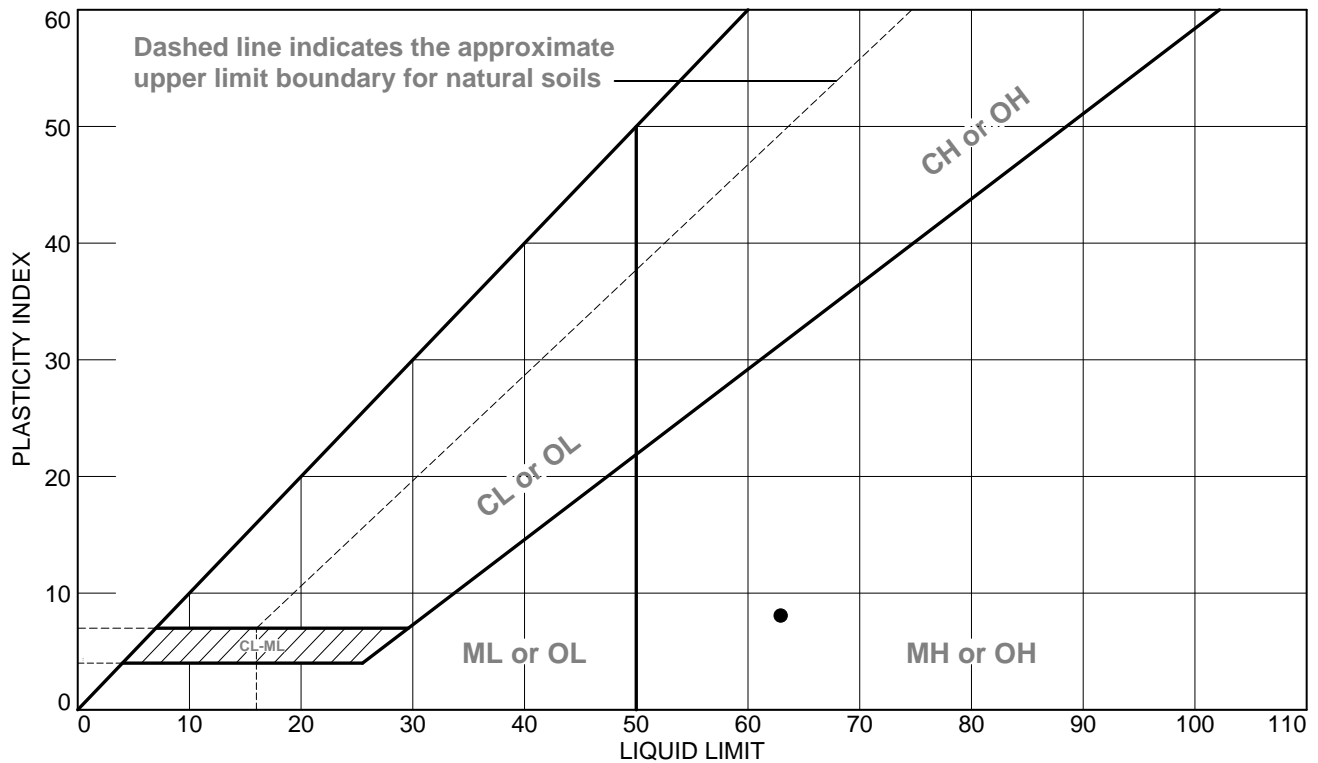
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.7	2.8	25.1	28.6	42.9	28.5	71.4

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
		0.0024	0.0055	0.0213	0.0416	0.1200	0.1602	0.2174	0.3367

Fineness Modulus
0.26



# LIQUID AND PLASTIC LIMITS TEST REPORT ASTM D 4318



## SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	LIQUIDITY INDEX	USCS
●	MW-2 D		19.0 - 20.0	102.2	55	63	8	5.9	MH

**Weaver Boos Consultants**

**GRANGER, IN**

**Client:** Sanitary District of Michigan City

**Project:** Karwick Road Nature Park  
Michigan City, Indiana

**Project No.:** 1873-356-04-00-03

**Figure**

Tested By: dc Checked By: jjw



# LIQUID AND PLASTIC LIMIT TEST DATA

12/8/2014

**Client:** Sanitary District of Michigan City

**Project:** Karwick Road Nature Park

Michigan City, Indiana

**Project Number:** 1873-356-04-00-03

**Location:** MW-2 D

**Depth:** 19.0 - 20.0

**Material Description:** Gray Elastic SILT with sand

**USCS:** MH

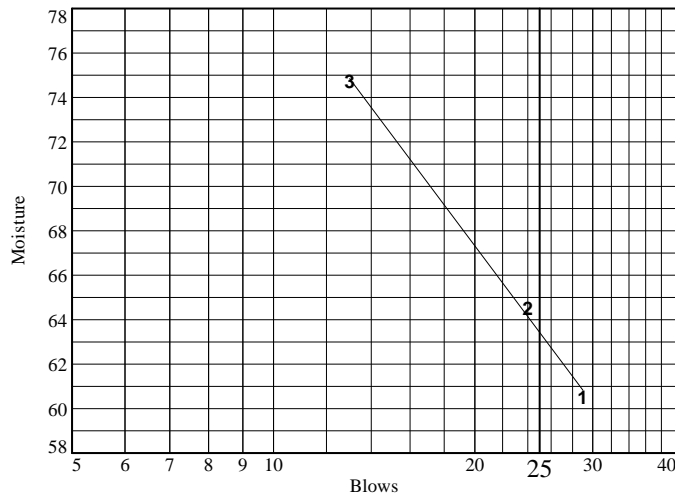
**AASHTO:** A-5(13)

**Tested by:** dc

**Checked by:** jjw

## Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	24.57	22.31	19.65			
Dry+Tare	21.12	19.49	17.37			
Tare	15.42	15.12	14.32			
# Blows	29	24	13			
Moisture	60.5	64.5	74.8			



Liquid Limit= 63  
 Plastic Limit= 55  
 Plasticity Index= 8  
 Natural Moisture= 102.2  
 Liquidity Index= 5.9

## Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	16.84	17.02			
Dry+Tare	15.95	16.17			
Tare	14.30	14.65			
Moisture	53.9	55.9			

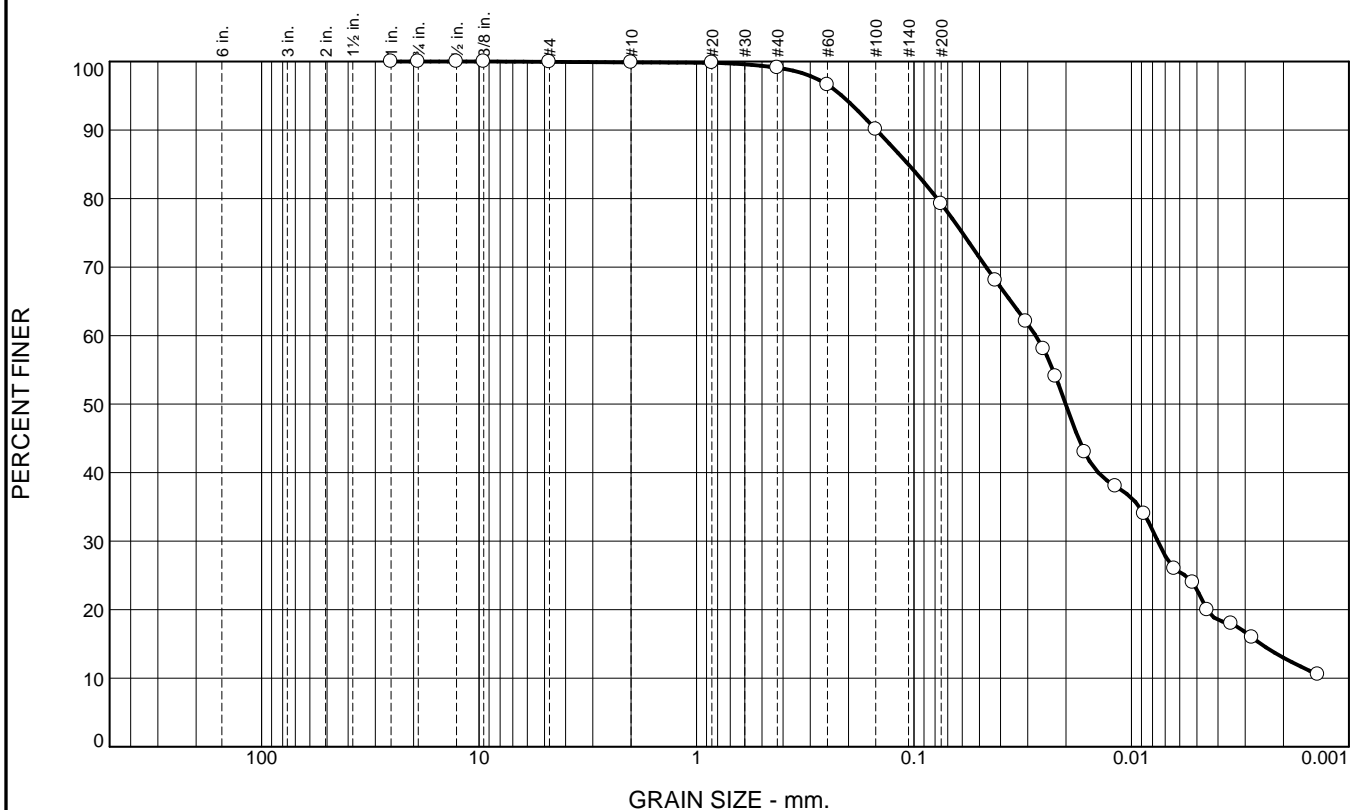
## Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
68.9	35.9	3.6	102.2

Weaver Boos Consultants



# Particle Size Distribution Report ASTM D 422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.0	0.8	19.9	56.3	22.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
.75"	100.0		
.50"	100.0		
.375"	100.0		
#4	99.9		
#10	99.9		
#20	99.8		
#40	99.1		
#60	96.6		
#100	90.1		
#200	79.2		
0.0422 mm.	68.1		
0.0306 mm.	62.1		
0.0254 mm.	58.1		
0.0223 mm.	54.0		
0.0164 mm.	43.0		
0.0118 mm.	38.0		
0.0088 mm.	34.0		
0.0064 mm.	26.0		
0.0052 mm.	24.0		
0.0045 mm.	20.0		
0.0035 mm.	18.0		
0.0028 mm.	16.0		
0.0014 mm.	10.5		

\* (no specification provided)

<u><b>Soil Description</b></u>		
Gray Elastic SILT with sand		
<u><b>Atterberg Limits</b></u>		
PL= 55	LL= 63	PI= 8
<u><b>Coefficients</b></u>		
D <sub>90</sub> = 0.1488	D <sub>85</sub> = 0.1062	D <sub>60</sub> = 0.0276
D <sub>50</sub> = 0.0201	D <sub>30</sub> = 0.0076	D <sub>15</sub> = 0.0025
D <sub>10</sub> =	C <sub>u</sub> =	C <sub>c</sub> =
<u><b>Classification</b></u>		
USCS= MH	AASHTO= A-5(13)	
<u><b>Remarks</b></u>		
Moisture Content = 102.2%		

Source of Sample: MW-2 D Depth: 19.0 - 20.0

Date: 11-21-14

**Weaver Boos Consultants**

**GRANGER, IN**

Client: Sanitary District of Michigan City

Project: Karwick Road Nature Park  
Michigan City, Indiana

Project No: 1873-356-04-00-03

Figure

Tested By: tn Checked By: jjw



**GRAIN SIZE DISTRIBUTION TEST DATA**

12/8/2014

**Client:** Sanitary District of Michigan City**Project:** Karwick Road Nature Park

Michigan City, Indiana

**Project Number:** 1873-356-04-00-03**Location:** MW-2 D**Depth:** 19.0 - 20.0**Material Description:** Gray Elastic SILT with sand**Date:** 11-21-14**PL:** 55**LL:** 63**PI:** 8**USCS Classification:** MH**AASHTO Classification:** A-5(13)**Testing Remarks:** Moisture Content = 102.2%**Tested by:** tn**Checked by:** jjw**Sieve Test Data**

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
92.42	0.00	0.00	1"	0.00	100.0
			.75"	0.00	100.0
			.50"	0.00	100.0
			.375"	0.00	100.0
			#4	0.05	99.9
			#10	0.11	99.9
50.10	0.00	0.00	#20	0.03	99.8
			#40	0.40	99.1
			#60	1.64	96.6
			#100	4.90	90.1
			#200	10.35	79.2

**Hydrometer Test Data****Hydrometer test uses material passing #10****Percent passing #10 based upon complete sample = 99.9****Weight of hydrometer sample = 50.10****Hygroscopic moisture correction:**

Moist weight and tare = 28.40

Dry weight and tare = 28.32

Tare weight = 13.94

Hygroscopic moisture = 0.6%

**Automatic temperature correction**

Composite correction (fluid density and meniscus height) at 20 deg. C = -6

**Meniscus correction only = 1.0****Specific gravity of solids = 2.65****Hydrometer type = 152H****Hydrometer effective depth equation:  $L = 16.294964 - 0.164 \times R_m$** 

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1.00	20.0	40.0	34.0	0.0136	41.0	9.6	0.0422	68.1
2.00	20.0	37.0	31.0	0.0136	38.0	10.1	0.0306	62.1
3.00	20.0	35.0	29.0	0.0136	36.0	10.4	0.0254	58.1
4.00	20.0	33.0	27.0	0.0136	34.0	10.7	0.0223	54.0
8.00	20.0	27.5	21.5	0.0136	28.5	11.6	0.0164	43.0

**Weaver Boos Consultants**



### Hydrometer Test Data (continued)

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
16.00	20.0	25.0	19.0	0.0136	26.0	12.0	0.0118	38.0
30.00	20.0	23.0	17.0	0.0136	24.0	12.4	0.0088	34.0
60.00	20.0	19.0	13.0	0.0136	20.0	13.0	0.0064	26.0
90.00	20.0	18.0	12.0	0.0136	19.0	13.2	0.0052	24.0
125.00	20.0	16.0	10.0	0.0136	17.0	13.5	0.0045	20.0
210.00	20.0	15.0	9.0	0.0136	16.0	13.7	0.0035	18.0
330.00	20.0	14.0	8.0	0.0136	15.0	13.8	0.0028	16.0
1410.00	19.0	11.5	5.3	0.0138	12.5	14.2	0.0014	10.5

### Fractional Components

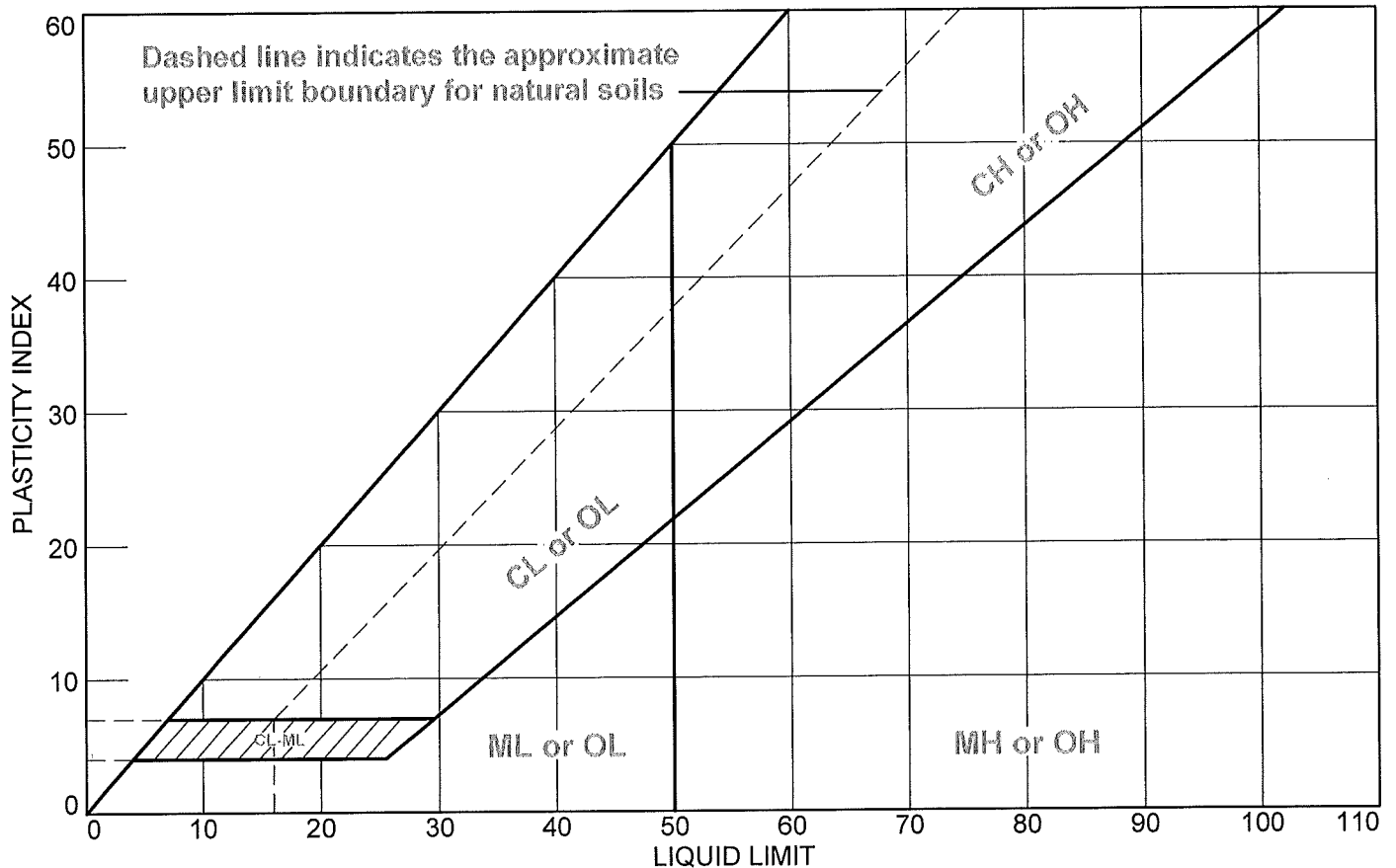
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.1	0.1	0.0	0.8	19.9	20.7	56.3	22.9	79.2

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
	0.0025	0.0045	0.0076	0.0201	0.0276	0.0782	0.1062	0.1488	0.2144

Fineness Modulus
0.13



# LIQUID AND PLASTIC LIMITS TEST REPORT ASTM D 4318



## SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	LIQUIDITY INDEX	USCS
●	MW-2 D		23.5 - 25.0	40.3	NP	NP	NP		SM

**Weaver Boos Consultants**

**GRANGER, IN**

**Client:** Sanitary District of Michigan City

**Project:** Karwick Road Nature Park  
Michigan City, Indiana

**Project No.:** 1873-356-04-00-03

**Figure**



# LIQUID AND PLASTIC LIMIT TEST DATA

11/26/2014

**Client:** Sanitary District of Michigan City

**Project:** Karwick Road Nature Park

Michigan City, Indiana

**Project Number:** 1873-356-04-00-03

**Location:** MW-2 D

**Depth:** 23.5 - 25.0

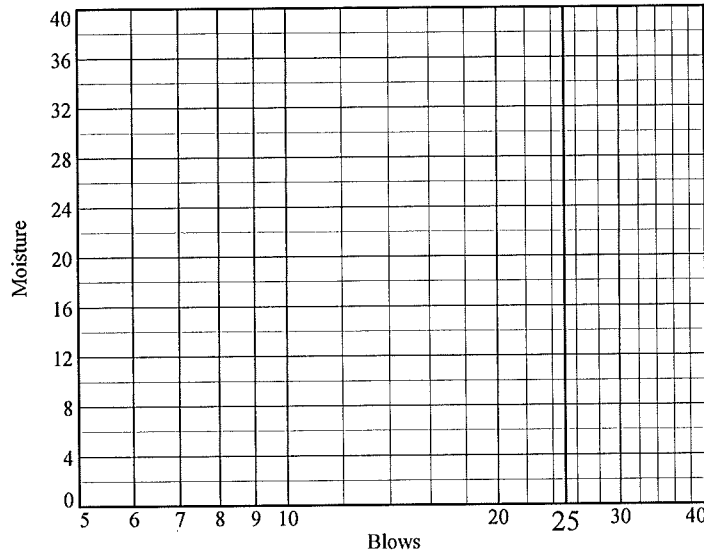
**Material Description:** Gray SILTY SAND

**USCS:** SM

**AASHTO:** A-2-4(0)

## Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						



Liquid Limit= NP  
 Plastic Limit= NP  
 Plasticity Index= NP  
 Natural Moisture= 40.3

## Plastic Limit Data

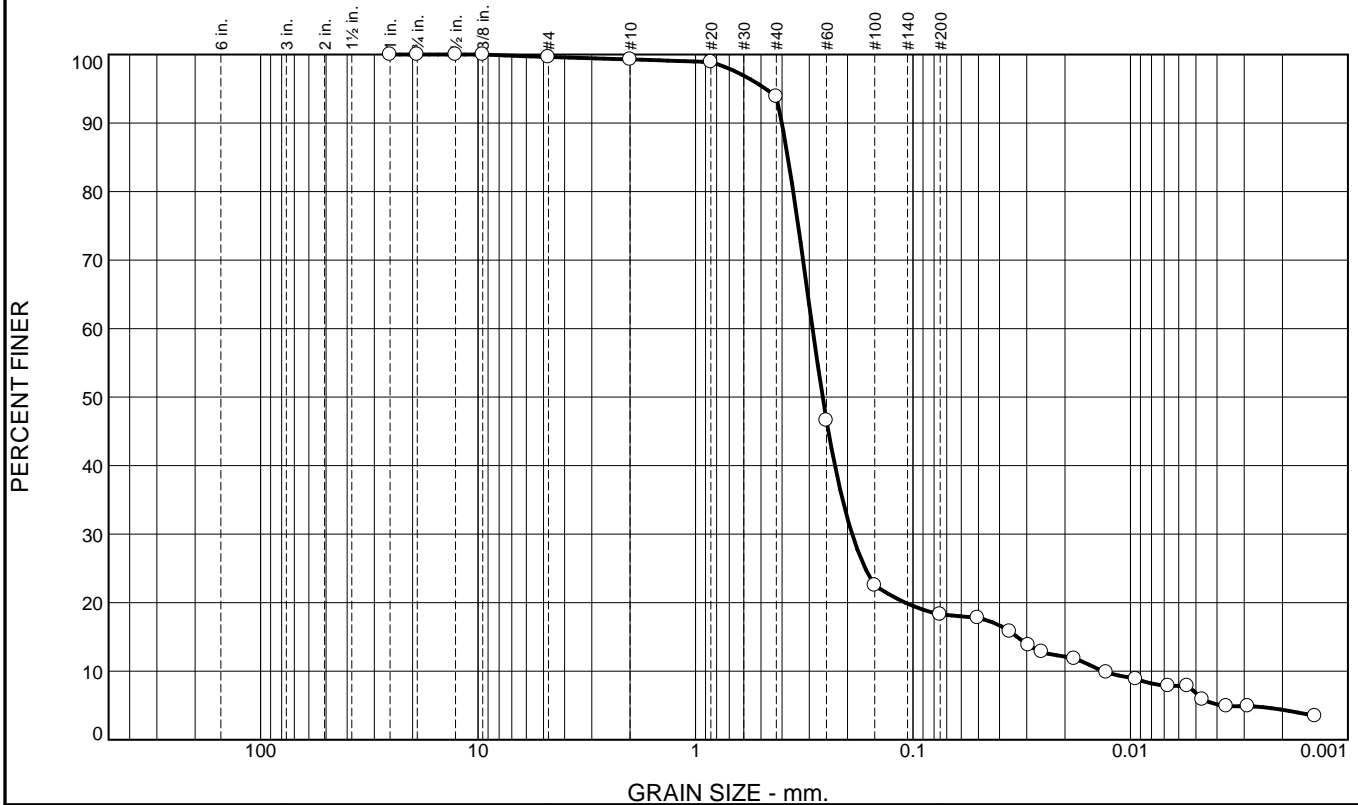
Run No.	1	2	3	4
Wet+Tare				
Dry+Tare				
Tare				
Moisture				

## Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
25.1	18.9	3.5	40.3



# Particle Size Distribution Report ASTM D 422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	0.3	5.4	75.6	11.5	6.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
.75"	100.0		
.50"	100.0		
.375"	100.0		
#4	99.6		
#10	99.3		
#20	98.9		
#40	93.9		
#60	46.6		
#100	22.5		
#200	18.3		
0.0505 mm.	17.8		
0.0359 mm.	15.8		
0.0295 mm.	13.8		
0.0256 mm.	12.8		
0.0182 mm.	11.8		
0.0129 mm.	9.8		
0.0095 mm.	8.9		
0.0067 mm.	7.9		
0.0055 mm.	7.9		
0.0047 mm.	5.9		
0.0036 mm.	4.9		
0.0029 mm.	4.9		
0.0014 mm.	3.5		

\* (no specification provided)

<u><b>Soil Description</b></u>		
Gray SILTY SAND		
<u><b>Atterberg Limits</b></u>		
PL= NP	LL= NP	PI= NP
<u><b>Coefficients</b></u>		
D <sub>90</sub> = 0.4009	D <sub>85</sub> = 0.3763	D <sub>60</sub> = 0.2896
D <sub>50</sub> = 0.2602	D <sub>30</sub> = 0.1906	D <sub>15</sub> = 0.0331
D <sub>10</sub> = 0.0133	C <sub>u</sub> = 21.76	C <sub>c</sub> = 9.42
<u><b>Classification</b></u>		
USCS= SM	AASHTO= A-2-4(0)	
<u><b>Remarks</b></u>		
Moisture Content = 40.3%		

Source of Sample: MW-2 D Depth: 23.5 - 25.0

Date: 11-21-14

**Weaver Boos Consultants**

**GRANGER, IN**

Client: Sanitary District of Michigan City

Project: Karwick Road Nature Park  
Michigan City, Indiana

Project No: 1873-356-04-00-03

Figure

Tested By: tn Checked By: jjw



**GRAIN SIZE DISTRIBUTION TEST DATA**

12/8/2014

**Client:** Sanitary District of Michigan City**Project:** Karwick Road Nature Park

Michigan City, Indiana

**Project Number:** 1873-356-04-00-03**Location:** MW-2 D**Depth:** 23.5 - 25.0**Material Description:** Gray SILTY SAND**Date:** 11-21-14**PL:** NP**LL:** NP**PI:** NP**USCS Classification:** SM**AASHTO Classification:** A-2-4(0)**Testing Remarks:** Moisture Content = 40.3%**Tested by:** tn**Checked by:** jjw**Sieve Test Data**

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
120.79	0.00	0.00	1"	0.00	100.0
			.75"	0.00	100.0
			.50"	0.00	100.0
			.375"	0.00	100.0
			#4	0.43	99.6
			#10	0.86	99.3
50.13	0.00	0.00	#20	0.19	98.9
			#40	2.73	93.9
			#60	26.60	46.6
			#100	38.76	22.5
			#200	40.90	18.3

**Hydrometer Test Data****Hydrometer test uses material passing #10****Percent passing #10 based upon complete sample = 99.3****Weight of hydrometer sample = 50.13****Hygroscopic moisture correction:**

Moist weight and tare = 32.90

Dry weight and tare = 32.85

Tare weight = 12.47

Hygroscopic moisture = 0.2%

**Automatic temperature correction**

Composite correction (fluid density and meniscus height) at 20 deg. C = -6

**Meniscus correction only = 1.0****Specific gravity of solids = 2.65****Hydrometer type = 152H****Hydrometer effective depth equation:  $L = 16.294964 - 0.164 \times R_m$** 

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1.00	20.0	15.0	9.0	0.0136	16.0	13.7	0.0505	17.8
2.00	20.0	14.0	8.0	0.0136	15.0	13.8	0.0359	15.8
3.00	20.0	13.0	7.0	0.0136	14.0	14.0	0.0295	13.8
4.00	20.0	12.5	6.5	0.0136	13.5	14.1	0.0256	12.8
8.00	20.0	12.0	6.0	0.0136	13.0	14.2	0.0182	11.8

**Weaver Boos Consultants**



### Hydrometer Test Data (continued)

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
16.00	20.0	11.0	5.0	0.0136	12.0	14.3	0.0129	9.8
30.00	20.0	10.5	4.5	0.0136	11.5	14.4	0.0095	8.9
60.00	20.0	10.0	4.0	0.0136	11.0	14.5	0.0067	7.9
90.00	20.0	10.0	4.0	0.0136	11.0	14.5	0.0055	7.9
125.00	20.0	9.0	3.0	0.0136	10.0	14.7	0.0047	5.9
210.00	20.0	8.5	2.5	0.0136	9.5	14.7	0.0036	4.9
330.00	20.0	8.5	2.5	0.0136	9.5	14.7	0.0029	4.9
1410.00	19.0	8.0	1.8	0.0138	9.0	14.8	0.0014	3.5

### Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.4	0.4	0.3	5.4	75.6	81.3	11.5	6.8	18.3

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
0.0133	0.0331	0.1084	0.1906	0.2602	0.2896	0.3556	0.3763	0.4009	0.4764

Fineness Modulus	C <sub>u</sub>	C <sub>c</sub>
1.19	21.76	9.42

Weaver Boos Consultants



# Particle Size Distribution Report ASTM D 422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.7	5.5	29.6	56.9	4.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	99.4		
3/8"	98.8		
#4	96.3		
#8	92.3		
#16	86.1		
#30	77.0		
#50	41.1		
#100	11.6		
#200	4.3		

\* (no specification provided)

<u><b>Soil Description</b></u>		
Gray poorly graded SAND		
<u><b>Atterberg Limits</b></u>		
PL=	LL=	PI=
<u><b>Coefficients</b></u>		
D <sub>90</sub> = 1.8489	D <sub>85</sub> = 0.9820	D <sub>60</sub> = 0.4159
D <sub>50</sub> = 0.3497	D <sub>30</sub> = 0.2431	D <sub>15</sub> = 0.1688
D <sub>10</sub> = 0.1396	C <sub>u</sub> = 2.98	C <sub>c</sub> = 1.02
<u><b>Classification</b></u>		
USCS= SP	AASHTO=	
<u><b>Remarks</b></u>		
Moisture Content = 19.1%		

Source of Sample: MW-2 D Depth: 48.5 - 50.0

Date: 11-20-14

**Weaver Boos Consultants**

**GRANGER, IN**

Client: Sanitary District of Michigan City

Project: Karwick Road Nature Park  
Michigan City, Indiana

Project No: 1873-356-04-00-03

Figure

Tested By: dc Checked By: jjw



**GRAIN SIZE DISTRIBUTION TEST DATA**

12/8/2014

**Client:** Sanitary District of Michigan City**Project:** Karwick Road Nature Park

Michigan City, Indiana

**Project Number:** 1873-356-04-00-03**Location:** MW-2 D**Depth:** 48.5 - 50.0**Material Description:** Gray poorly graded SAND**Date:** 11-20-14**USCS Classification:** SP**Testing Remarks:** Moisture Content = 19.1%**Tested by:** dc**Checked by:** jjw**Sieve Test Data****Post #200 Wash Test Weights (grams):** Dry Sample and Tare = 631.50

Tare Wt. = 220.40

Minus #200 from wash = 4.3%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
1148.90	719.40	1"	0.00	0.00	100.0
		3/4"	0.00	0.00	100.0
		1/2"	2.70	0.00	99.4
		3/8"	2.50	0.00	98.8
		#4	10.90	0.00	96.3
		#8	17.10	0.00	92.3
		#16	26.70	0.00	86.1
		#30	38.70	0.00	77.0
		#50	154.20	0.00	41.1
		#100	126.70	0.00	11.6
		#200	31.40	0.00	4.3

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	3.7	3.7	5.5	29.6	56.9	92.0			4.3

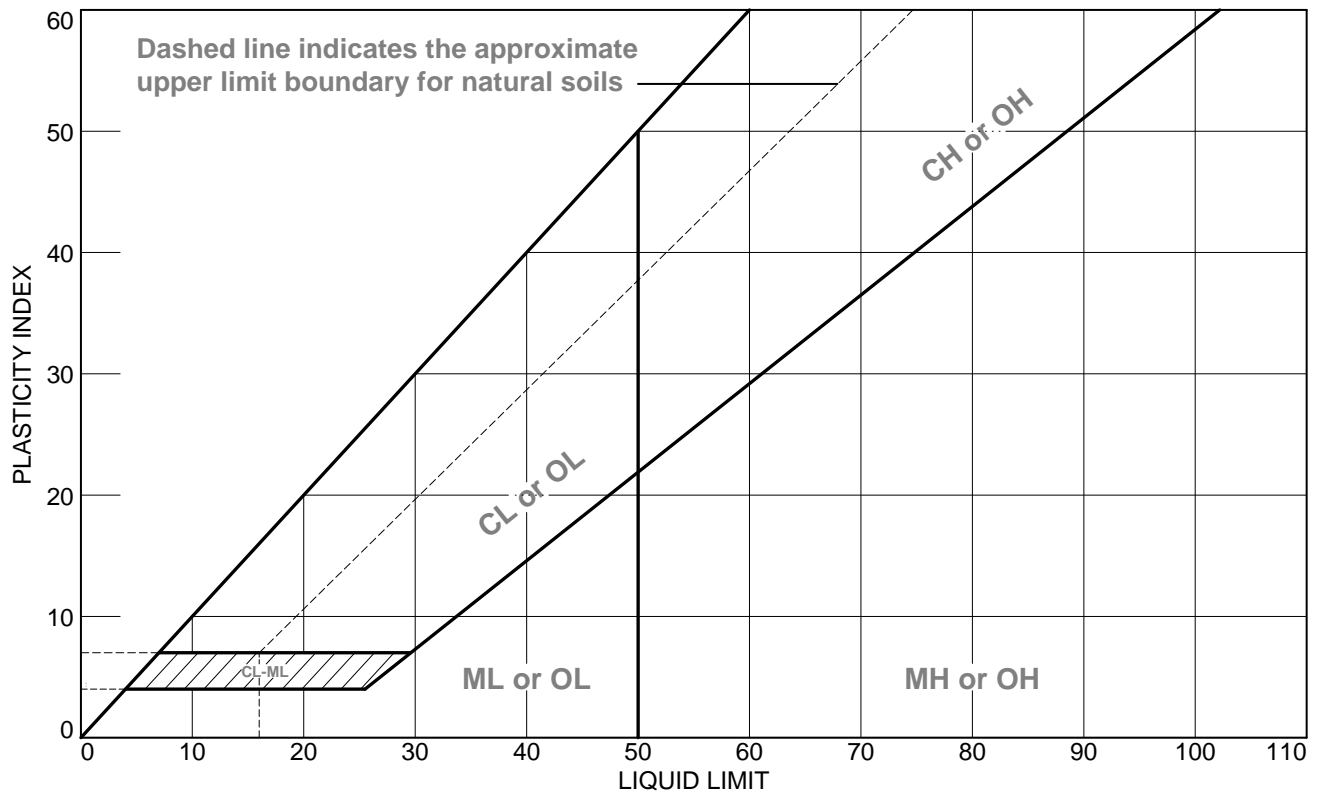
D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
0.1396	0.1688	0.1942	0.2431	0.3497	0.4159	0.6661	0.9820	1.8489	3.6079

Fineness Modulus	C <sub>u</sub>	C <sub>c</sub>
1.97	2.98	1.02

Weaver Boos Consultants



# LIQUID AND PLASTIC LIMITS TEST REPORT ASTM D 4318



## SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	LIQUIDITY INDEX	USCS
●	MW-4 D		23.5 - 25.0	32.2	NP	NP	NP		

**Weaver Boos Consultants**

**GRANGER, IN**

**Client:** Sanitary District of Michigan City

**Project:** Karwick Road Nature Park  
Michigan City, Indiana

**Project No.:** 1873-356-04-00-03

**Figure**



# LIQUID AND PLASTIC LIMIT TEST DATA

12/8/2014

**Client:** Sanitary District of Michigan City

**Project:** Karwick Road Nature Park

Michigan City, Indiana

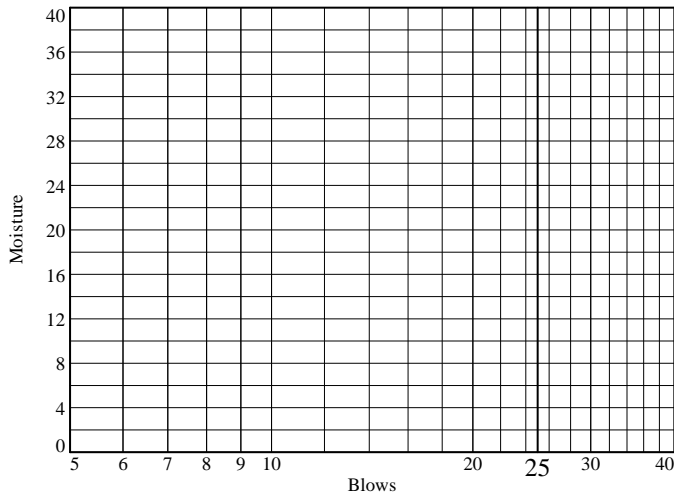
**Project Number:** 1873-356-04-00-03

**Location:** MW-4 D

**Depth:** 23.5 - 25.0

## Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						



Liquid Limit= NP  
 Plastic Limit= NP  
 Plasticity Index= NP  
 Natural Moisture= 32.2

## Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare					
Dry+Tare					
Tare					
Moisture					

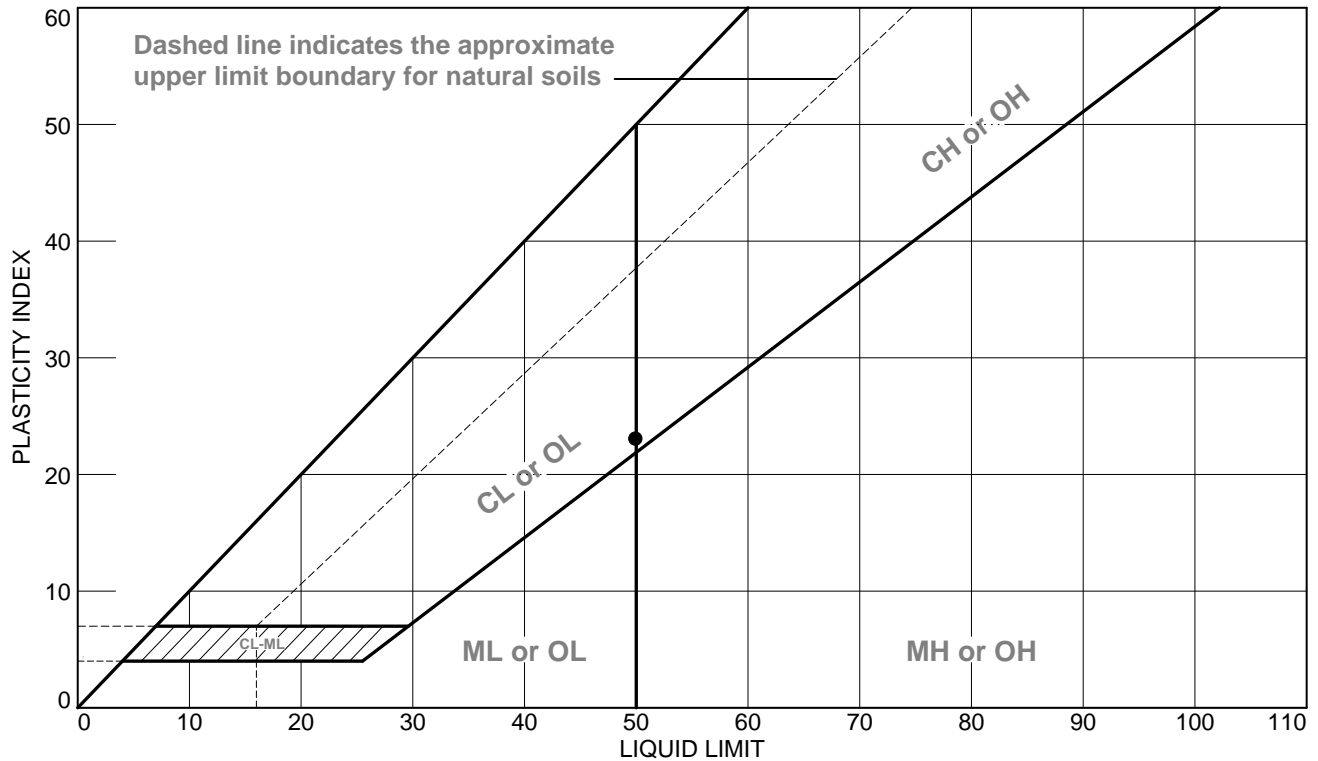
## Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
24.28	19.27	3.70	32.2

Weaver Boos Consultants



# LIQUID AND PLASTIC LIMITS TEST REPORT ASTM D 4318



## SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	LIQUIDITY INDEX	USCS
●	MW-4 D		28.5 - 30.0	45.1	27	50	23	0.8	

**Weaver Boos Consultants**

**GRANGER, IN**

**Client:** Sanitary District of Michigan City

**Project:** Karwick Road Nature Park  
Michigan City, Indiana

**Project No.:** 1873-356-04-00-03

**Figure**

Tested By: dc Checked By: jjw



# LIQUID AND PLASTIC LIMIT TEST DATA

12/8/2014

**Client:** Sanitary District of Michigan City

**Project:** Karwick Road Nature Park

Michigan City, Indiana

**Project Number:** 1873-356-04-00-03

**Location:** MW-4 D

**Depth:** 28.5 - 30.0

**Material Description:** Dark gray, LEAN ORGANIC SILT

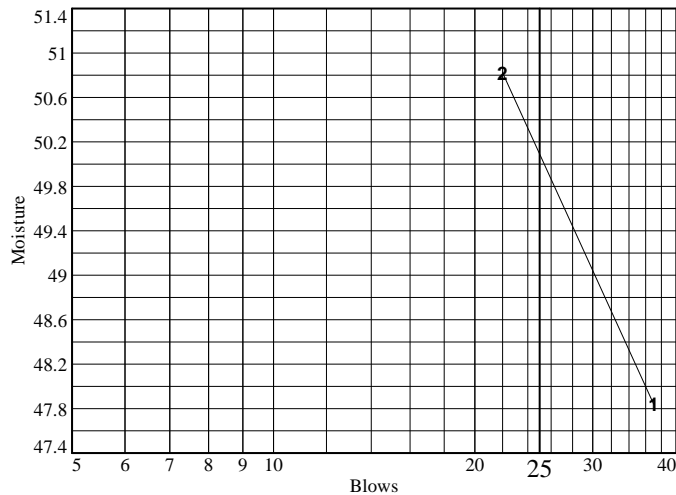
Loss on Ignition = 3.8%

**Tested by:** dc

**Checked by:** jjw

## Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	21.00	20.47				
Dry+Tare	18.12	17.38				
Tare	12.10	11.30				
# Blows	37	22				
Moisture	47.8	50.8				



Liquid Limit= 50  
 Plastic Limit= 27  
 Plasticity Index= 23  
 Natural Moisture= 45.1  
 Liquidity Index= 0.8

## Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.67	19.30	19.78		
Dry+Tare	16.70	18.34	18.75		
Tare	13.23	14.56	15.00		
Moisture	28.0	25.4	27.5		

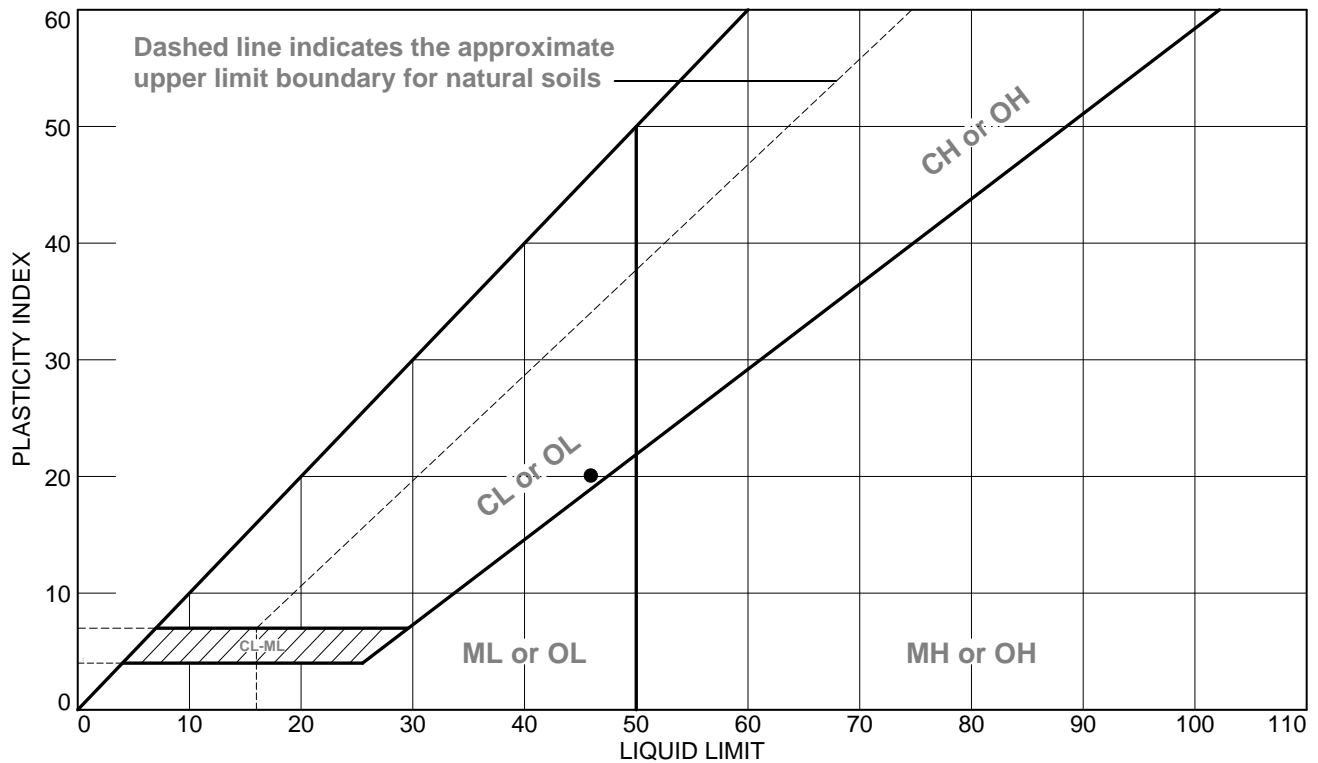
## Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
62.90	44.70	4.35	45.1

Weaver Boos Consultants



# LIQUID AND PLASTIC LIMITS TEST REPORT ASTM D 4318



## SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	LIQUIDITY INDEX	USCS
●	MW-4 D		38.0 - 40.0	38.1	26	46	20	0.6	CL

**Weaver Boos Consultants**

**GRANGER, IN**

**Client:** Sanitary District of Michigan City

**Project:** Karwick Road Nature Park  
Michigan City, Indiana

**Project No.:** 1873-356-04-00-03

**Figure**

Tested By: dc Checked By: jjw



# LIQUID AND PLASTIC LIMIT TEST DATA

12/8/2014

**Client:** Sanitary District of Michigan City

**Project:** Karwick Road Nature Park

Michigan City, Indiana

**Project Number:** 1873-356-04-00-03

**Location:** MW-4 D

**Depth:** 38.0 - 40.0

**Material Description:** Dark Gray LEAN CLAY

**USCS:** CL

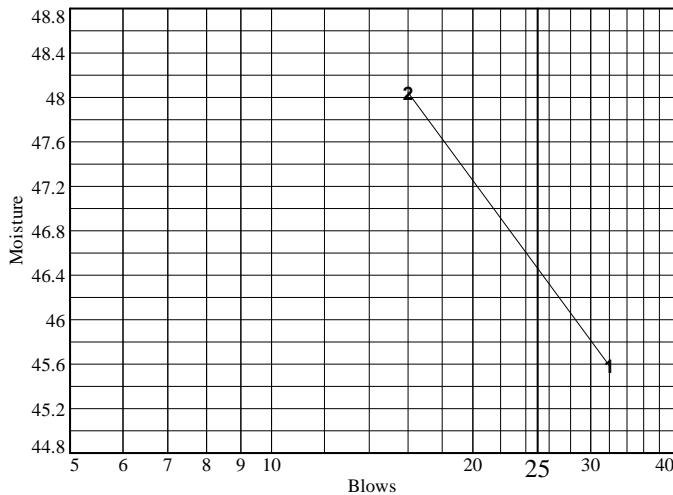
**AASHTO:** A-7-6(20)

**Tested by:** dc

**Checked by:** jjw

## Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	21.99	25.71				
Dry+Tare	19.77	22.27				
Tare	14.90	15.11				
# Blows	32	16				
Moisture	45.6	48.0				



Liquid Limit=	46
Plastic Limit=	26
Plasticity Index=	20
Natural Moisture=	38.1
Liquidity Index=	0.6

## Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.52	20.11	20.17		
Dry+Tare	16.47	19.02	19.05		
Tare	12.48	14.95	14.80		
Moisture	26.3	26.8	26.4		

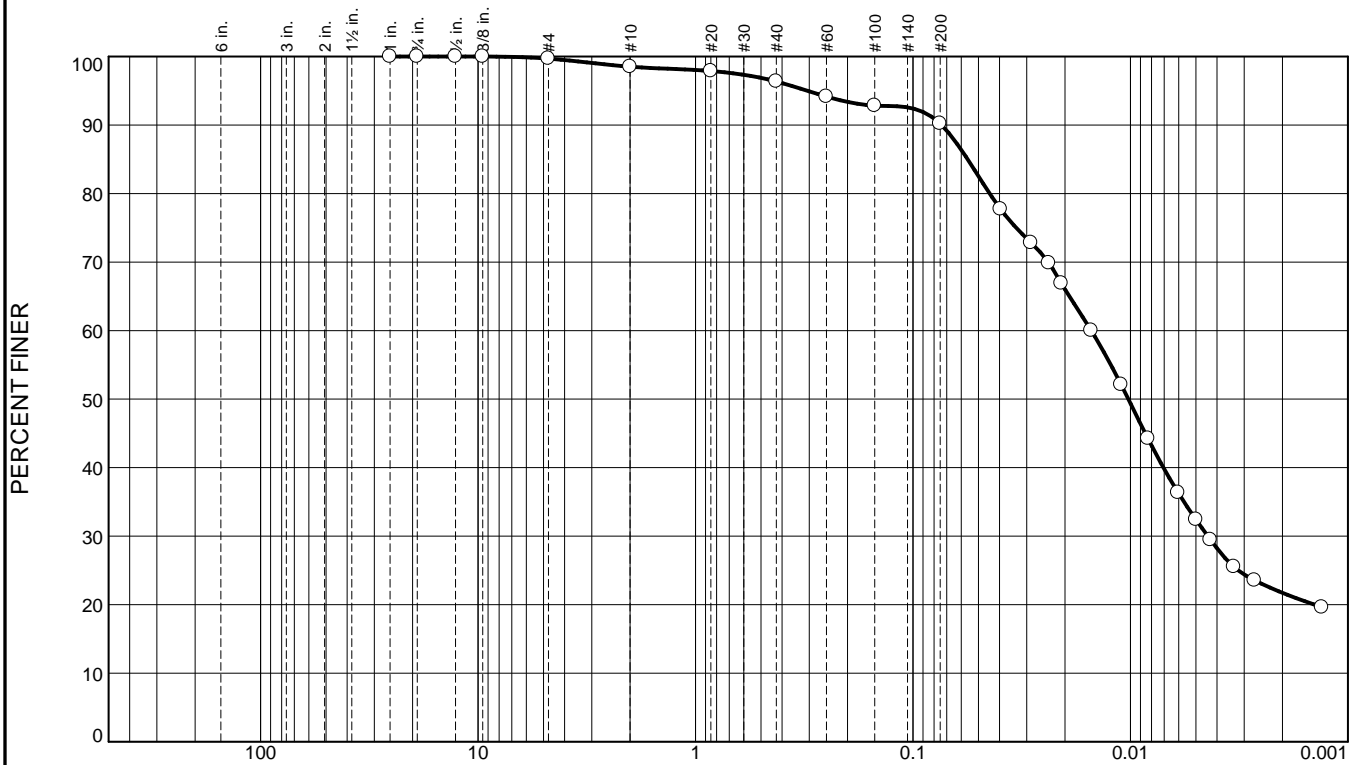
## Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
62.49	46.28	3.72	38.1

Weaver Boos Consultants



# Particle Size Distribution Report ASTM D 422



GRAIN SIZE - mm.

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	1.2	2.1	6.2	57.8	32.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
.75"	100.0		
.50"	100.0		
.375"	100.0		
#4	99.7		
#10	98.5		
#20	97.9		
#40	96.4		
#60	94.2		
#100	92.8		
#200	90.2		
0.0396 mm.	77.7		
0.0286 mm.	72.8		
0.0237 mm.	69.8		
0.0208 mm.	66.9		
0.0151 mm.	60.0		
0.0110 mm.	52.1		
0.0083 mm.	44.2		
0.0060 mm.	36.4		
0.0050 mm.	32.4		
0.0043 mm.	29.5		
0.0033 mm.	25.5		
0.0027 mm.	23.6		
0.0013 mm.	19.6		

\* (no specification provided)

## Soil Description

Dark Gray LEAN CLAY

## Atterberg Limits

PL= 26

LL= 46

PI= 20

## Coefficients

D<sub>90</sub>= 0.0739

D<sub>85</sub>= 0.0561

D<sub>60</sub>= 0.0151

D<sub>50</sub>= 0.0102

D<sub>30</sub>= 0.0044

D<sub>15</sub>=

D<sub>10</sub>=

C<sub>u</sub>=

C<sub>c</sub>=

## Classification

USCS= CL

AASHTO= A-7-6(20)

## Remarks

Moisture Content = 38.1%

Loss On Ignition = 4.6%

Source of Sample: MW-4 D

Depth: 38.0 - 40.0

Date: 11-26-14

**Weaver Boos Consultants**

**GRANGER, IN**

Client: Sanitary District of Michigan City

Project: Karwick Road Nature Park  
Michigan City, Indiana

Project No: 1873-356-04-00-03

Figure

Tested By: dc

Checked By: jjw



**GRAIN SIZE DISTRIBUTION TEST DATA**

12/8/2014

**Client:** Sanitary District of Michigan City**Project:** Karwick Road Nature Park

Michigan City, Indiana

**Project Number:** 1873-356-04-00-03**Location:** MW-4 D**Depth:** 38.0 - 40.0**Material Description:** Dark Gray LEAN CLAY**Date:** 11-26-14**PL:** 26**LL:** 46**PI:** 20**USCS Classification:** CL**AASHTO Classification:** A-7-6(20)**Testing Remarks:** Moisture Content = 38.1%

Loss On Ignition = 4.6%

**Tested by:** dc**Checked by:** jjw**Sieve Test Data**

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
172.48	0.00	0.00	1"	0.00	100.0
			.75"	0.00	100.0
			.50"	0.00	100.0
			.375"	0.00	100.0
			#4	0.52	99.7
			#10	2.56	98.5
50.14	0.00	0.00	#20	0.32	97.9
			#40	1.10	96.4
			#60	2.22	94.2
			#100	2.89	92.8
			#200	4.23	90.2

**Hydrometer Test Data****Hydrometer test uses material passing #10****Percent passing #10 based upon complete sample = 98.5****Weight of hydrometer sample = 50.14****Hygroscopic moisture correction:**

Moist weight and tare = 30.34

Dry weight and tare = 30.09

Tare weight = 11.91

Hygroscopic moisture = 1.4%

**Automatic temperature correction**

Composite correction (fluid density and meniscus height) at 20 deg. C = -6

**Meniscus correction only = 1.0****Specific gravity of solids = 2.70****Hydrometer type = 152H****Hydrometer effective depth equation:  $L = 16.294964 - 0.164 \times R_m$** **Weaver Boos Consultants**



### Hydrometer Test Data (continued)

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1.00	20.0	45.5	39.5	0.0134	46.5	8.7	0.0396	77.7
2.00	20.0	43.0	37.0	0.0134	44.0	9.1	0.0286	72.8
3.00	20.0	41.5	35.5	0.0134	42.5	9.3	0.0237	69.8
4.00	20.0	40.0	34.0	0.0134	41.0	9.6	0.0208	66.9
8.00	20.0	36.5	30.5	0.0134	37.5	10.1	0.0151	60.0
16.00	20.0	32.5	26.5	0.0134	33.5	10.8	0.0110	52.1
30.00	20.0	28.5	22.5	0.0134	29.5	11.5	0.0083	44.2
60.00	20.0	24.5	18.5	0.0134	25.5	12.1	0.0060	36.4
90.00	20.0	22.5	16.5	0.0134	23.5	12.4	0.0050	32.4
125.00	20.0	21.0	15.0	0.0134	22.0	12.7	0.0043	29.5
210.00	20.0	19.0	13.0	0.0134	20.0	13.0	0.0033	25.5
330.00	20.0	18.0	12.0	0.0134	19.0	13.2	0.0027	23.6
1410.00	20.0	16.0	10.0	0.0134	17.0	13.5	0.0013	19.6

### Fractional Components

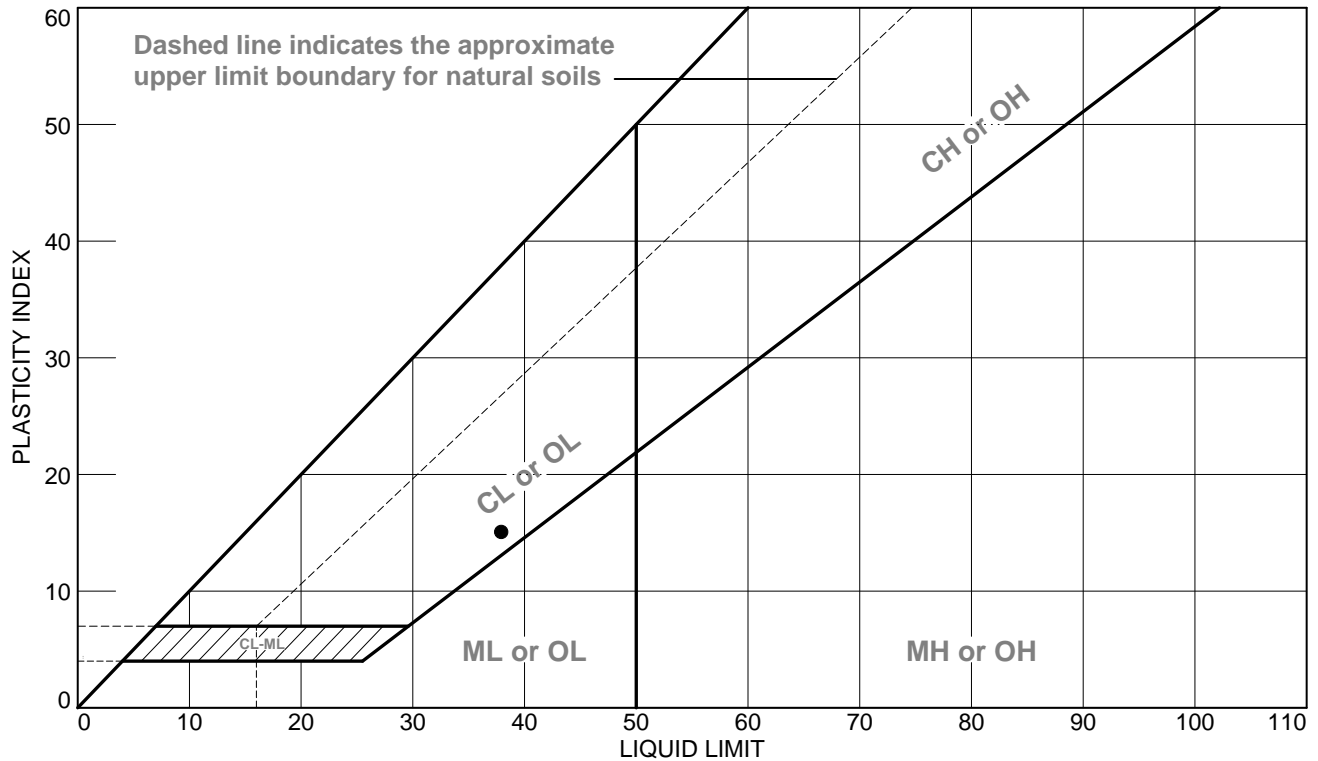
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.3	0.3	1.2	2.1	6.2	9.5	57.8	32.4	90.2

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
		0.0014	0.0044	0.0102	0.0151	0.0444	0.0561	0.0739	0.3058

Fineness Modulus
0.18



# LIQUID AND PLASTIC LIMITS TEST REPORT ASTM D 4318



## SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	LIQUIDITY INDEX	USCS
●	MW-4 D		43.0 - 45.0	38.6	23	38	15	1.0	

**Weaver Boos Consultants**

**GRANGER, IN**

**Client:** Sanitary District of Michigan City

**Project:** Karwick Road Nature Park  
Michigan City, Indiana

**Project No.:** 1873-356-04-00-03

**Figure**

Tested By: dc Checked By: jjw



# LIQUID AND PLASTIC LIMIT TEST DATA

12/8/2014

**Client:** Sanitary District of Michigan City

**Project:** Karwick Road Nature Park

Michigan City, Indiana

**Project Number:** 1873-356-04-00-03

**Location:** MW-4 D

**Depth:** 43.0 - 45.0

**Material Description:** Dark Gray LEAN CLAY

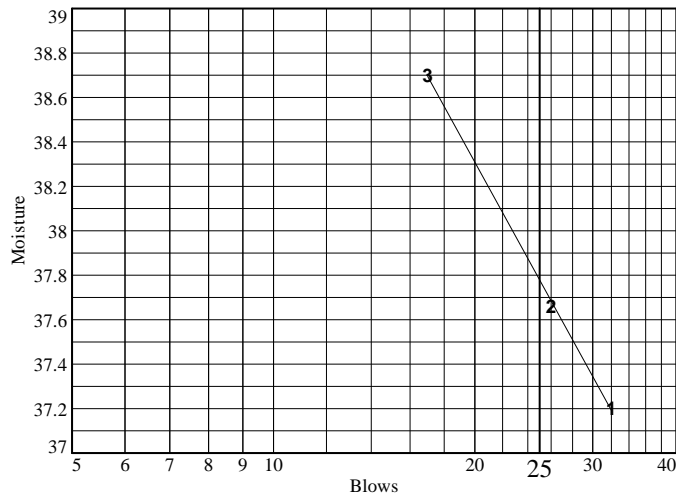
Loss on Ignition = 3.1%

**Tested by:** dc

**Checked by:** jjw

## Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	22.87	23.51	25.12			
Dry+Tare	20.50	21.22	22.14			
Tare	14.13	15.14	14.44			
# Blows	32	26	17			
Moisture	37.2	37.7	38.7			



Liquid Limit= 38  
 Plastic Limit= 23  
 Plasticity Index= 15  
 Natural Moisture= 38.6  
 Liquidity Index= 1.0

## Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.41	17.38	18.61		
Dry+Tare	16.64	16.54	17.73		
Tare	13.24	12.92	13.94		
Moisture	22.6	23.2	23.2		

## Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
61.55	45.44	3.69	38.6

Weaver Boos Consultants



# Particle Size Distribution Report ASTM D 422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.5	4.7	35.5	52.5	3.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	100.0		
3/8"	99.0		
#4	96.5		
#8	93.1		
#16	88.3		
#30	78.4		
#50	31.0		
#100	6.9		
#200	3.8		

\* (no specification provided)

<u><b>Soil Description</b></u>		
Poorly Graded SAND		
<u><b>Atterberg Limits</b></u>		
PL=	LL=	PI=
<u><b>Coefficients</b></u>		
D <sub>90</sub> = 1.5965	D <sub>85</sub> = 0.7358	D <sub>60</sub> = 0.4463
D <sub>50</sub> = 0.3910	D <sub>30</sub> = 0.2949	D <sub>15</sub> = 0.2137
D <sub>10</sub> = 0.1784	C <sub>u</sub> = 2.50	C <sub>c</sub> = 1.09
<u><b>Classification</b></u>		
USCS= SP	AASHTO=	
<u><b>Remarks</b></u>		

Source of Sample: MW-4 D Depth: 53.0 - 55.0

Date: 11-25-14

**Weaver Boos Consultants**

**GRANGER, IN**

Client: Sanitary District of Michigan City

Project: Karwick Road Nature Park  
Michigan City, Indiana

Project No: 1873-356-04-00-03

Figure

Tested By: dc Checked By: jjw



**GRAIN SIZE DISTRIBUTION TEST DATA**

12/8/2014

**Client:** Sanitary District of Michigan City**Project:** Karwick Road Nature Park

Michigan City, Indiana

**Project Number:** 1873-356-04-00-03**Location:** MW-4 D**Depth:** 53.0 - 55.0**Material Description:** Poorly Graded SAND**Date:** 11-25-14**USCS Classification:** SP**Tested by:** dc**Checked by:** jjw**Sieve Test Data****Post #200 Wash Test Weights (grams):** Dry Sample and Tare = 724.10

Tare Wt. = 218.00

Minus #200 from wash = 3.7%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
743.30	218.00	3/4"	0.00	0.00	100.0
		1/2"	0.00	0.00	100.0
		3/8"	5.30	0.00	99.0
		#4	13.20	0.00	96.5
		#8	17.80	0.00	93.1
		#16	25.00	0.00	88.3
		#30	52.00	0.00	78.4
		#50	248.90	0.00	31.0
		#100	126.90	0.00	6.9
		#200	16.30	0.00	3.8

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	3.5	3.5	4.7	35.5	52.5	92.7			3.8

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
0.1784	0.2137	0.2433	0.2949	0.3910	0.4463	0.6223	0.7358	1.5965	3.2747

Fineness Modulus	C <sub>u</sub>	C <sub>c</sub>
2.07	2.50	1.09

Weaver Boos Consultants



# LIQUID AND PLASTIC LIMIT TEST DATA

12/8/2014

**Client:** Sanitary District of Michigan City

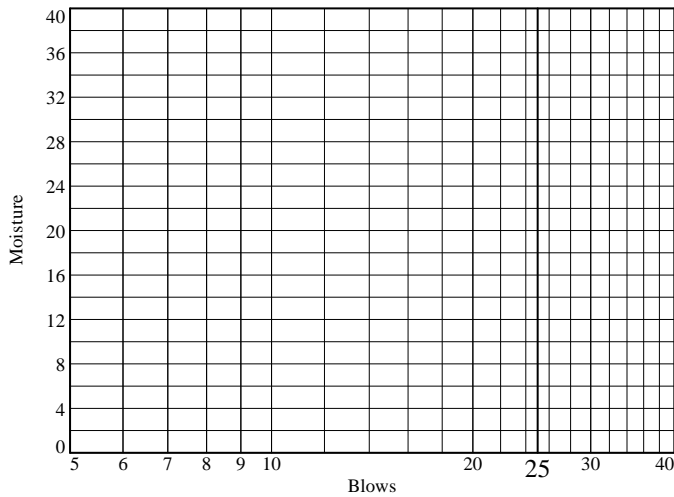
**Project:** Karwick Road Nature Park

Michigan City, Indiana

**Project Number:** 1873-356-04-00-03

**Location:** MW-6 D

**Depth:** 11.5 - 12.5



Liquid Limit= \_\_\_\_\_  
 Plastic Limit= \_\_\_\_\_  
 Plasticity Index= \_\_\_\_\_  
 Natural Moisture= 38.8

## Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
101.17	74.08	4.26	38.8

Weaver Boos Consultants



# LIQUID AND PLASTIC LIMIT TEST DATA

12/8/2014

**Client:** Sanitary District of Michigan City

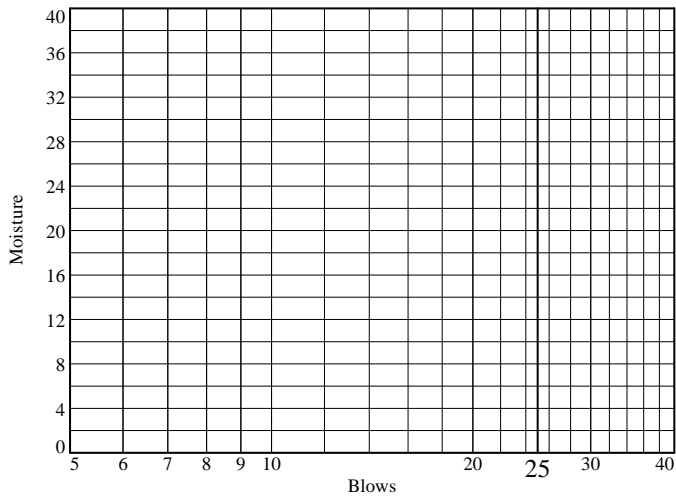
**Project:** Karwick Road Nature Park

Michigan City, Indiana

**Project Number:** 1873-356-04-00-03

**Location:** MW-6 D

**Depth:** 18.5 - 20.0



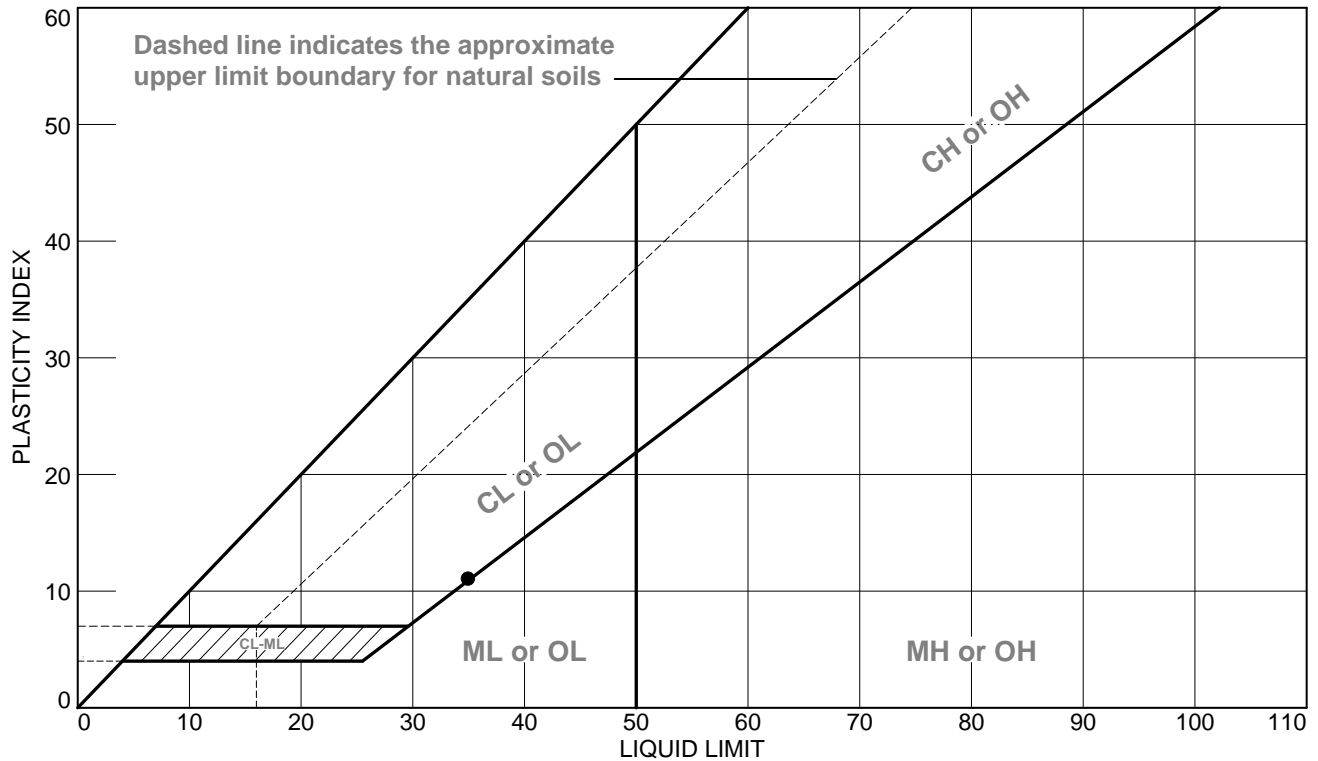
Liquid Limit= \_\_\_\_\_  
 Plastic Limit= \_\_\_\_\_  
 Plasticity Index= \_\_\_\_\_  
 Natural Moisture= 81.2

## Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
79.77	46.06	4.52	81.2



# LIQUID AND PLASTIC LIMITS TEST REPORT ASTM D 4318



## SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	LIQUIDITY INDEX	USCS
●	MW-6 D		23.5 - 25.0	39.6	24	35	11	1.4	CL

**Weaver Boos Consultants**

**GRANGER, IN**

**Client:** Sanitary District of Michigan City

**Project:** Karwick Road Nature Park  
Michigan City, Indiana

**Project No.:** 1873-356-04-00-03

**Figure**

Tested By: dc Checked By: jjw



# LIQUID AND PLASTIC LIMIT TEST DATA

12/8/2014

**Client:** Sanitary District of Michigan City

**Project:** Karwick Road Nature Park

Michigan City, Indiana

**Project Number:** 1873-356-04-00-03

**Location:** MW-6 D

**Depth:** 23.5 - 25.0

**Material Description:** Gray SANDY LEAN CLAY

**USCS:** CL

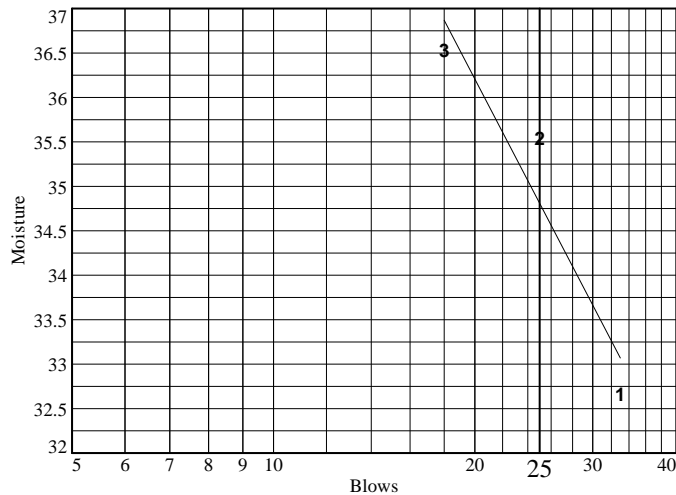
**AASHTO:** A-6(5)

**Tested by:** dc

**Checked by:** jjw

## Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	23.26	25.58	22.94			
Dry+Tare	20.79	22.47	20.58			
Tare	13.23	13.72	14.12			
# Blows	33	25	18			
Moisture	32.7	35.5	36.5			



Liquid Limit= 35  
 Plastic Limit= 24  
 Plasticity Index= 11  
 Natural Moisture= 39.6  
 Liquidity Index= 1.4

## Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.41	19.40	17.51		
Dry+Tare	16.66	18.62	16.60		
Tare	13.40	15.40	12.76		
Moisture	23.0	24.2	23.7		

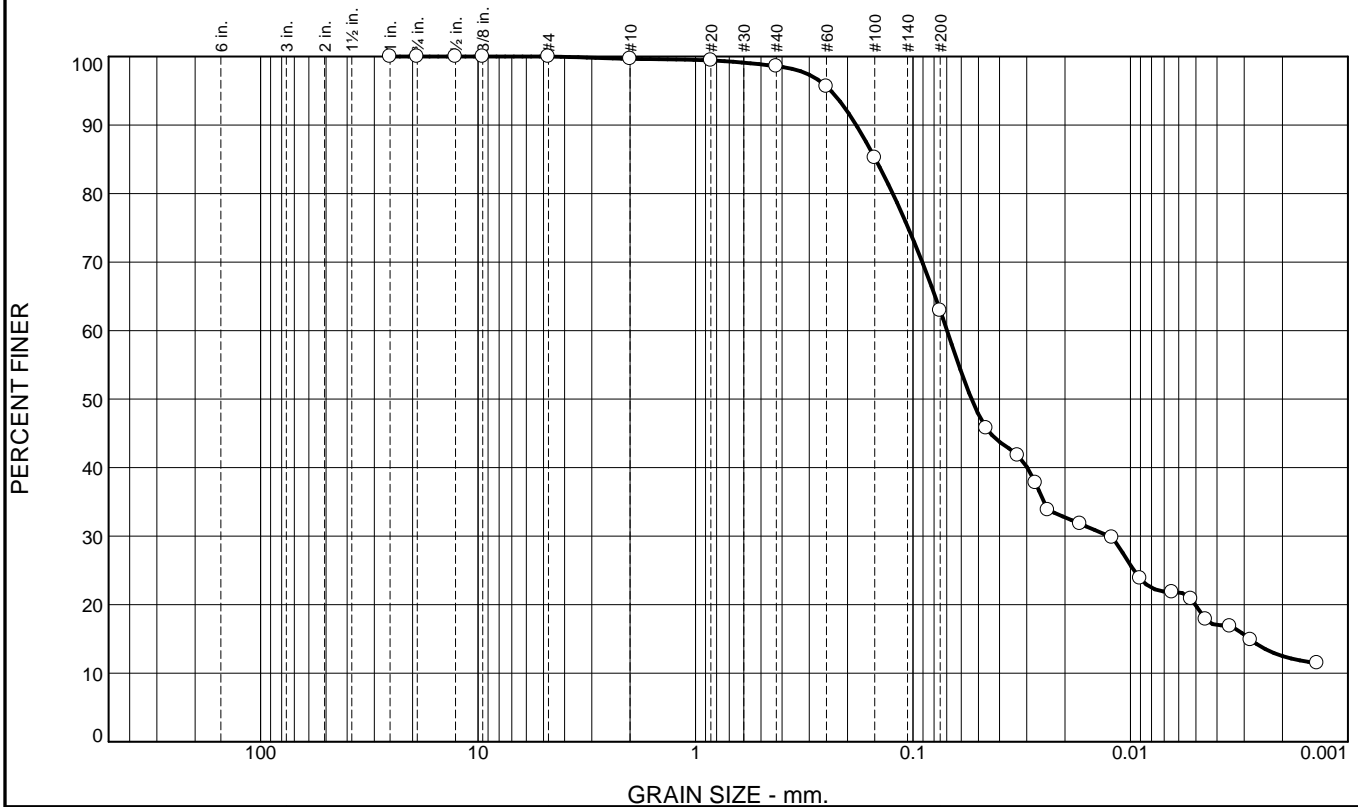
## Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
80.6	58.8	3.7	39.6

Weaver Boos Consultants



# Particle Size Distribution Report ASTM D 422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	1.1	35.7	43.0	19.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
.75"	100.0		
.50"	100.0		
.375"	100.0		
#4	100.0		
#10	99.7		
#20	99.4		
#40	98.6		
#60	95.6		
#100	85.2		
#200	62.9		
0.0460 mm.	45.8		
0.0330 mm.	41.8		
0.0273 mm.	37.8		
0.0240 mm.	33.8		
0.0171 mm.	31.8		
0.0122 mm.	29.8		
0.0090 mm.	23.8		
0.0064 mm.	21.8		
0.0053 mm.	20.8		
0.0045 mm.	17.9		
0.0035 mm.	16.9		
0.0028 mm.	14.9		
0.0014 mm.	11.5		

\* (no specification provided)

<u><b>Soil Description</b></u>		
Gray SANDY LEAN CLAY		
<u><b>Atterberg Limits</b></u>		
PL= 24	LL= 35	PI= 11
<u><b>Coefficients</b></u>		
D <sub>90</sub> = 0.1824	D <sub>85</sub> = 0.1487	D <sub>60</sub> = 0.0697
D <sub>50</sub> = 0.0538	D <sub>30</sub> = 0.0125	D <sub>15</sub> = 0.0028
D <sub>10</sub> =	C <sub>u</sub> =	C <sub>c</sub> =
<u><b>Classification</b></u>		
USCS= CL	AASHTO= A-6(5)	
<u><b>Remarks</b></u>		
Moisture Content = 39.6%		

Source of Sample: MW-6 D Depth: 23.5 - 25.0

Date: 11-21-14

**Weaver Boos Consultants**  
**GRANGER, IN**

**Client:** Sanitary District of Michigan City  
**Project:** Karwick Road Nature Park  
Michigan City, Indiana  
**Project No:** 1873-356-04-00-03

**Figure**

Tested By: tn Checked By: jjw



**GRAIN SIZE DISTRIBUTION TEST DATA**

12/8/2014

**Client:** Sanitary District of Michigan City**Project:** Karwick Road Nature Park

Michigan City, Indiana

**Project Number:** 1873-356-04-00-03**Location:** MW-6 D**Depth:** 23.5 - 25.0**Material Description:** Gray SANDY LEAN CLAY**Date:** 11-21-14**PL:** 24**LL:** 35**PI:** 11**USCS Classification:** CL**AASHTO Classification:** A-6(5)**Testing Remarks:** Moisture Content = 39.6%**Tested by:** tn**Checked by:** jjw**Sieve Test Data**

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
166.47	0.00	0.00	1"	0.00	100.0
			.75"	0.00	100.0
			.50"	0.00	100.0
			.375"	0.00	100.0
			#4	0.00	100.0
			#10	0.55	99.7
50.33	0.00	0.00	#20	0.12	99.4
			#40	0.55	98.6
			#60	2.04	95.6
			#100	7.29	85.2
			#200	18.55	62.9

**Hydrometer Test Data****Hydrometer test uses material passing #10****Percent passing #10 based upon complete sample = 99.7****Weight of hydrometer sample = 50.33****Hygroscopic moisture correction:**

Moist weight and tare = 32.26

Dry weight and tare = 32.14

Tare weight = 13.89

Hygroscopic moisture = 0.7%

**Automatic temperature correction**

Composite correction (fluid density and meniscus height) at 20 deg. C = -6

**Meniscus correction only = 1.0****Specific gravity of solids = 2.65****Hydrometer type = 152H****Hydrometer effective depth equation:**  $L = 16.294964 - 0.164 \times R_m$ 

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1.00	20.0	29.0	23.0	0.0136	30.0	11.4	0.0460	45.8
2.00	20.0	27.0	21.0	0.0136	28.0	11.7	0.0330	41.8
3.00	20.0	25.0	19.0	0.0136	26.0	12.0	0.0273	37.8
4.00	20.0	23.0	17.0	0.0136	24.0	12.4	0.0240	33.8
8.00	20.0	22.0	16.0	0.0136	23.0	12.5	0.0171	31.8

**Weaver Boos Consultants**



### Hydrometer Test Data (continued)

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
16.00	20.0	21.0	15.0	0.0136	22.0	12.7	0.0122	29.8
30.00	20.0	18.0	12.0	0.0136	19.0	13.2	0.0090	23.8
60.00	20.0	17.0	11.0	0.0136	18.0	13.3	0.0064	21.8
90.00	20.0	16.5	10.5	0.0136	17.5	13.4	0.0053	20.8
125.00	20.0	15.0	9.0	0.0136	16.0	13.7	0.0045	17.9
210.00	20.0	14.5	8.5	0.0136	15.5	13.8	0.0035	16.9
330.00	20.0	13.5	7.5	0.0136	14.5	13.9	0.0028	14.9
1410.00	19.0	12.0	5.8	0.0138	13.0	14.2	0.0014	11.5

### Fractional Components

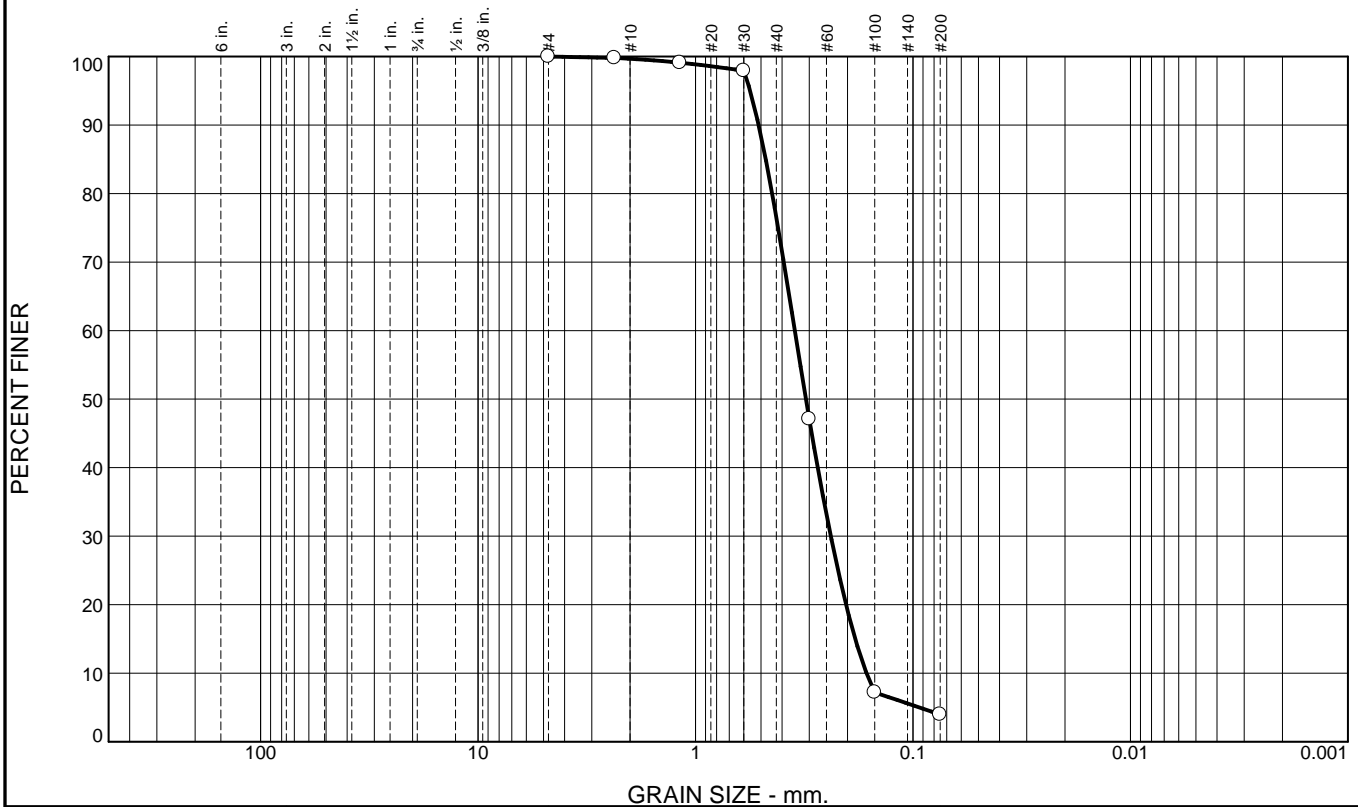
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.3	1.1	35.7	37.1	43.0	19.9	62.9

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
	0.0028	0.0050	0.0125	0.0538	0.0697	0.1240	0.1487	0.1824	0.2386

Fineness Modulus
0.19



# Particle Size Distribution Report ASTM D 422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	23.2	72.5	4.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	99.8		
#16	99.1		
#30	97.9		
#50	47.1		
#100	7.2		
#200	4.0		

\* (no specification provided)

<u><b>Soil Description</b></u>		
Poorly Graded SAND		
<u><b>Atterberg Limits</b></u>		
PL=	LL=	PI=
<u><b>Coefficients</b></u>		
D <sub>90</sub> = 0.5128	D <sub>85</sub> = 0.4756	D <sub>60</sub> = 0.3494
D <sub>50</sub> = 0.3107	D <sub>30</sub> = 0.2389	D <sub>15</sub> = 0.1843
D <sub>10</sub> = 0.1636	C <sub>u</sub> = 2.14	C <sub>c</sub> = 1.00
<u><b>Classification</b></u>		
USCS= SP	AASHTO=	
<u><b>Remarks</b></u>		

Source of Sample: MW-6 D Depth: 53.5 - 55.0

Date: 11-25-14

**Weaver Boos Consultants**

**GRANGER, IN**

Client: Sanitary District of Michigan City

Project: Karwick Road Nature Park  
Michigan City, Indiana

Project No: 1873-356-04-00-03

Figure

Tested By: dc Checked By: jjw



**GRAIN SIZE DISTRIBUTION TEST DATA**

12/8/2014

**Client:** Sanitary District of Michigan City**Project:** Karwick Road Nature Park

Michigan City, Indiana

**Project Number:** 1873-356-04-00-03**Location:** MW-6 D**Depth:** 53.5 - 55.0**Material Description:** Poorly Graded SAND**Date:** 11-25-14**USCS Classification:** SP**Tested by:** dc**Checked by:** jjw**Sieve Test Data****Post #200 Wash Test Weights (grams):** Dry Sample and Tare = 465.00

Tare Wt. = 220.00

Minus #200 from wash = 3.7%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
474.40	220.00	#4	0.00	0.00	100.0
		#8	0.50	0.00	99.8
		#16	1.80	0.00	99.1
		#30	3.00	0.00	97.9
		#50	129.30	0.00	47.1
		#100	101.50	0.00	7.2
		#200	8.20	0.00	4.0

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.3	23.2	72.5	96.0			4.0

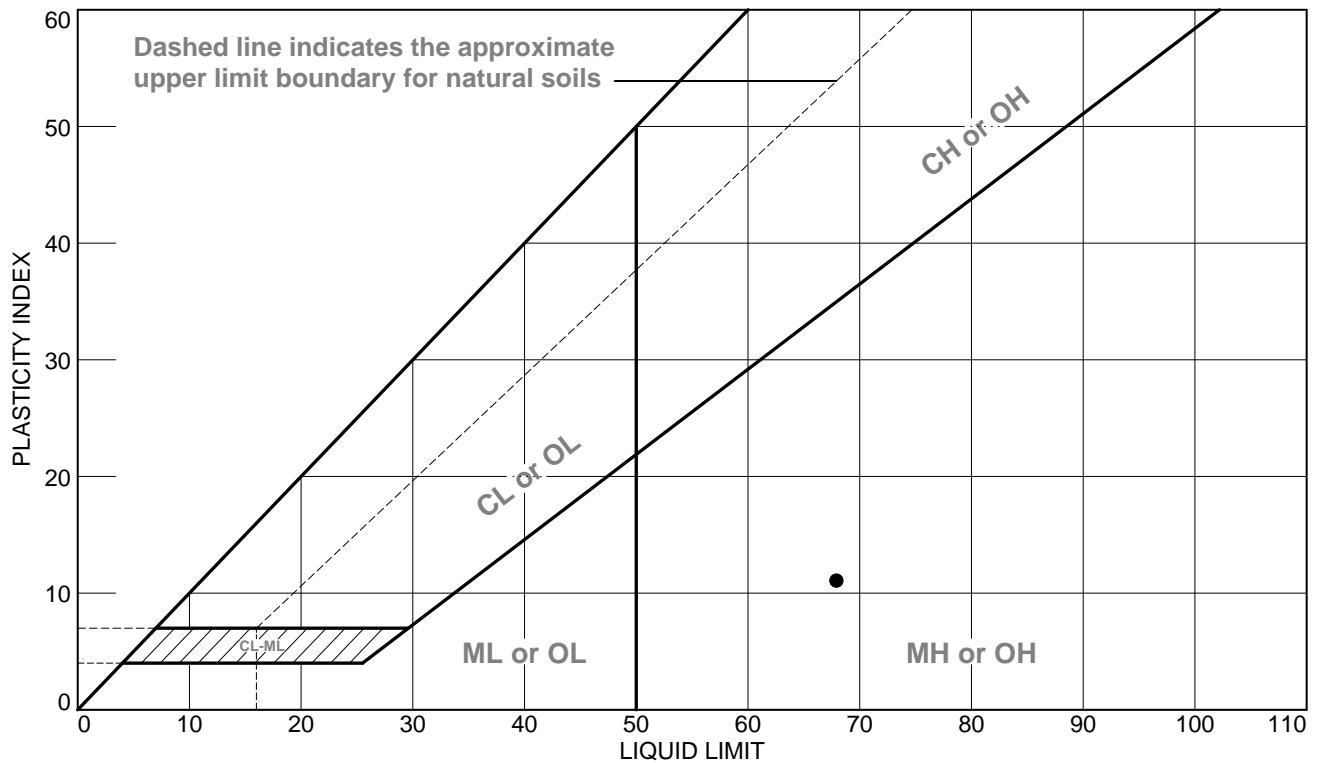
D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
0.1636	0.1843	0.2031	0.2389	0.3107	0.3494	0.4445	0.4756	0.5128	0.5610

Fineness Modulus	C <sub>u</sub>	C <sub>c</sub>
1.49	2.14	1.00

Weaver Boos Consultants



# LIQUID AND PLASTIC LIMITS TEST REPORT ASTM D 4318



## SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	LIQUIDITY INDEX	USCS
●	MW-9 S		18.5 - 20.0	100.6	57	68	11	4.0	MH

**Weaver Boos Consultants**

**GRANGER, IN**

**Client:** Sanitary District of Michigan City

**Project:** Karwick Road Nature Park  
Michigan City, Indiana

**Project No.:** 1873-356-04-00-03

**Figure**

Tested By: dc Checked By: jjw



# LIQUID AND PLASTIC LIMIT TEST DATA

12/8/2014

**Client:** Sanitary District of Michigan City

**Project:** Karwick Road Nature Park

Michigan City, Indiana

**Project Number:** 1873-356-04-00-03

**Location:** MW-9 S

**Depth:** 18.5 - 20.0

**Material Description:** Dark Gray ELASTIC SILT with sand

**USCS:** MH

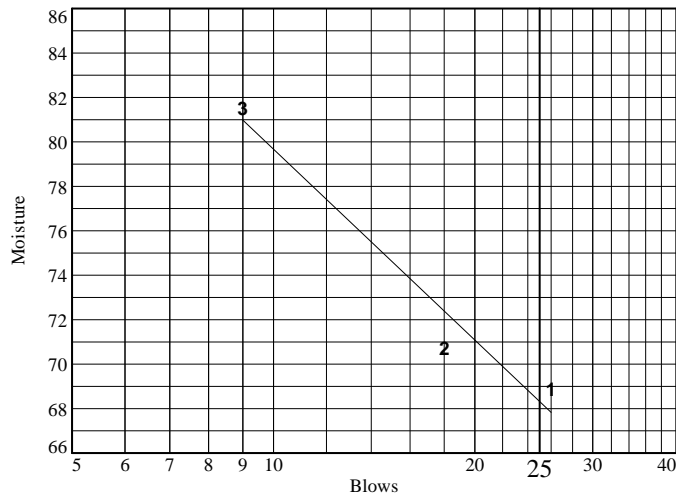
**AASHTO:** A-7-5(15)

**Tested by:** dc

**Checked by:** jjw

## Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	25.65	22.85	20.65			
Dry+Tare	20.44	19.13	16.98			
Tare	12.88	13.87	12.48			
# Blows	26	18	9			
Moisture	68.9	70.7	81.6			



Liquid Limit=	68
Plastic Limit=	57
Plasticity Index=	11
Natural Moisture=	100.6
Liquidity Index=	4.0

## Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	20.08	16.83			
Dry+Tare	18.38	15.82			
Tare	15.58	13.94			
Moisture	60.7	53.7			

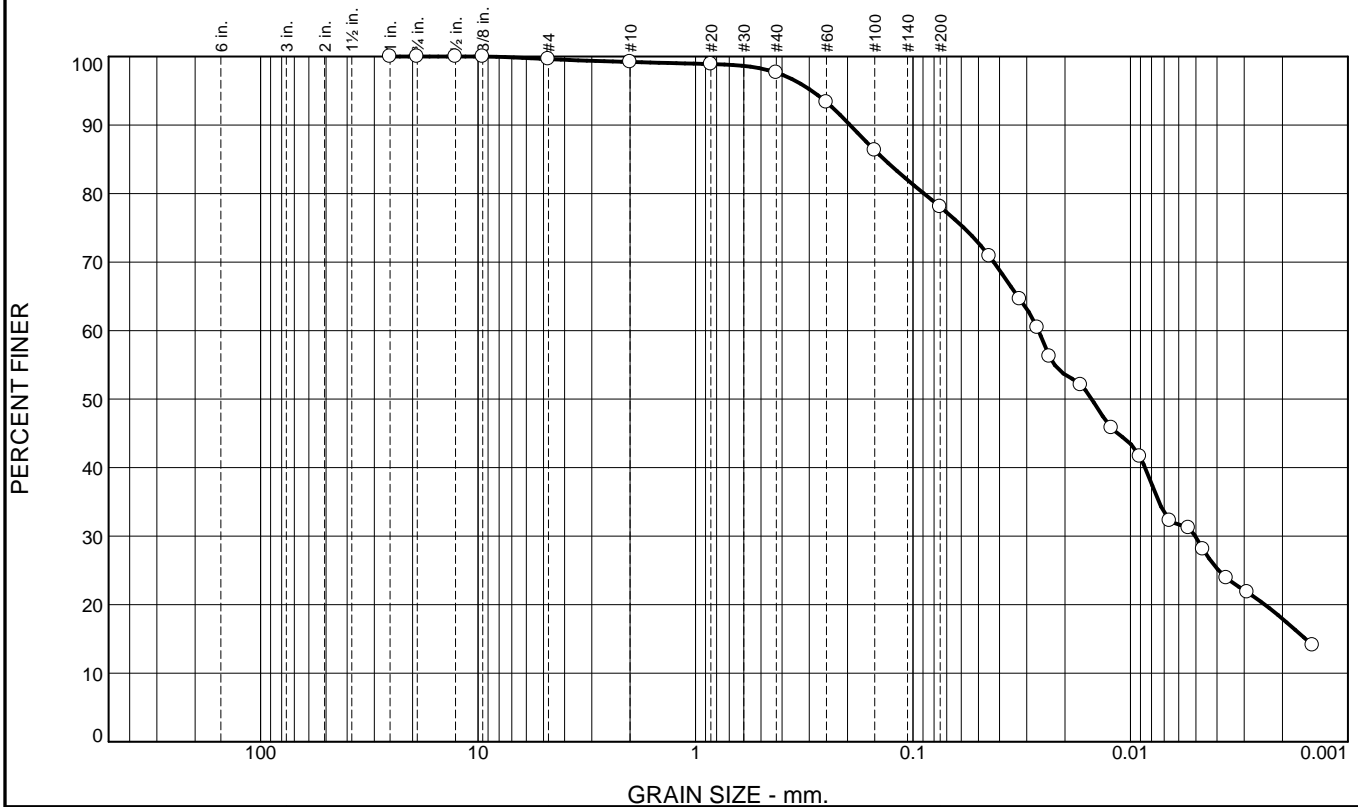
## Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
66.2	34.8	3.6	100.6

Weaver Boos Consultants



# Particle Size Distribution Report ASTM D 422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	0.4	1.6	19.5	48.3	29.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
.75"	100.0		
.50"	100.0		
.375"	100.0		
#4	99.6		
#10	99.2		
#20	98.9		
#40	97.6		
#60	93.3		
#100	86.3		
#200	78.1		
0.0446 mm.	70.9		
0.0323 mm.	64.6		
0.0268 mm.	60.4		
0.0236 mm.	56.2		
0.0169 mm.	52.1		
0.0122 mm.	45.8		
0.0091 mm.	41.6		
0.0066 mm.	32.3		
0.0054 mm.	31.2		
0.0046 mm.	28.1		
0.0036 mm.	23.9		
0.0029 mm.	21.8		
0.0015 mm.	14.1		

\* (no specification provided)

<u><b>Soil Description</b></u>		
Dark Gray ELASTIC SILT with sand		
<u><b>Atterberg Limits</b></u>		
PL= 57	LL= 68	PI= 11
<u><b>Coefficients</b></u>		
D <sub>90</sub> = 0.1946	D <sub>85</sub> = 0.1358	D <sub>60</sub> = 0.0265
D <sub>50</sub> = 0.0151	D <sub>30</sub> = 0.0050	D <sub>15</sub> = 0.0016
D <sub>10</sub> =	C <sub>u</sub> =	C <sub>c</sub> =
<u><b>Classification</b></u>		
USCS= MH	AASHTO= A-7-5(15)	
<u><b>Remarks</b></u>		
Moisture Content = 100.6%		

Source of Sample: MW-9 S Depth: 18.5 - 20.0

Date: 11-21-14

**Weaver Boos Consultants**  
**GRANGER, IN**

**Client:** Sanitary District of Michigan City  
**Project:** Karwick Road Nature Park  
Michigan City, Indiana  
**Project No:** 1873-356-04-00-03

**Figure**

Tested By: tn Checked By: jjw



**GRAIN SIZE DISTRIBUTION TEST DATA**

12/8/2014

**Client:** Sanitary District of Michigan City**Project:** Karwick Road Nature Park

Michigan City, Indiana

**Project Number:** 1873-356-04-00-03**Location:** MW-9 S**Depth:** 18.5 - 20.0**Material Description:** Dark Gray ELASTIC SILT with sand**Date:** 11-21-14**PL:** 57**LL:** 68**PI:** 11**USCS Classification:** MH**AASHTO Classification:** A-7-5(15)**Testing Remarks:** Moisture Content = 100.6%**Tested by:** tn**Checked by:** jjw**Sieve Test Data**

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
120.25	0.00	0.00	1"	0.00	100.0
			.75"	0.00	100.0
			.50"	0.00	100.0
			.375"	0.00	100.0
			#4	0.45	99.6
			#10	0.95	99.2
50.08	0.00	0.00	#20	0.16	98.9
			#40	0.79	97.6
			#60	2.97	93.3
			#100	6.51	86.3
			#200	10.68	78.1

**Hydrometer Test Data**

Hydrometer test uses material passing #10

Percent passing #10 based upon complete sample = 99.2

Weight of hydrometer sample = 50.08

Hygroscopic moisture correction:

Moist weight and tare = 32.11

Dry weight and tare = 31.96

Tare weight = 16.11

Hygroscopic moisture = 0.9%

Automatic temperature correction

Composite correction (fluid density and meniscus height) at 20 deg. C = -6

Meniscus correction only = 1.0

Specific gravity of solids = 2.48

Hydrometer type = 152H

Hydrometer effective depth equation:  $L = 16.294964 - 0.164 \times R_m$ 

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1.00	20.0	40.0	34.0	0.0144	41.0	9.6	0.0446	70.9
2.00	20.0	37.0	31.0	0.0144	38.0	10.1	0.0323	64.6
3.00	20.0	35.0	29.0	0.0144	36.0	10.4	0.0268	60.4
4.00	20.0	33.0	27.0	0.0144	34.0	10.7	0.0236	56.2
8.00	20.0	31.0	25.0	0.0144	32.0	11.0	0.0169	52.1

**Weaver Boos Consultants**



### Hydrometer Test Data (continued)

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
16.00	20.0	28.0	22.0	0.0144	29.0	11.5	0.0122	45.8
30.00	20.0	26.0	20.0	0.0144	27.0	11.9	0.0091	41.6
60.00	20.0	21.5	15.5	0.0144	22.5	12.6	0.0066	32.3
90.00	20.0	21.0	15.0	0.0144	22.0	12.7	0.0054	31.2
125.00	20.0	19.5	13.5	0.0144	20.5	12.9	0.0046	28.1
210.00	20.0	17.5	11.5	0.0144	18.5	13.3	0.0036	23.9
330.00	20.0	16.5	10.5	0.0144	17.5	13.4	0.0029	21.8
1410.00	19.0	13.0	6.8	0.0146	14.0	14.0	0.0015	14.1

### Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.4	0.4	0.4	1.6	19.5	21.5	48.3	29.8	78.1

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
	0.0016	0.0024	0.0050	0.0151	0.0265	0.0890	0.1358	0.1946	0.2922

Fineness Modulus
0.22



# LIQUID AND PLASTIC LIMIT TEST DATA

12/8/2014

**Client:** Sanitary District of Michigan City

**Project:** Karwick Road Nature Park

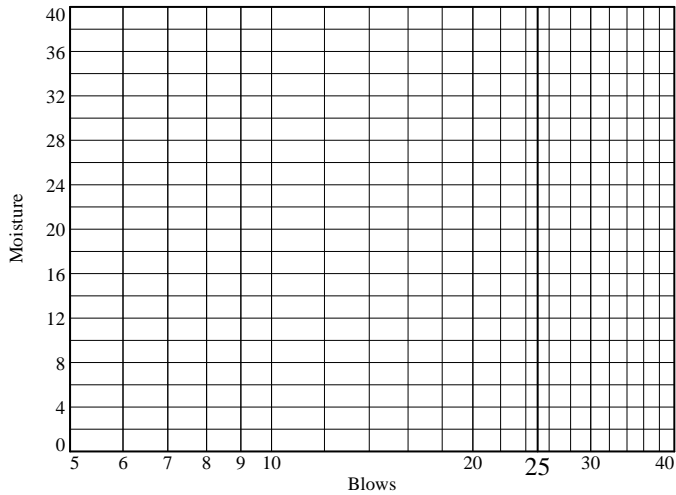
Michigan City, Indiana

**Project Number:** 1873-356-04-00-03

**Location:** MW-10 D

**Depth:** 8.5 - 10.0

**Material Description:** Loss On Ignition = 21.2%



Liquid Limit= \_\_\_\_\_  
Plastic Limit= \_\_\_\_\_  
Plasticity Index= \_\_\_\_\_  
Natural Moisture= 112.8

## Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
68.75	34.62	4.37	112.8

Weaver Boos Consultants



# LIQUID AND PLASTIC LIMIT TEST DATA

12/8/2014

**Client:** Sanitary District of Michigan City

**Project:** Karwick Road Nature Park

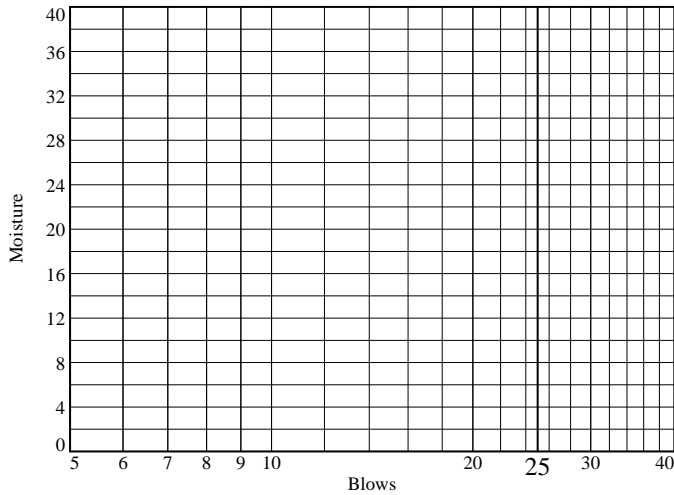
Michigan City, Indiana

**Project Number:** 1873-356-04-00-03

**Location:** MW-10 D

**Depth:** 18.5 - 20.0

**Material Description:** Loss On Ignition = 5.2%



Liquid Limit= \_\_\_\_\_  
 Plastic Limit= \_\_\_\_\_  
 Plasticity Index= \_\_\_\_\_  
 Natural Moisture= 52.0

## Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
110.70	74.31	4.33	52.0

Weaver Boos Consultants



# Particle Size Distribution Report ASTM D 422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	3.5	91.8	4.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#8	100.0		
#16	99.9		
#30	99.6		
#50	79.9		
#100	10.4		
#200	4.7		

\* (no specification provided)

<u><b>Soil Description</b></u>		
Poorly Graded SAND		
<u><b>Atterberg Limits</b></u>		
PL=	LL=	PI=
<u><b>Coefficients</b></u>		
D <sub>90</sub> = 0.3517	D <sub>85</sub> = 0.3220	D <sub>60</sub> = 0.2443
D <sub>50</sub> = 0.2235	D <sub>30</sub> = 0.1869	D <sub>15</sub> = 0.1597
D <sub>10</sub> = 0.1435	C <sub>u</sub> = 1.70	C <sub>c</sub> = 1.00
<u><b>Classification</b></u>		
USCS= SP	AASHTO=	
<u><b>Remarks</b></u>		

Source of Sample: MW-10 D Depth: 28.5 - 30.0

Date: 11-25-14

**Weaver Boos Consultants**

**GRANGER, IN**

Client: Sanitary District of Michigan City

Project: Karwick Road Nature Park  
Michigan City, Indiana

Project No: 1873-356-04-00-03

Figure

Tested By: dc Checked By: jjw



**GRAIN SIZE DISTRIBUTION TEST DATA**

12/8/2014

**Client:** Sanitary District of Michigan City**Project:** Karwick Road Nature Park

Michigan City, Indiana

**Project Number:** 1873-356-04-00-03**Location:** MW-10 D**Depth:** 28.5 - 30.0**Material Description:** Poorly Graded SAND**Date:** 11-25-14**USCS Classification:** SP**Tested by:** dc**Checked by:** jjw**Sieve Test Data****Post #200 Wash Test Weights (grams):** Dry Sample and Tare = 299.80

Tare Wt. = 164.30

Minus #200 from wash = 5.1%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
307.10	164.30	#8	0.00	0.00	100.0
		#16	0.20	0.00	99.9
		#30	0.30	0.00	99.6
		#50	28.20	0.00	79.9
		#100	99.30	0.00	10.4
		#200	8.10	0.00	4.7

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.0	3.5	91.8	95.3			4.7

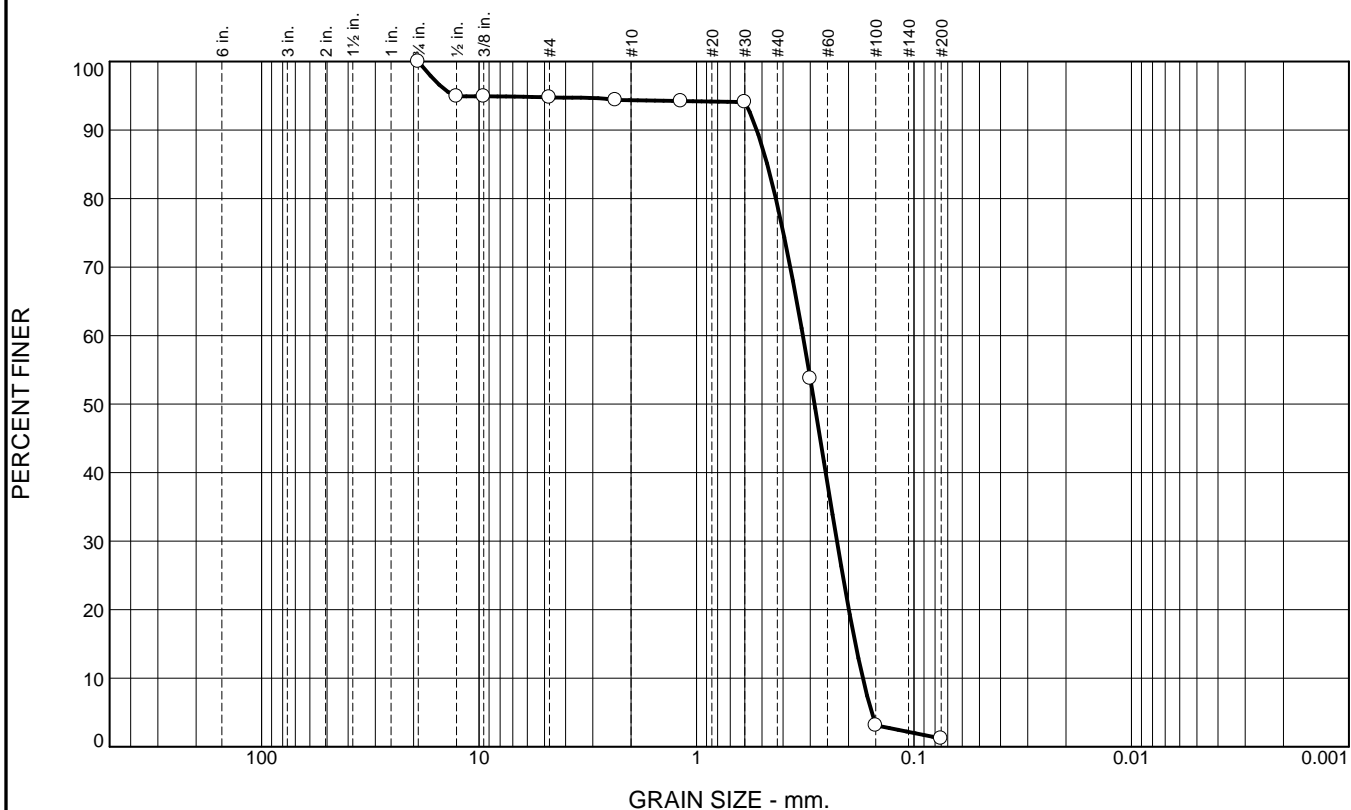
D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
0.1435	0.1597	0.1691	0.1869	0.2235	0.2443	0.3004	0.3220	0.3517	0.4002

Fineness Modulus	C <sub>u</sub>	C <sub>c</sub>
1.10	1.70	1.00

Weaver Boos Consultants



# Particle Size Distribution Report ASTM D 422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.2	0.4	15.4	77.8	1.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	94.9		
3/8"	94.9		
#4	94.8		
#8	94.4		
#16	94.2		
#30	94.1		
#50	53.8		
#100	3.1		
#200	1.2		

\* (no specification provided)

<u><b>Soil Description</b></u>		
Poorly Graded SAND		
<u><b>Atterberg Limits</b></u>		
PL=	LL=	PI=
<u><b>Coefficients</b></u>		
D <sub>90</sub> = 0.5284	D <sub>85</sub> = 0.4732	D <sub>60</sub> = 0.3242
D <sub>50</sub> = 0.2867	D <sub>30</sub> = 0.2262	D <sub>15</sub> = 0.1859
D <sub>10</sub> = 0.1719	C <sub>u</sub> = 1.89	C <sub>c</sub> = 0.92
<u><b>Classification</b></u>		
USCS= SP	AASHTO=	
<u><b>Remarks</b></u>		

Source of Sample: MW-10 D Depth: 38.5 - 40.0

Date: 11-25-14

**Weaver Boos Consultants**

**GRANGER, IN**

Client: Sanitary District of Michigan City

Project: Karwick Road Nature Park  
Michigan City, Indiana

Project No: 1873-356-04-00-03

Figure

Tested By: dc Checked By: jjw



**GRAIN SIZE DISTRIBUTION TEST DATA**

12/8/2014

**Client:** Sanitary District of Michigan City**Project:** Karwick Road Nature Park

Michigan City, Indiana

**Project Number:** 1873-356-04-00-03**Location:** MW-10 D**Depth:** 38.5 - 40.0**Material Description:** Poorly Graded SAND**Date:** 11-25-14**USCS Classification:** SP**Tested by:** dc**Checked by:** jjw**Sieve Test Data****Post #200 Wash Test Weights (grams):** Dry Sample and Tare = 302.60

Tare Wt. = 172.10

Minus #200 from wash = 1.1%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
304.00	172.10	3/4"	0.00	0.00	100.0
		1/2"	6.70	0.00	94.9
		3/8"	0.00	0.00	94.9
		#4	0.20	0.00	94.8
		#8	0.50	0.00	94.4
		#16	0.20	0.00	94.2
		#30	0.20	0.00	94.1
		#50	53.20	0.00	53.8
		#100	66.80	0.00	3.1
		#200	2.50	0.00	1.2

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	5.2	5.2	0.4	15.4	77.8	93.6			1.2

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
0.1719	0.1859	0.1993	0.2262	0.2867	0.3242	0.4321	0.4732	0.5284	12.8912

Fineness Modulus	C <sub>u</sub>	C <sub>c</sub>
1.71	1.89	0.92

Weaver Boos Consultants



## **APPENDIX E**

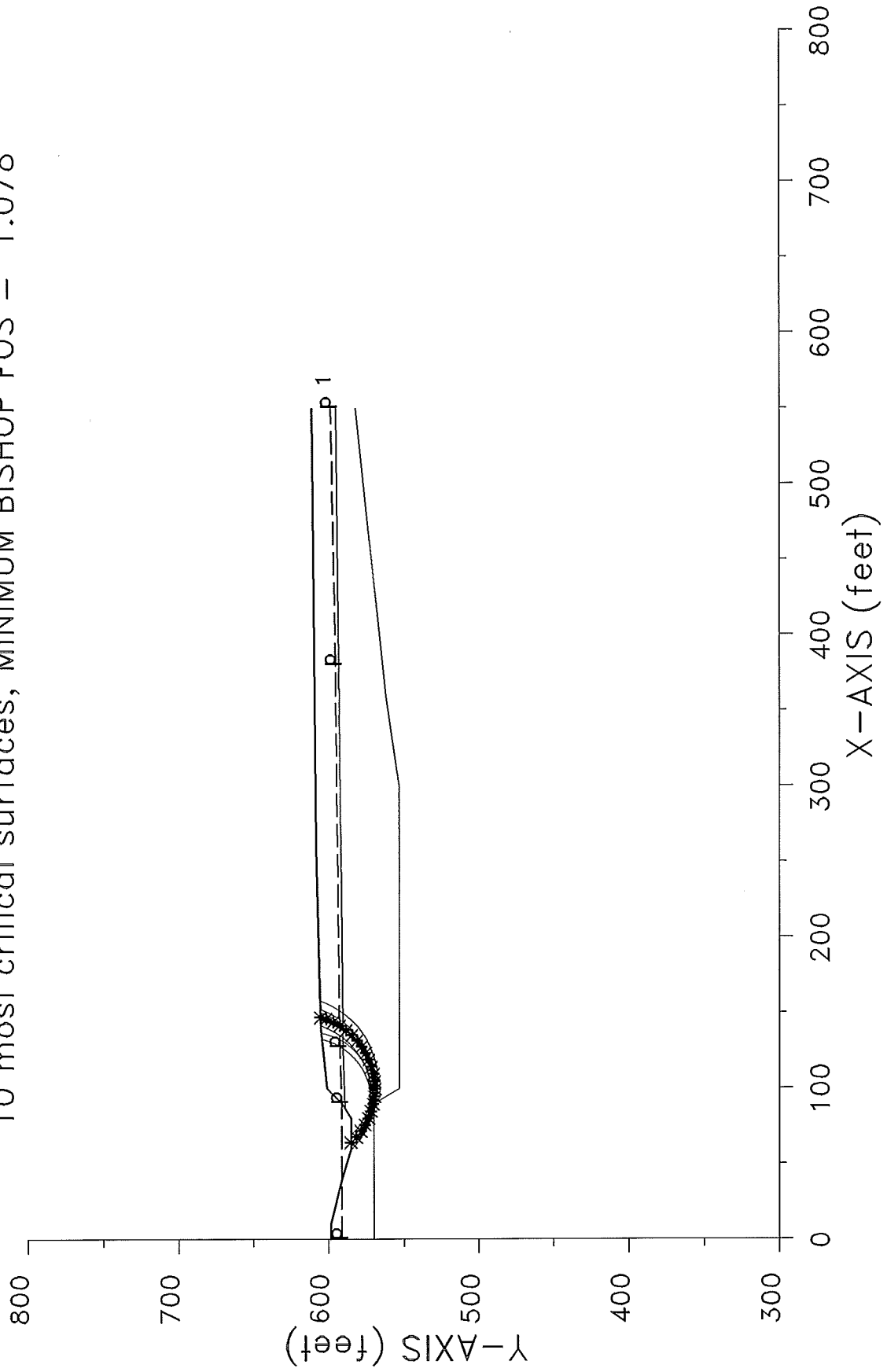
1. Slope Stability Calculations
2. Estimate Flow to Drain Trench Calculations



## **1. Slope Stability Calculations**



Karwick Road Stability – Existing  
10 most critical surfaces, MINIMUM BISHOP FOS = 1.078





```

*****
*               X S T A B L               *
*                                           *
*      Slope Stability Analysis            *
*      using the                          *
*      Method of Slices                    *
*                                           *
*      Copyright (C) 1992 - 2008          *
*      Interactive Software Designs, Inc.  *
*      Moscow, ID 83843, U.S.A.          *
*                                           *
*      All Rights Reserved                 *
*                                           *
*      Ver. 5.208                         96 - 2057 *
*****

```

Problem Description : Karwick Road Stability - Existing

-----  
 SEGMENT BOUNDARY COORDINATES  
 -----

10 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	598.0	10.0	598.0	3
2	10.0	598.0	40.0	591.0	3
3	40.0	591.0	60.0	585.0	3
4	60.0	585.0	80.0	585.0	3
5	80.0	585.0	86.7	589.0	3
6	86.7	589.0	90.0	591.0	3
7	90.0	591.0	100.0	601.0	2
8	100.0	601.0	139.0	605.0	2
9	139.0	605.0	260.0	608.0	2
10	260.0	608.0	550.0	611.0	2

9 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	86.7	589.0	127.0	590.0	3
2	127.0	590.0	138.0	590.0	3
3	138.0	590.0	380.0	593.0	3
4	380.0	593.0	550.0	595.0	3
5	.0	570.0	90.0	570.0	4
6	90.0	570.0	100.0	553.0	4
7	100.0	553.0	300.0	553.0	4
8	300.0	553.0	360.0	562.0	4
9	360.0	562.0	550.0	582.0	4



-----  
ISOTROPIC Soil Parameters  
-----

5 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	110.0	125.0	100.0	25.00	.000	.0	1
2	85.0	95.0	300.0	30.00	.000	.0	1
3	63.0	95.0	300.0	.00	.000	.0	1
4	110.0	125.0	.0	30.00	.000	.0	1
5	110.0	125.0	.0	35.00	.000	.0	1

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 5 coordinate points

\*\*\*\*\*

PIEZOMETRIC SURFACE

\*\*\*\*\*

Point No.	x-water (ft)	y-water (ft)
1	.00	591.00
2	90.00	591.00
3	127.00	592.00
4	380.00	595.00
5	550.00	598.00

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

1600 trial surfaces will be generated and analyzed.

40 Surfaces initiate from each of 40 points equally spaced along the ground surface between x = .0 ft and x = 100.0 ft

Each surface terminates between x = 100.0 ft and x = 300.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft



5.0 ft line segments define each trial failure surface.

-----  
ANGULAR RESTRICTIONS  
-----

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees  
Upper angular limit := (slope angle - 5.0) degrees

\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 18 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\* \*\*  
\*\* The last calculated value of the FOS was 2252.1300 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS=\*\*\*\*\*) is defined by: xcenter = 55.60  
ycenter = 650.64 Init. Pt. = .00 Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 25 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\* \*\*  
\*\* The last calculated value of the FOS was -16.7986 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS=-16.7986) is defined by: xcenter = 53.40  
ycenter = 671.63 Init. Pt. = .00 Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 38 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\* \*\*  
\*\* The last calculated value of the FOS was -9.3835 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS= -9.3835) is defined by: xcenter = 52.23  
ycenter = 661.70 Init. Pt. = .00 Seg. Length = 5.00  
-----



```
*****
**      Factor of safety calculation for surface #      41      **
**      failed to converge within FIFTY iterations      **
**                                                     **
**      The last calculated value of the FOS was -36.3096  **
**      This will be ignored for final summary of results **
*****
```

Circular surface (FOS=-36.3096) is defined by: xcenter = 55.52  
ycenter = 648.21 Init. Pt. = 2.56 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #      42      **
**      failed to converge within FIFTY iterations      **
**                                                     **
**      The last calculated value of the FOS was -15.9606  **
**      This will be ignored for final summary of results **
*****
```

Circular surface (FOS=-15.9606) is defined by: xcenter = 54.31  
ycenter = 662.09 Init. Pt. = 2.56 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #      43      **
**      failed to converge within FIFTY iterations      **
**                                                     **
**      The last calculated value of the FOS was 31.8428   **
**      This will be ignored for final summary of results **
*****
```

Circular surface (FOS= 31.8428) is defined by: xcenter = 57.08  
ycenter = 665.72 Init. Pt. = 2.56 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #      60      **
**      failed to converge within FIFTY iterations      **
**                                                     **
**      The last calculated value of the FOS was 61.8644   **
**      This will be ignored for final summary of results **
*****
```

Circular surface (FOS= 61.8644) is defined by: xcenter = 56.70  
ycenter = 654.95 Init. Pt. = 2.56 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #      62      **
**      failed to converge within FIFTY iterations      **
```



```

**
** The last calculated value of the FOS was -5.5107 **
** This will be ignored for final summary of results **
*****

```

```

Circular surface (FOS= -5.5107) is defined by: xcenter = 51.71
ycenter = 646.56 Init. Pt. = 2.56 Seg. Length = 5.00
-----

```

```

*****
** Factor of safety calculation for surface # 65 **
** failed to converge within FIFTY iterations **
**
** The last calculated value of the FOS was -5.1830 **
** This will be ignored for final summary of results **
*****

```

```

Circular surface (FOS= -5.1830) is defined by: xcenter = 51.60
ycenter = 644.85 Init. Pt. = 2.56 Seg. Length = 5.00
-----

```

```

*****
** Factor of safety calculation for surface # 79 **
** failed to converge within FIFTY iterations **
**
** The last calculated value of the FOS was -13.1417 **
** This will be ignored for final summary of results **
*****

```

```

Circular surface (FOS=-13.1417) is defined by: xcenter = 54.18
ycenter = 648.37 Init. Pt. = 2.56 Seg. Length = 5.00
-----

```

```

*****
** Factor of safety calculation for surface # 81 **
** failed to converge within FIFTY iterations **
**
** The last calculated value of the FOS was -10.3823 **
** This will be ignored for final summary of results **
*****

```

```

Circular surface (FOS=-10.3823) is defined by: xcenter = 54.39
ycenter = 651.25 Init. Pt. = 5.13 Seg. Length = 5.00
-----

```

```

*****
** Factor of safety calculation for surface # 93 **
** failed to converge within FIFTY iterations **
**
** The last calculated value of the FOS was 29.4144 **
** This will be ignored for final summary of results **
*****

```



Circular surface (FOS= 29.4144) is defined by: xcenter = 58.33  
ycenter = 676.88 Init. Pt. = 5.13 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #    96      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was  51.5024    **
**      This will be ignored for final summary of results   **
*****
```

Circular surface (FOS= 51.5024) is defined by: xcenter = 57.49  
ycenter = 647.20 Init. Pt. = 5.13 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #   111      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was  -5.7463    **
**      This will be ignored for final summary of results   **
*****
```

Circular surface (FOS= -5.7463) is defined by: xcenter = 52.84  
ycenter = 643.30 Init. Pt. = 5.13 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #   116      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was  -74.1063    **
**      This will be ignored for final summary of results   **
*****
```

Circular surface (FOS=-74.1063) is defined by: xcenter = 56.56  
ycenter = 662.43 Init. Pt. = 5.13 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #   130      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was  -6.4020    **
**      This will be ignored for final summary of results   **
*****
```

Circular surface (FOS= -6.4020) is defined by: xcenter = 54.06  
ycenter = 644.55 Init. Pt. = 7.69 Seg. Length = 5.00



-----  
\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 163 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\*  
\*\* The last calculated value of the FOS was -125.3572 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS=\*\*\*\*\*) is defined by: xcenter = 58.12  
ycenter = 660.37 Init. Pt. = 10.26 Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 168 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\*  
\*\* The last calculated value of the FOS was -6.6499 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS= -6.6499) is defined by: xcenter = 55.08  
ycenter = 641.05 Init. Pt. = 10.26 Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 191 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\*  
\*\* The last calculated value of the FOS was -5.5980 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS= -5.5980) is defined by: xcenter = 54.64  
ycenter = 638.80 Init. Pt. = 10.26 Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 220 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\*  
\*\* The last calculated value of the FOS was -5.8554 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS= -5.8554) is defined by: xcenter = 55.46  
ycenter = 639.91 Init. Pt. = 12.82 Seg. Length = 5.00  
-----

\*\*\*\*\*



```
**      Factor of safety calculation for surface #    235      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was    24.0799    **
**      This will be ignored for final summary of results    **
*****
```

Circular surface (FOS= 24.0799) is defined by: xcenter = 59.72  
ycenter = 647.80 Init. Pt. = 12.82 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #    242      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was   -25.4833    **
**      This will be ignored for final summary of results    **
*****
```

Circular surface (FOS=-25.4833) is defined by: xcenter = 58.45  
ycenter = 647.78 Init. Pt. = 15.38 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #    273      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was    -5.3451    **
**      This will be ignored for final summary of results    **
*****
```

Circular surface (FOS= -5.3451) is defined by: xcenter = 56.07  
ycenter = 634.45 Init. Pt. = 15.38 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #    284      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was   -39.0135    **
**      This will be ignored for final summary of results    **
*****
```

Circular surface (FOS=-39.0135) is defined by: xcenter = 59.51  
ycenter = 637.46 Init. Pt. = 17.95 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #    300      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was   -10.7389    **
```



\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS=-10.7389) is defined by: xcenter = 58.29  
ycenter = 632.97 Init. Pt. = 17.95 Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 315 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\*  
\*\* The last calculated value of the FOS was -7.7282 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS= -7.7282) is defined by: xcenter = 57.75  
ycenter = 632.43 Init. Pt. = 17.95 Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 316 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\*  
\*\* The last calculated value of the FOS was 89.3151 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS= 89.3151) is defined by: xcenter = 60.27  
ycenter = 635.02 Init. Pt. = 17.95 Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 326 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\*  
\*\* The last calculated value of the FOS was -12.6927 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS=-12.6927) is defined by: xcenter = 59.07  
ycenter = 638.74 Init. Pt. = 20.51 Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 343 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\*  
\*\* The last calculated value of the FOS was -15.9577 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*



Circular surface (FOS=-15.9577) is defined by: xcenter = 59.49  
ycenter = 632.57 Init. Pt. = 20.51 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface # 351      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was -8.0058    **
**      This will be ignored for final summary of results   **
*****
```

Circular surface (FOS= -8.0058) is defined by: xcenter = 58.50  
ycenter = 632.49 Init. Pt. = 20.51 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface # 472      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was -10.3989   **
**      This will be ignored for final summary of results   **
*****
```

Circular surface (FOS=-10.3989) is defined by: xcenter = 61.13  
ycenter = 628.82 Init. Pt. = 28.21 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface # 526      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was 20.8215    **
**      This will be ignored for final summary of results   **
*****
```

Circular surface (FOS= 20.8215) is defined by: xcenter = 64.70  
ycenter = 620.38 Init. Pt. = 33.33 Seg. Length = 5.00  
-----

```
*****
-- WARNING -- WARNING -- WARNING -- WARNING -- (# 48)
*****
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter. In such
cases, this effect can only be eliminated by reducing the "c" value.
*****
```

-----  
USER SELECTED option to maintain strength greater than zero  
-----



```
*****
**      Factor of safety calculation for surface #   586      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was   31.0877    **
**      This will be ignored for final summary of results    **
*****
```

Circular surface (FOS= 31.0877) is defined by: xcenter = 65.22  
ycenter = 618.80 Init. Pt. = 35.90 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #   1551     **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was   21.8056    **
**      This will be ignored for final summary of results    **
*****
```

Circular surface (FOS= 21.8056) is defined by: xcenter = 159.01  
ycenter = 862.75 Init. Pt. = 97.44 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #   1561     **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was   22.5604    **
**      This will be ignored for final summary of results    **
*****
```

Circular surface (FOS= 22.5604) is defined by: xcenter = 116.30  
ycenter = 694.45 Init. Pt. = 100.00 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #   1562     **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was   45.5247    **
**      This will be ignored for final summary of results    **
*****
```

Circular surface (FOS= 45.5247) is defined by: xcenter = 104.99  
ycenter = 605.77 Init. Pt. = 100.00 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #   1564     **
**      failed to converge within FIFTY iterations          **
```



```

**
** The last calculated value of the FOS was 27.9484 **
** This will be ignored for final summary of results **
*****

```

```

Circular surface (FOS= 27.9484) is defined by: xcenter = 108.16
ycenter = 605.67 Init. Pt. = 100.00 Seg. Length = 5.00
-----

```

```

*****
** Factor of safety calculation for surface # 1565 **
** failed to converge within FIFTY iterations **
**
** The last calculated value of the FOS was 26.0980 **
** This will be ignored for final summary of results **
*****

```

```

Circular surface (FOS= 26.0980) is defined by: xcenter = 108.56
ycenter = 607.18 Init. Pt. = 100.00 Seg. Length = 5.00
-----

```

```

*****
ERROR # 28
*****
In automatically generating a failure surface, it has been found that
more than 100 points are needed to define this surface. The program
is limited to a maximum of 100 points. To meet this criterion,
please INCREASE the specified length of the line segments.
*****

```

```

*****
*** The above error occurred in attempting ***
*** to generate surface # 6 from the ***
*** initiation point located at x = 100.00 ***
*****

```

Factors of safety have been calculated by the :

\* \* \* \* \* SIMPLIFIED BISHOP METHOD \* \* \* \* \*

The most critical circular failure surface  
is specified by 22 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	64.10	585.00
2	67.65	581.48



3	71.54	578.34
4	75.74	575.61
5	80.19	573.34
6	84.85	571.53
7	89.67	570.21
8	94.60	569.39
9	99.59	569.09
10	104.59	569.30
11	109.54	570.02
12	114.39	571.25
13	119.08	572.96
14	123.57	575.16
15	127.82	577.80
16	131.77	580.86
17	135.39	584.32
18	138.63	588.12
19	141.46	592.25
20	143.85	596.64
21	145.78	601.25
22	146.97	605.20

\*\*\*\* Simplified BISHOP FOS = 1.078 \*\*\*\*

```

*****
**
** Out of the 1565 surfaces generated and analyzed by XSTABL, **
** 38 surfaces were found to have MISLEADING FOS values. **
**
*****

```

The following is a summary of the TEN most critical surfaces

Problem Description : Karwick Road Stability - Existing

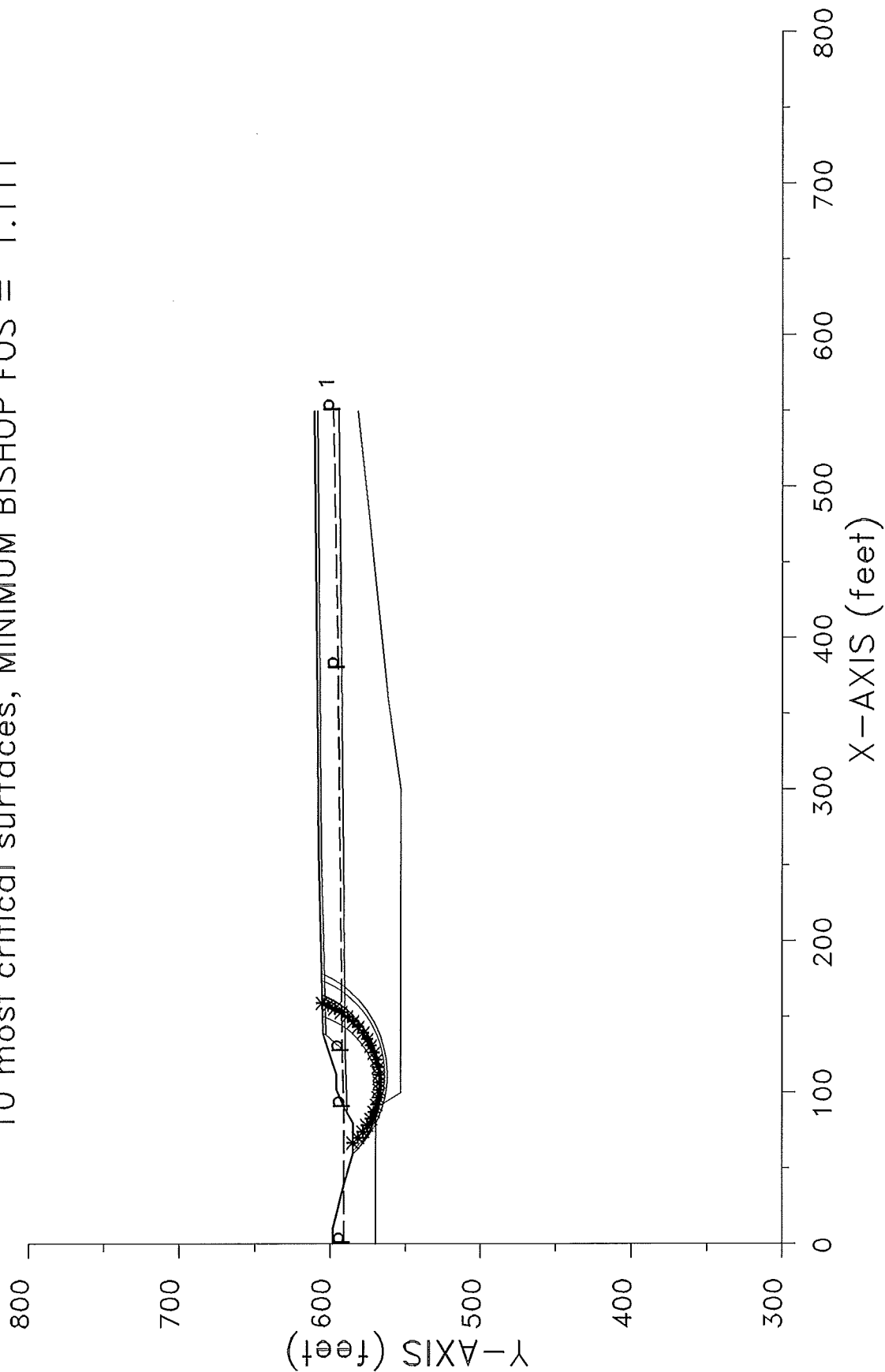
	FOS (BISHOP)	Circle Center x-coord (ft)	y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	1.078	100.06	617.66	48.58	64.10	146.97	1.536E+06
2.	1.088	98.64	622.55	54.41	58.97	150.18	1.900E+06
3.	1.095	99.45	624.53	56.36	58.97	152.40	2.009E+06
4.	1.099	99.59	621.29	50.75	64.10	147.67	1.606E+06
5.	1.101	101.56	618.34	48.27	66.67	147.96	1.496E+06
6.	1.101	100.26	617.06	46.44	66.67	145.08	1.394E+06
7.	1.102	91.96	613.24	41.51	61.54	132.48	1.124E+06
8.	1.104	104.85	623.37	55.97	64.10	157.87	2.002E+06
9.	1.107	94.07	620.97	50.04	58.97	141.46	1.561E+06
10.	1.108	98.23	610.65	38.71	69.23	136.41	1.008E+06

\* \* \* END OF FILE \* \* \*



# Karwick Road Stability

10 most critical surfaces, MINIMUM BISHOP FOS = 1.111





```

*****
*               X S T A B L               *
*                                           *
*      Slope Stability Analysis            *
*      using the                          *
*      Method of Slices                   *
*                                           *
*      Copyright (C) 1992 - 2008          *
*      Interactive Software Designs, Inc.  *
*      Moscow, ID 83843, U.S.A.         *
*                                           *
*      All Rights Reserved                *
*                                           *
*      Ver. 5.208                        96 - 2057 *
*****

```

Problem Description : Karwick Road Stability

-----  
 SEGMENT BOUNDARY COORDINATES  
 -----

11 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	598.0	10.0	598.0	3
2	10.0	598.0	40.0	591.0	3
3	40.0	591.0	60.0	585.0	3
4	60.0	585.0	80.0	585.0	3
5	80.0	585.0	86.7	589.0	3
6	86.7	589.0	90.0	591.0	5
7	90.0	591.0	102.0	596.0	5
8	102.0	596.0	112.0	596.0	5
9	112.0	596.0	139.0	605.0	5
10	139.0	605.0	260.0	608.0	1
11	260.0	608.0	550.0	611.0	1

12 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	86.7	589.0	127.0	590.0	3
2	127.0	590.0	138.5	603.0	3
3	138.5	603.0	139.0	605.0	1
4	138.5	603.0	260.0	606.0	2
5	260.0	606.0	550.0	609.0	2
6	127.0	590.0	380.0	593.0	3
7	380.0	593.0	550.0	595.0	3
8	.0	570.0	90.0	570.0	4



9	90.0	570.0	100.0	553.0	4
10	100.0	553.0	300.0	553.0	4
11	300.0	553.0	360.0	562.0	4
12	360.0	562.0	550.0	582.0	4

-----  
ISOTROPIC Soil Parameters  
-----

5 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	110.0	125.0	300.0	30.00	.000	.0	1
2	85.0	95.0	300.0	30.00	.000	.0	1
3	63.0	95.0	300.0	.00	.000	.0	1
4	110.0	125.0	.0	30.00	.000	.0	1
5	110.0	125.0	300.0	35.00	.000	.0	1

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 5 coordinate points

\*\*\*\*\*  
PIEZOMETRIC SURFACE  
\*\*\*\*\*

Point No.	x-water (ft)	y-water (ft)
1	.00	591.00
2	90.00	591.00
3	127.00	592.00
4	380.00	595.00
5	550.00	598.00

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

1600 trial surfaces will be generated and analyzed.

40 Surfaces initiate from each of 40 points equally spaced along the ground surface between x = .0 ft and x = 100.0 ft

Each surface terminates between x = 101.0 ft and x = 300.0 ft



Unless further limitations were imposed, the minimum elevation  
at which a surface extends is  $y = .0$  ft

5.0 ft line segments define each trial failure surface.

-----  
ANGULAR RESTRICTIONS  
-----

The first segment of each failure surface will be inclined  
within the angular range defined by :

Lower angular limit := -45.0 degrees  
Upper angular limit := (slope angle - 5.0) degrees

```
*****
**      Factor of safety calculation for surface #      10      **
**      failed to converge within FIFTY iterations      **
**                                                    **
**      The last calculated value of the FOS was  43.4964      **
**      This will be ignored for final summary of results      **
*****
```

Circular surface (FOS= 43.4964) is defined by: xcenter = 60.40  
ycenter = 656.75 Init. Pt. = .00 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #      11      **
**      failed to converge within FIFTY iterations      **
**                                                    **
**      The last calculated value of the FOS was  -7.8968      **
**      This will be ignored for final summary of results      **
*****
```

Circular surface (FOS= -7.8968) is defined by: xcenter = 54.87  
ycenter = 649.34 Init. Pt. = .00 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #      20      **
**      failed to converge within FIFTY iterations      **
**                                                    **
**      The last calculated value of the FOS was -40.0296      **
**      This will be ignored for final summary of results      **
*****
```



Circular surface (FOS=-40.0296) is defined by: xcenter = 58.79  
ycenter = 653.87 Init. Pt. = .00 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #    27      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was -18.8743    **
**      This will be ignored for final summary of results   **
*****
```

Circular surface (FOS=-18.8743) is defined by: xcenter = 57.78  
ycenter = 678.03 Init. Pt. = .00 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #    42      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was -43.2498    **
**      This will be ignored for final summary of results   **
*****
```

Circular surface (FOS=-43.2498) is defined by: xcenter = 59.51  
ycenter = 654.37 Init. Pt. = 2.56 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #    51      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was -5.1596     **
**      This will be ignored for final summary of results   **
*****
```

Circular surface (FOS= -5.1596) is defined by: xcenter = 53.39  
ycenter = 657.50 Init. Pt. = 2.56 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #    56      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was -9.5632     **
**      This will be ignored for final summary of results   **
*****
```

Circular surface (FOS= -9.5632) is defined by: xcenter = 55.98  
ycenter = 677.73 Init. Pt. = 2.56 Seg. Length = 5.00  
-----



```

*****
**      Factor of safety calculation for surface #      58      **
**      failed to converge within FIFTY iterations      **
**                                                     **
**      The last calculated value of the FOS was  28.1376      **
**      This will be ignored for final summary of results      **
*****

```

Circular surface (FOS= 28.1376) is defined by: xcenter = 61.60  
ycenter = 653.71 Init. Pt. = 2.56 Seg. Length = 5.00  
-----

```

*****
**      Factor of safety calculation for surface #      65      **
**      failed to converge within FIFTY iterations      **
**                                                     **
**      The last calculated value of the FOS was  33.6183      **
**      This will be ignored for final summary of results      **
*****

```

Circular surface (FOS= 33.6183) is defined by: xcenter = 62.05  
ycenter = 701.49 Init. Pt. = 2.56 Seg. Length = 5.00  
-----

```

*****
**      Factor of safety calculation for surface #      81      **
**      failed to converge within FIFTY iterations      **
**                                                     **
**      The last calculated value of the FOS was -20.0202      **
**      This will be ignored for final summary of results      **
*****

```

Circular surface (FOS=-20.0202) is defined by: xcenter = 58.99  
ycenter = 679.62 Init. Pt. = 5.13 Seg. Length = 5.00  
-----

```

*****
**      Factor of safety calculation for surface #      86      **
**      failed to converge within FIFTY iterations      **
**                                                     **
**      The last calculated value of the FOS was -27.3059      **
**      This will be ignored for final summary of results      **
*****

```

Circular surface (FOS=-27.3059) is defined by: xcenter = 59.44  
ycenter = 648.97 Init. Pt. = 5.13 Seg. Length = 5.00  
-----

```

*****
**      Factor of safety calculation for surface #      93      **
**      failed to converge within FIFTY iterations      **

```



```

**
** The last calculated value of the FOS was 26.7695 **
** This will be ignored for final summary of results **
*****

```

```

Circular surface (FOS= 26.7695) is defined by: xcenter = 63.10
ycenter = 684.38 Init. Pt. = 5.13 Seg. Length = 5.00
-----

```

```

*****
** Factor of safety calculation for surface # 94 **
** failed to converge within FIFTY iterations **
**
** The last calculated value of the FOS was -7.8446 **
** This will be ignored for final summary of results **
*****

```

```

Circular surface (FOS= -7.8446) is defined by: xcenter = 56.02
ycenter = 653.49 Init. Pt. = 5.13 Seg. Length = 5.00
-----

```

```

*****
** Factor of safety calculation for surface # 112 **
** failed to converge within FIFTY iterations **
**
** The last calculated value of the FOS was -7.4119 **
** This will be ignored for final summary of results **
*****

```

```

Circular surface (FOS= -7.4119) is defined by: xcenter = 55.93
ycenter = 646.47 Init. Pt. = 5.13 Seg. Length = 5.00
-----

```

```

*****
** Factor of safety calculation for surface # 117 **
** failed to converge within FIFTY iterations **
**
** The last calculated value of the FOS was -73.4213 **
** This will be ignored for final summary of results **
*****

```

```

Circular surface (FOS=-73.4213) is defined by: xcenter = 60.61
ycenter = 667.84 Init. Pt. = 5.13 Seg. Length = 5.00
-----

```

```

*****
** Factor of safety calculation for surface # 131 **
** failed to converge within FIFTY iterations **
**
** The last calculated value of the FOS was -9.0253 **
** This will be ignored for final summary of results **
*****

```



Circular surface (FOS= -9.0253) is defined by: xcenter = 57.31  
ycenter = 648.07 Init. Pt. = 7.69 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface # 162      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was -9.1175    **
**      This will be ignored for final summary of results   **
*****
```

Circular surface (FOS= -9.1175) is defined by: xcenter = 58.00  
ycenter = 642.74 Init. Pt. = 10.26 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface # 165      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was 130.9134    **
**      This will be ignored for final summary of results   **
*****
```

Circular surface (FOS=130.9134) is defined by: xcenter = 62.31  
ycenter = 666.20 Init. Pt. = 10.26 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface # 168      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was 110.6322    **
**      This will be ignored for final summary of results   **
*****
```

Circular surface (FOS=110.6322) is defined by: xcenter = 62.43  
ycenter = 669.04 Init. Pt. = 10.26 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface # 191      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was -13.4146    **
**      This will be ignored for final summary of results   **
*****
```

Circular surface (FOS=-13.4146) is defined by: xcenter = 58.99  
ycenter = 654.65 Init. Pt. = 10.26 Seg. Length = 5.00



-----  
\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 202 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\*  
\*\* The last calculated value of the FOS was -11.8633 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS=-11.8633) is defined by: xcenter = 59.17  
ycenter = 645.88 Init. Pt. = 12.82 Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 207 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\*  
\*\* The last calculated value of the FOS was -11.5039 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS=-11.5039) is defined by: xcenter = 59.05  
ycenter = 642.07 Init. Pt. = 12.82 Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 212 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\*  
\*\* The last calculated value of the FOS was 21.2274 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS= 21.2274) is defined by: xcenter = 63.69  
ycenter = 645.03 Init. Pt. = 12.82 Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 224 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\*  
\*\* The last calculated value of the FOS was -9.4675 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS= -9.4675) is defined by: xcenter = 58.58  
ycenter = 643.30 Init. Pt. = 12.82 Seg. Length = 5.00  
-----

\*\*\*\*\*



```
**      Factor of safety calculation for surface #    228      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was    63.5946    **
**      This will be ignored for final summary of results    **
*****
```

Circular surface (FOS= 63.5946) is defined by: xcenter = 62.80  
ycenter = 664.22 Init. Pt. = 12.82 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #    240      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was    33.8322    **
**      This will be ignored for final summary of results    **
*****
```

Circular surface (FOS= 33.8322) is defined by: xcenter = 63.20  
ycenter = 651.82 Init. Pt. = 12.82 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #    247      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was -136.2823    **
**      This will be ignored for final summary of results    **
*****
```

Circular surface (FOS=\*\*\*\*\*) is defined by: xcenter = 62.06  
ycenter = 652.41 Init. Pt. = 15.38 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #    278      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was    -8.6414    **
**      This will be ignored for final summary of results    **
*****
```

Circular surface (FOS= -8.6414) is defined by: xcenter = 58.91  
ycenter = 637.33 Init. Pt. = 15.38 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #    287      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was    39.9448    **
*****
```



\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS= 39.9448) is defined by: xcenter = 63.59  
ycenter = 660.92 Init. Pt. = 17.95 Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 303 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\*  
\*\* The last calculated value of the FOS was 45.9816 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS= 45.9816) is defined by: xcenter = 63.40  
ycenter = 656.63 Init. Pt. = 17.95 Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 307 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\*  
\*\* The last calculated value of the FOS was -20.3811 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS=-20.3811) is defined by: xcenter = 61.06  
ycenter = 635.74 Init. Pt. = 17.95 Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 322 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\*  
\*\* The last calculated value of the FOS was -18.8818 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS=-18.8818) is defined by: xcenter = 61.49  
ycenter = 633.01 Init. Pt. = 20.51 Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 323 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\*  
\*\* The last calculated value of the FOS was 25.2592 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*



Circular surface (FOS= 25.2592) is defined by: xcenter = 64.04  
ycenter = 635.62 Init. Pt. = 20.51 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface # 333      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was -43.4731    **
**      This will be ignored for final summary of results    **
*****
```

Circular surface (FOS=-43.4731) is defined by: xcenter = 62.27  
ycenter = 642.66 Init. Pt. = 20.51 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface # 350      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was -48.3886    **
**      This will be ignored for final summary of results    **
*****
```

Circular surface (FOS=-48.3886) is defined by: xcenter = 62.27  
ycenter = 635.47 Init. Pt. = 20.51 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface # 354      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was -153.9687   **
**      This will be ignored for final summary of results    **
*****
```

Circular surface (FOS=\*\*\*\*\*) is defined by: xcenter = 62.75  
ycenter = 643.48 Init. Pt. = 20.51 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface # 356      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was 37.7293     **
**      This will be ignored for final summary of results    **
*****
```

Circular surface (FOS= 37.7293) is defined by: xcenter = 63.96  
ycenter = 651.08 Init. Pt. = 20.51 Seg. Length = 5.00  
-----



```
*****
**      Factor of safety calculation for surface #    369      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was 125.4845    **
**      This will be ignored for final summary of results    **
*****
```

Circular surface (FOS=125.4845) is defined by: xcenter = 63.50  
ycenter = 638.74 Init. Pt. = 23.08 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #    382      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was 32.0337     **
**      This will be ignored for final summary of results    **
*****
```

Circular surface (FOS= 32.0337) is defined by: xcenter = 64.47  
ycenter = 650.45 Init. Pt. = 23.08 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #    441      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was -173.8889    **
**      This will be ignored for final summary of results    **
*****
```

Circular surface (FOS=\*\*\*\*\*) is defined by: xcenter = 64.11  
ycenter = 641.97 Init. Pt. = 28.21 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface #    472      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was 51.8807     **
**      This will be ignored for final summary of results    **
*****
```

Circular surface (FOS= 51.8807) is defined by: xcenter = 64.59  
ycenter = 627.37 Init. Pt. = 28.21 Seg. Length = 5.00  
-----

```
*****
-- WARNING -- WARNING -- WARNING -- WARNING -- (# 48)
*****
```



Negative effective stresses were calculated at the base of a slice.  
This warning is usually reported for cases where slices have low self  
weight and a relatively high "c" shear strength parameter. In such  
cases, this effect can only be eliminated by reducing the "c" value.  
\*\*\*\*\*

-----  
USER SELECTED option to maintain strength greater than zero  
-----

\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 1347 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\*  
\*\* The last calculated value of the FOS was 2.8939 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS= 2.8939) is defined by: xcenter = -169.37  
ycenter = 1141.25 Init. Pt. = 84.62 Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 1430 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\*  
\*\* The last calculated value of the FOS was 28.2768 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS= 28.2768) is defined by: xcenter = -504.25  
ycenter = 2197.02 Init. Pt. = 89.74 Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 1457 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\*  
\*\* The last calculated value of the FOS was 26.4281 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS= 26.4281) is defined by: xcenter = 88.27  
ycenter = 614.94 Init. Pt. = 92.31 Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 1509 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\*  
\*\* The last calculated value of the FOS was 27.6755 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*



Circular surface (FOS= 27.6755) is defined by: xcenter = 93.79  
ycenter = 605.77 Init. Pt. = 94.87 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface # 1524      **
**      failed to converge within FIFTY iterations           **
**                                                         **
**      The last calculated value of the FOS was 23.7719      **
**      This will be ignored for final summary of results    **
*****
```

Circular surface (FOS= 23.7719) is defined by: xcenter = 100.84  
ycenter = 614.81 Init. Pt. = 97.44 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface # 1533      **
**      failed to converge within FIFTY iterations           **
**                                                         **
**      The last calculated value of the FOS was 23.7921      **
**      This will be ignored for final summary of results    **
*****
```

Circular surface (FOS= 23.7921) is defined by: xcenter = 103.57  
ycenter = 603.36 Init. Pt. = 97.44 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface # 1539      **
**      failed to converge within FIFTY iterations           **
**                                                         **
**      The last calculated value of the FOS was 22.5433      **
**      This will be ignored for final summary of results    **
*****
```

Circular surface (FOS= 22.5433) is defined by: xcenter = 102.83  
ycenter = 601.15 Init. Pt. = 97.44 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface # 1544      **
**      failed to converge within FIFTY iterations           **
**                                                         **
**      The last calculated value of the FOS was 25.6706      **
**      This will be ignored for final summary of results    **
*****
```

Circular surface (FOS= 25.6706) is defined by: xcenter = 95.41  
ycenter = 617.08 Init. Pt. = 97.44 Seg. Length = 5.00



\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 1550 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\*  
\*\* The last calculated value of the FOS was 24.8710 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS= 24.8710) is defined by: xcenter = 103.44  
ycenter = 607.67 Init. Pt. = 97.44 Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 1552 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\*  
\*\* The last calculated value of the FOS was 28.8233 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS= 28.8233) is defined by: xcenter = 99.26  
ycenter = 634.64 Init. Pt. = 97.44 Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 1557 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\*  
\*\* The last calculated value of the FOS was 38.3143 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS= 38.3143) is defined by: xcenter = 96.04  
ycenter = 607.08 Init. Pt. = 97.44 Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\* Factor of safety calculation for surface # 1558 \*\*  
\*\* failed to converge within FIFTY iterations \*\*  
\*\*  
\*\* The last calculated value of the FOS was 22.8178 \*\*  
\*\* This will be ignored for final summary of results \*\*  
\*\*\*\*\*

Circular surface (FOS= 22.8178) is defined by: xcenter = 102.76  
ycenter = 600.13 Init. Pt. = 97.44 Seg. Length = 5.00  
-----

\*\*\*\*\*



```

**      Factor of safety calculation for surface # 1562      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was 87.3862     **
**      This will be ignored for final summary of results    **
*****

```

```

Circular surface (FOS= 87.3862) is defined by: xcenter = 103.40
ycenter = 600.54 Init. Pt. = 100.00 Seg. Length = 5.00
-----

```

```

*****
-- WARNING -- WARNING -- WARNING -- WARNING -- (# 50)
*****
This warning is usually reported for cases where slices near the toe
of the slide mass have steep, negative base angles. Generally, this
error condition can be avoided by "raising" the lower angular limit
boundary to prevent generation of such deep failure surfaces.
*****

```

```

Surface No: 1569      Slice No: 1      m_alpha = -.889990
Alpha = -2.32 deg     Phi = 35.00 deg     FOS = .015

```

```

*****
**      Factor of safety calculation for surface # 1569      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was 67.2479     **
**      This will be ignored for final summary of results    **
*****

```

```

Circular surface (FOS= 67.2479) is defined by: xcenter = 102.83
ycenter = 603.33 Init. Pt. = 100.00 Seg. Length = 5.00
-----

```

```

*****
**      Factor of safety calculation for surface # 1570      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was 107.8067    **
**      This will be ignored for final summary of results    **
*****

```

```

Circular surface (FOS=107.8067) is defined by: xcenter = 105.05
ycenter = 600.73 Init. Pt. = 100.00 Seg. Length = 5.00
-----

```

```

*****
-- WARNING -- WARNING -- WARNING -- WARNING -- (# 50)
*****
This warning is usually reported for cases where slices near the toe

```



of the slide mass have steep, negative base angles. Generally, this error condition can be avoided by "raising" the lower angular limit boundary to prevent generation of such deep failure surfaces.

\*\*\*\*\*

Surface No: 1576                      Slice No: 1                      m\_alpha = -.048261  
Alpha = -5.25 deg                      Phi = 35.00 deg                      FOS = .061

\*\*\*\*\*  
\*\*            Factor of safety calculation for surface # 1576            \*\*  
\*\*            failed to converge within FIFTY iterations            \*\*  
\*\*            \*\*  
\*\*            The last calculated value of the FOS was 73.9121            \*\*  
\*\*            This will be ignored for final summary of results            \*\*  
\*\*\*\*\*

Circular surface (FOS= 73.9121) is defined by: xcenter = 103.44  
ycenter = 605.24    Init. Pt. = 100.00    Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\*            Factor of safety calculation for surface # 1579            \*\*  
\*\*            failed to converge within FIFTY iterations            \*\*  
\*\*            \*\*  
\*\*            The last calculated value of the FOS was 174.8378            \*\*  
\*\*            This will be ignored for final summary of results            \*\*  
\*\*\*\*\*

Circular surface (FOS=174.8378) is defined by: xcenter = 105.40  
ycenter = 599.46    Init. Pt. = 100.00    Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\*            Factor of safety calculation for surface # 1581            \*\*  
\*\*            failed to converge within FIFTY iterations            \*\*  
\*\*            \*\*  
\*\*            The last calculated value of the FOS was 25.8717            \*\*  
\*\*            This will be ignored for final summary of results            \*\*  
\*\*\*\*\*

Circular surface (FOS= 25.8717) is defined by: xcenter = 108.67  
ycenter = 600.34    Init. Pt. = 100.00    Seg. Length = 5.00  
-----

\*\*\*\*\*  
\*\*            Factor of safety calculation for surface # 1583            \*\*  
\*\*            failed to converge within FIFTY iterations            \*\*  
\*\*            \*\*  
\*\*            The last calculated value of the FOS was 67.7373            \*\*  
\*\*            This will be ignored for final summary of results            \*\*  
\*\*\*\*\*



Circular surface (FOS= 67.7373) is defined by: xcenter = 102.30  
ycenter = 602.25 Init. Pt. = 100.00 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface # 1586      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was 87.9226     **
**      This will be ignored for final summary of results   **
*****
```

Circular surface (FOS= 87.9226) is defined by: xcenter = 104.14  
ycenter = 600.79 Init. Pt. = 100.00 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface # 1589      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was 48.8021     **
**      This will be ignored for final summary of results   **
*****
```

Circular surface (FOS= 48.8021) is defined by: xcenter = 106.18  
ycenter = 612.40 Init. Pt. = 100.00 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface # 1593      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was 66.5670     **
**      This will be ignored for final summary of results   **
*****
```

Circular surface (FOS= 66.5670) is defined by: xcenter = 102.18  
ycenter = 600.92 Init. Pt. = 100.00 Seg. Length = 5.00  
-----

```
*****
**      Factor of safety calculation for surface # 1595      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was 70.1937     **
**      This will be ignored for final summary of results   **
*****
```

Circular surface (FOS= 70.1937) is defined by: xcenter = 103.37  
ycenter = 589.92 Init. Pt. = 100.00 Seg. Length = 4.83



```

*****
**      Factor of safety calculation for surface # 1596      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was 36.5486    **
**      This will be ignored for final summary of results   **
*****

```

Circular surface (FOS= 36.5486) is defined by: xcenter = 107.74  
ycenter = 600.59 Init. Pt. = 100.00 Seg. Length = 5.00

```

*****
**      Factor of safety calculation for surface # 1599      **
**      failed to converge within FIFTY iterations          **
**                                                         **
**      The last calculated value of the FOS was 86.2464    **
**      This will be ignored for final summary of results   **
*****

```

Circular surface (FOS= 86.2464) is defined by: xcenter = 106.86  
ycenter = 599.19 Init. Pt. = 100.00 Seg. Length = 5.00

Factors of safety have been calculated by the :

\* \* \* \* \* SIMPLIFIED BISHOP METHOD \* \* \* \* \*

The most critical circular failure surface  
is specified by 24 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	66.67	585.00
2	70.23	581.50
3	74.10	578.33
4	78.25	575.53
5	82.62	573.12
6	87.21	571.11
7	91.95	569.53
8	96.82	568.39
9	101.77	567.70
10	106.76	567.46
11	111.76	567.68
12	116.71	568.34
13	121.59	569.46
14	126.34	571.02
15	130.93	573.00
16	135.32	575.39



17	139.48	578.17
18	143.36	581.31
19	146.95	584.80
20	150.20	588.60
21	153.09	592.68
22	155.60	597.00
23	157.71	601.54
24	159.13	605.50

\*\*\*\* Simplified BISHOP FOS = 1.111 \*\*\*\*

\*\*\*\*\*  
 \*\*  
 \*\* Out of the 1600 surfaces generated and analyzed by XSTABL, \*\*  
 \*\* 66 surfaces were found to have MISLEADING FOS values. \*\*  
 \*\*  
 \*\*\*\*\*

The following is a summary of the TEN most critical surfaces

Problem Description : Karwick Road Stability

	FOS (BISHOP)	Circle x-coord (ft)	Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	1.111	106.90	622.37	54.91	66.67	159.13	1.934E+06
2.	1.113	109.23	626.44	59.41	66.67	164.85	2.205E+06
3.	1.116	106.95	624.37	58.19	64.10	162.00	2.210E+06
4.	1.116	105.23	622.86	55.89	64.10	158.31	2.038E+06
5.	1.118	105.01	629.80	64.02	58.97	164.24	2.602E+06
6.	1.119	103.80	623.87	57.42	61.54	158.15	2.164E+06
7.	1.126	103.92	631.63	64.55	58.97	162.96	2.562E+06
8.	1.126	101.44	619.73	50.99	64.10	150.28	1.683E+06
9.	1.128	112.58	630.12	66.23	64.10	174.16	2.833E+06
10.	1.132	112.19	635.01	72.82	58.97	178.94	3.427E+06

\* \* \* END OF FILE \* \* \*



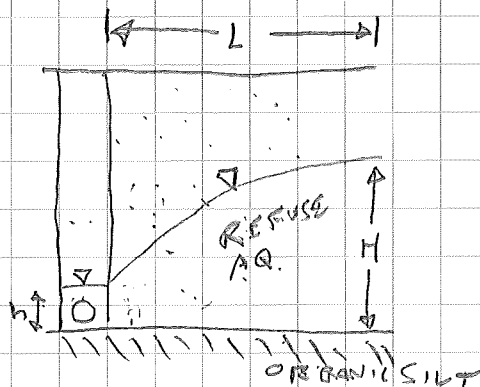
## **2. Estimate Flow to Drain Trench Calculations**



# WEAVER BOOS CONSULTANTS

- ☐ 7340 East Caley Avenue, Suite 110 • Centennial, CO 80111 • (720) 529-0132
- ☐ 35 E. Wacker Drive, Suite 1250 • Chicago, IL 60601 • (312) 922-1030
- ☐ 365 Citrus Tower Blvd., Suite 110 • Clermont, FL 34711 • (352) 241-0848
- ☐ 1000 North College Ave., Suite D • Columbia, MO 65201 • (888) 660-0346
- ☐ 4260 Tuller Rd. Suite 202 • Dublin, OH 43017 • (614) 389-4132
- ☐ 701 N. Weinbach Ave., Suite 730 • Evansville, IN 47711 • (812) 402-8588
- ☐ 6420 Southwest Blvd., Suite 206 • Fort Worth, TX 76109 • (817) 735-9770
- ☐ 400 Ann Street N.W., Suite 201A • Grand Rapids, MI 40504 • (616) 458-8052
- ☐ 1813 N. Mill St., Suite A • Naperville, IL 60563 • (630) 717-4848
- ☐ 4085 Meghan Beeler Court • South Bend, IN 46628 • (574) 271-3447
- ☐ 2021 Timberbrook Lane • Springfield, IL 62702 • (217) 787-0290

By S. STANFORD Date 2-10-15 Subject ESTIMATE FLOW TO DRAIN Sheet 1 of 1  
 Ckd By A. MAXSON Date 2/10/15 TRENCH File No. 183356-04



$$\frac{Q}{L} = \frac{K(H^2 - h^2)}{2L}$$

POWERS  
(1981)

$$L = 2(H - h) \sqrt{K}$$

POWERS  
1981, ARTS  
SIGNART

WHERE K IN UNITS  
OF  $1 \times 10^{-4}$  CM/S, L IN FT,

FOR KARWICK ROAD

$$K = 1.2 \times 10^{-3} \text{ CM/S} = 11.2 \times 10^{-4} \text{ (SLUG TESTING SHALLOW WELLS)}$$

$$= 3.2 \text{ FT/DAY}$$

$$H \approx 7.0 \text{ FT}$$

$$h \approx 1.5 \text{ FT}$$

$$\therefore L = 2(7 - 1.5) \sqrt{11.2} = 40 \text{ FT}$$

$$Q_{\text{PER FOOT}} = \frac{(3.2 \text{ FT/DAY})(7^2 - 1.5^2 \text{ FT})}{2(40 \text{ FT})}$$

$$Q = 1.9 \text{ FT}^3/\text{DAY} \text{ OF TRENCH (ONE SIDE ONLY)}$$



# **APPENDIX F**

Test Pit Soil Sample Results



Variable	Value
TR (target cancer risk) unitless	0.000001
SA <sub>recsc</sub> (skin surface area - child) cm <sup>2</sup> /day	2800
SA <sub>recsa</sub> (skin surface area - adult) cm <sup>2</sup> /day	5408.3
SA <sub>0-2</sub> (skin surface area - mutagenic) cm <sup>2</sup> /day	2600
SA <sub>2-6</sub> (skin surface area - mutagenic) cm <sup>2</sup> /day	2900
SA <sub>6-16</sub> (skin surface area - mutagenic) cm <sup>2</sup> /day	5000
SA <sub>16-30</sub> (skin surface area - mutagenic) cm <sup>2</sup> /day	5700
SA <sub>recsa</sub> (skin surface area - adult) cm <sup>2</sup> /day	5408.3
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
IFS <sub>rec-adj</sub> (age-adjusted soil ingestion factor) mg/kg	5645.123
DFS <sub>rec-adj</sub> (age-adjusted soil dermal factor) mg/kg	40788.808
IFSM <sub>rec-adj</sub> (mutagenic age-adjusted soil ingestion factor) mg/kg	30073.365
DFSM <sub>rec-adj</sub> (mutagenic age-adjusted soil dermal factor) mg/kg	195713.258
EF <sub>0-2</sub> (exposure frequency) day/year	75
EF <sub>2-6</sub> (exposure frequency) day/year	75
EF <sub>6-16</sub> (exposure frequency) day/year	104
EF <sub>16-30</sub> (exposure frequency) day/year	75
EF <sub>recsc</sub> (exposure frequency - child) day/year	75
EF <sub>recsa</sub> (exposure frequency - adult) day/year	87.1
EF <sub>recsa</sub> (exposure frequency - adult) day/year	87.1
EF <sub>recs</sub> (exposure frequency - recreator) day/year	84.7
IRS <sub>0-2</sub> (soil intake rate) mg/day	100
IRS <sub>2-6</sub> (soil intake rate) mg/day	100
IRS <sub>6-16</sub> (soil intake rate) mg/day	100
IRS <sub>16-30</sub> (soil intake rate) mg/day	50
IRS <sub>recsc</sub> (soil intake rate - child) mg/day	100
IRS <sub>recsa</sub> (soil intake rate - adult) mg/day	70.8
IRS <sub>recsa</sub> (soil intake rate - adult) mg/day	70.8
ED <sub>0-2</sub> (exposure duration) year	2
ED <sub>2-6</sub> (exposure duration) year	4
ED <sub>6-16</sub> (exposure duration) year	10
ED <sub>16-30</sub> (exposure duration) year	14
ED <sub>recsc</sub> (exposure duration - child) year	6
ED <sub>recsa</sub> (exposure duration - adult) year	24
ED <sub>recsa</sub> (exposure duration - adult) year	24
ED <sub>recs</sub> (exposure duration - recreator) year	30
ET <sub>0-2</sub> (exposure time) hr/day	2
ET <sub>2-6</sub> (exposure time) hr/day	2
ET <sub>6-16</sub> (exposure time) hr/day	2
ET <sub>16-30</sub> (exposure time) hr/day	2
ET <sub>recsc</sub> (exposure time - child) hr/day	2
ET <sub>recsa</sub> (exposure time - adult) hr/day	2
ET <sub>recsa</sub> (exposure time - adult) hr/day	2
ET <sub>recs</sub> (exposure time - recreator) hr/day	2
BW <sub>0-2</sub> (body weight) kg	9
BW <sub>2-6</sub> (body weight) kg	16
BW <sub>6-16</sub> (body weight) kg	44
BW <sub>16-30</sub> (body weight) kg	76
BW <sub>recsc</sub> (body weight - child) kg	13.7
BW <sub>recsa</sub> (body weight - adult) kg	62.7
BW <sub>recsa</sub> (body weight - adult) kg	62.7
AF <sub>0-2</sub> (skin adherence factor) mg/cm <sup>2</sup>	0.2
AF <sub>2-6</sub> (skin adherence factor) mg/cm <sup>2</sup>	0.2
AF <sub>6-16</sub> (skin adherence factor) mg/cm <sup>2</sup>	0.2
AF <sub>16-30</sub> (skin adherence factor) mg/cm <sup>2</sup>	0.07
AF <sub>recsc</sub> (skin adherence factor - child) mg/cm <sup>2</sup>	0.2
AF <sub>recsa</sub> (skin adherence factor - adult) mg/cm <sup>2</sup>	0.1242
AF <sub>recsa</sub> (skin adherence factor - adult) mg/cm <sup>2</sup>	0.1242
City (Climate Zone) PEF Selection	Default
A <sub>s</sub> (acres) PEF Selection	0.5
Q/C <sub>wfp</sub> (g/m <sup>2</sup> -s per kg/m <sup>3</sup> ) PEF Selection	93.77
PEF (particulate emission factor) m <sup>3</sup> /kg	135934438
A (PEF Dispersion Constant)	16.2302
B (PEF Dispersion Constant)	18.7762
C (PEF Dispersion Constant)	216.108
V (fraction of vegetative cover) unitless	0.5
U <sub>m</sub> (mean annual wind speed) m/s	4.69
U <sub>t</sub> (equivalent threshold value)	11.32
F(x) (function dependant on U <sub>t</sub> /U <sub>i</sub> ) unitless	0.194
City (Climate Zone) VF Selection	Default
A <sub>s</sub> (acres) VF Selection	0.5
Q/C <sub>wfp</sub> (g/m <sup>2</sup> -s per kg/m <sup>3</sup> ) VF Selection	68.18
foc (fraction organic carbon in soil) g/g	0.006
&rho <sub>so</sub> (dry soil bulk density) g/cm <sup>3</sup>	1.5
&rho <sub>so</sub> (soil particle density) g/cm <sup>3</sup>	2.65
&theta <sub>w</sub> (water-filled soil porosity) L <sub>water</sub> /L <sub>soil</sub>	0.15
T (exposure interval) s	819936000
A (VF Dispersion Constant)	11.911
B (VF Dispersion Constant)	18.4385
C (VF Dispersion Constant)	209.7845

K:\Wbqm\Client Information\1800-1899\1873\356\04-00\03 Site Car Imp\TABLES\Recreational Soil Screening Levels.xml



**Site-specific**

**Recreator Screening Levels (RSL) for Soil**

ca=Cancer, nc=Noncancer, ca\* (Where nc SL < 100 x ca SL),

ca\* (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat

Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide)

Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	Ingestion SF (mg/kg-day) <sup>-1</sup>	Inhalation Unit Risk (ug/m <sup>3</sup> ) <sup>-1</sup>	Chronic RfD (mg/kg-day)	Chronic RfC (mg/m <sup>3</sup> )	Ingestion SL TR=1.0E-6 (mg/kg)	Dermal SL TR=1.0E-6 (mg/kg)	Inhalation SL TR=1.0E-6 (mg/kg)	Carcinogenic SL TR=1.0E-6 (mg/kg)	Ingestion SL (Child) HQ=1 (mg/kg)	Dermal SL (Child) HQ=1 (mg/kg)	Inhalation SL (Child) HQ=1 (mg/kg)	Noncarcinoge nic SL (Child) HI=1 (mg/kg)	Ingestion SL (Adult) HQ=1 (mg/kg)	Dermal SL (Adult) HQ=1 (mg/kg)	Inhalation SL (Adult) HQ=1 (mg/kg)	Noncarcinoge nic SL (Adult) HI=1 (mg/kg)	Screening Level (mg/kg)
Arsenic, Inorganic	1.50E+00	4.30E-03	3.00E-04	1.50E-05	5.03E+00	1.39E+01	3.81E+04	3.69E+00	3.33E+02	1.19E+03	1.19E+06	2.60E+02	1.86E+03	3.91E+03	1.03E+06	1.26E+03	3.69E+00 ca*
Barium	-	-	2.00E-01	5.00E-04	-	-	-	-	1.33E+05	-	3.97E+07	1.33E+05	7.42E+05	-	3.42E+07	7.26E+05	max
Benzene	5.50E-02	7.80E-06	4.00E-03	3.00E-02	8.23E+01	-	5.47E+01	3.29E+01	2.67E+03	-	6.19E+03	1.86E+03	1.48E+04	-	5.33E+03	3.92E+03	3.29E+01 ca*
Butyl Benzyl Phthlate	1.90E-03	-	2.00E-01	-	2.38E+03	3.30E+03	-	1.38E+03	1.33E+05	2.38E+05	-	8.55E+04	7.42E+05	7.82E+05	-	3.81E+05	1.38E+03 ca*
Butylbenzene, n-	-	-	5.00E-02	-	-	-	-	-	3.33E+04	-	-	3.33E+04	1.86E+05	-	-	1.86E+05	3.33E+04 sat
Butylbenzene, sec-	-	-	1.00E-01	-	-	-	-	-	6.67E+04	-	-	6.67E+04	3.71E+05	-	-	3.71E+05	6.67E+04 sat
Cadmium (Diet)	-	1.80E-03	1.00E-03	1.00E-05	-	-	9.11E+04	9.11E+04	6.67E+02	2.98E+03	7.94E+05	5.44E+02	3.71E+03	9.78E+03	6.84E+05	2.68E+03	5.44E+02 nc
Chlorobenzene	-	-	2.00E-02	5.00E-02	-	-	-	-	1.33E+04	-	1.88E+04	7.81E+03	7.42E+04	-	1.62E+04	1.33E+04	7.81E+03 sat
Chromium(VI)	5.00E-01	8.40E-02	3.00E-03	1.00E-04	1.70E+00	-	7.55E+02	1.70E+00	2.00E+03	-	7.94E+06	2.00E+03	1.11E+04	-	6.84E+06	1.11E+04	1.70E+00 ca
Chromium, Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cumene	-	-	1.00E-01	4.00E-01	-	-	-	-	6.67E+04	-	1.45E+05	4.57E+04	3.71E+05	-	1.25E+05	9.34E+04	4.57E+04 sat
Dichlorobenzene, 1,4-	5.40E-03	1.10E-05	7.00E-02	8.00E-01	8.38E+02	-	1.15E+02	1.01E+02	4.67E+04	-	4.88E+05	4.26E+04	2.60E+05	-	4.20E+05	1.61E+05	1.01E+02 ca
Ethylbenzene	1.10E-02	2.50E-06	1.00E-01	1.00E+00	4.11E+02	-	2.73E+02	1.64E+02	6.67E+04	-	3.31E+05	5.55E+04	3.71E+05	-	2.85E+05	1.61E+05	1.64E+02 ca
Isopropyltoluene, p-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead and Compounds	-	-	-	-	-	-	-	-	-	-	-	4.00E+02	-	-	-	-	4.00E+02 nc
Mercury (elemental)	-	-	-	3.00E-04	-	-	-	-	-	-	5.28E+02	5.28E+02	-	-	4.55E+02	4.55E+02	4.55E+02 sat
Bis(2-ethylhexyl)phthalate	1.40E-02	2.40E-06	2.00E-02	-	3.23E+02	4.47E+02	6.83E+07	1.88E+02	1.33E+04	2.38E+04	-	8.55E+03	7.42E+04	7.82E+04	-	3.81E+04	1.88E+02 ca*
Anthracene	-	-	3.00E-01	-	-	-	-	-	2.00E+05	2.75E+05	-	1.16E+05	1.11E+06	9.03E+05	-	4.99E+05	max
Benz[a]anthracene	7.30E-01	1.10E-04	-	-	1.16E+00	1.38E+00	5.77E+05	6.30E-01	-	-	-	-	-	-	-	-	6.30E-01 ca
Benzo[a]pyrene	7.30E+00	1.10E-03	-	-	1.16E-01	1.38E-01	5.77E+04	6.30E-02	-	-	-	-	-	-	-	-	6.30E-02 ca
Benzo[b]fluoranthene	7.30E-01	1.10E-04	-	-	1.16E+00	1.38E+00	5.77E+05	6.30E-01	-	-	-	-	-	-	-	-	6.30E-01 ca
Benzo[g,h,i]perylene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	7.30E-03	1.10E-05	-	-	1.16E+02	1.38E+02	5.77E+06	6.30E+01	-	-	-	-	-	-	-	-	6.30E+01 ca
Fluoranthene	-	-	4.00E-02	-	-	-	-	-	2.67E+04	3.66E+04	-	1.54E+04	1.48E+05	1.20E+05	-	6.65E+04	1.54E+04 nc
Fluorene	-	-	4.00E-02	-	-	-	-	-	2.67E+04	3.66E+04	-	1.54E+04	1.48E+05	1.20E+05	-	6.65E+04	1.54E+04 nc
Methylnaphthalene, 1-	2.90E-02	-	7.00E-02	-	1.56E+02	1.66E+02	-	8.05E+01	4.67E+04	6.41E+04	-	2.70E+04	2.60E+05	2.11E+05	-	1.16E+05	8.05E+01 ca
Methylnaphthalene, 2-	-	-	4.00E-03	-	-	-	-	-	2.67E+03	3.66E+03	-	1.54E+03	1.48E+04	1.20E+04	-	6.65E+03	1.54E+03 nc
Naphthalene	-	3.40E-05	2.00E-02	3.00E-03	-	-	1.64E+02	1.64E+02	1.33E+04	1.83E+04	8.12E+03	3.96E+03	7.42E+04	6.02E+04	6.99E+03	5.77E+03	1.64E+02 ca*
Phenanthrene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	-	-	3.00E-02	-	-	-	-	-	2.00E+04	2.75E+04	-	1.16E+04	1.11E+05	9.03E+04	-	4.99E+04	1.16E+04 nc
Seleniur	-	-	5.00E-03	2.00E-02	-	-	-	-	3.33E+03	-	1.59E+09	3.33E+03	1.86E+04	-	1.37E+09	1.86E+04	3.33E+03 nc
Silver	-	-	5.00E-03	-	-	-	-	-	3.33E+03	-	-	3.33E+03	1.86E+04	-	-	1.86E+04	3.33E+03 nc
Toluene	-	-	8.00E-02	5.00E+00	-	-	-	-	5.33E+04	-	1.25E+06	5.12E+04	2.97E+05	-	1.08E+06	2.33E+05	5.12E+04 sat
Trichloroethane, 1,1,1-	-	-	2.00E+00	5.00E+00	-	-	-	-	1.33E+06	-	4.81E+05	3.54E+05	7.42E+06	-	4.15E+05	3.93E+05	3.54E+05 sat
Trimethylbenzene, 1,2,4-	-	-	-	7.00E-03	-	-	-	-	-	-	3.23E+03	3.23E+03	-	-	2.79E+03	2.79E+03	2.79E+03 sat
Trimethylbenzene, 1,3,5-	-	-	1.00E-02	-	-	-	-	-	6.67E+03	-	-	6.67E+03	3.71E+04	-	-	3.71E+04	6.67E+03 sat
Xylenes	-	-	2.00E-01	1.00E-01	-	-	-	-	1.33E+05	-	3.40E+04	2.71E+04	7.42E+05	-	2.93E+04	2.82E+04	2.71E+04 sat

Output generated 14JAN2015:09:11:27



January 08, 2015

Mr. Steve Stanford  
Weaver Boos & Gordon  
7121 Grape Road  
Granger, IN 46530

RE: Project: Karwick Road  
Pace Project No.: 50109725

Dear Mr. Stanford:

Enclosed are the analytical results for sample(s) received by the laboratory on December 23, 2014. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Tina Sayer for  
Lyle Cable  
lyle.cable@pacelabs.com  
Project Manager

Enclosures

cc: Mr. Alex Huang, Weaver Boos



## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## CERTIFICATIONS

Project: Karwick Road

Pace Project No.: 50109725

---

### Indiana Certification IDs

7726 Moller Road, Indianapolis, IN 46268

Illinois Certification #: 200074

Indiana Certification #: C-49-06

Kansas Certification #: E-10247

Kentucky UST Certification #: 0042

Louisiana/NELAP Certification #: 04076

Ohio VAP Certification #: CL-0065

West Virginia Certification #: 330

---

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## SAMPLE SUMMARY

Project: Karwick Road

Pace Project No.: 50109725

Lab ID	Sample ID	Matrix	Date Collected	Date Received
50109725001	TP-1	Solid	12/22/14 08:30	12/23/14 10:34
50109725002	TP-2	Solid	12/22/14 09:00	12/23/14 10:34
50109725003	TP-5	Solid	12/22/14 10:30	12/23/14 10:34
50109725004	TP-7	Solid	12/22/14 11:30	12/23/14 10:34
50109725005	FD	Solid	12/22/14 11:31	12/23/14 10:34
50109725006	TP-8	Solid	12/22/14 12:00	12/23/14 10:34
50109725007	TP-10	Solid	12/22/14 13:45	12/23/14 10:34
50109725008	TP-11	Solid	12/22/14 14:15	12/23/14 10:34
50109725009	TP-12	Solid	12/22/14 14:45	12/23/14 10:34
50109725010	Trip Blank	Solid	12/22/14 08:00	12/23/14 10:34

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## SAMPLE ANALYTE COUNT

Project: Karwick Road

Pace Project No.: 50109725

Lab ID	Sample ID	Method	Analysts	Analytes Reported
50109725001	TP-1	EPA 6010	JPk	7
		EPA 7471	LLB	1
		EPA 8270 by SIM	CEM	20
		EPA 8270	JCM	49
		EPA 8260	GRM	75
		ASTM D2974-87	MLS	1
50109725002	TP-2	EPA 6010	JPk	7
		EPA 7471	LLB	1
		EPA 8270 by SIM	CEM	20
		EPA 8270	JCM	49
		EPA 8260	GRM	75
		ASTM D2974-87	MLS	1
50109725003	TP-5	EPA 6010	JPk	7
		EPA 7471	LLB	1
		EPA 8270 by SIM	CEM	20
		EPA 8270	JCM	49
		EPA 8260	GRM	75
		ASTM D2974-87	MLS	1
50109725004	TP-7	EPA 6010	JPk	7
		EPA 7471	LLB	1
		EPA 8270 by SIM	CEM	20
		EPA 8270	JCM	49
		EPA 8260	GRM	75
		ASTM D2974-87	MLS	1
50109725005	FD	EPA 6010	JPk	7
		EPA 7471	LLB	1
		EPA 8270 by SIM	CEM	20
		EPA 8270	JCM	49
		EPA 8260	GRM	75
		ASTM D2974-87	MLS	1
50109725006	TP-8	EPA 6010	JPk	7
		EPA 7471	LLB	1
		EPA 8270 by SIM	CEM	20
		EPA 8270	JCM	49
		EPA 8260	GRM	75
		ASTM D2974-87	MLS	1
50109725007	TP-10	EPA 6010	JPk	7

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## SAMPLE ANALYTE COUNT

Project: Karwick Road

Pace Project No.: 50109725

Lab ID	Sample ID	Method	Analysts	Analytes Reported
50109725008	TP-11	EPA 7471	LLB	1
		EPA 8270 by SIM	CEM	20
		EPA 8270	JCM	49
		EPA 8260	GRM	75
		ASTM D2974-87	MLS	1
		EPA 6010	JPK	7
		EPA 7471	LLB	1
		EPA 8270 by SIM	CEM	20
		EPA 8270	JCM	49
		EPA 8260	GRM	75
50109725009	TP-12	ASTM D2974-87	MLS	1
		EPA 6010	JPK	7
		EPA 7471	LLB	1
		EPA 8270 by SIM	CEM	20
		EPA 8270	JCM	49
		EPA 8260	GRM	75
50109725010	Trip Blank	ASTM D2974-87	MLS	1
		EPA 8260	GRM	75

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-1 Lab ID: 50109725001 Collected: 12/22/14 08:30 Received: 12/23/14 10:34 Matrix: Solid

### Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050								
Arsenic	2.6	mg/kg	1.0	1	12/30/14 09:14	12/30/14 20:18	7440-38-2	
Barium	26.3	mg/kg	1.0	1	12/30/14 09:14	12/30/14 20:18	7440-39-3	
Cadmium	1.5	mg/kg	0.51	1	12/30/14 09:14	12/30/14 20:18	7440-43-9	
Chromium	11.7	mg/kg	1.0	1	12/30/14 09:14	12/30/14 20:18	7440-47-3	
Lead	45.0	mg/kg	1.0	1	12/30/14 09:14	12/30/14 20:18	7439-92-1	
Selenium	ND	mg/kg	1.0	1	12/30/14 09:14	12/30/14 20:18	7782-49-2	
Silver	ND	mg/kg	0.51	1	12/30/14 09:14	12/30/14 20:18	7440-22-4	

### 7471 Mercury

Analytical Method: EPA 7471 Preparation Method: EPA 7471

Mercury	0.38	mg/kg	0.22	1	01/05/15 10:20	01/05/15 16:26	7439-97-6	
---------	------	-------	------	---	----------------	----------------	-----------	--

### 8270 MSSV PAH by SIM

Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546

Acenaphthene	ND	ug/kg	28.6	5	12/24/14 11:30	12/29/14 23:09	83-32-9	
Acenaphthylene	ND	ug/kg	28.6	5	12/24/14 11:30	12/29/14 23:09	208-96-8	
Anthracene	ND	ug/kg	28.6	5	12/24/14 11:30	12/29/14 23:09	120-12-7	
Benzo(a)anthracene	ND	ug/kg	28.6	5	12/24/14 11:30	12/29/14 23:09	56-55-3	
Benzo(a)pyrene	ND	ug/kg	28.6	5	12/24/14 11:30	12/29/14 23:09	50-32-8	
Benzo(b)fluoranthene	ND	ug/kg	28.6	5	12/24/14 11:30	12/29/14 23:09	205-99-2	
Benzo(g,h,i)perylene	ND	ug/kg	28.6	5	12/24/14 11:30	12/29/14 23:09	191-24-2	
Benzo(k)fluoranthene	ND	ug/kg	28.6	5	12/24/14 11:30	12/29/14 23:09	207-08-9	
Chrysene	ND	ug/kg	28.6	5	12/24/14 11:30	12/29/14 23:09	218-01-9	
Dibenz(a,h)anthracene	ND	ug/kg	28.6	5	12/24/14 11:30	12/29/14 23:09	53-70-3	
Fluoranthene	ND	ug/kg	28.6	5	12/24/14 11:30	12/29/14 23:09	206-44-0	
Fluorene	ND	ug/kg	28.6	5	12/24/14 11:30	12/29/14 23:09	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/kg	28.6	5	12/24/14 11:30	12/29/14 23:09	193-39-5	
1-Methylnaphthalene	ND	ug/kg	28.6	5	12/24/14 11:30	12/29/14 23:09	90-12-0	
2-Methylnaphthalene	ND	ug/kg	28.6	5	12/24/14 11:30	12/29/14 23:09	91-57-6	
Naphthalene	ND	ug/kg	28.6	5	12/24/14 11:30	12/29/14 23:09	91-20-3	1d
Phenanthrene	ND	ug/kg	28.6	5	12/24/14 11:30	12/29/14 23:09	85-01-8	
Pyrene	ND	ug/kg	28.6	5	12/24/14 11:30	12/29/14 23:09	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	43	%	38-110	5	12/24/14 11:30	12/29/14 23:09	321-60-8	
p-Terphenyl-d14 (S)	48	%	32-111	5	12/24/14 11:30	12/29/14 23:09	1718-51-0	

### 8270 MSSV SHORT LIST MICROWAVE Analytical Method: EPA 8270 Preparation Method: EPA 3546

Benzyl alcohol	ND	ug/kg	755	1	12/23/14 16:15	12/24/14 09:29	100-51-6	
4-Bromophenylphenyl ether	ND	ug/kg	377	1	12/23/14 16:15	12/24/14 09:29	101-55-3	
Butylbenzylphthalate	571	ug/kg	377	1	12/23/14 16:15	12/24/14 09:29	85-68-7	
4-Chloro-3-methylphenol	ND	ug/kg	755	1	12/23/14 16:15	12/24/14 09:29	59-50-7	
4-Chloroaniline	ND	ug/kg	755	1	12/23/14 16:15	12/24/14 09:29	106-47-8	
bis(2-Chloroethoxy)methane	ND	ug/kg	377	1	12/23/14 16:15	12/24/14 09:29	111-91-1	
bis(2-Chloroethyl) ether	ND	ug/kg	377	1	12/23/14 16:15	12/24/14 09:29	111-44-4	
bis(2chloro1methylethyl) ether	ND	ug/kg	377	1	12/23/14 16:15	12/24/14 09:29	108-60-1	
2-Chloronaphthalene	ND	ug/kg	377	1	12/23/14 16:15	12/24/14 09:29	91-58-7	
2-Chlorophenol	ND	ug/kg	377	1	12/23/14 16:15	12/24/14 09:29	95-57-8	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-1 Lab ID: 50109725001 Collected: 12/22/14 08:30 Received: 12/23/14 10:34 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SHORT LIST MICROWAVE</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546								
4-Chlorophenylphenyl ether	ND ug/kg		377	1	12/23/14 16:15	12/24/14 09:29	7005-72-3	
Dibenzofuran	ND ug/kg		377	1	12/23/14 16:15	12/24/14 09:29	132-64-9	
3,3'-Dichlorobenzidine	ND ug/kg		755	1	12/23/14 16:15	12/24/14 09:29	91-94-1	
2,4-Dichlorophenol	ND ug/kg		377	1	12/23/14 16:15	12/24/14 09:29	120-83-2	
Diethylphthalate	ND ug/kg		377	1	12/23/14 16:15	12/24/14 09:29	84-66-2	
2,4-Dimethylphenol	ND ug/kg		377	1	12/23/14 16:15	12/24/14 09:29	105-67-9	
Dimethylphthalate	ND ug/kg		377	1	12/23/14 16:15	12/24/14 09:29	131-11-3	
Di-n-butylphthalate	ND ug/kg		377	1	12/23/14 16:15	12/24/14 09:29	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/kg		1830	1	12/23/14 16:15	12/24/14 09:29	534-52-1	
2,4-Dinitrophenol	ND ug/kg		1830	1	12/23/14 16:15	12/24/14 09:29	51-28-5	
2,4-Dinitrotoluene	ND ug/kg		377	1	12/23/14 16:15	12/24/14 09:29	121-14-2	
2,6-Dinitrotoluene	ND ug/kg		377	1	12/23/14 16:15	12/24/14 09:29	606-20-2	
Di-n-octylphthalate	ND ug/kg		377	1	12/23/14 16:15	12/24/14 09:29	117-84-0	
bis(2-Ethylhexyl)phthalate	430 ug/kg		377	1	12/23/14 16:15	12/24/14 09:29	117-81-7	
Hexachloro-1,3-butadiene	ND ug/kg		377	1	12/23/14 16:15	12/24/14 09:29	87-68-3	
Hexachlorobenzene	ND ug/kg		377	1	12/23/14 16:15	12/24/14 09:29	118-74-1	
Hexachlorocyclopentadiene	ND ug/kg		377	1	12/23/14 16:15	12/24/14 09:29	77-47-4	
Hexachloroethane	ND ug/kg		377	1	12/23/14 16:15	12/24/14 09:29	67-72-1	
Isophorone	ND ug/kg		377	1	12/23/14 16:15	12/24/14 09:29	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/kg		377	1	12/23/14 16:15	12/24/14 09:29	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/kg		755	1	12/23/14 16:15	12/24/14 09:29		
2-Nitroaniline	ND ug/kg		1830	1	12/23/14 16:15	12/24/14 09:29	88-74-4	
3-Nitroaniline	ND ug/kg		1830	1	12/23/14 16:15	12/24/14 09:29	99-09-2	
4-Nitroaniline	ND ug/kg		1830	1	12/23/14 16:15	12/24/14 09:29	100-01-6	
Nitrobenzene	ND ug/kg		377	1	12/23/14 16:15	12/24/14 09:29	98-95-3	
2-Nitrophenol	ND ug/kg		377	1	12/23/14 16:15	12/24/14 09:29	88-75-5	
4-Nitrophenol	ND ug/kg		1830	1	12/23/14 16:15	12/24/14 09:29	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/kg		377	1	12/23/14 16:15	12/24/14 09:29	621-64-7	
N-Nitrosodiphenylamine	ND ug/kg		377	1	12/23/14 16:15	12/24/14 09:29	86-30-6	
Pentachlorophenol	ND ug/kg		1830	1	12/23/14 16:15	12/24/14 09:29	87-86-5	
Phenol	ND ug/kg		377	1	12/23/14 16:15	12/24/14 09:29	108-95-2	
2,4,5-Trichlorophenol	ND ug/kg		377	1	12/23/14 16:15	12/24/14 09:29	95-95-4	
2,4,6-Trichlorophenol	ND ug/kg		377	1	12/23/14 16:15	12/24/14 09:29	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	31 %.		28-101	1	12/23/14 16:15	12/24/14 09:29	4165-60-0	
2-Fluorobiphenyl (S)	28 %.		31-94	1	12/23/14 16:15	12/24/14 09:29	321-60-8	S0
p-Terphenyl-d14 (S)	31 %.		26-110	1	12/23/14 16:15	12/24/14 09:29	1718-51-0	
Phenol-d5 (S)	34 %.		28-101	1	12/23/14 16:15	12/24/14 09:29	4165-62-2	
2-Fluorophenol (S)	33 %.		24-104	1	12/23/14 16:15	12/24/14 09:29	367-12-4	
2,4,6-Tribromophenol (S)	31 %.		16-122	1	12/23/14 16:15	12/24/14 09:29	118-79-6	

### 8260 MSV 5035A VOA

Analytical Method: EPA 8260

Acetone	ND ug/kg	187	1	12/31/14 21:42	67-64-1
Acrolein	ND ug/kg	187	1	12/31/14 21:42	107-02-8
Acrylonitrile	ND ug/kg	187	1	12/31/14 21:42	107-13-1
Benzene	ND ug/kg	9.4	1	12/31/14 21:42	71-43-2

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-1 Lab ID: 50109725001 Collected: 12/22/14 08:30 Received: 12/23/14 10:34 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
Bromobenzene	ND	ug/kg	9.4	1		12/31/14 21:42	108-86-1	
Bromochloromethane	ND	ug/kg	9.4	1		12/31/14 21:42	74-97-5	
Bromodichloromethane	ND	ug/kg	9.4	1		12/31/14 21:42	75-27-4	
Bromoform	ND	ug/kg	9.4	1		12/31/14 21:42	75-25-2	
Bromomethane	ND	ug/kg	9.4	1		12/31/14 21:42	74-83-9	
2-Butanone (MEK)	ND	ug/kg	46.8	1		12/31/14 21:42	78-93-3	
n-Butylbenzene	ND	ug/kg	9.4	1		12/31/14 21:42	104-51-8	
sec-Butylbenzene	ND	ug/kg	9.4	1		12/31/14 21:42	135-98-8	
tert-Butylbenzene	ND	ug/kg	9.4	1		12/31/14 21:42	98-06-6	
Carbon disulfide	ND	ug/kg	18.7	1		12/31/14 21:42	75-15-0	
Carbon tetrachloride	ND	ug/kg	9.4	1		12/31/14 21:42	56-23-5	
Chlorobenzene	ND	ug/kg	9.4	1		12/31/14 21:42	108-90-7	
Chloroethane	ND	ug/kg	9.4	1		12/31/14 21:42	75-00-3	
Chloroform	ND	ug/kg	9.4	1		12/31/14 21:42	67-66-3	
Chloromethane	ND	ug/kg	9.4	1		12/31/14 21:42	74-87-3	
2-Chlorotoluene	ND	ug/kg	9.4	1		12/31/14 21:42	95-49-8	
4-Chlorotoluene	ND	ug/kg	9.4	1		12/31/14 21:42	106-43-4	
Dibromochloromethane	ND	ug/kg	9.4	1		12/31/14 21:42	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/kg	9.4	1		12/31/14 21:42	106-93-4	
Dibromomethane	ND	ug/kg	9.4	1		12/31/14 21:42	74-95-3	
1,2-Dichlorobenzene	ND	ug/kg	9.4	1		12/31/14 21:42	95-50-1	
1,3-Dichlorobenzene	ND	ug/kg	9.4	1		12/31/14 21:42	541-73-1	
1,4-Dichlorobenzene	ND	ug/kg	9.4	1		12/31/14 21:42	106-46-7	
trans-1,4-Dichloro-2-butene	ND	ug/kg	187	1		12/31/14 21:42	110-57-6	
Dichlorodifluoromethane	ND	ug/kg	9.4	1		12/31/14 21:42	75-71-8	
1,1-Dichloroethane	ND	ug/kg	9.4	1		12/31/14 21:42	75-34-3	
1,2-Dichloroethane	ND	ug/kg	9.4	1		12/31/14 21:42	107-06-2	
1,1-Dichloroethene	ND	ug/kg	9.4	1		12/31/14 21:42	75-35-4	
cis-1,2-Dichloroethene	ND	ug/kg	9.4	1		12/31/14 21:42	156-59-2	
trans-1,2-Dichloroethene	ND	ug/kg	9.4	1		12/31/14 21:42	156-60-5	
1,2-Dichloropropane	ND	ug/kg	9.4	1		12/31/14 21:42	78-87-5	
1,3-Dichloropropane	ND	ug/kg	9.4	1		12/31/14 21:42	142-28-9	
2,2-Dichloropropane	ND	ug/kg	9.4	1		12/31/14 21:42	594-20-7	
1,1-Dichloropropene	ND	ug/kg	9.4	1		12/31/14 21:42	563-58-6	
cis-1,3-Dichloropropene	ND	ug/kg	9.4	1		12/31/14 21:42	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/kg	9.4	1		12/31/14 21:42	10061-02-6	
Ethylbenzene	ND	ug/kg	9.4	1		12/31/14 21:42	100-41-4	
Ethyl methacrylate	ND	ug/kg	187	1		12/31/14 21:42	97-63-2	
Hexachloro-1,3-butadiene	ND	ug/kg	9.4	1		12/31/14 21:42	87-68-3	
n-Hexane	ND	ug/kg	9.4	1		12/31/14 21:42	110-54-3	
2-Hexanone	ND	ug/kg	187	1		12/31/14 21:42	591-78-6	
Iodomethane	ND	ug/kg	187	1		12/31/14 21:42	74-88-4	
Isopropylbenzene (Cumene)	ND	ug/kg	9.4	1		12/31/14 21:42	98-82-8	
p-Isopropyltoluene	ND	ug/kg	9.4	1		12/31/14 21:42	99-87-6	
Methylene Chloride	ND	ug/kg	37.5	1		12/31/14 21:42	75-09-2	
1-Methylnaphthalene	ND	ug/kg	18.7	1		12/31/14 21:42	90-12-0	N2

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-1 Lab ID: 50109725001 Collected: 12/22/14 08:30 Received: 12/23/14 10:34 Matrix: Solid

### Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
2-Methylnaphthalene	ND	ug/kg	18.7	1		12/31/14 21:42	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	46.8	1		12/31/14 21:42	108-10-1	
Methyl-tert-butyl ether	ND	ug/kg	9.4	1		12/31/14 21:42	1634-04-4	
Naphthalene	ND	ug/kg	9.4	1		12/31/14 21:42	91-20-3	
n-Propylbenzene	ND	ug/kg	9.4	1		12/31/14 21:42	103-65-1	
Styrene	ND	ug/kg	9.4	1		12/31/14 21:42	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/kg	9.4	1		12/31/14 21:42	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/kg	9.4	1		12/31/14 21:42	79-34-5	
Tetrachloroethene	ND	ug/kg	9.4	1		12/31/14 21:42	127-18-4	
Toluene	ND	ug/kg	9.4	1		12/31/14 21:42	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/kg	9.4	1		12/31/14 21:42	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/kg	9.4	1		12/31/14 21:42	120-82-1	
1,1,1-Trichloroethane	ND	ug/kg	9.4	1		12/31/14 21:42	71-55-6	
1,1,2-Trichloroethane	ND	ug/kg	9.4	1		12/31/14 21:42	79-00-5	
Trichloroethene	ND	ug/kg	9.4	1		12/31/14 21:42	79-01-6	
Trichlorofluoromethane	ND	ug/kg	9.4	1		12/31/14 21:42	75-69-4	
1,2,3-Trichloropropane	ND	ug/kg	9.4	1		12/31/14 21:42	96-18-4	
1,2,4-Trimethylbenzene	ND	ug/kg	9.4	1		12/31/14 21:42	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/kg	9.4	1		12/31/14 21:42	108-67-8	
Vinyl acetate	ND	ug/kg	187	1		12/31/14 21:42	108-05-4	
Vinyl chloride	ND	ug/kg	9.4	1		12/31/14 21:42	75-01-4	
Xylene (Total)	ND	ug/kg	18.7	1		12/31/14 21:42	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	96 %.		85-118	1		12/31/14 21:42	1868-53-7	
Toluene-d8 (S)	92 %.		71-128	1		12/31/14 21:42	2037-26-5	
4-Bromofluorobenzene (S)	91 %.		56-144	1		12/31/14 21:42	460-00-4	
<b>Percent Moisture</b>		Analytical Method: ASTM D2974-87						
Percent Moisture	13.4 %		0.10	1		12/31/14 11:59		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-2 Lab ID: 50109725002 Collected: 12/22/14 09:00 Received: 12/23/14 10:34 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050								
Arsenic	4.5	mg/kg	3.2	1	12/30/14 09:14	12/30/14 20:20	7440-38-2	
Barium	78.8	mg/kg	3.2	1	12/30/14 09:14	12/30/14 20:20	7440-39-3	
Cadmium	4.3	mg/kg	1.6	1	12/30/14 09:14	12/30/14 20:20	7440-43-9	
Chromium	22.3	mg/kg	3.2	1	12/30/14 09:14	12/30/14 20:20	7440-47-3	
Lead	125	mg/kg	3.2	1	12/30/14 09:14	12/30/14 20:20	7439-92-1	
Selenium	ND	mg/kg	3.2	1	12/30/14 09:14	12/30/14 20:20	7782-49-2	
Silver	ND	mg/kg	1.6	1	12/30/14 09:14	12/30/14 20:20	7440-22-4	

### 7471 Mercury

Analytical Method: EPA 7471 Preparation Method: EPA 7471

Mercury	1.1	mg/kg	0.68	1	01/05/15 10:20	01/05/15 16:28	7439-97-6	
---------	-----	-------	------	---	----------------	----------------	-----------	--

### 8270 MSSV PAH by SIM

Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546

Acenaphthene	ND	ug/kg	17.9	1	12/31/14 10:25	01/02/15 14:13	83-32-9	
Acenaphthylene	ND	ug/kg	17.9	1	12/31/14 10:25	01/02/15 14:13	208-96-8	
Anthracene	ND	ug/kg	17.9	1	12/31/14 10:25	01/02/15 14:13	120-12-7	
Benzo(a)anthracene	ND	ug/kg	17.9	1	12/31/14 10:25	01/02/15 14:13	56-55-3	
Benzo(a)pyrene	ND	ug/kg	17.9	1	12/31/14 10:25	01/02/15 14:13	50-32-8	
Benzo(b)fluoranthene	ND	ug/kg	17.9	1	12/31/14 10:25	01/02/15 14:13	205-99-2	
Benzo(g,h,i)perylene	ND	ug/kg	17.9	1	12/31/14 10:25	01/02/15 14:13	191-24-2	
Benzo(k)fluoranthene	ND	ug/kg	17.9	1	12/31/14 10:25	01/02/15 14:13	207-08-9	
Chrysene	40.1	ug/kg	17.9	1	12/31/14 10:25	01/02/15 14:13	218-01-9	
Dibenz(a,h)anthracene	ND	ug/kg	17.9	1	12/31/14 10:25	01/02/15 14:13	53-70-3	
Fluoranthene	35.9	ug/kg	17.9	1	12/31/14 10:25	01/02/15 14:13	206-44-0	
Fluorene	41.5	ug/kg	17.9	1	12/31/14 10:25	01/02/15 14:13	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/kg	17.9	1	12/31/14 10:25	01/02/15 14:13	193-39-5	
1-Methylnaphthalene	210	ug/kg	17.9	1	12/31/14 10:25	01/02/15 14:13	90-12-0	
2-Methylnaphthalene	387	ug/kg	17.9	1	12/31/14 10:25	01/02/15 14:13	91-57-6	
Naphthalene	5970	ug/kg	17.9	1	12/31/14 10:25	01/02/15 14:13	91-20-3	
Phenanthrene	141	ug/kg	17.9	1	12/31/14 10:25	01/02/15 14:13	85-01-8	
Pyrene	51.8	ug/kg	17.9	1	12/31/14 10:25	01/02/15 14:13	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	54	%.	38-110	1	12/31/14 10:25	01/02/15 14:13	321-60-8	
p-Terphenyl-d14 (S)	44	%.	32-111	1	12/31/14 10:25	01/02/15 14:13	1718-51-0	

### 8270 MSSV SHORT LIST MICROWAVE

Analytical Method: EPA 8270 Preparation Method: EPA 3546

Benzyl alcohol	ND	ug/kg	2370	1	12/23/14 16:15	12/24/14 09:51	100-51-6	
4-Bromophenylphenyl ether	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	101-55-3	
Butylbenzylphthalate	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	85-68-7	
4-Chloro-3-methylphenol	ND	ug/kg	2370	1	12/23/14 16:15	12/24/14 09:51	59-50-7	
4-Chloroaniline	ND	ug/kg	2370	1	12/23/14 16:15	12/24/14 09:51	106-47-8	
bis(2-Chloroethoxy)methane	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	111-91-1	
bis(2-Chloroethyl) ether	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	111-44-4	
bis(2chloro1methylethyl) ether	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	108-60-1	
2-Chloronaphthalene	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	91-58-7	
2-Chlorophenol	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	95-57-8	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-2 Lab ID: 50109725002 Collected: 12/22/14 09:00 Received: 12/23/14 10:34 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SHORT LIST MICROWAVE</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546								
4-Chlorophenylphenyl ether	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	7005-72-3	
Dibenzofuran	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	132-64-9	
3,3'-Dichlorobenzidine	ND	ug/kg	2370	1	12/23/14 16:15	12/24/14 09:51	91-94-1	
2,4-Dichlorophenol	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	120-83-2	
Diethylphthalate	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	84-66-2	
2,4-Dimethylphenol	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	105-67-9	
Dimethylphthalate	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	131-11-3	
Di-n-butylphthalate	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	84-74-2	
4,6-Dinitro-2-methylphenol	ND	ug/kg	5740	1	12/23/14 16:15	12/24/14 09:51	534-52-1	
2,4-Dinitrophenol	ND	ug/kg	5740	1	12/23/14 16:15	12/24/14 09:51	51-28-5	
2,4-Dinitrotoluene	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	121-14-2	
2,6-Dinitrotoluene	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	606-20-2	
Di-n-octylphthalate	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	117-84-0	
bis(2-Ethylhexyl)phthalate	3990	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	117-81-7	
Hexachloro-1,3-butadiene	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	87-68-3	
Hexachlorobenzene	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	118-74-1	
Hexachlorocyclopentadiene	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	77-47-4	
Hexachloroethane	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	67-72-1	
Isophorone	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	78-59-1	
2-Methylphenol(o-Cresol)	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND	ug/kg	2370	1	12/23/14 16:15	12/24/14 09:51		
2-Nitroaniline	ND	ug/kg	5740	1	12/23/14 16:15	12/24/14 09:51	88-74-4	
3-Nitroaniline	ND	ug/kg	5740	1	12/23/14 16:15	12/24/14 09:51	99-09-2	
4-Nitroaniline	ND	ug/kg	5740	1	12/23/14 16:15	12/24/14 09:51	100-01-6	
Nitrobenzene	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	98-95-3	
2-Nitrophenol	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	88-75-5	
4-Nitrophenol	ND	ug/kg	5740	1	12/23/14 16:15	12/24/14 09:51	100-02-7	
N-Nitroso-di-n-propylamine	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	621-64-7	
N-Nitrosodiphenylamine	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	86-30-6	
Pentachlorophenol	ND	ug/kg	5740	1	12/23/14 16:15	12/24/14 09:51	87-86-5	
Phenol	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	108-95-2	
2,4,5-Trichlorophenol	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	95-95-4	
2,4,6-Trichlorophenol	ND	ug/kg	1180	1	12/23/14 16:15	12/24/14 09:51	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	2 %.		28-101	1	12/23/14 16:15	12/24/14 09:51	4165-60-0	2d
2-Fluorobiphenyl (S)	4 %.		31-94	1	12/23/14 16:15	12/24/14 09:51	321-60-8	2d
p-Terphenyl-d14 (S)	16 %.		26-110	1	12/23/14 16:15	12/24/14 09:51	1718-51-0	2d
Phenol-d5 (S)	14 %.		28-101	1	12/23/14 16:15	12/24/14 09:51	4165-62-2	2d
2-Fluorophenol (S)	7 %.		24-104	1	12/23/14 16:15	12/24/14 09:51	367-12-4	2d
2,4,6-Tribromophenol (S)	8 %.		16-122	1	12/23/14 16:15	12/24/14 09:51	118-79-6	2d

### 8260 MSV 5035A VOA

Analytical Method: EPA 8260

Acetone	ND	ug/kg	912	1		12/31/14 22:15	67-64-1	
Acrolein	ND	ug/kg	912	1		12/31/14 22:15	107-02-8	
Acrylonitrile	ND	ug/kg	912	1		12/31/14 22:15	107-13-1	
Benzene	361	ug/kg	45.6	1		12/31/14 22:15	71-43-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-2 Lab ID: 50109725002 Collected: 12/22/14 09:00 Received: 12/23/14 10:34 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
Bromobenzene	ND	ug/kg	45.6	1		12/31/14 22:15	108-86-1	
Bromochloromethane	ND	ug/kg	45.6	1		12/31/14 22:15	74-97-5	
Bromodichloromethane	ND	ug/kg	45.6	1		12/31/14 22:15	75-27-4	
Bromoform	ND	ug/kg	45.6	1		12/31/14 22:15	75-25-2	
Bromomethane	ND	ug/kg	45.6	1		12/31/14 22:15	74-83-9	
2-Butanone (MEK)	ND	ug/kg	228	1		12/31/14 22:15	78-93-3	
n-Butylbenzene	449	ug/kg	45.6	1		12/31/14 22:15	104-51-8	
sec-Butylbenzene	293	ug/kg	45.6	1		12/31/14 22:15	135-98-8	
tert-Butylbenzene	ND	ug/kg	45.6	1		12/31/14 22:15	98-06-6	
Carbon disulfide	ND	ug/kg	91.2	1		12/31/14 22:15	75-15-0	
Carbon tetrachloride	ND	ug/kg	45.6	1		12/31/14 22:15	56-23-5	
Chlorobenzene	579	ug/kg	45.6	1		12/31/14 22:15	108-90-7	
Chloroethane	347	ug/kg	45.6	1		12/31/14 22:15	75-00-3	
Chloroform	ND	ug/kg	45.6	1		12/31/14 22:15	67-66-3	
Chloromethane	ND	ug/kg	45.6	1		12/31/14 22:15	74-87-3	
2-Chlorotoluene	ND	ug/kg	45.6	1		12/31/14 22:15	95-49-8	
4-Chlorotoluene	ND	ug/kg	45.6	1		12/31/14 22:15	106-43-4	
Dibromochloromethane	ND	ug/kg	45.6	1		12/31/14 22:15	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/kg	45.6	1		12/31/14 22:15	106-93-4	
Dibromomethane	ND	ug/kg	45.6	1		12/31/14 22:15	74-95-3	
1,2-Dichlorobenzene	ND	ug/kg	45.6	1		12/31/14 22:15	95-50-1	
1,3-Dichlorobenzene	ND	ug/kg	45.6	1		12/31/14 22:15	541-73-1	
1,4-Dichlorobenzene	510	ug/kg	45.6	1		12/31/14 22:15	106-46-7	
trans-1,4-Dichloro-2-butene	ND	ug/kg	912	1		12/31/14 22:15	110-57-6	
Dichlorodifluoromethane	ND	ug/kg	45.6	1		12/31/14 22:15	75-71-8	
1,1-Dichloroethane	ND	ug/kg	45.6	1		12/31/14 22:15	75-34-3	
1,2-Dichloroethane	ND	ug/kg	45.6	1		12/31/14 22:15	107-06-2	
1,1-Dichloroethene	ND	ug/kg	45.6	1		12/31/14 22:15	75-35-4	
cis-1,2-Dichloroethene	ND	ug/kg	45.6	1		12/31/14 22:15	156-59-2	
trans-1,2-Dichloroethene	ND	ug/kg	45.6	1		12/31/14 22:15	156-60-5	
1,2-Dichloropropane	ND	ug/kg	45.6	1		12/31/14 22:15	78-87-5	
1,3-Dichloropropane	ND	ug/kg	45.6	1		12/31/14 22:15	142-28-9	
2,2-Dichloropropane	ND	ug/kg	45.6	1		12/31/14 22:15	594-20-7	
1,1-Dichloropropene	ND	ug/kg	45.6	1		12/31/14 22:15	563-58-6	
cis-1,3-Dichloropropene	ND	ug/kg	45.6	1		12/31/14 22:15	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/kg	45.6	1		12/31/14 22:15	10061-02-6	
Ethylbenzene	246	ug/kg	45.6	1		12/31/14 22:15	100-41-4	
Ethyl methacrylate	ND	ug/kg	912	1		12/31/14 22:15	97-63-2	
Hexachloro-1,3-butadiene	ND	ug/kg	45.6	1		12/31/14 22:15	87-68-3	
n-Hexane	ND	ug/kg	45.6	1		12/31/14 22:15	110-54-3	
2-Hexanone	ND	ug/kg	912	1		12/31/14 22:15	591-78-6	
Iodomethane	ND	ug/kg	912	1		12/31/14 22:15	74-88-4	
Isopropylbenzene (Cumene)	269	ug/kg	45.6	1		12/31/14 22:15	98-82-8	
p-Isopropyltoluene	152	ug/kg	45.6	1		12/31/14 22:15	99-87-6	
Methylene Chloride	ND	ug/kg	182	1		12/31/14 22:15	75-09-2	
1-Methylnaphthalene	ND	ug/kg	91.2	1		12/31/14 22:15	90-12-0	N2

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-2 Lab ID: 50109725002 Collected: 12/22/14 09:00 Received: 12/23/14 10:34 Matrix: Solid

### Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
2-Methylnaphthalene	117	ug/kg	91.2	1		12/31/14 22:15	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	228	1		12/31/14 22:15	108-10-1	
Methyl-tert-butyl ether	ND	ug/kg	45.6	1		12/31/14 22:15	1634-04-4	
Naphthalene	893	ug/kg	45.6	1		12/31/14 22:15	91-20-3	
n-Propylbenzene	429	ug/kg	45.6	1		12/31/14 22:15	103-65-1	
Styrene	ND	ug/kg	45.6	1		12/31/14 22:15	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/kg	45.6	1		12/31/14 22:15	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/kg	45.6	1		12/31/14 22:15	79-34-5	
Tetrachloroethene	ND	ug/kg	45.6	1		12/31/14 22:15	127-18-4	
Toluene	11200	ug/kg	475	25		01/03/15 11:09	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/kg	45.6	1		12/31/14 22:15	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/kg	45.6	1		12/31/14 22:15	120-82-1	
1,1,1-Trichloroethane	69.6	ug/kg	45.6	1		12/31/14 22:15	71-55-6	
1,1,2-Trichloroethane	ND	ug/kg	45.6	1		12/31/14 22:15	79-00-5	
Trichloroethene	ND	ug/kg	45.6	1		12/31/14 22:15	79-01-6	
Trichlorofluoromethane	ND	ug/kg	45.6	1		12/31/14 22:15	75-69-4	
1,2,3-Trichloropropane	ND	ug/kg	45.6	1		12/31/14 22:15	96-18-4	
1,2,4-Trimethylbenzene	3950	ug/kg	475	25		01/03/15 11:09	95-63-6	
1,3,5-Trimethylbenzene	238	ug/kg	45.6	1		12/31/14 22:15	108-67-8	
Vinyl acetate	ND	ug/kg	912	1		12/31/14 22:15	108-05-4	
Vinyl chloride	ND	ug/kg	45.6	1		12/31/14 22:15	75-01-4	
Xylene (Total)	590	ug/kg	91.2	1		12/31/14 22:15	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	98	%	85-118	1		12/31/14 22:15	1868-53-7	
Toluene-d8 (S)	111	%	71-128	1		12/31/14 22:15	2037-26-5	
4-Bromofluorobenzene (S)	92	%	56-144	1		12/31/14 22:15	460-00-4	
<b>Percent Moisture</b>		Analytical Method: ASTM D2974-87						
Percent Moisture	72.2	%	0.10	1		12/31/14 11:59		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

**Sample: TP-5** **Lab ID: 50109725003** Collected: 12/22/14 10:30 Received: 12/23/14 10:34 Matrix: Solid

**Results reported on a "dry-weight" basis**

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050								
Arsenic	1.8 mg/kg		1.0	1	12/30/14 09:14	12/30/14 20:23	7440-38-2	
Barium	13.0 mg/kg		1.0	1	12/30/14 09:14	12/30/14 20:23	7440-39-3	
Cadmium	ND mg/kg		0.52	1	12/30/14 09:14	12/30/14 20:23	7440-43-9	
Chromium	3.8 mg/kg		1.0	1	12/30/14 09:14	12/30/14 20:23	7440-47-3	
Lead	11.4 mg/kg		1.0	1	12/30/14 09:14	12/30/14 20:23	7439-92-1	
Selenium	ND mg/kg		1.0	1	12/30/14 09:14	12/30/14 20:23	7782-49-2	
Silver	ND mg/kg		0.52	1	12/30/14 09:14	12/30/14 20:23	7440-22-4	

### 7471 Mercury

Analytical Method: EPA 7471 Preparation Method: EPA 7471

Mercury	ND mg/kg		0.23	1	01/05/15 10:20	01/05/15 16:30	7439-97-6	
---------	----------	--	------	---	----------------	----------------	-----------	--

### 8270 MSSV PAH by SIM

Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546

Acenaphthene	ND ug/kg		5.4	1	12/24/14 11:30	12/29/14 23:45	83-32-9	
Acenaphthylene	ND ug/kg		5.4	1	12/24/14 11:30	12/29/14 23:45	208-96-8	
Anthracene	ND ug/kg		5.4	1	12/24/14 11:30	12/29/14 23:45	120-12-7	
Benzo(a)anthracene	ND ug/kg		5.4	1	12/24/14 11:30	12/29/14 23:45	56-55-3	
Benzo(a)pyrene	ND ug/kg		5.4	1	12/24/14 11:30	12/29/14 23:45	50-32-8	
Benzo(b)fluoranthene	ND ug/kg		5.4	1	12/24/14 11:30	12/29/14 23:45	205-99-2	
Benzo(g,h,i)perylene	ND ug/kg		5.4	1	12/24/14 11:30	12/29/14 23:45	191-24-2	
Benzo(k)fluoranthene	ND ug/kg		5.4	1	12/24/14 11:30	12/29/14 23:45	207-08-9	
Chrysene	ND ug/kg		5.4	1	12/24/14 11:30	12/29/14 23:45	218-01-9	
Dibenz(a,h)anthracene	ND ug/kg		5.4	1	12/24/14 11:30	12/29/14 23:45	53-70-3	
Fluoranthene	ND ug/kg		5.4	1	12/24/14 11:30	12/29/14 23:45	206-44-0	
Fluorene	ND ug/kg		5.4	1	12/24/14 11:30	12/29/14 23:45	86-73-7	
Indeno(1,2,3-cd)pyrene	ND ug/kg		5.4	1	12/24/14 11:30	12/29/14 23:45	193-39-5	
1-Methylnaphthalene	ND ug/kg		5.4	1	12/24/14 11:30	12/29/14 23:45	90-12-0	
2-Methylnaphthalene	ND ug/kg		5.4	1	12/24/14 11:30	12/29/14 23:45	91-57-6	
Naphthalene	ND ug/kg		5.4	1	12/24/14 11:30	12/29/14 23:45	91-20-3	
Phenanthrene	ND ug/kg		5.4	1	12/24/14 11:30	12/29/14 23:45	85-01-8	
Pyrene	ND ug/kg		5.4	1	12/24/14 11:30	12/29/14 23:45	129-00-0	

### Surrogates

2-Fluorobiphenyl (S)	46 %.		38-110	1	12/24/14 11:30	12/29/14 23:45	321-60-8	
p-Terphenyl-d14 (S)	46 %.		32-111	1	12/24/14 11:30	12/29/14 23:45	1718-51-0	

### 8270 MSSV SHORT LIST MICROWAVE

Analytical Method: EPA 8270 Preparation Method: EPA 3546

Benzyl alcohol	ND ug/kg		710	1	12/23/14 16:15	12/24/14 10:11	100-51-6	
4-Bromophenylphenyl ether	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	101-55-3	
Butylbenzylphthalate	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	85-68-7	
4-Chloro-3-methylphenol	ND ug/kg		710	1	12/23/14 16:15	12/24/14 10:11	59-50-7	
4-Chloroaniline	ND ug/kg		710	1	12/23/14 16:15	12/24/14 10:11	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	111-91-1	
bis(2-Chloroethyl) ether	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	111-44-4	
bis(2chloro1methylethyl) ether	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	108-60-1	
2-Chloronaphthalene	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	91-58-7	
2-Chlorophenol	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	95-57-8	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-5 Lab ID: 50109725003 Collected: 12/22/14 10:30 Received: 12/23/14 10:34 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SHORT LIST MICROWAVE</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546								
4-Chlorophenylphenyl ether	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	7005-72-3	
Dibenzofuran	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	132-64-9	
3,3'-Dichlorobenzidine	ND ug/kg		710	1	12/23/14 16:15	12/24/14 10:11	91-94-1	
2,4-Dichlorophenol	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	120-83-2	
Diethylphthalate	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	84-66-2	
2,4-Dimethylphenol	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	105-67-9	
Dimethylphthalate	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	131-11-3	
Di-n-butylphthalate	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/kg		1720	1	12/23/14 16:15	12/24/14 10:11	534-52-1	
2,4-Dinitrophenol	ND ug/kg		1720	1	12/23/14 16:15	12/24/14 10:11	51-28-5	
2,4-Dinitrotoluene	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	121-14-2	
2,6-Dinitrotoluene	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	606-20-2	
Di-n-octylphthalate	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	117-81-7	
Hexachloro-1,3-butadiene	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	87-68-3	
Hexachlorobenzene	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	118-74-1	
Hexachlorocyclopentadiene	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	77-47-4	
Hexachloroethane	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	67-72-1	
Isophorone	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/kg		710	1	12/23/14 16:15	12/24/14 10:11		
2-Nitroaniline	ND ug/kg		1720	1	12/23/14 16:15	12/24/14 10:11	88-74-4	
3-Nitroaniline	ND ug/kg		1720	1	12/23/14 16:15	12/24/14 10:11	99-09-2	
4-Nitroaniline	ND ug/kg		1720	1	12/23/14 16:15	12/24/14 10:11	100-01-6	
Nitrobenzene	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	98-95-3	
2-Nitrophenol	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	88-75-5	
4-Nitrophenol	ND ug/kg		1720	1	12/23/14 16:15	12/24/14 10:11	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	621-64-7	
N-Nitrosodiphenylamine	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	86-30-6	
Pentachlorophenol	ND ug/kg		1720	1	12/23/14 16:15	12/24/14 10:11	87-86-5	
Phenol	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	108-95-2	
2,4,5-Trichlorophenol	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	95-95-4	
2,4,6-Trichlorophenol	ND ug/kg		355	1	12/23/14 16:15	12/24/14 10:11	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	55 %.		28-101	1	12/23/14 16:15	12/24/14 10:11	4165-60-0	
2-Fluorobiphenyl (S)	54 %.		31-94	1	12/23/14 16:15	12/24/14 10:11	321-60-8	
p-Terphenyl-d14 (S)	64 %.		26-110	1	12/23/14 16:15	12/24/14 10:11	1718-51-0	
Phenol-d5 (S)	64 %.		28-101	1	12/23/14 16:15	12/24/14 10:11	4165-62-2	
2-Fluorophenol (S)	64 %.		24-104	1	12/23/14 16:15	12/24/14 10:11	367-12-4	
2,4,6-Tribromophenol (S)	59 %.		16-122	1	12/23/14 16:15	12/24/14 10:11	118-79-6	

### 8260 MSV 5035A VOA

Analytical Method: EPA 8260

Acetone	ND ug/kg		110	1	12/31/14 22:47	67-64-1
Acrolein	ND ug/kg		110	1	12/31/14 22:47	107-02-8
Acrylonitrile	ND ug/kg		110	1	12/31/14 22:47	107-13-1
Benzene	ND ug/kg		5.5	1	12/31/14 22:47	71-43-2

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-5 Lab ID: 50109725003 Collected: 12/22/14 10:30 Received: 12/23/14 10:34 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
Bromobenzene	ND	ug/kg	5.5	1		12/31/14 22:47	108-86-1	
Bromochloromethane	ND	ug/kg	5.5	1		12/31/14 22:47	74-97-5	
Bromodichloromethane	ND	ug/kg	5.5	1		12/31/14 22:47	75-27-4	
Bromoform	ND	ug/kg	5.5	1		12/31/14 22:47	75-25-2	
Bromomethane	ND	ug/kg	5.5	1		12/31/14 22:47	74-83-9	
2-Butanone (MEK)	ND	ug/kg	27.6	1		12/31/14 22:47	78-93-3	
n-Butylbenzene	ND	ug/kg	5.5	1		12/31/14 22:47	104-51-8	
sec-Butylbenzene	ND	ug/kg	5.5	1		12/31/14 22:47	135-98-8	
tert-Butylbenzene	ND	ug/kg	5.5	1		12/31/14 22:47	98-06-6	
Carbon disulfide	ND	ug/kg	11.0	1		12/31/14 22:47	75-15-0	
Carbon tetrachloride	ND	ug/kg	5.5	1		12/31/14 22:47	56-23-5	
Chlorobenzene	ND	ug/kg	5.5	1		12/31/14 22:47	108-90-7	
Chloroethane	ND	ug/kg	5.5	1		12/31/14 22:47	75-00-3	
Chloroform	ND	ug/kg	5.5	1		12/31/14 22:47	67-66-3	
Chloromethane	ND	ug/kg	5.5	1		12/31/14 22:47	74-87-3	
2-Chlorotoluene	ND	ug/kg	5.5	1		12/31/14 22:47	95-49-8	
4-Chlorotoluene	ND	ug/kg	5.5	1		12/31/14 22:47	106-43-4	
Dibromochloromethane	ND	ug/kg	5.5	1		12/31/14 22:47	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/kg	5.5	1		12/31/14 22:47	106-93-4	
Dibromomethane	ND	ug/kg	5.5	1		12/31/14 22:47	74-95-3	
1,2-Dichlorobenzene	ND	ug/kg	5.5	1		12/31/14 22:47	95-50-1	
1,3-Dichlorobenzene	ND	ug/kg	5.5	1		12/31/14 22:47	541-73-1	
1,4-Dichlorobenzene	ND	ug/kg	5.5	1		12/31/14 22:47	106-46-7	
trans-1,4-Dichloro-2-butene	ND	ug/kg	110	1		12/31/14 22:47	110-57-6	
Dichlorodifluoromethane	ND	ug/kg	5.5	1		12/31/14 22:47	75-71-8	
1,1-Dichloroethane	ND	ug/kg	5.5	1		12/31/14 22:47	75-34-3	
1,2-Dichloroethane	ND	ug/kg	5.5	1		12/31/14 22:47	107-06-2	
1,1-Dichloroethene	ND	ug/kg	5.5	1		12/31/14 22:47	75-35-4	
cis-1,2-Dichloroethene	ND	ug/kg	5.5	1		12/31/14 22:47	156-59-2	
trans-1,2-Dichloroethene	ND	ug/kg	5.5	1		12/31/14 22:47	156-60-5	
1,2-Dichloropropane	ND	ug/kg	5.5	1		12/31/14 22:47	78-87-5	
1,3-Dichloropropane	ND	ug/kg	5.5	1		12/31/14 22:47	142-28-9	
2,2-Dichloropropane	ND	ug/kg	5.5	1		12/31/14 22:47	594-20-7	
1,1-Dichloropropene	ND	ug/kg	5.5	1		12/31/14 22:47	563-58-6	
cis-1,3-Dichloropropene	ND	ug/kg	5.5	1		12/31/14 22:47	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/kg	5.5	1		12/31/14 22:47	10061-02-6	
Ethylbenzene	ND	ug/kg	5.5	1		12/31/14 22:47	100-41-4	
Ethyl methacrylate	ND	ug/kg	110	1		12/31/14 22:47	97-63-2	
Hexachloro-1,3-butadiene	ND	ug/kg	5.5	1		12/31/14 22:47	87-68-3	
n-Hexane	ND	ug/kg	5.5	1		12/31/14 22:47	110-54-3	
2-Hexanone	ND	ug/kg	110	1		12/31/14 22:47	591-78-6	
Iodomethane	ND	ug/kg	110	1		12/31/14 22:47	74-88-4	
Isopropylbenzene (Cumene)	ND	ug/kg	5.5	1		12/31/14 22:47	98-82-8	
p-Isopropyltoluene	ND	ug/kg	5.5	1		12/31/14 22:47	99-87-6	
Methylene Chloride	ND	ug/kg	22.1	1		12/31/14 22:47	75-09-2	
1-Methylnaphthalene	ND	ug/kg	11.0	1		12/31/14 22:47	90-12-0	N2

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-5 Lab ID: 50109725003 Collected: 12/22/14 10:30 Received: 12/23/14 10:34 Matrix: Solid

### Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
2-Methylnaphthalene	ND	ug/kg	11.0	1		12/31/14 22:47	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	27.6	1		12/31/14 22:47	108-10-1	
Methyl-tert-butyl ether	ND	ug/kg	5.5	1		12/31/14 22:47	1634-04-4	
Naphthalene	ND	ug/kg	5.5	1		12/31/14 22:47	91-20-3	
n-Propylbenzene	ND	ug/kg	5.5	1		12/31/14 22:47	103-65-1	
Styrene	ND	ug/kg	5.5	1		12/31/14 22:47	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/kg	5.5	1		12/31/14 22:47	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/kg	5.5	1		12/31/14 22:47	79-34-5	
Tetrachloroethene	ND	ug/kg	5.5	1		12/31/14 22:47	127-18-4	
Toluene	ND	ug/kg	5.5	1		12/31/14 22:47	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/kg	5.5	1		12/31/14 22:47	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/kg	5.5	1		12/31/14 22:47	120-82-1	
1,1,1-Trichloroethane	ND	ug/kg	5.5	1		12/31/14 22:47	71-55-6	
1,1,2-Trichloroethane	ND	ug/kg	5.5	1		12/31/14 22:47	79-00-5	
Trichloroethene	ND	ug/kg	5.5	1		12/31/14 22:47	79-01-6	
Trichlorofluoromethane	ND	ug/kg	5.5	1		12/31/14 22:47	75-69-4	
1,2,3-Trichloropropane	ND	ug/kg	5.5	1		12/31/14 22:47	96-18-4	
1,2,4-Trimethylbenzene	ND	ug/kg	5.5	1		12/31/14 22:47	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/kg	5.5	1		12/31/14 22:47	108-67-8	
Vinyl acetate	ND	ug/kg	110	1		12/31/14 22:47	108-05-4	
Vinyl chloride	ND	ug/kg	5.5	1		12/31/14 22:47	75-01-4	
Xylene (Total)	ND	ug/kg	11.0	1		12/31/14 22:47	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	96 %.		85-118	1		12/31/14 22:47	1868-53-7	
Toluene-d8 (S)	87 %.		71-128	1		12/31/14 22:47	2037-26-5	
4-Bromofluorobenzene (S)	100 %.		56-144	1		12/31/14 22:47	460-00-4	
<b>Percent Moisture</b>		Analytical Method: ASTM D2974-87						
Percent Moisture	7.4 %		0.10	1		12/31/14 11:59		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-7 Lab ID: 50109725004 Collected: 12/22/14 11:30 Received: 12/23/14 10:34 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050								
Arsenic	1.4	mg/kg	0.92	1	12/30/14 09:14	12/30/14 20:33	7440-38-2	
Barium	20.9	mg/kg	0.92	1	12/30/14 09:14	12/30/14 20:33	7440-39-3	
Cadmium	ND	mg/kg	0.46	1	12/30/14 09:14	12/30/14 20:33	7440-43-9	
Chromium	4.6	mg/kg	0.92	1	12/30/14 09:14	12/30/14 20:33	7440-47-3	
Lead	21.8	mg/kg	0.92	1	12/30/14 09:14	12/30/14 20:33	7439-92-1	
Selenium	ND	mg/kg	0.92	1	12/30/14 09:14	12/30/14 20:33	7782-49-2	
Silver	ND	mg/kg	0.46	1	12/30/14 09:14	12/30/14 20:33	7440-22-4	

### 7471 Mercury

Analytical Method: EPA 7471 Preparation Method: EPA 7471

Mercury	ND	mg/kg	0.22	1	01/05/15 10:20	01/05/15 16:36	7439-97-6	
---------	----	-------	------	---	----------------	----------------	-----------	--

### 8270 MSSV PAH by SIM

Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546

Acenaphthene	ND	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:38	83-32-9	
Acenaphthylene	ND	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:38	208-96-8	
Anthracene	7.5	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:38	120-12-7	
Benzo(a)anthracene	24.1	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:38	56-55-3	
Benzo(a)pyrene	24.5	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:38	50-32-8	
Benzo(b)fluoranthene	26.2	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:38	205-99-2	
Benzo(g,h,i)perylene	21.8	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:38	191-24-2	
Benzo(k)fluoranthene	20.3	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:38	207-08-9	
Chrysene	35.0	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:38	218-01-9	
Dibenz(a,h)anthracene	11.2	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:38	53-70-3	
Fluoranthene	65.4	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:38	206-44-0	
Fluorene	5.9	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:38	86-73-7	
Indeno(1,2,3-cd)pyrene	16.4	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:38	193-39-5	
1-Methylnaphthalene	9.3	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:38	90-12-0	
2-Methylnaphthalene	10.6	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:38	91-57-6	
Naphthalene	26.0	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:38	91-20-3	
Phenanthrene	48.6	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:38	85-01-8	
Pyrene	53.0	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:38	129-00-0	

### Surrogates

2-Fluorobiphenyl (S)	54	%	38-110	1	12/24/14 11:30	12/30/14 00:38	321-60-8	
p-Terphenyl-d14 (S)	51	%	32-111	1	12/24/14 11:30	12/30/14 00:38	1718-51-0	

### 8270 MSSV SHORT LIST MICROWAVE Analytical Method: EPA 8270 Preparation Method: EPA 3546

Benzyl alcohol	ND	ug/kg	718	1	12/23/14 16:15	12/24/14 11:15	100-51-6	
4-Bromophenylphenyl ether	ND	ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	101-55-3	
Butylbenzylphthalate	ND	ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	85-68-7	
4-Chloro-3-methylphenol	ND	ug/kg	718	1	12/23/14 16:15	12/24/14 11:15	59-50-7	
4-Chloroaniline	ND	ug/kg	718	1	12/23/14 16:15	12/24/14 11:15	106-47-8	
bis(2-Chloroethoxy)methane	ND	ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	111-91-1	
bis(2-Chloroethyl) ether	ND	ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	111-44-4	
bis(2chloro1methylethyl) ether	ND	ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	108-60-1	
2-Chloronaphthalene	ND	ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	91-58-7	
2-Chlorophenol	ND	ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	95-57-8	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-7 Lab ID: 50109725004 Collected: 12/22/14 11:30 Received: 12/23/14 10:34 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
------------	---------	-------	--------------	----	----------	----------	---------	------

8270 MSSV SHORT LIST MICROWAVE Analytical Method: EPA 8270 Preparation Method: EPA 3546

4-Chlorophenylphenyl ether	ND ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	7005-72-3
Dibenzofuran	ND ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	132-64-9
3,3'-Dichlorobenzidine	ND ug/kg	718	1	12/23/14 16:15	12/24/14 11:15	91-94-1
2,4-Dichlorophenol	ND ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	120-83-2
Diethylphthalate	ND ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	84-66-2
2,4-Dimethylphenol	ND ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	105-67-9
Dimethylphthalate	ND ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	131-11-3
Di-n-butylphthalate	ND ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	84-74-2
4,6-Dinitro-2-methylphenol	ND ug/kg	1740	1	12/23/14 16:15	12/24/14 11:15	534-52-1
2,4-Dinitrophenol	ND ug/kg	1740	1	12/23/14 16:15	12/24/14 11:15	51-28-5
2,4-Dinitrotoluene	ND ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	121-14-2
2,6-Dinitrotoluene	ND ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	606-20-2
Di-n-octylphthalate	ND ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	117-84-0
bis(2-Ethylhexyl)phthalate	ND ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	117-81-7
Hexachloro-1,3-butadiene	ND ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	87-68-3
Hexachlorobenzene	ND ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	118-74-1
Hexachlorocyclopentadiene	ND ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	77-47-4
Hexachloroethane	ND ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	67-72-1
Isophorone	ND ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	78-59-1
2-Methylphenol(o-Cresol)	ND ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	95-48-7
3&4-Methylphenol(m&p Cresol)	ND ug/kg	718	1	12/23/14 16:15	12/24/14 11:15	
2-Nitroaniline	ND ug/kg	1740	1	12/23/14 16:15	12/24/14 11:15	88-74-4
3-Nitroaniline	ND ug/kg	1740	1	12/23/14 16:15	12/24/14 11:15	99-09-2
4-Nitroaniline	ND ug/kg	1740	1	12/23/14 16:15	12/24/14 11:15	100-01-6
Nitrobenzene	ND ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	98-95-3
2-Nitrophenol	ND ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	88-75-5
4-Nitrophenol	ND ug/kg	1740	1	12/23/14 16:15	12/24/14 11:15	100-02-7
N-Nitroso-di-n-propylamine	ND ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	621-64-7
N-Nitrosodiphenylamine	ND ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	86-30-6
Pentachlorophenol	ND ug/kg	1740	1	12/23/14 16:15	12/24/14 11:15	87-86-5
Phenol	ND ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	108-95-2
2,4,5-Trichlorophenol	ND ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	95-95-4
2,4,6-Trichlorophenol	ND ug/kg	359	1	12/23/14 16:15	12/24/14 11:15	88-06-2

### Surrogates

Nitrobenzene-d5 (S)	51 %.	28-101	1	12/23/14 16:15	12/24/14 11:15	4165-60-0
2-Fluorobiphenyl (S)	51 %.	31-94	1	12/23/14 16:15	12/24/14 11:15	321-60-8
p-Terphenyl-d14 (S)	61 %.	26-110	1	12/23/14 16:15	12/24/14 11:15	1718-51-0
Phenol-d5 (S)	59 %.	28-101	1	12/23/14 16:15	12/24/14 11:15	4165-62-2
2-Fluorophenol (S)	58 %.	24-104	1	12/23/14 16:15	12/24/14 11:15	367-12-4
2,4,6-Tribromophenol (S)	60 %.	16-122	1	12/23/14 16:15	12/24/14 11:15	118-79-6

### 8260 MSV 5035A VOA

Analytical Method: EPA 8260

Acetone	ND ug/kg	118	1	01/01/15 00:25	67-64-1
Acrolein	ND ug/kg	118	1	01/01/15 00:25	107-02-8
Acrylonitrile	ND ug/kg	118	1	01/01/15 00:25	107-13-1
Benzene	ND ug/kg	5.9	1	01/01/15 00:25	71-43-2

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-7 Lab ID: 50109725004 Collected: 12/22/14 11:30 Received: 12/23/14 10:34 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
Bromobenzene	ND	ug/kg	5.9	1		01/01/15 00:25	108-86-1	
Bromochloromethane	ND	ug/kg	5.9	1		01/01/15 00:25	74-97-5	
Bromodichloromethane	ND	ug/kg	5.9	1		01/01/15 00:25	75-27-4	
Bromoform	ND	ug/kg	5.9	1		01/01/15 00:25	75-25-2	
Bromomethane	ND	ug/kg	5.9	1		01/01/15 00:25	74-83-9	
2-Butanone (MEK)	ND	ug/kg	29.4	1		01/01/15 00:25	78-93-3	
n-Butylbenzene	ND	ug/kg	5.9	1		01/01/15 00:25	104-51-8	
sec-Butylbenzene	ND	ug/kg	5.9	1		01/01/15 00:25	135-98-8	
tert-Butylbenzene	ND	ug/kg	5.9	1		01/01/15 00:25	98-06-6	
Carbon disulfide	ND	ug/kg	11.8	1		01/01/15 00:25	75-15-0	
Carbon tetrachloride	ND	ug/kg	5.9	1		01/01/15 00:25	56-23-5	
Chlorobenzene	ND	ug/kg	5.9	1		01/01/15 00:25	108-90-7	
Chloroethane	ND	ug/kg	5.9	1		01/01/15 00:25	75-00-3	
Chloroform	ND	ug/kg	5.9	1		01/01/15 00:25	67-66-3	
Chloromethane	ND	ug/kg	5.9	1		01/01/15 00:25	74-87-3	
2-Chlorotoluene	ND	ug/kg	5.9	1		01/01/15 00:25	95-49-8	
4-Chlorotoluene	ND	ug/kg	5.9	1		01/01/15 00:25	106-43-4	
Dibromochloromethane	ND	ug/kg	5.9	1		01/01/15 00:25	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/kg	5.9	1		01/01/15 00:25	106-93-4	
Dibromomethane	ND	ug/kg	5.9	1		01/01/15 00:25	74-95-3	
1,2-Dichlorobenzene	ND	ug/kg	5.9	1		01/01/15 00:25	95-50-1	
1,3-Dichlorobenzene	ND	ug/kg	5.9	1		01/01/15 00:25	541-73-1	
1,4-Dichlorobenzene	59.5	ug/kg	5.9	1		01/01/15 00:25	106-46-7	
trans-1,4-Dichloro-2-butene	ND	ug/kg	118	1		01/01/15 00:25	110-57-6	
Dichlorodifluoromethane	ND	ug/kg	5.9	1		01/01/15 00:25	75-71-8	
1,1-Dichloroethane	ND	ug/kg	5.9	1		01/01/15 00:25	75-34-3	
1,2-Dichloroethane	ND	ug/kg	5.9	1		01/01/15 00:25	107-06-2	
1,1-Dichloroethene	ND	ug/kg	5.9	1		01/01/15 00:25	75-35-4	
cis-1,2-Dichloroethene	ND	ug/kg	5.9	1		01/01/15 00:25	156-59-2	
trans-1,2-Dichloroethene	ND	ug/kg	5.9	1		01/01/15 00:25	156-60-5	
1,2-Dichloropropane	ND	ug/kg	5.9	1		01/01/15 00:25	78-87-5	
1,3-Dichloropropane	ND	ug/kg	5.9	1		01/01/15 00:25	142-28-9	
2,2-Dichloropropane	ND	ug/kg	5.9	1		01/01/15 00:25	594-20-7	
1,1-Dichloropropene	ND	ug/kg	5.9	1		01/01/15 00:25	563-58-6	
cis-1,3-Dichloropropene	ND	ug/kg	5.9	1		01/01/15 00:25	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/kg	5.9	1		01/01/15 00:25	10061-02-6	
Ethylbenzene	ND	ug/kg	5.9	1		01/01/15 00:25	100-41-4	
Ethyl methacrylate	ND	ug/kg	118	1		01/01/15 00:25	97-63-2	
Hexachloro-1,3-butadiene	ND	ug/kg	5.9	1		01/01/15 00:25	87-68-3	
n-Hexane	ND	ug/kg	5.9	1		01/01/15 00:25	110-54-3	
2-Hexanone	ND	ug/kg	118	1		01/01/15 00:25	591-78-6	
Iodomethane	ND	ug/kg	118	1		01/01/15 00:25	74-88-4	
Isopropylbenzene (Cumene)	ND	ug/kg	5.9	1		01/01/15 00:25	98-82-8	
p-Isopropyltoluene	ND	ug/kg	5.9	1		01/01/15 00:25	99-87-6	
Methylene Chloride	ND	ug/kg	23.5	1		01/01/15 00:25	75-09-2	
1-Methylnaphthalene	ND	ug/kg	11.8	1		01/01/15 00:25	90-12-0	N2

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-7 Lab ID: 50109725004 Collected: 12/22/14 11:30 Received: 12/23/14 10:34 Matrix: Solid

### Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
2-Methylnaphthalene	ND	ug/kg	11.8	1		01/01/15 00:25	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	29.4	1		01/01/15 00:25	108-10-1	
Methyl-tert-butyl ether	ND	ug/kg	5.9	1		01/01/15 00:25	1634-04-4	
Naphthalene	ND	ug/kg	5.9	1		01/01/15 00:25	91-20-3	
n-Propylbenzene	ND	ug/kg	5.9	1		01/01/15 00:25	103-65-1	
Styrene	ND	ug/kg	5.9	1		01/01/15 00:25	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/kg	5.9	1		01/01/15 00:25	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/kg	5.9	1		01/01/15 00:25	79-34-5	
Tetrachloroethene	ND	ug/kg	5.9	1		01/01/15 00:25	127-18-4	
Toluene	ND	ug/kg	5.9	1		01/01/15 00:25	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/kg	5.9	1		01/01/15 00:25	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/kg	5.9	1		01/01/15 00:25	120-82-1	
1,1,1-Trichloroethane	ND	ug/kg	5.9	1		01/01/15 00:25	71-55-6	
1,1,2-Trichloroethane	ND	ug/kg	5.9	1		01/01/15 00:25	79-00-5	
Trichloroethene	ND	ug/kg	5.9	1		01/01/15 00:25	79-01-6	
Trichlorofluoromethane	ND	ug/kg	5.9	1		01/01/15 00:25	75-69-4	
1,2,3-Trichloropropane	ND	ug/kg	5.9	1		01/01/15 00:25	96-18-4	
1,2,4-Trimethylbenzene	ND	ug/kg	5.9	1		01/01/15 00:25	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/kg	5.9	1		01/01/15 00:25	108-67-8	
Vinyl acetate	ND	ug/kg	118	1		01/01/15 00:25	108-05-4	
Vinyl chloride	ND	ug/kg	5.9	1		01/01/15 00:25	75-01-4	
Xylene (Total)	ND	ug/kg	11.8	1		01/01/15 00:25	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	99 %.		85-118	1		01/01/15 00:25	1868-53-7	
Toluene-d8 (S)	88 %.		71-128	1		01/01/15 00:25	2037-26-5	
4-Bromofluorobenzene (S)	94 %.		56-144	1		01/01/15 00:25	460-00-4	

### Percent Moisture

Analytical Method: ASTM D2974-87

Percent Moisture	9.0 %	0.10	1	12/31/14 11:59
------------------	-------	------	---	----------------

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

**Sample: FD** **Lab ID: 50109725005** Collected: 12/22/14 11:31 Received: 12/23/14 10:34 Matrix: Solid

**Results reported on a "dry-weight" basis**

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050								
Arsenic	1.7	mg/kg	1.0	1	12/30/14 09:14	12/30/14 20:35	7440-38-2	
Barium	14.4	mg/kg	1.0	1	12/30/14 09:14	12/30/14 20:35	7440-39-3	
Cadmium	ND	mg/kg	0.50	1	12/30/14 09:14	12/30/14 20:35	7440-43-9	
Chromium	4.3	mg/kg	1.0	1	12/30/14 09:14	12/30/14 20:35	7440-47-3	
Lead	16.8	mg/kg	1.0	1	12/30/14 09:14	12/30/14 20:35	7439-92-1	
Selenium	ND	mg/kg	1.0	1	12/30/14 09:14	12/30/14 20:35	7782-49-2	
Silver	ND	mg/kg	0.50	1	12/30/14 09:14	12/30/14 20:35	7440-22-4	

### 7471 Mercury

Analytical Method: EPA 7471 Preparation Method: EPA 7471

Mercury	ND	mg/kg	0.22	1	01/05/15 10:20	01/05/15 16:38	7439-97-6	
---------	----	-------	------	---	----------------	----------------	-----------	--

### 8270 MSSV PAH by SIM

Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546

Acenaphthene	ND	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:57	83-32-9	
Acenaphthylene	ND	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:57	208-96-8	
Anthracene	ND	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:57	120-12-7	
Benzo(a)anthracene	7.6	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:57	56-55-3	
Benzo(a)pyrene	6.7	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:57	50-32-8	
Benzo(b)fluoranthene	8.8	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:57	205-99-2	
Benzo(g,h,i)perylene	7.0	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:57	191-24-2	
Benzo(k)fluoranthene	ND	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:57	207-08-9	
Chrysene	9.6	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:57	218-01-9	
Dibenz(a,h)anthracene	ND	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:57	53-70-3	
Fluoranthene	16.5	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:57	206-44-0	
Fluorene	ND	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:57	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:57	193-39-5	
1-Methylnaphthalene	ND	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:57	90-12-0	
2-Methylnaphthalene	ND	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:57	91-57-6	
Naphthalene	10.5	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:57	91-20-3	
Phenanthrene	14.0	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:57	85-01-8	
Pyrene	14.6	ug/kg	5.4	1	12/24/14 11:30	12/30/14 00:57	129-00-0	

### Surrogates

2-Fluorobiphenyl (S)	53	%.	38-110	1	12/24/14 11:30	12/30/14 00:57	321-60-8	
p-Terphenyl-d14 (S)	55	%.	32-111	1	12/24/14 11:30	12/30/14 00:57	1718-51-0	

### 8270 MSSV SHORT LIST MICROWAVE

Analytical Method: EPA 8270 Preparation Method: EPA 3546

Benzyl alcohol	ND	ug/kg	708	1	12/23/14 16:15	12/24/14 11:36	100-51-6	
4-Bromophenylphenyl ether	ND	ug/kg	354	1	12/23/14 16:15	12/24/14 11:36	101-55-3	
Butylbenzylphthalate	ND	ug/kg	354	1	12/23/14 16:15	12/24/14 11:36	85-68-7	
4-Chloro-3-methylphenol	ND	ug/kg	708	1	12/23/14 16:15	12/24/14 11:36	59-50-7	
4-Chloroaniline	ND	ug/kg	708	1	12/23/14 16:15	12/24/14 11:36	106-47-8	
bis(2-Chloroethoxy)methane	ND	ug/kg	354	1	12/23/14 16:15	12/24/14 11:36	111-91-1	
bis(2-Chloroethyl) ether	ND	ug/kg	354	1	12/23/14 16:15	12/24/14 11:36	111-44-4	
bis(2chloro1methylethyl) ether	ND	ug/kg	354	1	12/23/14 16:15	12/24/14 11:36	108-60-1	
2-Chloronaphthalene	ND	ug/kg	354	1	12/23/14 16:15	12/24/14 11:36	91-58-7	
2-Chlorophenol	ND	ug/kg	354	1	12/23/14 16:15	12/24/14 11:36	95-57-8	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: FD Lab ID: 50109725005 Collected: 12/22/14 11:31 Received: 12/23/14 10:34 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SHORT LIST MICROWAVE</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546								
4-Chlorophenylphenyl ether	ND ug/kg		354	1	12/23/14 16:15	12/24/14 11:36	7005-72-3	
Dibenzofuran	ND ug/kg		354	1	12/23/14 16:15	12/24/14 11:36	132-64-9	
3,3'-Dichlorobenzidine	ND ug/kg		708	1	12/23/14 16:15	12/24/14 11:36	91-94-1	
2,4-Dichlorophenol	ND ug/kg		354	1	12/23/14 16:15	12/24/14 11:36	120-83-2	
Diethylphthalate	ND ug/kg		354	1	12/23/14 16:15	12/24/14 11:36	84-66-2	
2,4-Dimethylphenol	ND ug/kg		354	1	12/23/14 16:15	12/24/14 11:36	105-67-9	
Dimethylphthalate	ND ug/kg		354	1	12/23/14 16:15	12/24/14 11:36	131-11-3	
Di-n-butylphthalate	ND ug/kg		354	1	12/23/14 16:15	12/24/14 11:36	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/kg		1720	1	12/23/14 16:15	12/24/14 11:36	534-52-1	
2,4-Dinitrophenol	ND ug/kg		1720	1	12/23/14 16:15	12/24/14 11:36	51-28-5	
2,4-Dinitrotoluene	ND ug/kg		354	1	12/23/14 16:15	12/24/14 11:36	121-14-2	
2,6-Dinitrotoluene	ND ug/kg		354	1	12/23/14 16:15	12/24/14 11:36	606-20-2	
Di-n-octylphthalate	ND ug/kg		354	1	12/23/14 16:15	12/24/14 11:36	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/kg		354	1	12/23/14 16:15	12/24/14 11:36	117-81-7	
Hexachloro-1,3-butadiene	ND ug/kg		354	1	12/23/14 16:15	12/24/14 11:36	87-68-3	
Hexachlorobenzene	ND ug/kg		354	1	12/23/14 16:15	12/24/14 11:36	118-74-1	
Hexachlorocyclopentadiene	ND ug/kg		354	1	12/23/14 16:15	12/24/14 11:36	77-47-4	
Hexachloroethane	ND ug/kg		354	1	12/23/14 16:15	12/24/14 11:36	67-72-1	
Isophorone	ND ug/kg		354	1	12/23/14 16:15	12/24/14 11:36	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/kg		354	1	12/23/14 16:15	12/24/14 11:36	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/kg		708	1	12/23/14 16:15	12/24/14 11:36		
2-Nitroaniline	ND ug/kg		1720	1	12/23/14 16:15	12/24/14 11:36	88-74-4	
3-Nitroaniline	ND ug/kg		1720	1	12/23/14 16:15	12/24/14 11:36	99-09-2	
4-Nitroaniline	ND ug/kg		1720	1	12/23/14 16:15	12/24/14 11:36	100-01-6	
Nitrobenzene	ND ug/kg		354	1	12/23/14 16:15	12/24/14 11:36	98-95-3	
2-Nitrophenol	ND ug/kg		354	1	12/23/14 16:15	12/24/14 11:36	88-75-5	
4-Nitrophenol	ND ug/kg		1720	1	12/23/14 16:15	12/24/14 11:36	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/kg		354	1	12/23/14 16:15	12/24/14 11:36	621-64-7	
N-Nitrosodiphenylamine	ND ug/kg		354	1	12/23/14 16:15	12/24/14 11:36	86-30-6	
Pentachlorophenol	ND ug/kg		1720	1	12/23/14 16:15	12/24/14 11:36	87-86-5	
Phenol	ND ug/kg		354	1	12/23/14 16:15	12/24/14 11:36	108-95-2	
2,4,5-Trichlorophenol	ND ug/kg		354	1	12/23/14 16:15	12/24/14 11:36	95-95-4	
2,4,6-Trichlorophenol	ND ug/kg		354	1	12/23/14 16:15	12/24/14 11:36	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	40 %.		28-101	1	12/23/14 16:15	12/24/14 11:36	4165-60-0	
2-Fluorobiphenyl (S)	41 %.		31-94	1	12/23/14 16:15	12/24/14 11:36	321-60-8	
p-Terphenyl-d14 (S)	49 %.		26-110	1	12/23/14 16:15	12/24/14 11:36	1718-51-0	
Phenol-d5 (S)	46 %.		28-101	1	12/23/14 16:15	12/24/14 11:36	4165-62-2	
2-Fluorophenol (S)	47 %.		24-104	1	12/23/14 16:15	12/24/14 11:36	367-12-4	
2,4,6-Tribromophenol (S)	49 %.		16-122	1	12/23/14 16:15	12/24/14 11:36	118-79-6	

### 8260 MSV 5035A VOA

Analytical Method: EPA 8260

Acetone	ND ug/kg	115	1	01/01/15 00:57	67-64-1
Acrolein	ND ug/kg	115	1	01/01/15 00:57	107-02-8
Acrylonitrile	ND ug/kg	115	1	01/01/15 00:57	107-13-1
Benzene	ND ug/kg	5.7	1	01/01/15 00:57	71-43-2

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: FD Lab ID: 50109725005 Collected: 12/22/14 11:31 Received: 12/23/14 10:34 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
Bromobenzene	ND	ug/kg	5.7	1		01/01/15 00:57	108-86-1	
Bromochloromethane	ND	ug/kg	5.7	1		01/01/15 00:57	74-97-5	
Bromodichloromethane	ND	ug/kg	5.7	1		01/01/15 00:57	75-27-4	
Bromoform	ND	ug/kg	5.7	1		01/01/15 00:57	75-25-2	
Bromomethane	ND	ug/kg	5.7	1		01/01/15 00:57	74-83-9	
2-Butanone (MEK)	ND	ug/kg	28.7	1		01/01/15 00:57	78-93-3	
n-Butylbenzene	ND	ug/kg	5.7	1		01/01/15 00:57	104-51-8	
sec-Butylbenzene	ND	ug/kg	5.7	1		01/01/15 00:57	135-98-8	
tert-Butylbenzene	ND	ug/kg	5.7	1		01/01/15 00:57	98-06-6	
Carbon disulfide	ND	ug/kg	11.5	1		01/01/15 00:57	75-15-0	
Carbon tetrachloride	ND	ug/kg	5.7	1		01/01/15 00:57	56-23-5	
Chlorobenzene	ND	ug/kg	5.7	1		01/01/15 00:57	108-90-7	
Chloroethane	ND	ug/kg	5.7	1		01/01/15 00:57	75-00-3	
Chloroform	ND	ug/kg	5.7	1		01/01/15 00:57	67-66-3	
Chloromethane	ND	ug/kg	5.7	1		01/01/15 00:57	74-87-3	
2-Chlorotoluene	ND	ug/kg	5.7	1		01/01/15 00:57	95-49-8	
4-Chlorotoluene	ND	ug/kg	5.7	1		01/01/15 00:57	106-43-4	
Dibromochloromethane	ND	ug/kg	5.7	1		01/01/15 00:57	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/kg	5.7	1		01/01/15 00:57	106-93-4	
Dibromomethane	ND	ug/kg	5.7	1		01/01/15 00:57	74-95-3	
1,2-Dichlorobenzene	ND	ug/kg	5.7	1		01/01/15 00:57	95-50-1	
1,3-Dichlorobenzene	ND	ug/kg	5.7	1		01/01/15 00:57	541-73-1	
1,4-Dichlorobenzene	46.6	ug/kg	5.7	1		01/01/15 00:57	106-46-7	
trans-1,4-Dichloro-2-butene	ND	ug/kg	115	1		01/01/15 00:57	110-57-6	
Dichlorodifluoromethane	ND	ug/kg	5.7	1		01/01/15 00:57	75-71-8	
1,1-Dichloroethane	ND	ug/kg	5.7	1		01/01/15 00:57	75-34-3	
1,2-Dichloroethane	ND	ug/kg	5.7	1		01/01/15 00:57	107-06-2	
1,1-Dichloroethene	ND	ug/kg	5.7	1		01/01/15 00:57	75-35-4	
cis-1,2-Dichloroethene	ND	ug/kg	5.7	1		01/01/15 00:57	156-59-2	
trans-1,2-Dichloroethene	ND	ug/kg	5.7	1		01/01/15 00:57	156-60-5	
1,2-Dichloropropane	ND	ug/kg	5.7	1		01/01/15 00:57	78-87-5	
1,3-Dichloropropane	ND	ug/kg	5.7	1		01/01/15 00:57	142-28-9	
2,2-Dichloropropane	ND	ug/kg	5.7	1		01/01/15 00:57	594-20-7	
1,1-Dichloropropene	ND	ug/kg	5.7	1		01/01/15 00:57	563-58-6	
cis-1,3-Dichloropropene	ND	ug/kg	5.7	1		01/01/15 00:57	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/kg	5.7	1		01/01/15 00:57	10061-02-6	
Ethylbenzene	ND	ug/kg	5.7	1		01/01/15 00:57	100-41-4	
Ethyl methacrylate	ND	ug/kg	115	1		01/01/15 00:57	97-63-2	
Hexachloro-1,3-butadiene	ND	ug/kg	5.7	1		01/01/15 00:57	87-68-3	
n-Hexane	ND	ug/kg	5.7	1		01/01/15 00:57	110-54-3	
2-Hexanone	ND	ug/kg	115	1		01/01/15 00:57	591-78-6	
Iodomethane	ND	ug/kg	115	1		01/01/15 00:57	74-88-4	
Isopropylbenzene (Cumene)	ND	ug/kg	5.7	1		01/01/15 00:57	98-82-8	
p-Isopropyltoluene	ND	ug/kg	5.7	1		01/01/15 00:57	99-87-6	
Methylene Chloride	ND	ug/kg	22.9	1		01/01/15 00:57	75-09-2	
1-Methylnaphthalene	ND	ug/kg	11.5	1		01/01/15 00:57	90-12-0	N2

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: FD Lab ID: 50109725005 Collected: 12/22/14 11:31 Received: 12/23/14 10:34 Matrix: Solid

### Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
2-Methylnaphthalene	ND ug/kg		11.5	1		01/01/15 00:57	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND ug/kg		28.7	1		01/01/15 00:57	108-10-1	
Methyl-tert-butyl ether	ND ug/kg		5.7	1		01/01/15 00:57	1634-04-4	
Naphthalene	ND ug/kg		5.7	1		01/01/15 00:57	91-20-3	
n-Propylbenzene	ND ug/kg		5.7	1		01/01/15 00:57	103-65-1	
Styrene	ND ug/kg		5.7	1		01/01/15 00:57	100-42-5	
1,1,1,2-Tetrachloroethane	ND ug/kg		5.7	1		01/01/15 00:57	630-20-6	
1,1,2,2-Tetrachloroethane	ND ug/kg		5.7	1		01/01/15 00:57	79-34-5	
Tetrachloroethene	ND ug/kg		5.7	1		01/01/15 00:57	127-18-4	
Toluene	ND ug/kg		5.7	1		01/01/15 00:57	108-88-3	
1,2,3-Trichlorobenzene	ND ug/kg		5.7	1		01/01/15 00:57	87-61-6	
1,2,4-Trichlorobenzene	ND ug/kg		5.7	1		01/01/15 00:57	120-82-1	
1,1,1-Trichloroethane	ND ug/kg		5.7	1		01/01/15 00:57	71-55-6	
1,1,2-Trichloroethane	ND ug/kg		5.7	1		01/01/15 00:57	79-00-5	
Trichloroethene	ND ug/kg		5.7	1		01/01/15 00:57	79-01-6	
Trichlorofluoromethane	ND ug/kg		5.7	1		01/01/15 00:57	75-69-4	
1,2,3-Trichloropropane	ND ug/kg		5.7	1		01/01/15 00:57	96-18-4	
1,2,4-Trimethylbenzene	ND ug/kg		5.7	1		01/01/15 00:57	95-63-6	
1,3,5-Trimethylbenzene	ND ug/kg		5.7	1		01/01/15 00:57	108-67-8	
Vinyl acetate	ND ug/kg		115	1		01/01/15 00:57	108-05-4	
Vinyl chloride	ND ug/kg		5.7	1		01/01/15 00:57	75-01-4	
Xylene (Total)	ND ug/kg		11.5	1		01/01/15 00:57	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	98 %.		85-118	1		01/01/15 00:57	1868-53-7	
Toluene-d8 (S)	88 %.		71-128	1		01/01/15 00:57	2037-26-5	
4-Bromofluorobenzene (S)	100 %.		56-144	1		01/01/15 00:57	460-00-4	
<b>Percent Moisture</b>		Analytical Method: ASTM D2974-87						
Percent Moisture	7.7 %		0.10	1		12/31/14 11:59		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-8 Lab ID: 50109725006 Collected: 12/22/14 12:00 Received: 12/23/14 10:34 Matrix: Solid

### Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050								
Arsenic	1.8 mg/kg		0.94	1	12/30/14 09:14	12/30/14 20:37	7440-38-2	
Barium	17.4 mg/kg		0.94	1	12/30/14 09:14	12/30/14 20:37	7440-39-3	
Cadmium	1.1 mg/kg		0.47	1	12/30/14 09:14	12/30/14 20:37	7440-43-9	
Chromium	8.0 mg/kg		0.94	1	12/30/14 09:14	12/30/14 20:37	7440-47-3	
Lead	20.9 mg/kg		0.94	1	12/30/14 09:14	12/30/14 20:37	7439-92-1	
Selenium	ND mg/kg		0.94	1	12/30/14 09:14	12/30/14 20:37	7782-49-2	
Silver	ND mg/kg		0.47	1	12/30/14 09:14	12/30/14 20:37	7440-22-4	

### 7471 Mercury

Analytical Method: EPA 7471 Preparation Method: EPA 7471

Mercury	ND mg/kg		0.21	1	01/05/15 10:20	01/05/15 16:40	7439-97-6	
---------	----------	--	------	---	----------------	----------------	-----------	--

### 8270 MSSV PAH by SIM

Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546

Acenaphthene	ND ug/kg		27.7	5	12/24/14 11:30	12/30/14 01:14	83-32-9	
Acenaphthylene	ND ug/kg		27.7	5	12/24/14 11:30	12/30/14 01:14	208-96-8	
Anthracene	ND ug/kg		27.7	5	12/24/14 11:30	12/30/14 01:14	120-12-7	
Benzo(a)anthracene	ND ug/kg		27.7	5	12/24/14 11:30	12/30/14 01:14	56-55-3	
Benzo(a)pyrene	ND ug/kg		27.7	5	12/24/14 11:30	12/30/14 01:14	50-32-8	
Benzo(b)fluoranthene	ND ug/kg		27.7	5	12/24/14 11:30	12/30/14 01:14	205-99-2	
Benzo(g,h,i)perylene	ND ug/kg		27.7	5	12/24/14 11:30	12/30/14 01:14	191-24-2	
Benzo(k)fluoranthene	ND ug/kg		27.7	5	12/24/14 11:30	12/30/14 01:14	207-08-9	
Chrysene	ND ug/kg		27.7	5	12/24/14 11:30	12/30/14 01:14	218-01-9	
Dibenz(a,h)anthracene	ND ug/kg		27.7	5	12/24/14 11:30	12/30/14 01:14	53-70-3	
Fluoranthene	ND ug/kg		27.7	5	12/24/14 11:30	12/30/14 01:14	206-44-0	
Fluorene	ND ug/kg		27.7	5	12/24/14 11:30	12/30/14 01:14	86-73-7	
Indeno(1,2,3-cd)pyrene	ND ug/kg		27.7	5	12/24/14 11:30	12/30/14 01:14	193-39-5	
1-Methylnaphthalene	ND ug/kg		27.7	5	12/24/14 11:30	12/30/14 01:14	90-12-0	
2-Methylnaphthalene	ND ug/kg		27.7	5	12/24/14 11:30	12/30/14 01:14	91-57-6	
Naphthalene	182 ug/kg		27.7	5	12/24/14 11:30	12/30/14 01:14	91-20-3	1d
Phenanthrene	ND ug/kg		27.7	5	12/24/14 11:30	12/30/14 01:14	85-01-8	
Pyrene	ND ug/kg		27.7	5	12/24/14 11:30	12/30/14 01:14	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	45 %.		38-110	5	12/24/14 11:30	12/30/14 01:14	321-60-8	
p-Terphenyl-d14 (S)	46 %.		32-111	5	12/24/14 11:30	12/30/14 01:14	1718-51-0	

### 8270 MSSV SHORT LIST MICROWAVE Analytical Method: EPA 8270 Preparation Method: EPA 3546

Benzyl alcohol	ND ug/kg		726	1	12/23/14 16:15	12/24/14 11:57	100-51-6	
4-Bromophenylphenyl ether	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	101-55-3	
Butylbenzylphthalate	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	85-68-7	
4-Chloro-3-methylphenol	ND ug/kg		726	1	12/23/14 16:15	12/24/14 11:57	59-50-7	
4-Chloroaniline	ND ug/kg		726	1	12/23/14 16:15	12/24/14 11:57	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	111-91-1	
bis(2-Chloroethyl) ether	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	111-44-4	
bis(2chloro1methylethyl) ether	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	108-60-1	
2-Chloronaphthalene	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	91-58-7	
2-Chlorophenol	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	95-57-8	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-8 Lab ID: 50109725006 Collected: 12/22/14 12:00 Received: 12/23/14 10:34 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SHORT LIST MICROWAVE</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546								
4-Chlorophenylphenyl ether	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	7005-72-3	
Dibenzofuran	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	132-64-9	
3,3'-Dichlorobenzidine	ND ug/kg		726	1	12/23/14 16:15	12/24/14 11:57	91-94-1	
2,4-Dichlorophenol	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	120-83-2	
Diethylphthalate	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	84-66-2	
2,4-Dimethylphenol	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	105-67-9	
Dimethylphthalate	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	131-11-3	
Di-n-butylphthalate	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/kg		1760	1	12/23/14 16:15	12/24/14 11:57	534-52-1	
2,4-Dinitrophenol	ND ug/kg		1760	1	12/23/14 16:15	12/24/14 11:57	51-28-5	
2,4-Dinitrotoluene	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	121-14-2	
2,6-Dinitrotoluene	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	606-20-2	
Di-n-octylphthalate	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	117-81-7	
Hexachloro-1,3-butadiene	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	87-68-3	
Hexachlorobenzene	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	118-74-1	
Hexachlorocyclopentadiene	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	77-47-4	
Hexachloroethane	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	67-72-1	
Isophorone	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/kg		726	1	12/23/14 16:15	12/24/14 11:57		
2-Nitroaniline	ND ug/kg		1760	1	12/23/14 16:15	12/24/14 11:57	88-74-4	
3-Nitroaniline	ND ug/kg		1760	1	12/23/14 16:15	12/24/14 11:57	99-09-2	
4-Nitroaniline	ND ug/kg		1760	1	12/23/14 16:15	12/24/14 11:57	100-01-6	
Nitrobenzene	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	98-95-3	
2-Nitrophenol	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	88-75-5	
4-Nitrophenol	ND ug/kg		1760	1	12/23/14 16:15	12/24/14 11:57	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	621-64-7	
N-Nitrosodiphenylamine	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	86-30-6	
Pentachlorophenol	ND ug/kg		1760	1	12/23/14 16:15	12/24/14 11:57	87-86-5	
Phenol	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	108-95-2	
2,4,5-Trichlorophenol	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	95-95-4	
2,4,6-Trichlorophenol	ND ug/kg		363	1	12/23/14 16:15	12/24/14 11:57	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	50 %.		28-101	1	12/23/14 16:15	12/24/14 11:57	4165-60-0	
2-Fluorobiphenyl (S)	52 %.		31-94	1	12/23/14 16:15	12/24/14 11:57	321-60-8	
p-Terphenyl-d14 (S)	60 %.		26-110	1	12/23/14 16:15	12/24/14 11:57	1718-51-0	
Phenol-d5 (S)	58 %.		28-101	1	12/23/14 16:15	12/24/14 11:57	4165-62-2	
2-Fluorophenol (S)	58 %.		24-104	1	12/23/14 16:15	12/24/14 11:57	367-12-4	
2,4,6-Tribromophenol (S)	58 %.		16-122	1	12/23/14 16:15	12/24/14 11:57	118-79-6	

### 8260 MSV 5035A VOA

Analytical Method: EPA 8260

Acetone	ND ug/kg	108	1	12/31/14 21:26	67-64-1
Acrolein	ND ug/kg	108	1	12/31/14 21:26	107-02-8
Acrylonitrile	ND ug/kg	108	1	12/31/14 21:26	107-13-1
Benzene	ND ug/kg	5.4	1	12/31/14 21:26	71-43-2

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-8 Lab ID: 50109725006 Collected: 12/22/14 12:00 Received: 12/23/14 10:34 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
Bromobenzene	ND	ug/kg	5.4	1		12/31/14 21:26	108-86-1	
Bromochloromethane	ND	ug/kg	5.4	1		12/31/14 21:26	74-97-5	
Bromodichloromethane	ND	ug/kg	5.4	1		12/31/14 21:26	75-27-4	
Bromoform	ND	ug/kg	5.4	1		12/31/14 21:26	75-25-2	
Bromomethane	ND	ug/kg	5.4	1		12/31/14 21:26	74-83-9	
2-Butanone (MEK)	ND	ug/kg	27.1	1		12/31/14 21:26	78-93-3	
n-Butylbenzene	ND	ug/kg	5.4	1		12/31/14 21:26	104-51-8	
sec-Butylbenzene	ND	ug/kg	5.4	1		12/31/14 21:26	135-98-8	
tert-Butylbenzene	ND	ug/kg	5.4	1		12/31/14 21:26	98-06-6	
Carbon disulfide	ND	ug/kg	10.8	1		12/31/14 21:26	75-15-0	
Carbon tetrachloride	ND	ug/kg	5.4	1		12/31/14 21:26	56-23-5	
Chlorobenzene	ND	ug/kg	5.4	1		12/31/14 21:26	108-90-7	
Chloroethane	ND	ug/kg	5.4	1		12/31/14 21:26	75-00-3	
Chloroform	ND	ug/kg	5.4	1		12/31/14 21:26	67-66-3	
Chloromethane	ND	ug/kg	5.4	1		12/31/14 21:26	74-87-3	
2-Chlorotoluene	ND	ug/kg	5.4	1		12/31/14 21:26	95-49-8	
4-Chlorotoluene	ND	ug/kg	5.4	1		12/31/14 21:26	106-43-4	
Dibromochloromethane	ND	ug/kg	5.4	1		12/31/14 21:26	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/kg	5.4	1		12/31/14 21:26	106-93-4	
Dibromomethane	ND	ug/kg	5.4	1		12/31/14 21:26	74-95-3	
1,2-Dichlorobenzene	ND	ug/kg	5.4	1		12/31/14 21:26	95-50-1	
1,3-Dichlorobenzene	ND	ug/kg	5.4	1		12/31/14 21:26	541-73-1	
1,4-Dichlorobenzene	ND	ug/kg	5.4	1		12/31/14 21:26	106-46-7	
trans-1,4-Dichloro-2-butene	ND	ug/kg	108	1		12/31/14 21:26	110-57-6	
Dichlorodifluoromethane	ND	ug/kg	5.4	1		12/31/14 21:26	75-71-8	
1,1-Dichloroethane	ND	ug/kg	5.4	1		12/31/14 21:26	75-34-3	
1,2-Dichloroethane	ND	ug/kg	5.4	1		12/31/14 21:26	107-06-2	
1,1-Dichloroethene	ND	ug/kg	5.4	1		12/31/14 21:26	75-35-4	
cis-1,2-Dichloroethene	ND	ug/kg	5.4	1		12/31/14 21:26	156-59-2	
trans-1,2-Dichloroethene	ND	ug/kg	5.4	1		12/31/14 21:26	156-60-5	
1,2-Dichloropropane	ND	ug/kg	5.4	1		12/31/14 21:26	78-87-5	
1,3-Dichloropropane	ND	ug/kg	5.4	1		12/31/14 21:26	142-28-9	
2,2-Dichloropropane	ND	ug/kg	5.4	1		12/31/14 21:26	594-20-7	
1,1-Dichloropropene	ND	ug/kg	5.4	1		12/31/14 21:26	563-58-6	
cis-1,3-Dichloropropene	ND	ug/kg	5.4	1		12/31/14 21:26	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/kg	5.4	1		12/31/14 21:26	10061-02-6	
Ethylbenzene	ND	ug/kg	5.4	1		12/31/14 21:26	100-41-4	
Ethyl methacrylate	ND	ug/kg	108	1		12/31/14 21:26	97-63-2	
Hexachloro-1,3-butadiene	ND	ug/kg	5.4	1		12/31/14 21:26	87-68-3	
n-Hexane	ND	ug/kg	5.4	1		12/31/14 21:26	110-54-3	
2-Hexanone	ND	ug/kg	108	1		12/31/14 21:26	591-78-6	
Iodomethane	ND	ug/kg	108	1		12/31/14 21:26	74-88-4	
Isopropylbenzene (Cumene)	ND	ug/kg	5.4	1		12/31/14 21:26	98-82-8	
p-Isopropyltoluene	ND	ug/kg	5.4	1		12/31/14 21:26	99-87-6	
Methylene Chloride	ND	ug/kg	21.7	1		12/31/14 21:26	75-09-2	
1-Methylnaphthalene	ND	ug/kg	10.8	1		12/31/14 21:26	90-12-0	N2

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-8 Lab ID: 50109725006 Collected: 12/22/14 12:00 Received: 12/23/14 10:34 Matrix: Solid

### Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
2-Methylnaphthalene	ND	ug/kg	10.8	1		12/31/14 21:26	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	27.1	1		12/31/14 21:26	108-10-1	
Methyl-tert-butyl ether	ND	ug/kg	5.4	1		12/31/14 21:26	1634-04-4	
Naphthalene	ND	ug/kg	5.8	1		01/03/15 07:52	91-20-3	
n-Propylbenzene	ND	ug/kg	5.4	1		12/31/14 21:26	103-65-1	
Styrene	ND	ug/kg	5.4	1		12/31/14 21:26	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/kg	5.4	1		12/31/14 21:26	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/kg	5.4	1		12/31/14 21:26	79-34-5	
Tetrachloroethene	ND	ug/kg	5.4	1		12/31/14 21:26	127-18-4	
Toluene	ND	ug/kg	5.4	1		12/31/14 21:26	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/kg	5.4	1		12/31/14 21:26	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/kg	5.4	1		12/31/14 21:26	120-82-1	
1,1,1-Trichloroethane	ND	ug/kg	5.4	1		12/31/14 21:26	71-55-6	
1,1,2-Trichloroethane	ND	ug/kg	5.4	1		12/31/14 21:26	79-00-5	
Trichloroethene	ND	ug/kg	5.4	1		12/31/14 21:26	79-01-6	
Trichlorofluoromethane	ND	ug/kg	5.4	1		12/31/14 21:26	75-69-4	
1,2,3-Trichloropropane	ND	ug/kg	5.4	1		12/31/14 21:26	96-18-4	
1,2,4-Trimethylbenzene	ND	ug/kg	5.4	1		12/31/14 21:26	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/kg	5.4	1		12/31/14 21:26	108-67-8	
Vinyl acetate	ND	ug/kg	108	1		12/31/14 21:26	108-05-4	
Vinyl chloride	ND	ug/kg	5.4	1		12/31/14 21:26	75-01-4	
Xylene (Total)	ND	ug/kg	10.8	1		12/31/14 21:26	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	95 %.		85-118	1		12/31/14 21:26	1868-53-7	
Toluene-d8 (S)	88 %.		71-128	1		12/31/14 21:26	2037-26-5	
4-Bromofluorobenzene (S)	96 %.		56-144	1		12/31/14 21:26	460-00-4	
<b>Percent Moisture</b>		Analytical Method: ASTM D2974-87						
Percent Moisture	9.7 %		0.10	1		12/31/14 12:00		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-10 Lab ID: 50109725007 Collected: 12/22/14 13:45 Received: 12/23/14 10:34 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050								
Arsenic	5.8	mg/kg	1.7	1	12/30/14 09:14	12/30/14 20:46	7440-38-2	
Barium	93.9	mg/kg	1.7	1	12/30/14 09:14	12/30/14 20:46	7440-39-3	
Cadmium	2.1	mg/kg	0.85	1	12/30/14 09:14	12/30/14 20:46	7440-43-9	
Chromium	29.2	mg/kg	1.7	1	12/30/14 09:14	12/30/14 20:46	7440-47-3	
Lead	170	mg/kg	1.7	1	12/30/14 09:14	12/30/14 20:46	7439-92-1	
Selenium	ND	mg/kg	1.7	1	12/30/14 09:14	12/30/14 20:46	7782-49-2	
Silver	ND	mg/kg	0.85	1	12/30/14 09:14	12/30/14 20:46	7440-22-4	

### 7471 Mercury

Analytical Method: EPA 7471 Preparation Method: EPA 7471

Mercury	0.44	mg/kg	0.35	1	01/05/15 10:20	01/05/15 16:43	7439-97-6	
---------	------	-------	------	---	----------------	----------------	-----------	--

### 8270 MSSV PAH by SIM

Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546

Acenaphthene	ND	ug/kg	43.3	5	12/24/14 11:30	12/30/14 01:32	83-32-9	
Acenaphthylene	ND	ug/kg	43.3	5	12/24/14 11:30	12/30/14 01:32	208-96-8	
Anthracene	ND	ug/kg	43.3	5	12/24/14 11:30	12/30/14 01:32	120-12-7	
Benzo(a)anthracene	ND	ug/kg	43.3	5	12/24/14 11:30	12/30/14 01:32	56-55-3	
Benzo(a)pyrene	ND	ug/kg	43.3	5	12/24/14 11:30	12/30/14 01:32	50-32-8	
Benzo(b)fluoranthene	ND	ug/kg	43.3	5	12/24/14 11:30	12/30/14 01:32	205-99-2	
Benzo(g,h,i)perylene	ND	ug/kg	43.3	5	12/24/14 11:30	12/30/14 01:32	191-24-2	
Benzo(k)fluoranthene	ND	ug/kg	43.3	5	12/24/14 11:30	12/30/14 01:32	207-08-9	
Chrysene	43.8	ug/kg	43.3	5	12/24/14 11:30	12/30/14 01:32	218-01-9	
Dibenz(a,h)anthracene	ND	ug/kg	43.3	5	12/24/14 11:30	12/30/14 01:32	53-70-3	
Fluoranthene	98.0	ug/kg	43.3	5	12/24/14 11:30	12/30/14 01:32	206-44-0	
Fluorene	62.0	ug/kg	43.3	5	12/24/14 11:30	12/30/14 01:32	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/kg	43.3	5	12/24/14 11:30	12/30/14 01:32	193-39-5	
1-Methylnaphthalene	272	ug/kg	43.3	5	12/24/14 11:30	12/30/14 01:32	90-12-0	
2-Methylnaphthalene	413	ug/kg	43.3	5	12/24/14 11:30	12/30/14 01:32	91-57-6	
Naphthalene	750	ug/kg	43.3	5	12/24/14 11:30	12/30/14 01:32	91-20-3	1d
Phenanthrene	193	ug/kg	43.3	5	12/24/14 11:30	12/30/14 01:32	85-01-8	
Pyrene	88.9	ug/kg	43.3	5	12/24/14 11:30	12/30/14 01:32	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	45	%	38-110	5	12/24/14 11:30	12/30/14 01:32	321-60-8	
p-Terphenyl-d14 (S)	32	%	32-111	5	12/24/14 11:30	12/30/14 01:32	1718-51-0	

### 8270 MSSV SHORT LIST MICROWAVE

Analytical Method: EPA 8270 Preparation Method: EPA 3546

Benzyl alcohol	ND	ug/kg	1140	1	12/23/14 16:15	12/24/14 12:18	100-51-6	
4-Bromophenylphenyl ether	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	101-55-3	
Butylbenzylphthalate	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	85-68-7	
4-Chloro-3-methylphenol	ND	ug/kg	1140	1	12/23/14 16:15	12/24/14 12:18	59-50-7	
4-Chloroaniline	ND	ug/kg	1140	1	12/23/14 16:15	12/24/14 12:18	106-47-8	
bis(2-Chloroethoxy)methane	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	111-91-1	
bis(2-Chloroethyl) ether	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	111-44-4	
bis(2chloro1methylethyl) ether	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	108-60-1	
2-Chloronaphthalene	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	91-58-7	
2-Chlorophenol	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	95-57-8	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-10 Lab ID: 50109725007 Collected: 12/22/14 13:45 Received: 12/23/14 10:34 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SHORT LIST MICROWAVE</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546								
4-Chlorophenylphenyl ether	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	7005-72-3	
Dibenzofuran	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	132-64-9	
3,3'-Dichlorobenzidine	ND	ug/kg	1140	1	12/23/14 16:15	12/24/14 12:18	91-94-1	
2,4-Dichlorophenol	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	120-83-2	
Diethylphthalate	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	84-66-2	
2,4-Dimethylphenol	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	105-67-9	
Dimethylphthalate	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	131-11-3	
Di-n-butylphthalate	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	84-74-2	
4,6-Dinitro-2-methylphenol	ND	ug/kg	2760	1	12/23/14 16:15	12/24/14 12:18	534-52-1	
2,4-Dinitrophenol	ND	ug/kg	2760	1	12/23/14 16:15	12/24/14 12:18	51-28-5	
2,4-Dinitrotoluene	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	121-14-2	
2,6-Dinitrotoluene	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	606-20-2	
Di-n-octylphthalate	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	117-84-0	
bis(2-Ethylhexyl)phthalate	1490	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	117-81-7	
Hexachloro-1,3-butadiene	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	87-68-3	
Hexachlorobenzene	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	118-74-1	
Hexachlorocyclopentadiene	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	77-47-4	
Hexachloroethane	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	67-72-1	
Isophorone	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	78-59-1	
2-Methylphenol(o-Cresol)	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND	ug/kg	1140	1	12/23/14 16:15	12/24/14 12:18		
2-Nitroaniline	ND	ug/kg	2760	1	12/23/14 16:15	12/24/14 12:18	88-74-4	
3-Nitroaniline	ND	ug/kg	2760	1	12/23/14 16:15	12/24/14 12:18	99-09-2	
4-Nitroaniline	ND	ug/kg	2760	1	12/23/14 16:15	12/24/14 12:18	100-01-6	
Nitrobenzene	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	98-95-3	
2-Nitrophenol	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	88-75-5	
4-Nitrophenol	ND	ug/kg	2760	1	12/23/14 16:15	12/24/14 12:18	100-02-7	
N-Nitroso-di-n-propylamine	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	621-64-7	
N-Nitrosodiphenylamine	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	86-30-6	
Pentachlorophenol	ND	ug/kg	2760	1	12/23/14 16:15	12/24/14 12:18	87-86-5	
Phenol	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	108-95-2	
2,4,5-Trichlorophenol	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	95-95-4	
2,4,6-Trichlorophenol	ND	ug/kg	570	1	12/23/14 16:15	12/24/14 12:18	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	25 %.		28-101	1	12/23/14 16:15	12/24/14 12:18	4165-60-0	S0
2-Fluorobiphenyl (S)	34 %.		31-94	1	12/23/14 16:15	12/24/14 12:18	321-60-8	
p-Terphenyl-d14 (S)	27 %.		26-110	1	12/23/14 16:15	12/24/14 12:18	1718-51-0	
Phenol-d5 (S)	36 %.		28-101	1	12/23/14 16:15	12/24/14 12:18	4165-62-2	
2-Fluorophenol (S)	38 %.		24-104	1	12/23/14 16:15	12/24/14 12:18	367-12-4	
2,4,6-Tribromophenol (S)	33 %.		16-122	1	12/23/14 16:15	12/24/14 12:18	118-79-6	

### 8260 MSV 5035A VOA

Analytical Method: EPA 8260

Acetone	ND	ug/kg	177	1	12/31/14 21:59	67-64-1
Acrolein	ND	ug/kg	177	1	12/31/14 21:59	107-02-8
Acrylonitrile	ND	ug/kg	177	1	12/31/14 21:59	107-13-1
Benzene	9.8	ug/kg	8.8	1	12/31/14 21:59	71-43-2

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-10 Lab ID: 50109725007 Collected: 12/22/14 13:45 Received: 12/23/14 10:34 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
Bromobenzene	ND	ug/kg	8.8	1		12/31/14 21:59	108-86-1	
Bromochloromethane	ND	ug/kg	8.8	1		12/31/14 21:59	74-97-5	
Bromodichloromethane	ND	ug/kg	8.8	1		12/31/14 21:59	75-27-4	
Bromoform	ND	ug/kg	8.8	1		12/31/14 21:59	75-25-2	
Bromomethane	ND	ug/kg	8.8	1		12/31/14 21:59	74-83-9	
2-Butanone (MEK)	ND	ug/kg	44.1	1		12/31/14 21:59	78-93-3	
n-Butylbenzene	35.7	ug/kg	8.8	1		12/31/14 21:59	104-51-8	
sec-Butylbenzene	19.9	ug/kg	8.8	1		12/31/14 21:59	135-98-8	
tert-Butylbenzene	ND	ug/kg	8.8	1		12/31/14 21:59	98-06-6	
Carbon disulfide	ND	ug/kg	17.7	1		12/31/14 21:59	75-15-0	
Carbon tetrachloride	ND	ug/kg	8.8	1		12/31/14 21:59	56-23-5	
Chlorobenzene	352	ug/kg	8.8	1		12/31/14 21:59	108-90-7	
Chloroethane	ND	ug/kg	8.8	1		12/31/14 21:59	75-00-3	
Chloroform	ND	ug/kg	8.8	1		12/31/14 21:59	67-66-3	
Chloromethane	ND	ug/kg	8.8	1		12/31/14 21:59	74-87-3	
2-Chlorotoluene	ND	ug/kg	8.8	1		12/31/14 21:59	95-49-8	
4-Chlorotoluene	ND	ug/kg	8.8	1		12/31/14 21:59	106-43-4	
Dibromochloromethane	ND	ug/kg	8.8	1		12/31/14 21:59	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/kg	8.8	1		12/31/14 21:59	106-93-4	
Dibromomethane	ND	ug/kg	8.8	1		12/31/14 21:59	74-95-3	
1,2-Dichlorobenzene	ND	ug/kg	8.8	1		12/31/14 21:59	95-50-1	
1,3-Dichlorobenzene	ND	ug/kg	8.8	1		12/31/14 21:59	541-73-1	
1,4-Dichlorobenzene	45.2	ug/kg	8.8	1		12/31/14 21:59	106-46-7	
trans-1,4-Dichloro-2-butene	ND	ug/kg	177	1		12/31/14 21:59	110-57-6	
Dichlorodifluoromethane	ND	ug/kg	8.8	1		12/31/14 21:59	75-71-8	
1,1-Dichloroethane	ND	ug/kg	8.8	1		12/31/14 21:59	75-34-3	
1,2-Dichloroethane	ND	ug/kg	8.8	1		12/31/14 21:59	107-06-2	
1,1-Dichloroethene	ND	ug/kg	8.8	1		12/31/14 21:59	75-35-4	
cis-1,2-Dichloroethene	ND	ug/kg	8.8	1		12/31/14 21:59	156-59-2	
trans-1,2-Dichloroethene	ND	ug/kg	8.8	1		12/31/14 21:59	156-60-5	
1,2-Dichloropropane	ND	ug/kg	8.8	1		12/31/14 21:59	78-87-5	
1,3-Dichloropropane	ND	ug/kg	8.8	1		12/31/14 21:59	142-28-9	
2,2-Dichloropropane	ND	ug/kg	8.8	1		12/31/14 21:59	594-20-7	
1,1-Dichloropropene	ND	ug/kg	8.8	1		12/31/14 21:59	563-58-6	
cis-1,3-Dichloropropene	ND	ug/kg	8.8	1		12/31/14 21:59	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/kg	8.8	1		12/31/14 21:59	10061-02-6	
Ethylbenzene	ND	ug/kg	8.8	1		12/31/14 21:59	100-41-4	
Ethyl methacrylate	ND	ug/kg	177	1		12/31/14 21:59	97-63-2	
Hexachloro-1,3-butadiene	ND	ug/kg	8.8	1		12/31/14 21:59	87-68-3	
n-Hexane	ND	ug/kg	8.8	1		12/31/14 21:59	110-54-3	
2-Hexanone	ND	ug/kg	177	1		12/31/14 21:59	591-78-6	
Iodomethane	ND	ug/kg	177	1		12/31/14 21:59	74-88-4	
Isopropylbenzene (Cumene)	19.2	ug/kg	8.8	1		12/31/14 21:59	98-82-8	
p-Isopropyltoluene	ND	ug/kg	8.8	1		12/31/14 21:59	99-87-6	
Methylene Chloride	ND	ug/kg	35.3	1		12/31/14 21:59	75-09-2	
1-Methylnaphthalene	26.0	ug/kg	17.7	1		12/31/14 21:59	90-12-0	N2

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-10 Lab ID: 50109725007 Collected: 12/22/14 13:45 Received: 12/23/14 10:34 Matrix: Solid

### Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
2-Methylnaphthalene	31.8	ug/kg	17.7	1		12/31/14 21:59	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	44.1	1		12/31/14 21:59	108-10-1	
Methyl-tert-butyl ether	ND	ug/kg	8.8	1		12/31/14 21:59	1634-04-4	
Naphthalene	65.4	ug/kg	8.8	1		12/31/14 21:59	91-20-3	
n-Propylbenzene	20.9	ug/kg	8.8	1		12/31/14 21:59	103-65-1	
Styrene	ND	ug/kg	8.8	1		12/31/14 21:59	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/kg	8.8	1		12/31/14 21:59	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/kg	8.8	1		12/31/14 21:59	79-34-5	
Tetrachloroethene	ND	ug/kg	8.8	1		12/31/14 21:59	127-18-4	
Toluene	ND	ug/kg	8.8	1		12/31/14 21:59	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/kg	8.8	1		12/31/14 21:59	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/kg	8.8	1		12/31/14 21:59	120-82-1	
1,1,1-Trichloroethane	ND	ug/kg	8.8	1		12/31/14 21:59	71-55-6	
1,1,2-Trichloroethane	ND	ug/kg	8.8	1		12/31/14 21:59	79-00-5	
Trichloroethene	ND	ug/kg	8.8	1		12/31/14 21:59	79-01-6	
Trichlorofluoromethane	ND	ug/kg	8.8	1		12/31/14 21:59	75-69-4	
1,2,3-Trichloropropane	ND	ug/kg	8.8	1		12/31/14 21:59	96-18-4	
1,2,4-Trimethylbenzene	34.3	ug/kg	8.8	1		12/31/14 21:59	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/kg	8.8	1		12/31/14 21:59	108-67-8	
Vinyl acetate	ND	ug/kg	177	1		12/31/14 21:59	108-05-4	
Vinyl chloride	ND	ug/kg	8.8	1		12/31/14 21:59	75-01-4	
Xylene (Total)	ND	ug/kg	17.7	1		12/31/14 21:59	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	95 %.		85-118	1		12/31/14 21:59	1868-53-7	
Toluene-d8 (S)	94 %.		71-128	1		12/31/14 21:59	2037-26-5	
4-Bromofluorobenzene (S)	82 %.		56-144	1		12/31/14 21:59	460-00-4	
<b>Percent Moisture</b>		Analytical Method: ASTM D2974-87						
Percent Moisture	42.4	%	0.10	1		12/31/14 12:00		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

**Sample: TP-11** **Lab ID: 50109725008** Collected: 12/22/14 14:15 Received: 12/23/14 10:34 Matrix: Solid

**Results reported on a "dry-weight" basis**

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050								
Arsenic	3.6	mg/kg	1.2	1	12/30/14 09:14	12/30/14 20:48	7440-38-2	
Barium	206	mg/kg	1.2	1	12/30/14 09:14	12/30/14 20:48	7440-39-3	
Cadmium	1.4	mg/kg	0.60	1	12/30/14 09:14	12/30/14 20:48	7440-43-9	
Chromium	20.5	mg/kg	1.2	1	12/30/14 09:14	12/30/14 20:48	7440-47-3	
Lead	106	mg/kg	1.2	1	12/30/14 09:14	12/30/14 20:48	7439-92-1	
Selenium	ND	mg/kg	1.2	1	12/30/14 09:14	12/30/14 20:48	7782-49-2	
Silver	ND	mg/kg	0.60	1	12/30/14 09:14	12/30/14 20:48	7440-22-4	

### 7471 Mercury

Analytical Method: EPA 7471 Preparation Method: EPA 7471

Mercury	0.41	mg/kg	0.27	1	01/05/15 10:20	01/05/15 16:49	7439-97-6	
---------	------	-------	------	---	----------------	----------------	-----------	--

### 8270 MSSV PAH by SIM

Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546

Acenaphthene	ND	ug/kg	6.8	1	12/24/14 11:30	12/30/14 01:50	83-32-9	
Acenaphthylene	ND	ug/kg	6.8	1	12/24/14 11:30	12/30/14 01:50	208-96-8	
Anthracene	7.9	ug/kg	6.8	1	12/24/14 11:30	12/30/14 01:50	120-12-7	
Benzo(a)anthracene	10.2	ug/kg	6.8	1	12/24/14 11:30	12/30/14 01:50	56-55-3	
Benzo(a)pyrene	7.2	ug/kg	6.8	1	12/24/14 11:30	12/30/14 01:50	50-32-8	
Benzo(b)fluoranthene	9.0	ug/kg	6.8	1	12/24/14 11:30	12/30/14 01:50	205-99-2	
Benzo(g,h,i)perylene	7.1	ug/kg	6.8	1	12/24/14 11:30	12/30/14 01:50	191-24-2	
Benzo(k)fluoranthene	7.2	ug/kg	6.8	1	12/24/14 11:30	12/30/14 01:50	207-08-9	
Chrysene	18.4	ug/kg	6.8	1	12/24/14 11:30	12/30/14 01:50	218-01-9	
Dibenz(a,h)anthracene	ND	ug/kg	6.8	1	12/24/14 11:30	12/30/14 01:50	53-70-3	
Fluoranthene	35.6	ug/kg	6.8	1	12/24/14 11:30	12/30/14 01:50	206-44-0	
Fluorene	22.2	ug/kg	6.8	1	12/24/14 11:30	12/30/14 01:50	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/kg	6.8	1	12/24/14 11:30	12/30/14 01:50	193-39-5	
1-Methylnaphthalene	60.6	ug/kg	6.8	1	12/24/14 11:30	12/30/14 01:50	90-12-0	
2-Methylnaphthalene	96.2	ug/kg	6.8	1	12/24/14 11:30	12/30/14 01:50	91-57-6	
Naphthalene	228	ug/kg	6.8	1	12/24/14 11:30	12/30/14 01:50	91-20-3	
Phenanthrene	74.6	ug/kg	6.8	1	12/24/14 11:30	12/30/14 01:50	85-01-8	
Pyrene	32.3	ug/kg	6.8	1	12/24/14 11:30	12/30/14 01:50	129-00-0	

### Surrogates

2-Fluorobiphenyl (S)	54	%.	38-110	1	12/24/14 11:30	12/30/14 01:50	321-60-8	
p-Terphenyl-d14 (S)	45	%.	32-111	1	12/24/14 11:30	12/30/14 01:50	1718-51-0	

### 8270 MSSV SHORT LIST MICROWAVE

Analytical Method: EPA 8270 Preparation Method: EPA 3546

Benzyl alcohol	ND	ug/kg	901	1	12/29/14 12:00	12/29/14 20:42	100-51-6	
4-Bromophenylphenyl ether	ND	ug/kg	450	1	12/29/14 12:00	12/29/14 20:42	101-55-3	
Butylbenzylphthalate	ND	ug/kg	450	1	12/29/14 12:00	12/29/14 20:42	85-68-7	
4-Chloro-3-methylphenol	ND	ug/kg	901	1	12/29/14 12:00	12/29/14 20:42	59-50-7	
4-Chloroaniline	ND	ug/kg	901	1	12/29/14 12:00	12/29/14 20:42	106-47-8	
bis(2-Chloroethoxy)methane	ND	ug/kg	450	1	12/29/14 12:00	12/29/14 20:42	111-91-1	
bis(2-Chloroethyl) ether	ND	ug/kg	450	1	12/29/14 12:00	12/29/14 20:42	111-44-4	
bis(2chloro1methylethyl) ether	ND	ug/kg	450	1	12/29/14 12:00	12/29/14 20:42	108-60-1	
2-Chloronaphthalene	ND	ug/kg	450	1	12/29/14 12:00	12/29/14 20:42	91-58-7	
2-Chlorophenol	ND	ug/kg	450	1	12/29/14 12:00	12/29/14 20:42	95-57-8	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-11 Lab ID: 50109725008 Collected: 12/22/14 14:15 Received: 12/23/14 10:34 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SHORT LIST MICROWAVE</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546								
4-Chlorophenylphenyl ether	ND ug/kg		450	1	12/29/14 12:00	12/29/14 20:42	7005-72-3	
Dibenzofuran	ND ug/kg		450	1	12/29/14 12:00	12/29/14 20:42	132-64-9	
3,3'-Dichlorobenzidine	ND ug/kg		901	1	12/29/14 12:00	12/29/14 20:42	91-94-1	
2,4-Dichlorophenol	ND ug/kg		450	1	12/29/14 12:00	12/29/14 20:42	120-83-2	
Diethylphthalate	ND ug/kg		450	1	12/29/14 12:00	12/29/14 20:42	84-66-2	
2,4-Dimethylphenol	ND ug/kg		450	1	12/29/14 12:00	12/29/14 20:42	105-67-9	
Dimethylphthalate	ND ug/kg		450	1	12/29/14 12:00	12/29/14 20:42	131-11-3	
Di-n-butylphthalate	ND ug/kg		450	1	12/29/14 12:00	12/29/14 20:42	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/kg		2180	1	12/29/14 12:00	12/29/14 20:42	534-52-1	
2,4-Dinitrophenol	ND ug/kg		2180	1	12/29/14 12:00	12/29/14 20:42	51-28-5	
2,4-Dinitrotoluene	ND ug/kg		450	1	12/29/14 12:00	12/29/14 20:42	121-14-2	
2,6-Dinitrotoluene	ND ug/kg		450	1	12/29/14 12:00	12/29/14 20:42	606-20-2	
Di-n-octylphthalate	ND ug/kg		450	1	12/29/14 12:00	12/29/14 20:42	117-84-0	
bis(2-Ethylhexyl)phthalate	532 ug/kg		450	1	12/29/14 12:00	12/29/14 20:42	117-81-7	
Hexachloro-1,3-butadiene	ND ug/kg		450	1	12/29/14 12:00	12/29/14 20:42	87-68-3	
Hexachlorobenzene	ND ug/kg		450	1	12/29/14 12:00	12/29/14 20:42	118-74-1	
Hexachlorocyclopentadiene	ND ug/kg		450	1	12/29/14 12:00	12/29/14 20:42	77-47-4	
Hexachloroethane	ND ug/kg		450	1	12/29/14 12:00	12/29/14 20:42	67-72-1	
Isophorone	ND ug/kg		450	1	12/29/14 12:00	12/29/14 20:42	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/kg		450	1	12/29/14 12:00	12/29/14 20:42	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/kg		901	1	12/29/14 12:00	12/29/14 20:42		
2-Nitroaniline	ND ug/kg		2180	1	12/29/14 12:00	12/29/14 20:42	88-74-4	
3-Nitroaniline	ND ug/kg		2180	1	12/29/14 12:00	12/29/14 20:42	99-09-2	
4-Nitroaniline	ND ug/kg		2180	1	12/29/14 12:00	12/29/14 20:42	100-01-6	
Nitrobenzene	ND ug/kg		450	1	12/29/14 12:00	12/29/14 20:42	98-95-3	
2-Nitrophenol	ND ug/kg		450	1	12/29/14 12:00	12/29/14 20:42	88-75-5	
4-Nitrophenol	ND ug/kg		2180	1	12/29/14 12:00	12/29/14 20:42	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/kg		450	1	12/29/14 12:00	12/29/14 20:42	621-64-7	
N-Nitrosodiphenylamine	ND ug/kg		450	1	12/29/14 12:00	12/29/14 20:42	86-30-6	
Pentachlorophenol	ND ug/kg		2180	1	12/29/14 12:00	12/29/14 20:42	87-86-5	
Phenol	ND ug/kg		450	1	12/29/14 12:00	12/29/14 20:42	108-95-2	
2,4,5-Trichlorophenol	ND ug/kg		450	1	12/29/14 12:00	12/29/14 20:42	95-95-4	
2,4,6-Trichlorophenol	ND ug/kg		450	1	12/29/14 12:00	12/29/14 20:42	88-06-2	

### Surrogates

Nitrobenzene-d5 (S)	33 %.		28-101	1	12/29/14 12:00	12/29/14 20:42	4165-60-0	
2-Fluorobiphenyl (S)	51 %.		31-94	1	12/29/14 12:00	12/29/14 20:42	321-60-8	
p-Terphenyl-d14 (S)	54 %.		26-110	1	12/29/14 12:00	12/29/14 20:42	1718-51-0	
Phenol-d5 (S)	63 %.		28-101	1	12/29/14 12:00	12/29/14 20:42	4165-62-2	
2-Fluorophenol (S)	63 %.		24-104	1	12/29/14 12:00	12/29/14 20:42	367-12-4	
2,4,6-Tribromophenol (S)	62 %.		16-122	1	12/29/14 12:00	12/29/14 20:42	118-79-6	

### 8260 MSV 5035A VOA

Analytical Method: EPA 8260

Acetone	ND ug/kg		133	1		12/31/14 22:31	67-64-1	
Acrolein	ND ug/kg		133	1		12/31/14 22:31	107-02-8	
Acrylonitrile	ND ug/kg		133	1		12/31/14 22:31	107-13-1	
Benzene	ND ug/kg		6.6	1		12/31/14 22:31	71-43-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-11 Lab ID: 50109725008 Collected: 12/22/14 14:15 Received: 12/23/14 10:34 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
Bromobenzene	ND	ug/kg	6.6	1		12/31/14 22:31	108-86-1	
Bromochloromethane	ND	ug/kg	6.6	1		12/31/14 22:31	74-97-5	
Bromodichloromethane	ND	ug/kg	6.6	1		12/31/14 22:31	75-27-4	
Bromoform	ND	ug/kg	6.6	1		12/31/14 22:31	75-25-2	
Bromomethane	ND	ug/kg	6.6	1		12/31/14 22:31	74-83-9	
2-Butanone (MEK)	ND	ug/kg	33.2	1		12/31/14 22:31	78-93-3	
n-Butylbenzene	13.2	ug/kg	6.6	1		12/31/14 22:31	104-51-8	
sec-Butylbenzene	11.1	ug/kg	6.6	1		12/31/14 22:31	135-98-8	
tert-Butylbenzene	ND	ug/kg	6.6	1		12/31/14 22:31	98-06-6	
Carbon disulfide	ND	ug/kg	13.3	1		12/31/14 22:31	75-15-0	
Carbon tetrachloride	ND	ug/kg	6.6	1		12/31/14 22:31	56-23-5	
Chlorobenzene	ND	ug/kg	6.6	1		12/31/14 22:31	108-90-7	
Chloroethane	ND	ug/kg	6.6	1		12/31/14 22:31	75-00-3	
Chloroform	ND	ug/kg	6.6	1		12/31/14 22:31	67-66-3	
Chloromethane	ND	ug/kg	6.6	1		12/31/14 22:31	74-87-3	
2-Chlorotoluene	ND	ug/kg	6.6	1		12/31/14 22:31	95-49-8	
4-Chlorotoluene	ND	ug/kg	6.6	1		12/31/14 22:31	106-43-4	
Dibromochloromethane	ND	ug/kg	6.6	1		12/31/14 22:31	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/kg	6.6	1		12/31/14 22:31	106-93-4	
Dibromomethane	ND	ug/kg	6.6	1		12/31/14 22:31	74-95-3	
1,2-Dichlorobenzene	ND	ug/kg	6.6	1		12/31/14 22:31	95-50-1	
1,3-Dichlorobenzene	ND	ug/kg	6.6	1		12/31/14 22:31	541-73-1	
1,4-Dichlorobenzene	15.3	ug/kg	6.6	1		12/31/14 22:31	106-46-7	
trans-1,4-Dichloro-2-butene	ND	ug/kg	133	1		12/31/14 22:31	110-57-6	
Dichlorodifluoromethane	ND	ug/kg	6.6	1		12/31/14 22:31	75-71-8	
1,1-Dichloroethane	ND	ug/kg	6.6	1		12/31/14 22:31	75-34-3	
1,2-Dichloroethane	ND	ug/kg	6.6	1		12/31/14 22:31	107-06-2	
1,1-Dichloroethene	ND	ug/kg	6.6	1		12/31/14 22:31	75-35-4	
cis-1,2-Dichloroethene	ND	ug/kg	6.6	1		12/31/14 22:31	156-59-2	
trans-1,2-Dichloroethene	ND	ug/kg	6.6	1		12/31/14 22:31	156-60-5	
1,2-Dichloropropane	ND	ug/kg	6.6	1		12/31/14 22:31	78-87-5	
1,3-Dichloropropane	ND	ug/kg	6.6	1		12/31/14 22:31	142-28-9	
2,2-Dichloropropane	ND	ug/kg	6.6	1		12/31/14 22:31	594-20-7	
1,1-Dichloropropene	ND	ug/kg	6.6	1		12/31/14 22:31	563-58-6	
cis-1,3-Dichloropropene	ND	ug/kg	6.6	1		12/31/14 22:31	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/kg	6.6	1		12/31/14 22:31	10061-02-6	
Ethylbenzene	ND	ug/kg	6.6	1		12/31/14 22:31	100-41-4	
Ethyl methacrylate	ND	ug/kg	133	1		12/31/14 22:31	97-63-2	
Hexachloro-1,3-butadiene	ND	ug/kg	6.6	1		12/31/14 22:31	87-68-3	
n-Hexane	ND	ug/kg	6.6	1		12/31/14 22:31	110-54-3	
2-Hexanone	ND	ug/kg	133	1		12/31/14 22:31	591-78-6	
Iodomethane	ND	ug/kg	133	1		12/31/14 22:31	74-88-4	
Isopropylbenzene (Cumene)	10.7	ug/kg	6.6	1		12/31/14 22:31	98-82-8	
p-Isopropyltoluene	ND	ug/kg	6.6	1		12/31/14 22:31	99-87-6	
Methylene Chloride	ND	ug/kg	26.5	1		12/31/14 22:31	75-09-2	
1-Methylnaphthalene	ND	ug/kg	13.3	1		12/31/14 22:31	90-12-0	N2

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-11 Lab ID: 50109725008 Collected: 12/22/14 14:15 Received: 12/23/14 10:34 Matrix: Solid

### Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
2-Methylnaphthalene	ND	ug/kg	13.3	1		12/31/14 22:31	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	33.2	1		12/31/14 22:31	108-10-1	
Methyl-tert-butyl ether	ND	ug/kg	6.6	1		12/31/14 22:31	1634-04-4	
Naphthalene	18.0	ug/kg	6.6	1		12/31/14 22:31	91-20-3	
n-Propylbenzene	9.2	ug/kg	6.6	1		12/31/14 22:31	103-65-1	
Styrene	ND	ug/kg	6.6	1		12/31/14 22:31	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/kg	6.6	1		12/31/14 22:31	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/kg	6.6	1		12/31/14 22:31	79-34-5	
Tetrachloroethene	ND	ug/kg	6.6	1		12/31/14 22:31	127-18-4	
Toluene	ND	ug/kg	6.6	1		12/31/14 22:31	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/kg	6.6	1		12/31/14 22:31	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/kg	6.6	1		12/31/14 22:31	120-82-1	
1,1,1-Trichloroethane	ND	ug/kg	6.6	1		12/31/14 22:31	71-55-6	
1,1,2-Trichloroethane	ND	ug/kg	6.6	1		12/31/14 22:31	79-00-5	
Trichloroethene	ND	ug/kg	6.6	1		12/31/14 22:31	79-01-6	
Trichlorofluoromethane	ND	ug/kg	6.6	1		12/31/14 22:31	75-69-4	
1,2,3-Trichloropropane	ND	ug/kg	6.6	1		12/31/14 22:31	96-18-4	
1,2,4-Trimethylbenzene	14.2	ug/kg	6.6	1		12/31/14 22:31	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/kg	6.6	1		12/31/14 22:31	108-67-8	
Vinyl acetate	ND	ug/kg	133	1		12/31/14 22:31	108-05-4	
Vinyl chloride	ND	ug/kg	6.6	1		12/31/14 22:31	75-01-4	
Xylene (Total)	ND	ug/kg	13.3	1		12/31/14 22:31	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	98 %		85-118	1		12/31/14 22:31	1868-53-7	
Toluene-d8 (S)	98 %		71-128	1		12/31/14 22:31	2037-26-5	
4-Bromofluorobenzene (S)	79 %		56-144	1		12/31/14 22:31	460-00-4	
<b>Percent Moisture</b>		Analytical Method: ASTM D2974-87						
Percent Moisture	27.0	%	0.10	1		12/31/14 12:00		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-12 Lab ID: 50109725009 Collected: 12/22/14 14:45 Received: 12/23/14 10:34 Matrix: Solid

### Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050								
Arsenic	6.0	mg/kg	1.1	1	12/30/14 09:14	12/30/14 20:50	7440-38-2	
Barium	103	mg/kg	1.1	1	12/30/14 09:14	12/30/14 20:50	7440-39-3	
Cadmium	ND	mg/kg	0.55	1	12/30/14 09:14	12/30/14 20:50	7440-43-9	
Chromium	14.7	mg/kg	1.1	1	12/30/14 09:14	12/30/14 20:50	7440-47-3	
Lead	22.3	mg/kg	1.1	1	12/30/14 09:14	12/30/14 20:50	7439-92-1	
Selenium	ND	mg/kg	1.1	1	12/30/14 09:14	12/30/14 20:50	7782-49-2	
Silver	ND	mg/kg	0.55	1	12/30/14 09:14	12/30/14 20:50	7440-22-4	

### 7471 Mercury

Analytical Method: EPA 7471 Preparation Method: EPA 7471

Mercury	ND	mg/kg	0.24	1	01/05/15 10:20	01/05/15 16:51	7439-97-6	
---------	----	-------	------	---	----------------	----------------	-----------	--

### 8270 MSSV PAH by SIM

Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546

Acenaphthene	ND	ug/kg	6.4	1	12/24/14 11:30	12/30/14 02:08	83-32-9	
Acenaphthylene	ND	ug/kg	6.4	1	12/24/14 11:30	12/30/14 02:08	208-96-8	
Anthracene	ND	ug/kg	6.4	1	12/24/14 11:30	12/30/14 02:08	120-12-7	
Benzo(a)anthracene	9.4	ug/kg	6.4	1	12/24/14 11:30	12/30/14 02:08	56-55-3	
Benzo(a)pyrene	8.0	ug/kg	6.4	1	12/24/14 11:30	12/30/14 02:08	50-32-8	
Benzo(b)fluoranthene	12.3	ug/kg	6.4	1	12/24/14 11:30	12/30/14 02:08	205-99-2	
Benzo(g,h,i)perylene	7.2	ug/kg	6.4	1	12/24/14 11:30	12/30/14 02:08	191-24-2	
Benzo(k)fluoranthene	8.2	ug/kg	6.4	1	12/24/14 11:30	12/30/14 02:08	207-08-9	
Chrysene	14.5	ug/kg	6.4	1	12/24/14 11:30	12/30/14 02:08	218-01-9	
Dibenz(a,h)anthracene	ND	ug/kg	6.4	1	12/24/14 11:30	12/30/14 02:08	53-70-3	
Fluoranthene	23.9	ug/kg	6.4	1	12/24/14 11:30	12/30/14 02:08	206-44-0	
Fluorene	ND	ug/kg	6.4	1	12/24/14 11:30	12/30/14 02:08	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/kg	6.4	1	12/24/14 11:30	12/30/14 02:08	193-39-5	
1-Methylnaphthalene	ND	ug/kg	6.4	1	12/24/14 11:30	12/30/14 02:08	90-12-0	
2-Methylnaphthalene	ND	ug/kg	6.4	1	12/24/14 11:30	12/30/14 02:08	91-57-6	
Naphthalene	ND	ug/kg	6.4	1	12/24/14 11:30	12/30/14 02:08	91-20-3	
Phenanthrene	13.1	ug/kg	6.4	1	12/24/14 11:30	12/30/14 02:08	85-01-8	
Pyrene	18.4	ug/kg	6.4	1	12/24/14 11:30	12/30/14 02:08	129-00-0	

### Surrogates

2-Fluorobiphenyl (S)	57	%.	38-110	1	12/24/14 11:30	12/30/14 02:08	321-60-8	
p-Terphenyl-d14 (S)	51	%.	32-111	1	12/24/14 11:30	12/30/14 02:08	1718-51-0	

### 8270 MSSV SHORT LIST MICROWAVE Analytical Method: EPA 8270 Preparation Method: EPA 3546

Benzyl alcohol	ND	ug/kg	845	1	12/23/14 16:15	12/24/14 13:00	100-51-6	
4-Bromophenylphenyl ether	ND	ug/kg	423	1	12/23/14 16:15	12/24/14 13:00	101-55-3	
Butylbenzylphthalate	ND	ug/kg	423	1	12/23/14 16:15	12/24/14 13:00	85-68-7	
4-Chloro-3-methylphenol	ND	ug/kg	845	1	12/23/14 16:15	12/24/14 13:00	59-50-7	
4-Chloroaniline	ND	ug/kg	845	1	12/23/14 16:15	12/24/14 13:00	106-47-8	
bis(2-Chloroethoxy)methane	ND	ug/kg	423	1	12/23/14 16:15	12/24/14 13:00	111-91-1	
bis(2-Chloroethyl) ether	ND	ug/kg	423	1	12/23/14 16:15	12/24/14 13:00	111-44-4	
bis(2chloro1methylethyl) ether	ND	ug/kg	423	1	12/23/14 16:15	12/24/14 13:00	108-60-1	
2-Chloronaphthalene	ND	ug/kg	423	1	12/23/14 16:15	12/24/14 13:00	91-58-7	
2-Chlorophenol	ND	ug/kg	423	1	12/23/14 16:15	12/24/14 13:00	95-57-8	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-12 Lab ID: 50109725009 Collected: 12/22/14 14:45 Received: 12/23/14 10:34 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SHORT LIST MICROWAVE</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546								
4-Chlorophenylphenyl ether	ND ug/kg		423	1	12/23/14 16:15	12/24/14 13:00	7005-72-3	
Dibenzofuran	ND ug/kg		423	1	12/23/14 16:15	12/24/14 13:00	132-64-9	
3,3'-Dichlorobenzidine	ND ug/kg		845	1	12/23/14 16:15	12/24/14 13:00	91-94-1	
2,4-Dichlorophenol	ND ug/kg		423	1	12/23/14 16:15	12/24/14 13:00	120-83-2	
Diethylphthalate	ND ug/kg		423	1	12/23/14 16:15	12/24/14 13:00	84-66-2	
2,4-Dimethylphenol	ND ug/kg		423	1	12/23/14 16:15	12/24/14 13:00	105-67-9	
Dimethylphthalate	ND ug/kg		423	1	12/23/14 16:15	12/24/14 13:00	131-11-3	
Di-n-butylphthalate	ND ug/kg		423	1	12/23/14 16:15	12/24/14 13:00	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/kg		2050	1	12/23/14 16:15	12/24/14 13:00	534-52-1	
2,4-Dinitrophenol	ND ug/kg		2050	1	12/23/14 16:15	12/24/14 13:00	51-28-5	
2,4-Dinitrotoluene	ND ug/kg		423	1	12/23/14 16:15	12/24/14 13:00	121-14-2	
2,6-Dinitrotoluene	ND ug/kg		423	1	12/23/14 16:15	12/24/14 13:00	606-20-2	
Di-n-octylphthalate	ND ug/kg		423	1	12/23/14 16:15	12/24/14 13:00	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/kg		423	1	12/23/14 16:15	12/24/14 13:00	117-81-7	
Hexachloro-1,3-butadiene	ND ug/kg		423	1	12/23/14 16:15	12/24/14 13:00	87-68-3	
Hexachlorobenzene	ND ug/kg		423	1	12/23/14 16:15	12/24/14 13:00	118-74-1	
Hexachlorocyclopentadiene	ND ug/kg		423	1	12/23/14 16:15	12/24/14 13:00	77-47-4	
Hexachloroethane	ND ug/kg		423	1	12/23/14 16:15	12/24/14 13:00	67-72-1	
Isophorone	ND ug/kg		423	1	12/23/14 16:15	12/24/14 13:00	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/kg		423	1	12/23/14 16:15	12/24/14 13:00	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/kg		845	1	12/23/14 16:15	12/24/14 13:00		
2-Nitroaniline	ND ug/kg		2050	1	12/23/14 16:15	12/24/14 13:00	88-74-4	
3-Nitroaniline	ND ug/kg		2050	1	12/23/14 16:15	12/24/14 13:00	99-09-2	
4-Nitroaniline	ND ug/kg		2050	1	12/23/14 16:15	12/24/14 13:00	100-01-6	
Nitrobenzene	ND ug/kg		423	1	12/23/14 16:15	12/24/14 13:00	98-95-3	
2-Nitrophenol	ND ug/kg		423	1	12/23/14 16:15	12/24/14 13:00	88-75-5	
4-Nitrophenol	ND ug/kg		2050	1	12/23/14 16:15	12/24/14 13:00	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/kg		423	1	12/23/14 16:15	12/24/14 13:00	621-64-7	
N-Nitrosodiphenylamine	ND ug/kg		423	1	12/23/14 16:15	12/24/14 13:00	86-30-6	
Pentachlorophenol	ND ug/kg		2050	1	12/23/14 16:15	12/24/14 13:00	87-86-5	
Phenol	ND ug/kg		423	1	12/23/14 16:15	12/24/14 13:00	108-95-2	
2,4,5-Trichlorophenol	ND ug/kg		423	1	12/23/14 16:15	12/24/14 13:00	95-95-4	
2,4,6-Trichlorophenol	ND ug/kg		423	1	12/23/14 16:15	12/24/14 13:00	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	58 %.		28-101	1	12/23/14 16:15	12/24/14 13:00	4165-60-0	
2-Fluorobiphenyl (S)	59 %.		31-94	1	12/23/14 16:15	12/24/14 13:00	321-60-8	
p-Terphenyl-d14 (S)	65 %.		26-110	1	12/23/14 16:15	12/24/14 13:00	1718-51-0	
Phenol-d5 (S)	71 %.		28-101	1	12/23/14 16:15	12/24/14 13:00	4165-62-2	
2-Fluorophenol (S)	72 %.		24-104	1	12/23/14 16:15	12/24/14 13:00	367-12-4	
2,4,6-Tribromophenol (S)	73 %.		16-122	1	12/23/14 16:15	12/24/14 13:00	118-79-6	

### 8260 MSV 5035A VOA

Analytical Method: EPA 8260

Acetone	ND ug/kg		107	1		12/31/14 23:03	67-64-1	
Acrolein	ND ug/kg		107	1		12/31/14 23:03	107-02-8	
Acrylonitrile	ND ug/kg		107	1		12/31/14 23:03	107-13-1	
Benzene	ND ug/kg		5.3	1		12/31/14 23:03	71-43-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-12 Lab ID: 50109725009 Collected: 12/22/14 14:45 Received: 12/23/14 10:34 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
Bromobenzene	ND	ug/kg	5.3	1		12/31/14 23:03	108-86-1	
Bromochloromethane	ND	ug/kg	5.3	1		12/31/14 23:03	74-97-5	
Bromodichloromethane	ND	ug/kg	5.3	1		12/31/14 23:03	75-27-4	
Bromoform	ND	ug/kg	5.3	1		12/31/14 23:03	75-25-2	
Bromomethane	ND	ug/kg	5.3	1		12/31/14 23:03	74-83-9	
2-Butanone (MEK)	ND	ug/kg	26.7	1		12/31/14 23:03	78-93-3	
n-Butylbenzene	ND	ug/kg	5.3	1		12/31/14 23:03	104-51-8	
sec-Butylbenzene	ND	ug/kg	5.3	1		12/31/14 23:03	135-98-8	
tert-Butylbenzene	ND	ug/kg	5.3	1		12/31/14 23:03	98-06-6	
Carbon disulfide	ND	ug/kg	10.7	1		12/31/14 23:03	75-15-0	
Carbon tetrachloride	ND	ug/kg	5.3	1		12/31/14 23:03	56-23-5	
Chlorobenzene	ND	ug/kg	5.3	1		12/31/14 23:03	108-90-7	
Chloroethane	ND	ug/kg	5.3	1		12/31/14 23:03	75-00-3	
Chloroform	ND	ug/kg	5.3	1		12/31/14 23:03	67-66-3	
Chloromethane	ND	ug/kg	5.3	1		12/31/14 23:03	74-87-3	
2-Chlorotoluene	ND	ug/kg	5.3	1		12/31/14 23:03	95-49-8	
4-Chlorotoluene	ND	ug/kg	5.3	1		12/31/14 23:03	106-43-4	
Dibromochloromethane	ND	ug/kg	5.3	1		12/31/14 23:03	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/kg	5.3	1		12/31/14 23:03	106-93-4	
Dibromomethane	ND	ug/kg	5.3	1		12/31/14 23:03	74-95-3	
1,2-Dichlorobenzene	ND	ug/kg	5.3	1		12/31/14 23:03	95-50-1	
1,3-Dichlorobenzene	ND	ug/kg	5.3	1		12/31/14 23:03	541-73-1	
1,4-Dichlorobenzene	ND	ug/kg	5.3	1		12/31/14 23:03	106-46-7	
trans-1,4-Dichloro-2-butene	ND	ug/kg	107	1		12/31/14 23:03	110-57-6	
Dichlorodifluoromethane	ND	ug/kg	5.3	1		12/31/14 23:03	75-71-8	
1,1-Dichloroethane	ND	ug/kg	5.3	1		12/31/14 23:03	75-34-3	
1,2-Dichloroethane	ND	ug/kg	5.3	1		12/31/14 23:03	107-06-2	
1,1-Dichloroethene	ND	ug/kg	5.3	1		12/31/14 23:03	75-35-4	
cis-1,2-Dichloroethene	ND	ug/kg	5.3	1		12/31/14 23:03	156-59-2	
trans-1,2-Dichloroethene	ND	ug/kg	5.3	1		12/31/14 23:03	156-60-5	
1,2-Dichloropropane	ND	ug/kg	5.3	1		12/31/14 23:03	78-87-5	
1,3-Dichloropropane	ND	ug/kg	5.3	1		12/31/14 23:03	142-28-9	
2,2-Dichloropropane	ND	ug/kg	5.3	1		12/31/14 23:03	594-20-7	
1,1-Dichloropropene	ND	ug/kg	5.3	1		12/31/14 23:03	563-58-6	
cis-1,3-Dichloropropene	ND	ug/kg	5.3	1		12/31/14 23:03	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/kg	5.3	1		12/31/14 23:03	10061-02-6	
Ethylbenzene	ND	ug/kg	5.3	1		12/31/14 23:03	100-41-4	
Ethyl methacrylate	ND	ug/kg	107	1		12/31/14 23:03	97-63-2	
Hexachloro-1,3-butadiene	ND	ug/kg	5.3	1		12/31/14 23:03	87-68-3	
n-Hexane	ND	ug/kg	5.3	1		12/31/14 23:03	110-54-3	
2-Hexanone	ND	ug/kg	107	1		12/31/14 23:03	591-78-6	
Iodomethane	ND	ug/kg	107	1		12/31/14 23:03	74-88-4	
Isopropylbenzene (Cumene)	ND	ug/kg	5.3	1		12/31/14 23:03	98-82-8	
p-Isopropyltoluene	ND	ug/kg	5.3	1		12/31/14 23:03	99-87-6	
Methylene Chloride	ND	ug/kg	21.3	1		12/31/14 23:03	75-09-2	
1-Methylnaphthalene	ND	ug/kg	10.7	1		12/31/14 23:03	90-12-0	N2

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: TP-12 Lab ID: 50109725009 Collected: 12/22/14 14:45 Received: 12/23/14 10:34 Matrix: Solid

### Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
2-Methylnaphthalene	ND	ug/kg	10.7	1		12/31/14 23:03	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	26.7	1		12/31/14 23:03	108-10-1	
Methyl-tert-butyl ether	ND	ug/kg	5.3	1		12/31/14 23:03	1634-04-4	
Naphthalene	ND	ug/kg	5.3	1		12/31/14 23:03	91-20-3	
n-Propylbenzene	ND	ug/kg	5.3	1		12/31/14 23:03	103-65-1	
Styrene	ND	ug/kg	5.3	1		12/31/14 23:03	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/kg	5.3	1		12/31/14 23:03	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/kg	5.3	1		12/31/14 23:03	79-34-5	
Tetrachloroethene	ND	ug/kg	5.3	1		12/31/14 23:03	127-18-4	
Toluene	ND	ug/kg	5.3	1		12/31/14 23:03	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/kg	5.3	1		12/31/14 23:03	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/kg	5.3	1		12/31/14 23:03	120-82-1	
1,1,1-Trichloroethane	ND	ug/kg	5.3	1		12/31/14 23:03	71-55-6	
1,1,2-Trichloroethane	ND	ug/kg	5.3	1		12/31/14 23:03	79-00-5	
Trichloroethene	ND	ug/kg	5.3	1		12/31/14 23:03	79-01-6	
Trichlorofluoromethane	ND	ug/kg	5.3	1		12/31/14 23:03	75-69-4	
1,2,3-Trichloropropane	ND	ug/kg	5.3	1		12/31/14 23:03	96-18-4	
1,2,4-Trimethylbenzene	ND	ug/kg	5.3	1		12/31/14 23:03	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/kg	5.3	1		12/31/14 23:03	108-67-8	
Vinyl acetate	ND	ug/kg	107	1		12/31/14 23:03	108-05-4	
Vinyl chloride	ND	ug/kg	5.3	1		12/31/14 23:03	75-01-4	
Xylene (Total)	ND	ug/kg	10.7	1		12/31/14 23:03	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	100 %.		85-118	1		12/31/14 23:03	1868-53-7	
Toluene-d8 (S)	88 %.		71-128	1		12/31/14 23:03	2037-26-5	
4-Bromofluorobenzene (S)	101 %.		56-144	1		12/31/14 23:03	460-00-4	
<b>Percent Moisture</b>		Analytical Method: ASTM D2974-87						
Percent Moisture	22.2 %		0.10	1		12/31/14 12:00		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: Trip Blank Lab ID: 50109725010 Collected: 12/22/14 08:00 Received: 12/23/14 10:34 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
Acetone	ND	ug/kg	100	1		01/03/15 07:20	67-64-1	
Acrolein	ND	ug/kg	100	1		01/03/15 07:20	107-02-8	
Acrylonitrile	ND	ug/kg	100	1		01/03/15 07:20	107-13-1	
Benzene	ND	ug/kg	5.0	1		01/03/15 07:20	71-43-2	
Bromobenzene	ND	ug/kg	5.0	1		01/03/15 07:20	108-86-1	
Bromochloromethane	ND	ug/kg	5.0	1		01/03/15 07:20	74-97-5	
Bromodichloromethane	ND	ug/kg	5.0	1		01/03/15 07:20	75-27-4	
Bromoform	ND	ug/kg	5.0	1		01/03/15 07:20	75-25-2	
Bromomethane	ND	ug/kg	5.0	1		01/03/15 07:20	74-83-9	
2-Butanone (MEK)	ND	ug/kg	25.0	1		01/03/15 07:20	78-93-3	
n-Butylbenzene	ND	ug/kg	5.0	1		01/03/15 07:20	104-51-8	
sec-Butylbenzene	ND	ug/kg	5.0	1		01/03/15 07:20	135-98-8	
tert-Butylbenzene	ND	ug/kg	5.0	1		01/03/15 07:20	98-06-6	
Carbon disulfide	ND	ug/kg	10.0	1		01/03/15 07:20	75-15-0	
Carbon tetrachloride	ND	ug/kg	5.0	1		01/03/15 07:20	56-23-5	
Chlorobenzene	ND	ug/kg	5.0	1		01/03/15 07:20	108-90-7	
Chloroethane	ND	ug/kg	5.0	1		01/03/15 07:20	75-00-3	
Chloroform	ND	ug/kg	5.0	1		01/03/15 07:20	67-66-3	
Chloromethane	ND	ug/kg	5.0	1		01/03/15 07:20	74-87-3	
2-Chlorotoluene	ND	ug/kg	5.0	1		01/03/15 07:20	95-49-8	
4-Chlorotoluene	ND	ug/kg	5.0	1		01/03/15 07:20	106-43-4	
Dibromochloromethane	ND	ug/kg	5.0	1		01/03/15 07:20	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/kg	5.0	1		01/03/15 07:20	106-93-4	
Dibromomethane	ND	ug/kg	5.0	1		01/03/15 07:20	74-95-3	
1,2-Dichlorobenzene	ND	ug/kg	5.0	1		01/03/15 07:20	95-50-1	
1,3-Dichlorobenzene	ND	ug/kg	5.0	1		01/03/15 07:20	541-73-1	
1,4-Dichlorobenzene	ND	ug/kg	5.0	1		01/03/15 07:20	106-46-7	
trans-1,4-Dichloro-2-butene	ND	ug/kg	100	1		01/03/15 07:20	110-57-6	
Dichlorodifluoromethane	ND	ug/kg	5.0	1		01/03/15 07:20	75-71-8	
1,1-Dichloroethane	ND	ug/kg	5.0	1		01/03/15 07:20	75-34-3	
1,2-Dichloroethane	ND	ug/kg	5.0	1		01/03/15 07:20	107-06-2	
1,1-Dichloroethene	ND	ug/kg	5.0	1		01/03/15 07:20	75-35-4	
cis-1,2-Dichloroethene	ND	ug/kg	5.0	1		01/03/15 07:20	156-59-2	
trans-1,2-Dichloroethene	ND	ug/kg	5.0	1		01/03/15 07:20	156-60-5	
1,2-Dichloropropane	ND	ug/kg	5.0	1		01/03/15 07:20	78-87-5	
1,3-Dichloropropane	ND	ug/kg	5.0	1		01/03/15 07:20	142-28-9	
2,2-Dichloropropane	ND	ug/kg	5.0	1		01/03/15 07:20	594-20-7	
1,1-Dichloropropene	ND	ug/kg	5.0	1		01/03/15 07:20	563-58-6	
cis-1,3-Dichloropropene	ND	ug/kg	5.0	1		01/03/15 07:20	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/kg	5.0	1		01/03/15 07:20	10061-02-6	
Ethylbenzene	ND	ug/kg	5.0	1		01/03/15 07:20	100-41-4	
Ethyl methacrylate	ND	ug/kg	100	1		01/03/15 07:20	97-63-2	
Hexachloro-1,3-butadiene	ND	ug/kg	5.0	1		01/03/15 07:20	87-68-3	
n-Hexane	ND	ug/kg	5.0	1		01/03/15 07:20	110-54-3	
2-Hexanone	ND	ug/kg	100	1		01/03/15 07:20	591-78-6	
Iodomethane	ND	ug/kg	100	1		01/03/15 07:20	74-88-4	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road

Pace Project No.: 50109725

Sample: Trip Blank Lab ID: 50109725010 Collected: 12/22/14 08:00 Received: 12/23/14 10:34 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
Isopropylbenzene (Cumene)	ND ug/kg		5.0	1		01/03/15 07:20	98-82-8	
p-Isopropyltoluene	ND ug/kg		5.0	1		01/03/15 07:20	99-87-6	
Methylene Chloride	ND ug/kg		20.0	1		01/03/15 07:20	75-09-2	
1-Methylnaphthalene	ND ug/kg		10.0	1		01/03/15 07:20	90-12-0	N2
2-Methylnaphthalene	ND ug/kg		10.0	1		01/03/15 07:20	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND ug/kg		25.0	1		01/03/15 07:20	108-10-1	
Methyl-tert-butyl ether	ND ug/kg		5.0	1		01/03/15 07:20	1634-04-4	
Naphthalene	ND ug/kg		5.0	1		01/03/15 07:20	91-20-3	
n-Propylbenzene	ND ug/kg		5.0	1		01/03/15 07:20	103-65-1	
Styrene	ND ug/kg		5.0	1		01/03/15 07:20	100-42-5	
1,1,1,2-Tetrachloroethane	ND ug/kg		5.0	1		01/03/15 07:20	630-20-6	
1,1,2,2-Tetrachloroethane	ND ug/kg		5.0	1		01/03/15 07:20	79-34-5	
Tetrachloroethene	ND ug/kg		5.0	1		01/03/15 07:20	127-18-4	
Toluene	ND ug/kg		5.0	1		01/03/15 07:20	108-88-3	
1,2,3-Trichlorobenzene	ND ug/kg		5.0	1		01/03/15 07:20	87-61-6	
1,2,4-Trichlorobenzene	ND ug/kg		5.0	1		01/03/15 07:20	120-82-1	
1,1,1-Trichloroethane	ND ug/kg		5.0	1		01/03/15 07:20	71-55-6	
1,1,2-Trichloroethane	ND ug/kg		5.0	1		01/03/15 07:20	79-00-5	
Trichloroethene	ND ug/kg		5.0	1		01/03/15 07:20	79-01-6	
Trichlorofluoromethane	ND ug/kg		5.0	1		01/03/15 07:20	75-69-4	
1,2,3-Trichloropropane	ND ug/kg		5.0	1		01/03/15 07:20	96-18-4	
1,2,4-Trimethylbenzene	ND ug/kg		5.0	1		01/03/15 07:20	95-63-6	
1,3,5-Trimethylbenzene	ND ug/kg		5.0	1		01/03/15 07:20	108-67-8	
Vinyl acetate	ND ug/kg		100	1		01/03/15 07:20	108-05-4	
Vinyl chloride	ND ug/kg		5.0	1		01/03/15 07:20	75-01-4	
Xylene (Total)	ND ug/kg		10.0	1		01/03/15 07:20	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	105 %.		85-118	1		01/03/15 07:20	1868-53-7	
Toluene-d8 (S)	97 %.		71-128	1		01/03/15 07:20	2037-26-5	
4-Bromofluorobenzene (S)	96 %.		56-144	1		01/03/15 07:20	460-00-4	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road

Pace Project No.: 50109725

QC Batch: MERP/5981

Analysis Method: EPA 7471

QC Batch Method: EPA 7471

Analysis Description: 7471 Mercury

Associated Lab Samples: 50109725001, 50109725002, 50109725003, 50109725004, 50109725005, 50109725006, 50109725007, 50109725008, 50109725009

METHOD BLANK: 1217138

Matrix: Solid

Associated Lab Samples: 50109725001, 50109725002, 50109725003, 50109725004, 50109725005, 50109725006, 50109725007, 50109725008, 50109725009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/kg	ND	0.20	01/05/15 16:00	

LABORATORY CONTROL SAMPLE: 1217139

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	.5	0.55	110	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1217140 1217141

Parameter	Units	50109725003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	Qual
Mercury	mg/kg	ND	.55	.56	0.61	0.63	109	110	75-125	3 20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road

Pace Project No.: 50109725

QC Batch:	MPRP/14967	Analysis Method:	EPA 6010
QC Batch Method:	EPA 3050	Analysis Description:	6010 MET
Associated Lab Samples:	50109725001, 50109725002, 50109725003, 50109725004, 50109725005, 50109725006, 50109725007, 50109725008, 50109725009		

METHOD BLANK: 1214361

Matrix: Solid

Associated Lab Samples: 50109725001, 50109725002, 50109725003, 50109725004, 50109725005, 50109725006, 50109725007, 50109725008, 50109725009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/kg	ND	1.0	12/30/14 19:51	
Barium	mg/kg	ND	1.0	12/30/14 19:51	
Cadmium	mg/kg	ND	0.50	12/30/14 19:51	
Chromium	mg/kg	ND	1.0	12/30/14 19:51	
Lead	mg/kg	ND	1.0	12/30/14 19:51	
Selenium	mg/kg	ND	1.0	12/30/14 19:51	
Silver	mg/kg	ND	0.50	12/30/14 19:51	

LABORATORY CONTROL SAMPLE: 1214362

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/kg	50	50.4	101	80-120	
Barium	mg/kg	50	50.2	100	80-120	
Cadmium	mg/kg	50	52.4	105	80-120	
Chromium	mg/kg	50	51.0	102	80-120	
Lead	mg/kg	50	51.6	103	80-120	
Selenium	mg/kg	50	52.4	105	80-120	
Silver	mg/kg	25	24.0	96	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1214363 1214364

Parameter	Units	50109725003	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		Result										
Arsenic	mg/kg	1.8	46.6	51.9	47.9	54.1	99	101	75-125	12	20	
Barium	mg/kg	13.0	46.6	51.9	59.0	64.7	99	100	75-125	9	20	
Cadmium	mg/kg	ND	46.6	51.9	48.6	53.9	104	104	75-125	10	20	
Chromium	mg/kg	3.8	46.6	51.9	50.0	55.4	99	99	75-125	10	20	
Lead	mg/kg	11.4	46.6	51.9	56.8	64.5	97	102	75-125	13	20	
Selenium	mg/kg	ND	46.6	51.9	49.2	54.6	105	105	75-125	10	20	
Silver	mg/kg	ND	23.3	26	21.6	23.7	92	91	75-125	9	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road

Pace Project No.: 50109725

QC Batch: MSV/72433

Analysis Method: EPA 8260

QC Batch Method: EPA 8260

Analysis Description: 8260 MSV 5035A Volatile Organics

Associated Lab Samples: 50109725006, 50109725007, 50109725008, 50109725009

METHOD BLANK: 1217005

Matrix: Solid

Associated Lab Samples: 50109725006, 50109725007, 50109725008, 50109725009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,1,2-Tetrachloroethane	ug/kg	ND	5.0	12/31/14 17:05	
1,1,1-Trichloroethane	ug/kg	ND	5.0	12/31/14 17:05	
1,1,2,2-Tetrachloroethane	ug/kg	ND	5.0	12/31/14 17:05	
1,1,2-Trichloroethane	ug/kg	ND	5.0	12/31/14 17:05	
1,1-Dichloroethane	ug/kg	ND	5.0	12/31/14 17:05	
1,1-Dichloroethene	ug/kg	ND	5.0	12/31/14 17:05	
1,1-Dichloropropene	ug/kg	ND	5.0	12/31/14 17:05	
1,2,3-Trichlorobenzene	ug/kg	ND	5.0	12/31/14 17:05	
1,2,3-Trichloropropane	ug/kg	ND	5.0	12/31/14 17:05	
1,2,4-Trichlorobenzene	ug/kg	ND	5.0	12/31/14 17:05	
1,2,4-Trimethylbenzene	ug/kg	ND	5.0	12/31/14 17:05	
1,2-Dibromoethane (EDB)	ug/kg	ND	5.0	12/31/14 17:05	
1,2-Dichlorobenzene	ug/kg	ND	5.0	12/31/14 17:05	
1,2-Dichloroethane	ug/kg	ND	5.0	12/31/14 17:05	
1,2-Dichloropropane	ug/kg	ND	5.0	12/31/14 17:05	
1,3,5-Trimethylbenzene	ug/kg	ND	5.0	12/31/14 17:05	
1,3-Dichlorobenzene	ug/kg	ND	5.0	12/31/14 17:05	
1,3-Dichloropropane	ug/kg	ND	5.0	12/31/14 17:05	
1,4-Dichlorobenzene	ug/kg	ND	5.0	12/31/14 17:05	
1-Methylnaphthalene	ug/kg	ND	10.0	12/31/14 17:05	N2
2,2-Dichloropropane	ug/kg	ND	5.0	12/31/14 17:05	
2-Butanone (MEK)	ug/kg	ND	25.0	12/31/14 17:05	
2-Chlorotoluene	ug/kg	ND	5.0	12/31/14 17:05	
2-Hexanone	ug/kg	ND	100	12/31/14 17:05	
2-Methylnaphthalene	ug/kg	ND	10.0	12/31/14 17:05	
4-Chlorotoluene	ug/kg	ND	5.0	12/31/14 17:05	
4-Methyl-2-pentanone (MIBK)	ug/kg	ND	25.0	12/31/14 17:05	
Acetone	ug/kg	ND	100	12/31/14 17:05	
Acrolein	ug/kg	ND	100	12/31/14 17:05	
Acrylonitrile	ug/kg	ND	100	12/31/14 17:05	
Benzene	ug/kg	ND	5.0	12/31/14 17:05	
Bromobenzene	ug/kg	ND	5.0	12/31/14 17:05	
Bromochloromethane	ug/kg	ND	5.0	12/31/14 17:05	
Bromodichloromethane	ug/kg	ND	5.0	12/31/14 17:05	
Bromoform	ug/kg	ND	5.0	12/31/14 17:05	
Bromomethane	ug/kg	ND	5.0	12/31/14 17:05	
Carbon disulfide	ug/kg	ND	10.0	12/31/14 17:05	
Carbon tetrachloride	ug/kg	ND	5.0	12/31/14 17:05	
Chlorobenzene	ug/kg	ND	5.0	12/31/14 17:05	
Chloroethane	ug/kg	ND	5.0	12/31/14 17:05	
Chloroform	ug/kg	ND	5.0	12/31/14 17:05	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road

Pace Project No.: 50109725

METHOD BLANK: 1217005

Matrix: Solid

Associated Lab Samples: 50109725006, 50109725007, 50109725008, 50109725009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloromethane	ug/kg	ND	5.0	12/31/14 17:05	
cis-1,2-Dichloroethene	ug/kg	ND	5.0	12/31/14 17:05	
cis-1,3-Dichloropropene	ug/kg	ND	5.0	12/31/14 17:05	
Dibromochloromethane	ug/kg	ND	5.0	12/31/14 17:05	
Dibromomethane	ug/kg	ND	5.0	12/31/14 17:05	
Dichlorodifluoromethane	ug/kg	ND	5.0	12/31/14 17:05	
Ethyl methacrylate	ug/kg	ND	100	12/31/14 17:05	
Ethylbenzene	ug/kg	ND	5.0	12/31/14 17:05	
Hexachloro-1,3-butadiene	ug/kg	ND	5.0	12/31/14 17:05	
Iodomethane	ug/kg	ND	100	12/31/14 17:05	
Isopropylbenzene (Cumene)	ug/kg	ND	5.0	12/31/14 17:05	
Methyl-tert-butyl ether	ug/kg	ND	5.0	12/31/14 17:05	
Methylene Chloride	ug/kg	ND	20.0	12/31/14 17:05	
n-Butylbenzene	ug/kg	ND	5.0	12/31/14 17:05	
n-Hexane	ug/kg	ND	5.0	12/31/14 17:05	
n-Propylbenzene	ug/kg	ND	5.0	12/31/14 17:05	
Naphthalene	ug/kg	ND	5.0	12/31/14 17:05	
p-Isopropyltoluene	ug/kg	ND	5.0	12/31/14 17:05	
sec-Butylbenzene	ug/kg	ND	5.0	12/31/14 17:05	
Styrene	ug/kg	ND	5.0	12/31/14 17:05	
tert-Butylbenzene	ug/kg	ND	5.0	12/31/14 17:05	
Tetrachloroethene	ug/kg	ND	5.0	12/31/14 17:05	
Toluene	ug/kg	ND	5.0	12/31/14 17:05	
trans-1,2-Dichloroethene	ug/kg	ND	5.0	12/31/14 17:05	
trans-1,3-Dichloropropene	ug/kg	ND	5.0	12/31/14 17:05	
trans-1,4-Dichloro-2-butene	ug/kg	ND	100	12/31/14 17:05	
Trichloroethene	ug/kg	ND	5.0	12/31/14 17:05	
Trichlorofluoromethane	ug/kg	ND	5.0	12/31/14 17:05	
Vinyl acetate	ug/kg	ND	100	12/31/14 17:05	
Vinyl chloride	ug/kg	ND	5.0	12/31/14 17:05	
Xylene (Total)	ug/kg	ND	10.0	12/31/14 17:05	
4-Bromofluorobenzene (S)	%	96	56-144	12/31/14 17:05	
Dibromofluoromethane (S)	%	101	85-118	12/31/14 17:05	
Toluene-d8 (S)	%	85	71-128	12/31/14 17:05	

LABORATORY CONTROL SAMPLE: 1217006

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,1-Trichloroethane	ug/kg	50	51.3	103	70-123	
1,1,2,2-Tetrachloroethane	ug/kg	50	47.3	95	65-124	
1,1-Dichloroethene	ug/kg	50	37.6	75	66-126	
1,2,4-Trimethylbenzene	ug/kg	50	47.2	94	67-126	
1,2-Dichloropropane	ug/kg	50	47.0	94	75-118	
Benzene	ug/kg	50	45.4	91	74-119	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road

Pace Project No.: 50109725

LABORATORY CONTROL SAMPLE: 1217006

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chlorobenzene	ug/kg	50	47.0	94	77-122	
Chloroform	ug/kg	50	47.4	95	75-124	
Ethylbenzene	ug/kg	50	47.3	95	72-123	
Isopropylbenzene (Cumene)	ug/kg	50	47.2	94	65-123	
Methyl-tert-butyl ether	ug/kg	100	78.1	78	68-120	
Naphthalene	ug/kg	50	46.0	92	67-131	
Tetrachloroethene	ug/kg	50	44.6	89	72-126	
Toluene	ug/kg	50	40.0	80	71-121	
Trichloroethene	ug/kg	50	49.9	100	74-123	
Vinyl chloride	ug/kg	50	35.4	71	55-128	
Xylene (Total)	ug/kg	150	141	94	66-124	
4-Bromofluorobenzene (S)	%.			101	56-144	
Dibromofluoromethane (S)	%.			100	85-118	
Toluene-d8 (S)	%.			84	71-128	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road

Pace Project No.: 50109725

QC Batch: MSV/72434

Analysis Method: EPA 8260

QC Batch Method: EPA 8260

Analysis Description: 8260 MSV 5035A Volatile Organics

Associated Lab Samples: 50109725001, 50109725002, 50109725003, 50109725004, 50109725005

METHOD BLANK: 1217007

Matrix: Solid

Associated Lab Samples: 50109725001, 50109725002, 50109725003, 50109725004, 50109725005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,1,2-Tetrachloroethane	ug/kg	ND	5.0	12/31/14 15:35	
1,1,1-Trichloroethane	ug/kg	ND	5.0	12/31/14 15:35	
1,1,2,2-Tetrachloroethane	ug/kg	ND	5.0	12/31/14 15:35	
1,1,2-Trichloroethane	ug/kg	ND	5.0	12/31/14 15:35	
1,1-Dichloroethane	ug/kg	ND	5.0	12/31/14 15:35	
1,1-Dichloroethene	ug/kg	ND	5.0	12/31/14 15:35	
1,1-Dichloropropene	ug/kg	ND	5.0	12/31/14 15:35	
1,2,3-Trichlorobenzene	ug/kg	ND	5.0	12/31/14 15:35	
1,2,3-Trichloropropane	ug/kg	ND	5.0	12/31/14 15:35	
1,2,4-Trichlorobenzene	ug/kg	ND	5.0	12/31/14 15:35	
1,2,4-Trimethylbenzene	ug/kg	ND	5.0	12/31/14 15:35	
1,2-Dibromoethane (EDB)	ug/kg	ND	5.0	12/31/14 15:35	
1,2-Dichlorobenzene	ug/kg	ND	5.0	12/31/14 15:35	
1,2-Dichloroethane	ug/kg	ND	5.0	12/31/14 15:35	
1,2-Dichloropropane	ug/kg	ND	5.0	12/31/14 15:35	
1,3,5-Trimethylbenzene	ug/kg	ND	5.0	12/31/14 15:35	
1,3-Dichlorobenzene	ug/kg	ND	5.0	12/31/14 15:35	
1,3-Dichloropropane	ug/kg	ND	5.0	12/31/14 15:35	
1,4-Dichlorobenzene	ug/kg	ND	5.0	12/31/14 15:35	
1-Methylnaphthalene	ug/kg	ND	10.0	12/31/14 15:35	N2
2,2-Dichloropropane	ug/kg	ND	5.0	12/31/14 15:35	
2-Butanone (MEK)	ug/kg	ND	25.0	12/31/14 15:35	
2-Chlorotoluene	ug/kg	ND	5.0	12/31/14 15:35	
2-Hexanone	ug/kg	ND	100	12/31/14 15:35	
2-Methylnaphthalene	ug/kg	ND	10.0	12/31/14 15:35	
4-Chlorotoluene	ug/kg	ND	5.0	12/31/14 15:35	
4-Methyl-2-pentanone (MIBK)	ug/kg	ND	25.0	12/31/14 15:35	
Acetone	ug/kg	ND	100	12/31/14 15:35	
Acrolein	ug/kg	ND	100	12/31/14 15:35	
Acrylonitrile	ug/kg	ND	100	12/31/14 15:35	
Benzene	ug/kg	ND	5.0	12/31/14 15:35	
Bromobenzene	ug/kg	ND	5.0	12/31/14 15:35	
Bromochloromethane	ug/kg	ND	5.0	12/31/14 15:35	
Bromodichloromethane	ug/kg	ND	5.0	12/31/14 15:35	
Bromoform	ug/kg	ND	5.0	12/31/14 15:35	
Bromomethane	ug/kg	ND	5.0	12/31/14 15:35	
Carbon disulfide	ug/kg	ND	10.0	12/31/14 15:35	
Carbon tetrachloride	ug/kg	ND	5.0	12/31/14 15:35	
Chlorobenzene	ug/kg	ND	5.0	12/31/14 15:35	
Chloroethane	ug/kg	ND	5.0	12/31/14 15:35	
Chloroform	ug/kg	ND	5.0	12/31/14 15:35	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road

Pace Project No.: 50109725

METHOD BLANK: 1217007

Matrix: Solid

Associated Lab Samples: 50109725001, 50109725002, 50109725003, 50109725004, 50109725005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloromethane	ug/kg	ND	5.0	12/31/14 15:35	
cis-1,2-Dichloroethene	ug/kg	ND	5.0	12/31/14 15:35	
cis-1,3-Dichloropropene	ug/kg	ND	5.0	12/31/14 15:35	
Dibromochloromethane	ug/kg	ND	5.0	12/31/14 15:35	
Dibromomethane	ug/kg	ND	5.0	12/31/14 15:35	
Dichlorodifluoromethane	ug/kg	ND	5.0	12/31/14 15:35	
Ethyl methacrylate	ug/kg	ND	100	12/31/14 15:35	
Ethylbenzene	ug/kg	ND	5.0	12/31/14 15:35	
Hexachloro-1,3-butadiene	ug/kg	ND	5.0	12/31/14 15:35	
Iodomethane	ug/kg	ND	100	12/31/14 15:35	
Isopropylbenzene (Cumene)	ug/kg	ND	5.0	12/31/14 15:35	
Methyl-tert-butyl ether	ug/kg	ND	5.0	12/31/14 15:35	
Methylene Chloride	ug/kg	ND	20.0	12/31/14 15:35	
n-Butylbenzene	ug/kg	ND	5.0	12/31/14 15:35	
n-Hexane	ug/kg	ND	5.0	12/31/14 15:35	
n-Propylbenzene	ug/kg	ND	5.0	12/31/14 15:35	
Naphthalene	ug/kg	ND	5.0	12/31/14 15:35	
p-Isopropyltoluene	ug/kg	ND	5.0	12/31/14 15:35	
sec-Butylbenzene	ug/kg	ND	5.0	12/31/14 15:35	
Styrene	ug/kg	ND	5.0	12/31/14 15:35	
tert-Butylbenzene	ug/kg	ND	5.0	12/31/14 15:35	
Tetrachloroethene	ug/kg	ND	5.0	12/31/14 15:35	
Toluene	ug/kg	ND	5.0	12/31/14 15:35	
trans-1,2-Dichloroethene	ug/kg	ND	5.0	12/31/14 15:35	
trans-1,3-Dichloropropene	ug/kg	ND	5.0	12/31/14 15:35	
trans-1,4-Dichloro-2-butene	ug/kg	ND	100	12/31/14 15:35	
Trichloroethene	ug/kg	ND	5.0	12/31/14 15:35	
Trichlorofluoromethane	ug/kg	ND	5.0	12/31/14 15:35	
Vinyl acetate	ug/kg	ND	100	12/31/14 15:35	
Vinyl chloride	ug/kg	ND	5.0	12/31/14 15:35	
Xylene (Total)	ug/kg	ND	10.0	12/31/14 15:35	
4-Bromofluorobenzene (S)	%	100	56-144	12/31/14 15:35	
Dibromofluoromethane (S)	%	102	85-118	12/31/14 15:35	
Toluene-d8 (S)	%	84	71-128	12/31/14 15:35	

LABORATORY CONTROL SAMPLE: 1217008

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,1-Trichloroethane	ug/kg	50	51.8	104	70-123	
1,1,2,2-Tetrachloroethane	ug/kg	50	54.8	110	65-124	
1,1-Dichloroethene	ug/kg	50	37.7	75	66-126	
1,2,4-Trimethylbenzene	ug/kg	50	49.6	99	67-126	
1,2-Dichloropropane	ug/kg	50	47.7	95	75-118	
Benzene	ug/kg	50	45.6	91	74-119	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road

Pace Project No.: 50109725

LABORATORY CONTROL SAMPLE: 1217008

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chlorobenzene	ug/kg	50	47.3	95	77-122	
Chloroform	ug/kg	50	48.7	97	75-124	
Ethylbenzene	ug/kg	50	46.9	94	72-123	
Isopropylbenzene (Cumene)	ug/kg	50	48.1	96	65-123	
Methyl-tert-butyl ether	ug/kg	100	81.2	81	68-120	
Naphthalene	ug/kg	50	49.6	99	67-131	
Tetrachloroethene	ug/kg	50	42.2	84	72-126	
Toluene	ug/kg	50	41.2	82	71-121	
Trichloroethene	ug/kg	50	48.5	97	74-123	
Vinyl chloride	ug/kg	50	36.2	72	55-128	
Xylene (Total)	ug/kg	150	142	95	66-124	
4-Bromofluorobenzene (S)	%.			100	56-144	
Dibromofluoromethane (S)	%.			102	85-118	
Toluene-d8 (S)	%.			83	71-128	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1217009 1217010

Parameter	Units	50109506003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	Qual
1,1,1-Trichloroethane	ug/kg	ND	55.3	57.6	48.3	52.6	87	91	26-143	8	20
1,1,2,2-Tetrachloroethane	ug/kg	ND	55.3	57.6	60.0	56.7	109	98	10-156	6	20
1,1-Dichloroethene	ug/kg	ND	55.3	57.6	55.4	55.6	100	97	31-146	0	20
1,2,4-Trimethylbenzene	ug/kg	1680	55.3	57.6	246	134	-2600	-2690	10-139	59	20 M0,R1
1,2-Dichloropropane	ug/kg	ND	55.3	57.6	58.5	57.1	106	99	29-135	3	20
Benzene	ug/kg	ND	55.3	57.6	54.1	55.6	98	96	27-140	3	20
Chlorobenzene	ug/kg	ND	55.3	57.6	50.0	51.9	90	90	10-136	4	20
Chloroform	ug/kg	ND	55.3	57.6	41.5	45.3	75	79	36-138	9	20
Ethylbenzene	ug/kg	ND	55.3	57.6	57.7	58.4	104	101	10-144	1	20
Isopropylbenzene (Cumene)	ug/kg	20.4	55.3	57.6	69.2	65.7	88	79	10-134	5	20
Methyl-tert-butyl ether	ug/kg	ND	110	116	95.2	94.3	86	82	30-147	1	20
Naphthalene	ug/kg	ND	55.3	57.6	41.8	48.6	76	84	10-130	15	20
Tetrachloroethene	ug/kg	ND	55.3	57.6	59.2	60.9	107	106	10-153	3	20
Toluene	ug/kg	ND	55.3	57.6	57.6	58.9	104	102	10-140	2	20
Trichloroethene	ug/kg	ND	55.3	57.6	63.9	63.1	116	110	17-148	1	20
Vinyl chloride	ug/kg	ND	55.3	57.6	46.1	47.1	83	82	30-145	2	20
Xylene (Total)	ug/kg	ND	166	172	175	173	105	100	10-143	1	20
4-Bromofluorobenzene (S)	%.						110	100	56-144		
Dibromofluoromethane (S)	%.						77	78	85-118		S1
Toluene-d8 (S)	%.						135	116	71-128		S0

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road

Pace Project No.: 50109725

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1217029 1217030											
Parameter	Units	50109725003 Result	MS	MSD	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	Qual
			Spike Conc.	Spike Conc.							
1,1,1-Trichloroethane	ug/kg	ND	70.8	58.4	58.1	56.5	82	97	26-143	3	20
1,1,2,2-Tetrachloroethane	ug/kg	ND	70.8	58.4	63.4	46.0	90	79	10-156	32	R1
1,1-Dichloroethene	ug/kg	ND	70.8	58.4	39.4	39.4	56	67	31-146	0	20
1,2,4-Trimethylbenzene	ug/kg	ND	70.8	58.4	48.6	38.7	68	66	10-139	23	R1
1,2-Dichloropropane	ug/kg	ND	70.8	58.4	61.3	55.2	87	95	29-135	11	20
Benzene	ug/kg	ND	70.8	58.4	56.0	52.6	79	90	27-140	6	20
Chlorobenzene	ug/kg	ND	70.8	58.4	54.2	45.5	77	78	10-136	17	20
Chloroform	ug/kg	ND	70.8	58.4	58.6	56.3	83	96	36-138	4	20
Ethylbenzene	ug/kg	ND	70.8	58.4	51.9	44.8	73	77	10-144	15	20
Isopropylbenzene (Cumene)	ug/kg	ND	70.8	58.4	49.2	42.3	69	72	10-134	15	20
Methyl-tert-butyl ether	ug/kg	ND	141	117	107	94.6	76	81	30-147	13	20
Naphthalene	ug/kg	ND	70.8	58.4	38.1	22.0	54	38	10-130	54	R1
Tetrachloroethene	ug/kg	ND	70.8	58.4	45.9	42.2	65	72	10-153	8	20
Toluene	ug/kg	ND	70.8	58.4	47.4	43.2	67	74	10-140	9	20
Trichloroethene	ug/kg	ND	70.8	58.4	56.1	53.8	79	92	17-148	4	20
Vinyl chloride	ug/kg	ND	70.8	58.4	44.0	38.1	62	65	30-145	14	20
Xylene (Total)	ug/kg	ND	213	175	156	131	74	75	10-143	18	20
4-Bromofluorobenzene (S)	%						98	97	56-144		
Dibromofluoromethane (S)	%						99	99	85-118		
Toluene-d8 (S)	%						88	85	71-128		

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road

Pace Project No.: 50109725

QC Batch: MSV/72487

Analysis Method: EPA 8260

QC Batch Method: EPA 8260

Analysis Description: 8260 MSV 5035A Volatile Organics

Associated Lab Samples: 50109725010

METHOD BLANK: 1217500

Matrix: Solid

Associated Lab Samples: 50109725010

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,1,2-Tetrachloroethane	ug/kg	ND	5.0	01/03/15 06:14	
1,1,1-Trichloroethane	ug/kg	ND	5.0	01/03/15 06:14	
1,1,2,2-Tetrachloroethane	ug/kg	ND	5.0	01/03/15 06:14	
1,1,2-Trichloroethane	ug/kg	ND	5.0	01/03/15 06:14	
1,1-Dichloroethane	ug/kg	ND	5.0	01/03/15 06:14	
1,1-Dichloroethene	ug/kg	ND	5.0	01/03/15 06:14	
1,1-Dichloropropene	ug/kg	ND	5.0	01/03/15 06:14	
1,2,3-Trichlorobenzene	ug/kg	ND	5.0	01/03/15 06:14	
1,2,3-Trichloropropane	ug/kg	ND	5.0	01/03/15 06:14	
1,2,4-Trichlorobenzene	ug/kg	ND	5.0	01/03/15 06:14	
1,2,4-Trimethylbenzene	ug/kg	ND	5.0	01/03/15 06:14	
1,2-Dibromoethane (EDB)	ug/kg	ND	5.0	01/03/15 06:14	
1,2-Dichlorobenzene	ug/kg	ND	5.0	01/03/15 06:14	
1,2-Dichloroethane	ug/kg	ND	5.0	01/03/15 06:14	
1,2-Dichloropropane	ug/kg	ND	5.0	01/03/15 06:14	
1,3,5-Trimethylbenzene	ug/kg	ND	5.0	01/03/15 06:14	
1,3-Dichlorobenzene	ug/kg	ND	5.0	01/03/15 06:14	
1,3-Dichloropropane	ug/kg	ND	5.0	01/03/15 06:14	
1,4-Dichlorobenzene	ug/kg	ND	5.0	01/03/15 06:14	
1-Methylnaphthalene	ug/kg	ND	10.0	01/03/15 06:14	N2
2,2-Dichloropropane	ug/kg	ND	5.0	01/03/15 06:14	
2-Butanone (MEK)	ug/kg	ND	25.0	01/03/15 06:14	
2-Chlorotoluene	ug/kg	ND	5.0	01/03/15 06:14	
2-Hexanone	ug/kg	ND	100	01/03/15 06:14	
2-Methylnaphthalene	ug/kg	ND	10.0	01/03/15 06:14	
4-Chlorotoluene	ug/kg	ND	5.0	01/03/15 06:14	
4-Methyl-2-pentanone (MIBK)	ug/kg	ND	25.0	01/03/15 06:14	
Acetone	ug/kg	ND	100	01/03/15 06:14	
Acrolein	ug/kg	ND	100	01/03/15 06:14	
Acrylonitrile	ug/kg	ND	100	01/03/15 06:14	
Benzene	ug/kg	ND	5.0	01/03/15 06:14	
Bromobenzene	ug/kg	ND	5.0	01/03/15 06:14	
Bromochloromethane	ug/kg	ND	5.0	01/03/15 06:14	
Bromodichloromethane	ug/kg	ND	5.0	01/03/15 06:14	
Bromoform	ug/kg	ND	5.0	01/03/15 06:14	
Bromomethane	ug/kg	ND	5.0	01/03/15 06:14	
Carbon disulfide	ug/kg	ND	10.0	01/03/15 06:14	
Carbon tetrachloride	ug/kg	ND	5.0	01/03/15 06:14	
Chlorobenzene	ug/kg	ND	5.0	01/03/15 06:14	
Chloroethane	ug/kg	ND	5.0	01/03/15 06:14	
Chloroform	ug/kg	ND	5.0	01/03/15 06:14	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road

Pace Project No.: 50109725

METHOD BLANK: 1217500

Matrix: Solid

Associated Lab Samples: 50109725010

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloromethane	ug/kg	ND	5.0	01/03/15 06:14	
cis-1,2-Dichloroethene	ug/kg	ND	5.0	01/03/15 06:14	
cis-1,3-Dichloropropene	ug/kg	ND	5.0	01/03/15 06:14	
Dibromochloromethane	ug/kg	ND	5.0	01/03/15 06:14	
Dibromomethane	ug/kg	ND	5.0	01/03/15 06:14	
Dichlorodifluoromethane	ug/kg	ND	5.0	01/03/15 06:14	
Ethyl methacrylate	ug/kg	ND	100	01/03/15 06:14	
Ethylbenzene	ug/kg	ND	5.0	01/03/15 06:14	
Hexachloro-1,3-butadiene	ug/kg	ND	5.0	01/03/15 06:14	
Iodomethane	ug/kg	ND	100	01/03/15 06:14	
Isopropylbenzene (Cumene)	ug/kg	ND	5.0	01/03/15 06:14	
Methyl-tert-butyl ether	ug/kg	ND	5.0	01/03/15 06:14	
Methylene Chloride	ug/kg	ND	20.0	01/03/15 06:14	
n-Butylbenzene	ug/kg	ND	5.0	01/03/15 06:14	
n-Hexane	ug/kg	ND	5.0	01/03/15 06:14	
n-Propylbenzene	ug/kg	ND	5.0	01/03/15 06:14	
Naphthalene	ug/kg	ND	5.0	01/03/15 06:14	
p-Isopropyltoluene	ug/kg	ND	5.0	01/03/15 06:14	
sec-Butylbenzene	ug/kg	ND	5.0	01/03/15 06:14	
Styrene	ug/kg	ND	5.0	01/03/15 06:14	
tert-Butylbenzene	ug/kg	ND	5.0	01/03/15 06:14	
Tetrachloroethene	ug/kg	ND	5.0	01/03/15 06:14	
Toluene	ug/kg	ND	5.0	01/03/15 06:14	
trans-1,2-Dichloroethene	ug/kg	ND	5.0	01/03/15 06:14	
trans-1,3-Dichloropropene	ug/kg	ND	5.0	01/03/15 06:14	
trans-1,4-Dichloro-2-butene	ug/kg	ND	100	01/03/15 06:14	
Trichloroethene	ug/kg	ND	5.0	01/03/15 06:14	
Trichlorofluoromethane	ug/kg	ND	5.0	01/03/15 06:14	
Vinyl acetate	ug/kg	ND	100	01/03/15 06:14	
Vinyl chloride	ug/kg	ND	5.0	01/03/15 06:14	
Xylene (Total)	ug/kg	ND	10.0	01/03/15 06:14	
4-Bromofluorobenzene (S)	%	99	56-144	01/03/15 06:14	
Dibromofluoromethane (S)	%	101	85-118	01/03/15 06:14	
Toluene-d8 (S)	%	100	71-128	01/03/15 06:14	

LABORATORY CONTROL SAMPLE: 1217501

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,1-Trichloroethane	ug/kg	50	54.4	109	70-123	
1,1,2,2-Tetrachloroethane	ug/kg	50	50.5	101	65-124	
1,1-Dichloroethene	ug/kg	50	60.4	121	66-126	
1,2,4-Trimethylbenzene	ug/kg	50	52.7	105	67-126	
1,2-Dichloropropane	ug/kg	50	53.5	107	75-118	
Benzene	ug/kg	50	51.7	103	74-119	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road

Pace Project No.: 50109725

LABORATORY CONTROL SAMPLE: 1217501

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chlorobenzene	ug/kg	50	49.7	99	77-122	
Chloroform	ug/kg	50	52.9	106	75-124	
Ethylbenzene	ug/kg	50	53.3	107	72-123	
Isopropylbenzene (Cumene)	ug/kg	50	55.6	111	65-123	
Methyl-tert-butyl ether	ug/kg	100	137	137	68-120	L3
Naphthalene	ug/kg	50	52.8	106	67-131	
Tetrachloroethene	ug/kg	50	48.1	96	72-126	
Toluene	ug/kg	50	51.7	103	71-121	
Trichloroethene	ug/kg	50	53.2	106	74-123	
Vinyl chloride	ug/kg	50	43.3	87	55-128	
Xylene (Total)	ug/kg	150	160	107	66-124	
4-Bromofluorobenzene (S)	%.			100	56-144	
Dibromofluoromethane (S)	%.			99	85-118	
Toluene-d8 (S)	%.			99	71-128	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road

Pace Project No.: 50109725

QC Batch:	OEXT/37896	Analysis Method:	EPA 8270 by SIM
QC Batch Method:	EPA 3546	Analysis Description:	8270 MSSV PAH by SIM
Associated Lab Samples:	50109725001, 50109725003, 50109725004, 50109725005, 50109725006, 50109725007, 50109725008, 50109725009		

METHOD BLANK: 1214451

Matrix: Solid

Associated Lab Samples: 50109725001, 50109725003, 50109725004, 50109725005, 50109725006, 50109725007, 50109725008, 50109725009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1-Methylnaphthalene	ug/kg	ND	5.0	12/29/14 22:33	
2-Methylnaphthalene	ug/kg	ND	5.0	12/29/14 22:33	
Acenaphthene	ug/kg	ND	5.0	12/29/14 22:33	
Acenaphthylene	ug/kg	ND	5.0	12/29/14 22:33	
Anthracene	ug/kg	ND	5.0	12/29/14 22:33	
Benzo(a)anthracene	ug/kg	ND	5.0	12/29/14 22:33	
Benzo(a)pyrene	ug/kg	ND	5.0	12/29/14 22:33	
Benzo(b)fluoranthene	ug/kg	ND	5.0	12/29/14 22:33	
Benzo(g,h,i)perylene	ug/kg	ND	5.0	12/29/14 22:33	
Benzo(k)fluoranthene	ug/kg	ND	5.0	12/29/14 22:33	
Chrysene	ug/kg	ND	5.0	12/29/14 22:33	
Dibenz(a,h)anthracene	ug/kg	ND	5.0	12/29/14 22:33	
Fluoranthene	ug/kg	ND	5.0	12/29/14 22:33	
Fluorene	ug/kg	ND	5.0	12/29/14 22:33	
Indeno(1,2,3-cd)pyrene	ug/kg	ND	5.0	12/29/14 22:33	
Naphthalene	ug/kg	ND	5.0	12/29/14 22:33	
Phenanthrene	ug/kg	ND	5.0	12/29/14 22:33	
Pyrene	ug/kg	ND	5.0	12/29/14 22:33	
2-Fluorobiphenyl (S)	%	59	38-110	12/29/14 22:33	
p-Terphenyl-d14 (S)	%	64	32-111	12/29/14 22:33	

LABORATORY CONTROL SAMPLE: 1214452

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1-Methylnaphthalene	ug/kg	333	216	65	40-102	
2-Methylnaphthalene	ug/kg	333	216	65	39-104	
Acenaphthene	ug/kg	333	218	65	43-108	
Acenaphthylene	ug/kg	333	219	66	44-110	
Anthracene	ug/kg	333	238	71	44-112	
Benzo(a)anthracene	ug/kg	333	221	66	43-124	
Benzo(a)pyrene	ug/kg	333	195	58	44-124	
Benzo(b)fluoranthene	ug/kg	333	188	56	44-123	
Benzo(g,h,i)perylene	ug/kg	333	179	54	44-118	
Benzo(k)fluoranthene	ug/kg	333	193	58	42-122	
Chrysene	ug/kg	333	244	73	44-124	
Dibenz(a,h)anthracene	ug/kg	333	186	56	44-119	
Fluoranthene	ug/kg	333	235	71	45-119	
Fluorene	ug/kg	333	222	67	44-113	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road

Pace Project No.: 50109725

LABORATORY CONTROL SAMPLE: 1214452

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Indeno(1,2,3-cd)pyrene	ug/kg	333	179	54	44-119	
Naphthalene	ug/kg	333	205	61	42-103	
Phenanthrene	ug/kg	333	226	68	44-113	
Pyrene	ug/kg	333	230	69	45-123	
2-Fluorobiphenyl (S)	%			58	38-110	
p-Terphenyl-d14 (S)	%			61	32-111	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1214453 1214454

Parameter	Units	50109725003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1-Methylnaphthalene	ug/kg	ND	358	357	167	204	47	57	20-116	20	20	
2-Methylnaphthalene	ug/kg	ND	358	357	169	209	47	58	10-131	21	20	R1
Acenaphthene	ug/kg	ND	358	357	170	212	47	59	25-117	22	20	R1
Acenaphthylene	ug/kg	ND	358	357	171	213	48	60	27-123	22	20	R1
Anthracene	ug/kg	ND	358	357	188	215	52	60	20-123	13	20	
Benzo(a)anthracene	ug/kg	ND	358	357	180	205	50	57	23-124	13	20	
Benzo(a)pyrene	ug/kg	ND	358	357	151	172	42	48	23-120	13	20	
Benzo(b)fluoranthene	ug/kg	ND	358	357	146	173	41	48	24-117	17	20	
Benzo(g,h,i)perylene	ug/kg	ND	358	357	149	164	41	45	12-122	10	20	
Benzo(k)fluoranthene	ug/kg	ND	358	357	156	170	43	48	14-123	9	20	
Chrysene	ug/kg	ND	358	357	181	212	50	58	22-124	16	20	
Dibenz(a,h)anthracene	ug/kg	ND	358	357	150	172	42	48	26-113	13	20	
Fluoranthene	ug/kg	ND	358	357	194	221	53	61	21-125	13	20	
Fluorene	ug/kg	ND	358	357	174	210	49	59	19-127	19	20	
Indeno(1,2,3-cd)pyrene	ug/kg	ND	358	357	147	165	41	46	15-121	12	20	
Naphthalene	ug/kg	ND	358	357	153	193	43	54	15-125	23	20	R1
Phenanthrene	ug/kg	ND	358	357	191	221	53	61	10-139	15	20	
Pyrene	ug/kg	ND	358	357	182	208	50	57	17-132	13	20	
2-Fluorobiphenyl (S)	%						42	51	38-110			
p-Terphenyl-d14 (S)	%						43	53	32-111			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road

Pace Project No.: 50109725

QC Batch: OEXT/37940

Analysis Method: EPA 8270 by SIM

QC Batch Method: EPA 3546

Analysis Description: 8270 MSSV PAH by SIM

Associated Lab Samples: 50109725002

METHOD BLANK: 1216408

Matrix: Solid

Associated Lab Samples: 50109725002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1-Methylnaphthalene	ug/kg	ND	5.0	01/02/15 11:49	
2-Methylnaphthalene	ug/kg	ND	5.0	01/02/15 11:49	
Acenaphthene	ug/kg	ND	5.0	01/02/15 11:49	
Acenaphthylene	ug/kg	ND	5.0	01/02/15 11:49	
Anthracene	ug/kg	ND	5.0	01/02/15 11:49	
Benzo(a)anthracene	ug/kg	ND	5.0	01/02/15 11:49	
Benzo(a)pyrene	ug/kg	ND	5.0	01/02/15 11:49	
Benzo(b)fluoranthene	ug/kg	ND	5.0	01/02/15 11:49	
Benzo(g,h,i)perylene	ug/kg	ND	5.0	01/02/15 11:49	
Benzo(k)fluoranthene	ug/kg	ND	5.0	01/02/15 11:49	
Chrysene	ug/kg	ND	5.0	01/02/15 11:49	
Dibenz(a,h)anthracene	ug/kg	ND	5.0	01/02/15 11:49	
Fluoranthene	ug/kg	ND	5.0	01/02/15 11:49	
Fluorene	ug/kg	ND	5.0	01/02/15 11:49	
Indeno(1,2,3-cd)pyrene	ug/kg	ND	5.0	01/02/15 11:49	
Naphthalene	ug/kg	ND	5.0	01/02/15 11:49	
Phenanthrene	ug/kg	ND	5.0	01/02/15 11:49	
Pyrene	ug/kg	ND	5.0	01/02/15 11:49	
2-Fluorobiphenyl (S)	%	74	38-110	01/02/15 11:49	
p-Terphenyl-d14 (S)	%	75	32-111	01/02/15 11:49	

LABORATORY CONTROL SAMPLE: 1216409

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1-Methylnaphthalene	ug/kg	333	242	73	40-102	
2-Methylnaphthalene	ug/kg	333	247	74	39-104	
Acenaphthene	ug/kg	333	250	75	43-108	
Acenaphthylene	ug/kg	333	251	75	44-110	
Anthracene	ug/kg	333	267	80	44-112	
Benzo(a)anthracene	ug/kg	333	246	74	43-124	
Benzo(a)pyrene	ug/kg	333	213	64	44-124	
Benzo(b)fluoranthene	ug/kg	333	198	59	44-123	
Benzo(g,h,i)perylene	ug/kg	333	208	62	44-118	
Benzo(k)fluoranthene	ug/kg	333	222	67	42-122	
Chrysene	ug/kg	333	263	79	44-124	
Dibenz(a,h)anthracene	ug/kg	333	212	64	44-119	
Fluoranthene	ug/kg	333	271	81	45-119	
Fluorene	ug/kg	333	259	78	44-113	
Indeno(1,2,3-cd)pyrene	ug/kg	333	205	61	44-119	
Naphthalene	ug/kg	333	229	69	42-103	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road

Pace Project No.: 50109725

LABORATORY CONTROL SAMPLE: 1216409

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phenanthrene	ug/kg	333	262	78	44-113	
Pyrene	ug/kg	333	254	76	45-123	
2-Fluorobiphenyl (S)	%.			68	38-110	
p-Terphenyl-d14 (S)	%.			69	32-111	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road

Pace Project No.: 50109725

QC Batch: OEXT/37880

Analysis Method: EPA 8270

QC Batch Method: EPA 3546

Analysis Description: 8270 Solid MSSV Microwave Short Spike

Associated Lab Samples: 50109725001, 50109725002, 50109725003, 50109725004, 50109725005, 50109725006, 50109725007, 50109725009

METHOD BLANK: 1213939

Matrix: Solid

Associated Lab Samples: 50109725001, 50109725002, 50109725003, 50109725004, 50109725005, 50109725006, 50109725007, 50109725009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
2,4,5-Trichlorophenol	ug/kg	ND	330	12/24/14 08:48	
2,4,6-Trichlorophenol	ug/kg	ND	330	12/24/14 08:48	
2,4-Dichlorophenol	ug/kg	ND	330	12/24/14 08:48	
2,4-Dimethylphenol	ug/kg	ND	330	12/24/14 08:48	
2,4-Dinitrophenol	ug/kg	ND	1600	12/24/14 08:48	
2,4-Dinitrotoluene	ug/kg	ND	330	12/24/14 08:48	
2,6-Dinitrotoluene	ug/kg	ND	330	12/24/14 08:48	
2-Chloronaphthalene	ug/kg	ND	330	12/24/14 08:48	
2-Chlorophenol	ug/kg	ND	330	12/24/14 08:48	
2-Methylphenol(o-Cresol)	ug/kg	ND	330	12/24/14 08:48	
2-Nitroaniline	ug/kg	ND	1600	12/24/14 08:48	
2-Nitrophenol	ug/kg	ND	330	12/24/14 08:48	
3&4-Methylphenol(m&p Cresol)	ug/kg	ND	660	12/24/14 08:48	
3,3'-Dichlorobenzidine	ug/kg	ND	660	12/24/14 08:48	
3-Nitroaniline	ug/kg	ND	1600	12/24/14 08:48	
4,6-Dinitro-2-methylphenol	ug/kg	ND	1600	12/24/14 08:48	
4-Bromophenylphenyl ether	ug/kg	ND	330	12/24/14 08:48	
4-Chloro-3-methylphenol	ug/kg	ND	660	12/24/14 08:48	
4-Chloroaniline	ug/kg	ND	660	12/24/14 08:48	
4-Chlorophenylphenyl ether	ug/kg	ND	330	12/24/14 08:48	
4-Nitroaniline	ug/kg	ND	1600	12/24/14 08:48	
4-Nitrophenol	ug/kg	ND	1600	12/24/14 08:48	
Benzyl alcohol	ug/kg	ND	660	12/24/14 08:48	
bis(2-Chloroethoxy)methane	ug/kg	ND	330	12/24/14 08:48	
bis(2-Chloroethyl) ether	ug/kg	ND	330	12/24/14 08:48	
bis(2-Ethylhexyl)phthalate	ug/kg	ND	330	12/24/14 08:48	
bis(2chloro1methylethyl) ether	ug/kg	ND	330	12/24/14 08:48	
Butylbenzylphthalate	ug/kg	ND	330	12/24/14 08:48	
Di-n-butylphthalate	ug/kg	ND	330	12/24/14 08:48	
Di-n-octylphthalate	ug/kg	ND	330	12/24/14 08:48	
Dibenzofuran	ug/kg	ND	330	12/24/14 08:48	
Diethylphthalate	ug/kg	ND	330	12/24/14 08:48	
Dimethylphthalate	ug/kg	ND	330	12/24/14 08:48	
Hexachloro-1,3-butadiene	ug/kg	ND	330	12/24/14 08:48	
Hexachlorobenzene	ug/kg	ND	330	12/24/14 08:48	
Hexachlorocyclopentadiene	ug/kg	ND	330	12/24/14 08:48	
Hexachloroethane	ug/kg	ND	330	12/24/14 08:48	
Isophorone	ug/kg	ND	330	12/24/14 08:48	
N-Nitroso-di-n-propylamine	ug/kg	ND	330	12/24/14 08:48	
N-Nitrosodiphenylamine	ug/kg	ND	330	12/24/14 08:48	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road

Pace Project No.: 50109725

METHOD BLANK: 1213939

Matrix: Solid

Associated Lab Samples: 50109725001, 50109725002, 50109725003, 50109725004, 50109725005, 50109725006, 50109725007, 50109725009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrobenzene	ug/kg	ND	330	12/24/14 08:48	
Pentachlorophenol	ug/kg	ND	1600	12/24/14 08:48	
Phenol	ug/kg	ND	330	12/24/14 08:48	
2,4,6-Tribromophenol (S)	%	67	16-122	12/24/14 08:48	
2-Fluorobiphenyl (S)	%	62	31-94	12/24/14 08:48	
2-Fluorophenol (S)	%	66	24-104	12/24/14 08:48	
Nitrobenzene-d5 (S)	%	61	28-101	12/24/14 08:48	
p-Terphenyl-d14 (S)	%	74	26-110	12/24/14 08:48	
Phenol-d5 (S)	%	65	28-101	12/24/14 08:48	

LABORATORY CONTROL SAMPLE: 1213940

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
2,4-Dinitrotoluene	ug/kg	3330	1940	58	39-103	
2-Chlorophenol	ug/kg	3330	2150	64	38-96	
4-Chloro-3-methylphenol	ug/kg	3330	2240	67	38-104	
4-Nitrophenol	ug/kg	3330	2130	64	34-104	
N-Nitroso-di-n-propylamine	ug/kg	3330	1980	59	37-96	
Pentachlorophenol	ug/kg	3330	1910	57	21-103	
Phenol	ug/kg	3330	2100	63	37-101	
2,4,6-Tribromophenol (S)	%			63	16-122	
2-Fluorobiphenyl (S)	%			60	31-94	
2-Fluorophenol (S)	%			67	24-104	
Nitrobenzene-d5 (S)	%			60	28-101	
p-Terphenyl-d14 (S)	%			69	26-110	
Phenol-d5 (S)	%			66	28-101	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1213942

1213943

Parameter	Units	50109725003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
2,4-Dinitrotoluene	ug/kg	ND	3580	3550	1530	1190	43	33	15-102	25	20	R1
2-Chlorophenol	ug/kg	ND	3580	3550	2040	1380	57	39	22-96	38	20	R1
4-Chloro-3-methylphenol	ug/kg	ND	3580	3550	2020	1460	56	41	21-105	32	20	R1
4-Nitrophenol	ug/kg	ND	3580	3550	2230	1630J	62	46	12-107		20	
N-Nitroso-di-n-propylamine	ug/kg	ND	3580	3550	1860	1260	52	35	18-103	39	20	R1
Pentachlorophenol	ug/kg	ND	3580	3550	2040	1530J	57	43	10-100		20	
Phenol	ug/kg	ND	3580	3550	2000	1370	56	39	22-97	37	20	R1
2,4,6-Tribromophenol (S)	%						53	42	16-122			
2-Fluorobiphenyl (S)	%						49	36	31-94			
2-Fluorophenol (S)	%						57	38	24-104			
Nitrobenzene-d5 (S)	%						50	34	26-98			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road

Pace Project No.: 50109725

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1213942 1213943											
Parameter	Units	50109725003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	Qual
p-Terphenyl-d14 (S)	%.						58	44	26-110		
Phenol-d5 (S)	%.						58	39	28-101		

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road

Pace Project No.: 50109725

QC Batch: OEXT/37934

Analysis Method: EPA 8270

QC Batch Method: EPA 3546

Analysis Description: 8270 Solid MSSV Microwave Short Spike

Associated Lab Samples: 50109725008

METHOD BLANK: 1216225

Matrix: Solid

Associated Lab Samples: 50109725008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
2,4,5-Trichlorophenol	ug/kg	ND	330	12/29/14 19:39	
2,4,6-Trichlorophenol	ug/kg	ND	330	12/29/14 19:39	
2,4-Dichlorophenol	ug/kg	ND	330	12/29/14 19:39	
2,4-Dimethylphenol	ug/kg	ND	330	12/29/14 19:39	
2,4-Dinitrophenol	ug/kg	ND	1600	12/29/14 19:39	
2,4-Dinitrotoluene	ug/kg	ND	330	12/29/14 19:39	
2,6-Dinitrotoluene	ug/kg	ND	330	12/29/14 19:39	
2-Chloronaphthalene	ug/kg	ND	330	12/29/14 19:39	
2-Chlorophenol	ug/kg	ND	330	12/29/14 19:39	
2-Methylphenol(o-Cresol)	ug/kg	ND	330	12/29/14 19:39	
2-Nitroaniline	ug/kg	ND	1600	12/29/14 19:39	
2-Nitrophenol	ug/kg	ND	330	12/29/14 19:39	
3&4-Methylphenol(m&p Cresol)	ug/kg	ND	660	12/29/14 19:39	
3,3'-Dichlorobenzidine	ug/kg	ND	660	12/29/14 19:39	
3-Nitroaniline	ug/kg	ND	1600	12/29/14 19:39	
4,6-Dinitro-2-methylphenol	ug/kg	ND	1600	12/29/14 19:39	
4-Bromophenylphenyl ether	ug/kg	ND	330	12/29/14 19:39	
4-Chloro-3-methylphenol	ug/kg	ND	660	12/29/14 19:39	
4-Chloroaniline	ug/kg	ND	660	12/29/14 19:39	
4-Chlorophenylphenyl ether	ug/kg	ND	330	12/29/14 19:39	
4-Nitroaniline	ug/kg	ND	1600	12/29/14 19:39	
4-Nitrophenol	ug/kg	ND	1600	12/29/14 19:39	
Benzyl alcohol	ug/kg	ND	660	12/29/14 19:39	
bis(2-Chloroethoxy)methane	ug/kg	ND	330	12/29/14 19:39	
bis(2-Chloroethyl) ether	ug/kg	ND	330	12/29/14 19:39	
bis(2-Ethylhexyl)phthalate	ug/kg	ND	330	12/29/14 19:39	
bis(2chloro1methylethyl) ether	ug/kg	ND	330	12/29/14 19:39	
Butylbenzylphthalate	ug/kg	ND	330	12/29/14 19:39	
Di-n-butylphthalate	ug/kg	ND	330	12/29/14 19:39	
Di-n-octylphthalate	ug/kg	ND	330	12/29/14 19:39	
Dibenzofuran	ug/kg	ND	330	12/29/14 19:39	
Diethylphthalate	ug/kg	ND	330	12/29/14 19:39	
Dimethylphthalate	ug/kg	ND	330	12/29/14 19:39	
Hexachloro-1,3-butadiene	ug/kg	ND	330	12/29/14 19:39	
Hexachlorobenzene	ug/kg	ND	330	12/29/14 19:39	
Hexachlorocyclopentadiene	ug/kg	ND	330	12/29/14 19:39	
Hexachloroethane	ug/kg	ND	330	12/29/14 19:39	
Isophorone	ug/kg	ND	330	12/29/14 19:39	
N-Nitroso-di-n-propylamine	ug/kg	ND	330	12/29/14 19:39	
N-Nitrosodiphenylamine	ug/kg	ND	330	12/29/14 19:39	
Nitrobenzene	ug/kg	ND	330	12/29/14 19:39	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road

Pace Project No.: 50109725

METHOD BLANK: 1216225

Matrix: Solid

Associated Lab Samples: 50109725008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Pentachlorophenol	ug/kg	ND	1600	12/29/14 19:39	
Phenol	ug/kg	ND	330	12/29/14 19:39	
2,4,6-Tribromophenol (S)	%.	62	16-122	12/29/14 19:39	
2-Fluorobiphenyl (S)	%.	58	31-94	12/29/14 19:39	
2-Fluorophenol (S)	%.	63	24-104	12/29/14 19:39	
Nitrobenzene-d5 (S)	%.	56	28-101	12/29/14 19:39	
p-Terphenyl-d14 (S)	%.	73	26-110	12/29/14 19:39	
Phenol-d5 (S)	%.	62	28-101	12/29/14 19:39	

LABORATORY CONTROL SAMPLE: 1216226

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
2,4-Dinitrotoluene	ug/kg	3330	2210	66	39-103	
2-Chlorophenol	ug/kg	3330	2280	68	38-96	
4-Chloro-3-methylphenol	ug/kg	3330	2500	75	38-104	
4-Nitrophenol	ug/kg	3330	2510	75	34-104	
N-Nitroso-di-n-propylamine	ug/kg	3330	2020	60	37-96	
Pentachlorophenol	ug/kg	3330	2630	79	21-103	
Phenol	ug/kg	3330	2220	67	37-101	
2,4,6-Tribromophenol (S)	%.			67	16-122	
2-Fluorobiphenyl (S)	%.			57	31-94	
2-Fluorophenol (S)	%.			62	24-104	
Nitrobenzene-d5 (S)	%.			57	28-101	
p-Terphenyl-d14 (S)	%.			69	26-110	
Phenol-d5 (S)	%.			63	28-101	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road

Pace Project No.: 50109725

QC Batch: PMST/10226

Analysis Method: ASTM D2974-87

QC Batch Method: ASTM D2974-87

Analysis Description: Dry Weight/Percent Moisture

Associated Lab Samples: 50109725001, 50109725002, 50109725003, 50109725004, 50109725005, 50109725006, 50109725007, 50109725008, 50109725009

SAMPLE DUPLICATE: 1216341

Parameter	Units	50108474001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	15.1	15.6	3	5	

SAMPLE DUPLICATE: 1216342

Parameter	Units	50109725003 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	7.4	7.9	7	5	R1

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALIFIERS

Project: Karwick Road

Pace Project No.: 50109725

### DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

### ANALYTE QUALIFIERS

- 1d Due to the extract's physical characteristics, the analysis was performed at dilution. CEM 12/31/14
- 2d Surrogate recovery outside laboratory control limits due to matrix interferences; confirmed by similar results from analysis of an in-hold re-extract sample on 12/29/14 at 20:42 on 50MSS7.
- L3 Analyte recovery in the laboratory control sample (LCS) exceeded QC limits. Analyte presence below reporting limits in associated samples. Results unaffected by high bias.
- M0 Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.
- N2 The lab does not hold TNI accreditation for this parameter.
- R1 RPD value was outside control limits.
- S0 Surrogate recovery outside laboratory control limits.
- S1 Surrogate recovery outside laboratory control limits (confirmed by re-analysis).

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Karwick Road

Pace Project No.: 50109725

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
50109725001	TP-1	EPA 3050	MPRP/14967	EPA 6010	ICP/17991
50109725002	TP-2	EPA 3050	MPRP/14967	EPA 6010	ICP/17991
50109725003	TP-5	EPA 3050	MPRP/14967	EPA 6010	ICP/17991
50109725004	TP-7	EPA 3050	MPRP/14967	EPA 6010	ICP/17991
50109725005	FD	EPA 3050	MPRP/14967	EPA 6010	ICP/17991
50109725006	TP-8	EPA 3050	MPRP/14967	EPA 6010	ICP/17991
50109725007	TP-10	EPA 3050	MPRP/14967	EPA 6010	ICP/17991
50109725008	TP-11	EPA 3050	MPRP/14967	EPA 6010	ICP/17991
50109725009	TP-12	EPA 3050	MPRP/14967	EPA 6010	ICP/17991
50109725001	TP-1	EPA 7471	MERP/5981	EPA 7471	MERC/6691
50109725002	TP-2	EPA 7471	MERP/5981	EPA 7471	MERC/6691
50109725003	TP-5	EPA 7471	MERP/5981	EPA 7471	MERC/6691
50109725004	TP-7	EPA 7471	MERP/5981	EPA 7471	MERC/6691
50109725005	FD	EPA 7471	MERP/5981	EPA 7471	MERC/6691
50109725006	TP-8	EPA 7471	MERP/5981	EPA 7471	MERC/6691
50109725007	TP-10	EPA 7471	MERP/5981	EPA 7471	MERC/6691
50109725008	TP-11	EPA 7471	MERP/5981	EPA 7471	MERC/6691
50109725009	TP-12	EPA 7471	MERP/5981	EPA 7471	MERC/6691
50109725001	TP-1	EPA 3546	OEXT/37896	EPA 8270 by SIM	MSSV/16895
50109725002	TP-2	EPA 3546	OEXT/37940	EPA 8270 by SIM	MSSV/16922
50109725003	TP-5	EPA 3546	OEXT/37896	EPA 8270 by SIM	MSSV/16895
50109725004	TP-7	EPA 3546	OEXT/37896	EPA 8270 by SIM	MSSV/16895
50109725005	FD	EPA 3546	OEXT/37896	EPA 8270 by SIM	MSSV/16895
50109725006	TP-8	EPA 3546	OEXT/37896	EPA 8270 by SIM	MSSV/16895
50109725007	TP-10	EPA 3546	OEXT/37896	EPA 8270 by SIM	MSSV/16895
50109725008	TP-11	EPA 3546	OEXT/37896	EPA 8270 by SIM	MSSV/16895
50109725009	TP-12	EPA 3546	OEXT/37896	EPA 8270 by SIM	MSSV/16895
50109725001	TP-1	EPA 3546	OEXT/37880	EPA 8270	MSSV/16882
50109725002	TP-2	EPA 3546	OEXT/37880	EPA 8270	MSSV/16882
50109725003	TP-5	EPA 3546	OEXT/37880	EPA 8270	MSSV/16882
50109725004	TP-7	EPA 3546	OEXT/37880	EPA 8270	MSSV/16882
50109725005	FD	EPA 3546	OEXT/37880	EPA 8270	MSSV/16882
50109725006	TP-8	EPA 3546	OEXT/37880	EPA 8270	MSSV/16882
50109725007	TP-10	EPA 3546	OEXT/37880	EPA 8270	MSSV/16882
50109725008	TP-11	EPA 3546	OEXT/37934	EPA 8270	MSSV/16914
50109725009	TP-12	EPA 3546	OEXT/37880	EPA 8270	MSSV/16882
50109725001	TP-1	EPA 8260	MSV/72434		
50109725002	TP-2	EPA 8260	MSV/72434		
50109725003	TP-5	EPA 8260	MSV/72434		
50109725004	TP-7	EPA 8260	MSV/72434		
50109725005	FD	EPA 8260	MSV/72434		
50109725006	TP-8	EPA 8260	MSV/72433		
50109725007	TP-10	EPA 8260	MSV/72433		
50109725008	TP-11	EPA 8260	MSV/72433		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Karwick Road

Pace Project No.: 50109725

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
50109725009	TP-12	EPA 8260	MSV/72433		
50109725010	Trip Blank	EPA 8260	MSV/72487		
50109725001	TP-1	ASTM D2974-87	PMST/10226		
50109725002	TP-2	ASTM D2974-87	PMST/10226		
50109725003	TP-5	ASTM D2974-87	PMST/10226		
50109725004	TP-7	ASTM D2974-87	PMST/10226		
50109725005	FD	ASTM D2974-87	PMST/10226		
50109725006	TP-8	ASTM D2974-87	PMST/10226		
50109725007	TP-10	ASTM D2974-87	PMST/10226		
50109725008	TP-11	ASTM D2974-87	PMST/10226		
50109725009	TP-12	ASTM D2974-87	PMST/10226		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



# CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

<b>Section A</b> Required Client Information: Company: <b>NEARER BOES</b> Address: <b>7121 GRACE RD</b> City: <b>GRANGE IN 46530</b> Email To: <b>ssstancord@nearerboes.com</b> Phone: <b>574-271-3447</b> Requested Due Date/TAT: <b>NORMAL</b>		<b>Section B</b> Required Project Information: Report To: <b>S. STANCORD</b> Copy To: Purchase Order No.: Project Name: Project Number: <b>1873-350-04-00-03</b>		<b>Section C</b> Invoice Information: Attention: <b>SAR</b> Company Name: Address: Pace Quote Reference: Pace Project Manager: Pace Profile #:	
Page: <b>1</b> of <b>1</b> 1683339		REGULATORY AGENCY <input type="checkbox"/> NPDES <input type="checkbox"/> GROUND WATER <input type="checkbox"/> DRINKING WATER <input type="checkbox"/> UST <input checked="" type="checkbox"/> RCRA <input type="checkbox"/> OTHER Site Location STATE: <b>IN</b>			

ITEM #	Section D Required Client Information	Matrix Codes MATRIX / CODE	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives										Analysis Test ↓ Y/N ↑	PCMs METALS (TOTAL)	VOL	SVC/PAH	MOISTURE	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
			COMPOSITE START	COMPOSITE END/GRAB					DATE	TIME	DATE	TIME	DATE	TIME	DATE	TIME	DATE	TIME							
1	TP-1	DW			G		12-22-14	0830	6																
2	TP-2	WT					12-22-14	0900																	
3	TP-5 + MS/MSD	WW					12-22-14	1030																	
4	TP-7	P						1130																	
5	FD	SL						1131																	
6	TP-8	OL						1200																	
7	TP-10	WP						1345																	
8	TP-11	AR						1415																	
9	TP-12	TS						1445																	
10	TRP BLANK	OT																							
11																									
12																									
ADDITIONAL COMMENTS Label for Pace (ide-id date) SHARF-EX-AR 0066 0804 5617		RELINQUISHED BY / AFFILIATION [Signature]		DATE 12-22-14		TIME 1700		ACCEPTED BY / AFFILIATION CAPTAIN WEAVER / PACE		DATE 12-23-14		TIME 1034		SAMPLE CONDITIONS Y N Y		Temp in °C 5.02		Received on Ice (Y/N)		Custody Sealed Cooler (Y/N)		Samples Intact (Y/N)			

SAMPLER NAME AND SIGNATURE  
 PRINT Name of SAMPLER: **STEVEN STANCORD**  
 SIGNATURE OF SAMPLER: [Signature]  
 DATE Signed (MM/DD/YYYY): **12-22-14**

ORIGINAL



# Sample Condition Upon Receipt

Pace Analytical

Client Name: Weaver Boos

Project # 50109715

Courier: ☒ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other \_\_\_\_\_

Tracking #: 8046 08104 5617

Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☒ Bubble Bags ☐ None ☒ Other Tc Way

Thermometer 1 2 3 4 5 6 A B C D E F

Type of Ice: Wet Blue None ☐ Samples on ice, cooling process has begun

Cooler Temperature 5.0°C  
(Corrected, if applicable)

Ice Visible in Sample Containers: ☐ yes ☒ no

Temp should be above freezing to 6°C

Comments:

Date and initials of person examining contents: 122314 CW

Chain of Custody Present: ☒ Yes ☐ No ☐ N/A

1.

Chain of Custody Filled Out: ☒ Yes ☐ No ☐ N/A

2.

Chain of Custody Relinquished: ☒ Yes ☐ No ☐ N/A

3.

Sampler Name & Signature on COC: ☒ Yes ☐ No ☐ N/A

4.

Short Hold Time Analysis (<72hr): ☐ Yes ☒ No ☐ N/A

5.

Rush Turn Around Time Requested: ☐ Yes ☒ No ☐ N/A

6.

Containers Intact: ☒ Yes ☐ No ☐ N/A

7.

Sample Labels match COC: ☒ Yes ☐ No ☐ N/A

8.

-Includes date/time/ID/Analysis

All containers needing acid/base pres. have been checked? ☐ Yes ☐ No ☒ N/A

9.

(Circle) HNO3 H2SO4 NaOH HCl

exceptions: VOA, coliform, TOC, O&G

All containers needing preservation are found to be in compliance with EPA recommendation (<2, >9, >12) unless otherwise noted.

Headspace in VOA Vials (>6mm): ☐ Yes ☐ No ☒ N/A

10.

Trip Blank Present: ☐ Yes ☐ No ☒ N/A

11.

Trip Blank Custody Seals Present ☐ Yes ☐ No ☒ N/A

Project Manager Review:

Samples Arrived within Hold Time: ☒ Yes ☐ No ☐ N/A

12.

Sufficient Volume: ☒ Yes ☐ No ☐ N/A

13.

Correct Containers Used: ☒ Yes ☐ No ☐ N/A

14.

Client Notification/ Resolution:

Field Data Required? Y / N

Person Contacted: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Comments/ Resolution: \_\_\_\_\_

Project Manager Review:

Date: 12-23-14



# Sample Container Count



CLIENT: Weaver Bros

COC PAGE 1 of 1  
COC ID# 1683339

Project # S0109725

Sample Line

Item	DG9H	AG1U	WG1U	AG0U	R	4/6	BP2N	BP2U	BP2S	BP3N	BP3U	BP3S	AG3S	AG1H	BP3C	BP1U	SPST	pH <2	pH >12	Comments
1																				
2			2																	
3			2																	
4			4																	
5			2																	
6			2																	
7			2																	
8			2																	
9			2																	
10																				
11																				
12																				

## Container Codes

Container Codes	DG9H	AG1U	WG1U	AG0U	R	4/6	BP2N	BP2U	BP2S	BP3N	BP3U	BP3S	AG3S	AG1H	BP3C	BP1U	SPST	pH <2	pH >12	Comments
DG9H																				
AG1U																				
WG1U																				
R																				
BP2N																				
BP2U																				
BP2S																				
BP3N																				
BP3U																				
BP3S																				
AG3S																				
AG1S																				
BP1U																				



# **APPENDIX G**

Groundwater Sample Results



11

**WEAVER BOOS**  
**CONSULTANTS, LLC**  
7121 Grape Road, Granger, IN 46530  
**FIELD SURVEY REPORT**  
**WATER SAMPLING**

File No: 1873-356-04-00-03  
Facility: Karwick Road Nature Park  
Address: Karwick Road, Michigan City, IN  
Project Name: Site Characterization  
Date: 11-19-14

Sample ID: MW-15 Sample Source: Monitoring Well  
Type of Sample: Groundwater  
Equipment Used: Purging Bladder Pump / Peristaltic Pump  
Sampling Bladder Pump (VOCs) / Bladder or Peristaltic for Other Parameters

**PURGING INFORMATION**

Purge Date 11-19-14 End Purge 10:00  
Water Volume in Casing (gallons) \_\_\_\_\_ Volume purged (liters) \_\_\_\_\_  
2-inch well has 0.163 gallons/foot

**MEASUREMENTS**

			#1	#2	#3	#4
Well Diameter	<u>2</u> (inches)					
Stick up	<u>31</u> (feet) <u>14 ft</u>	pH (std)	<u>7.73</u>	<u>7.68</u>	<u>7.67</u>	<u>7.67</u>
Water Level	<u>11.16</u> (feet)	SC (uS)	<u>0.837</u>	<u>0.825</u>	<u>0.820</u>	<u>0.815</u>
Total Depth	<u>20.0</u> (feet)	Temp (C)	<u>12.12</u>	<u>12.52</u>	<u>12.66</u>	<u>12.37</u>
Height of Water Col.	_____ (feet)	orp Eh (mV)	<u>93.4</u>	<u>88.0</u>	<u>85.3</u>	<u>80.0</u>
		DO (mg/l)	<u>7.99</u>	<u>9.08</u>	<u>8.93</u>	<u>4.50</u>
Methane	<u>0.2</u> (%) <u>0.4</u>					
Oxygen	<u>21.8</u> (%) <u>21.5</u>	after 4				
Carbon Dioxide	<u>0.1</u> (%) <u>0.2</u>	reads				
		pH (std)				
		SC (uS)				
		Temp (C)				
		Eh (mV)				
		DO (mg/l)				

Note: Well is considered stable for sampling when at least three (3) parameters indicated RPD of 20% or less.

**SAMPLE INFORMATION**

Sampling Date: 11-19-14  
Sampling Time: 10:00  
Sample Appearance/Odor: Colorless, minor turbidity, no odor  
Weather Conditions: cloudy - 25° , no precip, wind 5-10 mph

Comments: pH and SC meter calibrated prior to use with 4.00, 7.00 and 10.00 pH buffer solution  
and 1413 uS KCl conductivity standard. Eh meter calibrated with 240.0 mV solution.  
GEM 2000 gas detector calibrated using 50% methane, 35% carbon dioxide, nitrogen balance.

Sampler Name (Print): Alex Huang

Signature

Alex Huang



<b>WEAVER BOOS</b> <b>CONSULTANTS, LLC</b> 7121 Grape Road, Granger, IN 46530 <b>FIELD SURVEY REPORT</b> <b>WATER SAMPLING</b>	File No: 1873-356-04-00-03 Facility: Karwick Road Nature Park Address: Karwick Road, Michigan City, IN Project Name: Site Characterization Date: 11-19-14																														
Sample ID: <u>MW-2 S</u> Sample Source: <u>Monitoring Well</u>																															
Type of Sample: <u>Groundwater</u>																															
Equipment Used:      Purging <u>Bladder Pump / Peristaltic Pump</u> Sampling <u>Bladder Pump (VOCs) / Bladder or Peristaltic for Other Parameters</u>																															
<b>PURGING INFORMATION</b>																															
Purge Date <u>11-19-14</u> End Purge <u>1220</u>																															
Water Volume in Casing (gallons) _____ Volume purged (liters) _____																															
2-inch well has 0.163 gallons/foot																															
<b>MEASUREMENTS</b>																															
Well Diameter	<div style="display: flex; justify-content: space-between;"> <span><u>2</u> (inches)</span> <div style="width: 80%; text-align: center;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>#1</th> <th>#2</th> <th>#3</th> <th>#4</th> </tr> </thead> <tbody> <tr> <td>pH (std)</td> <td><u>6.51</u></td> <td><u>6.50</u></td> <td><u>6.49</u></td> <td></td> </tr> <tr> <td>SC (uS)</td> <td><u>1705</u></td> <td><u>1712</u></td> <td><u>1718</u></td> <td></td> </tr> <tr> <td>Temp (C)</td> <td><u>15.77</u></td> <td><u>16.18</u></td> <td><u>16.26</u></td> <td></td> </tr> <tr> <td>Eh (mV)</td> <td><u>-43.9</u></td> <td><u>-55.0</u></td> <td><u>-61.1</u></td> <td></td> </tr> <tr> <td>DO (mg/l)</td> <td><u>3.10</u></td> <td><u>2.20</u></td> <td><u>1.71</u></td> <td></td> </tr> </tbody> </table> </div> </div>		#1	#2	#3	#4	pH (std)	<u>6.51</u>	<u>6.50</u>	<u>6.49</u>		SC (uS)	<u>1705</u>	<u>1712</u>	<u>1718</u>		Temp (C)	<u>15.77</u>	<u>16.18</u>	<u>16.26</u>		Eh (mV)	<u>-43.9</u>	<u>-55.0</u>	<u>-61.1</u>		DO (mg/l)	<u>3.10</u>	<u>2.20</u>	<u>1.71</u>	
	#1	#2	#3	#4																											
pH (std)	<u>6.51</u>	<u>6.50</u>	<u>6.49</u>																												
SC (uS)	<u>1705</u>	<u>1712</u>	<u>1718</u>																												
Temp (C)	<u>15.77</u>	<u>16.18</u>	<u>16.26</u>																												
Eh (mV)	<u>-43.9</u>	<u>-55.0</u>	<u>-61.1</u>																												
DO (mg/l)	<u>3.10</u>	<u>2.20</u>	<u>1.71</u>																												
Stick up	<u>2' 11 1/2"</u> (feet)																														
Water Level	<u>12.15</u> (feet)																														
Total Depth	<u>20.10</u> (feet)																														
Height of Water Col.	_____ (feet)																														
Methane	<u>0.0</u> (%)																														
Oxygen	<u>21.3</u> (%)																														
Carbon Dioxide	<u>0.2</u> (%)																														
Note: Well is considered stable for sampling when at least three (3) parameters indicated RPD of 20% or less.																															
<b>SAMPLE INFORMATION</b>																															
Sampling Date: <u>11-19-14</u>																															
Sampling Time: <u>1300</u>																															
Sample Appearance/Odor: <u>clear, colorless, slight sour odor</u>																															
Weather Conditions: <u>cloudy, 25°, wind 10-15 mph</u>																															
Comments: <u>pH and SC meter calibrated prior to use with 4.00, 7.00 and 10.00 pH buffer solution and 1413 uS KCl conductivity standard. Eh meter calibrated with 240.0 mV solution.</u> <u>GEM 2000 gas detector calibrated using 50% methane, 35% carbon dioxide, nitrogen balance.</u>																															
Sampler Name (Print): <u>Alex Huang</u> Signature: <u>Alex Huang</u>																															

sample turned slightly green in poly bottles w/ NaOH or NaOH/Zn Ac.



**WEAVER BOOS  
CONSULTANTS, LLC**

7121 Grape Road, Granger, IN 46530

**FIELD SURVEY REPORT  
WATER SAMPLING**

File No: 1873-356-04-00-03

Facility: Karwick Road Nature Park

Address: Karwick Road, Michigan City, IN

Project Name: Site Characterization

Date: 11-19-14

Sample ID: MW-2D

Sample Source: Monitoring Well

Type of Sample: Groundwater

Equipment Used: Purging Bladder Pump / Peristaltic Pump  
Sampling Bladder Pump (VOCs) / Bladder or Peristaltic for Other Parameters

**PURGING INFORMATION**

Purge Date 11-19-14 End Purge 11/25

Water Volume in Casing (gallons) \_\_\_\_\_ Volume purged (liters) \_\_\_\_\_

2-inch well has 0.163 gallons/foot

**MEASUREMENTS**

		#1	#2	#3	#4
Well Diameter	2 (inches)				
Stick up	2.5" (feet)	pH (std) 7.23	7.24	7.24	7.24
Water Level	4.26 (feet)	SC (uS) 4380	4705	4792	4783
Total Depth	57.34 (feet)	Temp (C) 12.24	13.69	13.68	13.71
Height of Water Col.	(feet)	Eh (mV) 80.2	43.4	4.6	-0.1
		DO (mg/l) 2.01	1.03	0.66	0.56

Methane 0.00 (%)

Oxygen 21.1 (%)

Carbon Dioxide 0.2 (%)

RDP, #2 and #3

RDP, #3 and #4

pH (std) \_\_\_\_\_

SC (uS) \_\_\_\_\_

Temp (C) \_\_\_\_\_

Eh (mV) \_\_\_\_\_

DO (mg/l) \_\_\_\_\_

Note: Well is considered stable for sampling  
when at least three (3) parameters indicated  
RPD of 20% or less.

**SAMPLE INFORMATION**

Sampling Date: 11/19/14

Sampling Time: 11:40

Sample Appearance/Odor: Color light Gray, med turbidity, No odor

Weather Conditions: Cloudy, No precip, 25°

Comments: pH and SC meter calibrated prior to use with 4.00, 7.00 and 10.00 pH buffer solution  
and 1413 uS KCl conductivity standard. Eh meter calibrated with 240.0 mV solution.  
GEM 2000 gas detector calibrated using 50% methane, 35% carbon dioxide, nitrogen balance.

Field Duf collected @ MW-2D

Sampler Name (Print): Alex Huang

Signature Alex Huang



**WEAVER BOOS  
CONSULTANTS, LLC**  
7121 Grape Road, Granger, IN 46530  
**FIELD SURVEY REPORT  
WATER SAMPLING**

File No: 1873-356-04-00-03  
Facility: Karwick Road Nature Park  
Address: Karwick Road, Michigan City, IN  
Project Name: Site Characterization  
Date: 11-19-14

Sample ID: MW-3S

Sample Source: Monitoring Well

Type of Sample: Groundwater

Equipment Used: Purging Bladder Pump / Peristaltic Pump  
Sampling Bladder Pump (VOCs) / Bladder or Peristaltic for Other Parameters

**PURGING INFORMATION**

Purge Date 11-19-14 End Purge 1345  
Water Volume in Casing (gallons) \_\_\_\_\_ Volume purged (liters) \_\_\_\_\_  
2-inch well has 0.163 gallons/foot

**MEASUREMENTS**

		#1	#2	#3	#4
Well Diameter	<u>2</u> (inches)				
Stick up	<u>2' 7.5"</u> (feet)	pH (std) <u>6.79</u>	<u>6.87</u>	<u>6.93</u>	<u>6.94</u>
Water Level	<u>11.10</u> (feet)	SC (uS) <u>2250</u>	<u>2262</u>	<u>2253</u>	<u>2251</u>
Total Depth	<u>20.05</u> (feet)	Temp (C) <u>12.94</u>	<u>13.75</u>	<u>13.91</u>	<u>13.90</u>
Height of Water Col.	_____ (feet)	Eh (mV) <u>21.8</u>	<u>-14.0</u>	<u>-27.5</u>	<u>-30.4</u>
	<u>2.1</u> <sub>5</sub> <u>60.1</u> <sub>60</sub> DO (mg/l)	<u>8.43</u>	<u>5.54</u>	<u>6.08</u>	<u>6.09</u>
Methane	<u>0.0</u> (%) <u>0.8</u>				
Oxygen	<u>21.3</u> (%) <u>4820.7</u>	RDP, #2 and #3		RDP, #3 and #4	
Carbon Dioxide	<u>0.1</u> (%) <u>1.9</u>	pH (std) _____			
		SC (uS) _____			
Note: Well is considered stable for sampling		Temp (C) _____			
when at least three (3) parameters indicated		Eh (mV) _____			
RPD of 20% or less.		DO (mg/l) _____			

**SAMPLE INFORMATION**

Sampling Date: 11-19-14  
Sampling Time: 1420  
Sample Appearance/Odor: Very light Gray, Slight Sulfur Odor, low Turbidity  
Weather Conditions: Cloudy, no precip, wind 10-15 mph, 25°

Comments: pH and SC meter calibrated prior to use with 4.00, 7.00 and 10.00 pH buffer solution  
and 1413 uS KCl conductivity standard. Eh meter calibrated with 240.0 mV solution.  
GEM 2000 gas detector calibrated using 50% methane, 35% carbon dioxide, nitrogen balance.

Sampler Name (Print): Alex Huang

Signature Alex Huang



**WEAVER BOOS**  
**CONSULTANTS, LLC**  
7121 Grape Road, Granger, IN 46530  
**FIELD SURVEY REPORT**  
**WATER SAMPLING**

File No: 1873-356-04-00-03  
Facility: Karwick Road Nature Park  
Address: Karwick Road, Michigan City, IN  
Project Name: Site Characterization  
Date: ~~11-19-14~~ 11-20-14

Sample ID: MW - 45 Sample Source: Monitoring Well  
Type of Sample: Groundwater  
Equipment Used: Purging Bladder Pump / Peristaltic Pump  
Sampling Bladder Pump (VOCs) / Bladder or Peristaltic for Other Parameters

**PURGING INFORMATION**

Purge Date ~~11-19-14~~ 11-20-14 End Purge \_\_\_\_\_  
Water Volume in Casing (gallons) \_\_\_\_\_ Volume purged (liters) \_\_\_\_\_  
2-inch well has 0.163 gallons/foot

**MEASUREMENTS**

	0851 #1	0853 #2	0855 #3	0857 #4
Well Diameter	2 (inches)			
Stick up	2' 10" (feet)	6.74	6.74	6.75
Water Level	13.25 (feet)	2.255	2.256	2.257
Total Depth	19.65 (feet)	12.98	13.28	13.33
Height of Water Col.	(feet)	6.9	5.4	5.2
Methane	27.3 (%)	3.83	4.54	4.88
Oxygen	18.9 (%)	4.54	4.88	5.09
Carbon Dioxide	16.6 (%)			

Note: Well is considered stable for sampling when at least three (3) parameters indicated RPD of 20% or less.

6.9 mV attached for ~30 min at #2 and #3

well built dry.

**SAMPLE INFORMATION**

Sampling Date: ~~11-19-14~~ 11/20  
Sampling Time: ~~1600~~ 0900  
Sample Appearance/Odor: grayish + cloudy  
Weather Conditions: cloudy, 20°, No precip

Comments: pH and SC meter calibrated prior to use with 4.00, 7.00 and 10.00 pH buffer solution and 1413 uS KCl conductivity standard. Eh meter calibrated with 240.0 mV solution. GEM 2000 gas detector calibrated using 50% methane, 35% carbon dioxide, nitrogen balance.

Sampler Name (Print): Alex Huang

Signature: Alex Huang



**WEAVER BOOS**  
**CONSULTANTS, LLC**  
7121 Grape Road, Granger, IN 46530  
**FIELD SURVEY REPORT**  
**WATER SAMPLING**

File No: 1873-356-04-00-03  
Facility: Karwick Road Nature Park  
Address: Karwick Road, Michigan City, IN  
Project Name: Site Characterization  
Date: 11-19-14

Sample ID: MW-415 Sample Source: Monitoring Well  
Type of Sample: Groundwater  
Equipment Used: Purging Bladder Pump / Peristaltic Pump  
Sampling Bladder Pump (VOCs) / Bladder or Peristaltic for Other Parameters

**PURGING INFORMATION**

Purge Date 11-19-14 End Purge  
Water Volume in Casing (gallons) Volume purged (liters)  
2-inch well has 0.163 gallons/foot

**MEASUREMENTS**

	#1	#2	#3	#4
Well Diameter 2 (inches)				
Stick up 2' 7" (feet)	pH (std) 7.54	7.48	7.48	7.47
Water Level 9.2 (feet)	SC (uS) 6297	1572	1695	1704
Total Depth 63.19 (feet)	Temp (C) 9.84	11.20	11.12	11.35
Height of Water Col. (feet)	Eh (mV) 92.5	73.5	50.3	22.1
	DO (mg/l) 5.85	3.15	2.03	1.18
Methane 0.0 (%)				
Oxygen 20.2 (%)	RDP, #2 and #3		RDP, #3 and #4	
Carbon Dioxide 0.1 (%)	pH (std)			
	SC (uS)			
Note: Well is considered stable for sampling	Temp (C)			
when at least three (3) parameters indicated	Eh (mV)			
RPD of 20% or less.	DO (mg/l)			

**SAMPLE INFORMATION**

Sampling Date: 11-19-14  
Sampling Time: 1525  
Sample Appearance/Odor: Grayish & cloudy, organic (diesel) odor  
Weather Conditions: Cloudy, no precip, 20°

Comments: pH and SC meter calibrated prior to use with 4.00, 7.00 and 10.00 pH buffer solution  
and 1413 uS KCl conductivity standard. Eh meter calibrated with 240.0 mV solution.  
GEM 2000 gas detector calibrated using 50% methane, 35% carbon dioxide, nitrogen balance.

Sampler Name (Print):

Alex Huang

Signature

Alex Huang



<b>WEAVER BOOS</b> <b>CONSULTANTS, LLC</b> 7121 Grape Road, Granger, IN 46530 <b>FIELD SURVEY REPORT</b> <b>WATER SAMPLING</b>	File No: 1873-356-04-00-03 Facility: Karwick Road Nature Park Address: Karwick Road, Michigan City, IN Project Name: Site Characterization Date: 11/20/14																																																							
Sample ID: <u>02 MW-55</u> Sample Source: <u>Monitoring Well</u>																																																								
Type of Sample: <u>Groundwater</u>																																																								
Equipment Used:      Purging <u>Bladder Pump / Peristaltic Pump</u> Sampling <u>Bladder Pump (VOCs) / Bladder or Peristaltic for Other Parameters</u>																																																								
<b>PURGING INFORMATION</b>																																																								
Purge Date <u>11/20</u> End Purge _____ Water Volume in Casing (gallons) _____      Volume purged (liters) _____ 2-inch well has 0.163 gallons/foot																																																								
<b>MEASUREMENTS</b>																																																								
	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th> <th>1030 #1</th> <th>1039 #2</th> <th>1034 #3</th> <th>1024 #4</th> </tr> </thead> <tbody> <tr> <td>Well Diameter <u>2"</u> (inches)</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Stick up <u>27.5"</u> (feet)</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Water Level <u>10.71</u> (feet)</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total Depth <u>15.29</u> (feet)</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Height of Water Col. _____ (feet)</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>pH (std) <u>6.93</u></td> <td><u>6.88</u></td> <td><u>6.81</u></td> <td><u>6.79</u></td> </tr> <tr> <td></td> <td>SC (uS) <u>1.572</u></td> <td><u>1.515</u></td> <td><u>1.536</u></td> <td><u>1.567</u></td> </tr> <tr> <td></td> <td>Temp (C) <u>11.57</u></td> <td><u>13.10</u></td> <td><u>13.59</u></td> <td><u>13.65</u></td> </tr> <tr> <td></td> <td>Eh (mV) <u>-4.0</u></td> <td><u>-1.9</u></td> <td><u>1.5</u></td> <td><u>2.7</u></td> </tr> <tr> <td></td> <td>DO (mg/l) <u>8.01</u></td> <td><u>5.82</u></td> <td><u>5.01</u></td> <td><u>4.74</u></td> </tr> </tbody> </table>		1030 #1	1039 #2	1034 #3	1024 #4	Well Diameter <u>2"</u> (inches)					Stick up <u>27.5"</u> (feet)					Water Level <u>10.71</u> (feet)					Total Depth <u>15.29</u> (feet)					Height of Water Col. _____ (feet)						pH (std) <u>6.93</u>	<u>6.88</u>	<u>6.81</u>	<u>6.79</u>		SC (uS) <u>1.572</u>	<u>1.515</u>	<u>1.536</u>	<u>1.567</u>		Temp (C) <u>11.57</u>	<u>13.10</u>	<u>13.59</u>	<u>13.65</u>		Eh (mV) <u>-4.0</u>	<u>-1.9</u>	<u>1.5</u>	<u>2.7</u>		DO (mg/l) <u>8.01</u>	<u>5.82</u>	<u>5.01</u>	<u>4.74</u>
	1030 #1	1039 #2	1034 #3	1024 #4																																																				
Well Diameter <u>2"</u> (inches)																																																								
Stick up <u>27.5"</u> (feet)																																																								
Water Level <u>10.71</u> (feet)																																																								
Total Depth <u>15.29</u> (feet)																																																								
Height of Water Col. _____ (feet)																																																								
	pH (std) <u>6.93</u>	<u>6.88</u>	<u>6.81</u>	<u>6.79</u>																																																				
	SC (uS) <u>1.572</u>	<u>1.515</u>	<u>1.536</u>	<u>1.567</u>																																																				
	Temp (C) <u>11.57</u>	<u>13.10</u>	<u>13.59</u>	<u>13.65</u>																																																				
	Eh (mV) <u>-4.0</u>	<u>-1.9</u>	<u>1.5</u>	<u>2.7</u>																																																				
	DO (mg/l) <u>8.01</u>	<u>5.82</u>	<u>5.01</u>	<u>4.74</u>																																																				
Methane <u>2.6</u> (%) Oxygen <u>19</u> (%) Carbon Dioxide <u>2.8</u> (%)	RDP, #2 and #3      RDP, #3 and #4 pH (std) _____ SC (uS) _____ Temp (C) _____ Eh (mV) _____ DO (mg/l) _____																																																							
Note: Well is considered stable for sampling when at least three (3) parameters indicated RPD of 20% or less.																																																								
<b>SAMPLE INFORMATION</b>																																																								
Sampling Date: <u>11/20</u> Sampling Time: <u>1030</u> Sample Appearance/Odor: <u>clear colorless, mild sulfurous odor</u> Weather Conditions: <u>M cloudy, @ 20°F</u>																																																								
Comments: <u>pH and SC meter calibrated prior to use with 4.00, 7.00 and 10.00 pH buffer solution and 1413 uS KCl conductivity standard. Eh meter calibrated with 240.0 mV solution.</u> <u>GEM 2000 gas detector calibrated using 50% methane, 35% carbon dioxide, nitrogen balance.</u>																																																								
Sampler Name (Print): <u>Alex Huang</u> Signature: <u>Alex Huang</u>																																																								

Bladder pump lost.



**WEAVER BOOS**  
**CONSULTANTS, LLC**  
7121 Grape Road, Granger, IN 46530  
**FIELD SURVEY REPORT**  
**WATER SAMPLING**

File No: 1873-356-04-00-03  
Facility: Karwick Road Nature Park  
Address: Karwick Road, Michigan City, IN  
Project Name: Site Characterization  
Date: 11/20/14

Sample ID: NW-65

Sample Source: Monitoring Well

Type of Sample: Groundwater

Equipment Used: Purging Bladder Pump / Peristaltic Pump  
Sampling Bladder Pump (VOCs) / Bladder or Peristaltic for Other Parameters

**PURGING INFORMATION**

Purge Date 11/20/14 End Purge \_\_\_\_\_

Water Volume in Casing (gallons) \_\_\_\_\_ Volume purged (liters) \_\_\_\_\_

2-inch well has 0.163 gallons/foot

		MEASUREMENTS			
		1344	1346	1348	1350
		#1	#2	#3	#4
Well Diameter	<u>2"</u> (inches)				
Stick up	<u>36 1/4"</u> (feet)	pH (std) <u>6.51</u>	<u>6.50</u>	<u>6.48</u>	<u>6.50</u>
Water Level	<u>12.84</u> (feet)	SC (uS) <u>1.660</u>	<u>1.665</u>	<u>1.659</u>	<u>1.658</u>
Total Depth	<u>16.19</u> (feet)	Temp (C) <u>12.80</u>	<u>13.21</u>	<u>13.37</u>	<u>13.30</u>
Height of Water Col.	_____ (feet)	Eh (mV) <u>-43.7</u>	<u>-57.6</u>	<u>-63.5</u>	<u>-68.7</u>
		DO (mg/l) <u>1.88</u>	<u>1.34</u>	<u>0.96</u>	<u>0.76</u>
Methane	<u>4.6</u> (%)	RDP, #2 and #3		RDP, #3 and #4	
Oxygen	<u>11.3</u> (%)				
Carbon Dioxide	<u>12.7</u> (%)	pH (std) _____	_____	_____	_____
Note: Well is considered stable for sampling when at least three (3) parameters indicated RPD of 20% or less.		SC (uS) _____	_____	_____	_____
		Temp (C) _____	_____	_____	_____
		Eh (mV) _____	_____	_____	_____
		DO (mg/l) _____	_____	_____	_____

**SAMPLE INFORMATION**

Sampling Date: 11/20/14  
Sampling Time: 1400  
Sample Appearance/Odor: very light gray-green turbidity  
Weather Conditions: \_\_\_\_\_

Comments: pH and SC meter calibrated prior to use with 4.00, 7.00 and 10.00 pH buffer solution  
and 1413 uS KCl conductivity standard. Eh meter calibrated with 240.0 mV solution.  
GEM 2000 gas detector calibrated using 50% methane, 35% carbon dioxide, nitrogen balance.

Sampler Name (Print): Alex Huang

Signature: Alex Huang

Very light green on NaOH



**WEAVER BOOS**  
**CONSULTANTS, LLC**  
7121 Grape Road, Granger, IN 46530  
**FIELD SURVEY REPORT**  
**WATER SAMPLING**

File No: 1873-356-04-00-03  
Facility: Karwick Road Nature Park  
Address: Karwick Road, Michigan City, IN  
Project Name: Site Characterization  
Date: 11/20/14

Sample ID: MW-610

Sample Source: Monitoring Well

Type of Sample: Groundwater

Equipment Used: Purging Bladder Pump / Peristaltic Pump  
Sampling Bladder Pump (VOCs) / Bladder or Peristaltic for Other Parameters

**PURGING INFORMATION**

Purge Date 11/20/14 End Purge

Water Volume in Casing (gallons) Volume purged (liters)

2-inch well has 0.163 gallons/foot

**MEASUREMENTS**

	#1	#2	#3	#4
Well Diameter (inches)				
Stick up	37.58			
Water Level	4.77			
Total Depth	58.17			
Height of Water Col.				
pH (std)	7.80	7.70	7.70	7.70
SC (uS)	464	459	457	456
Temp (C)	12.58	12.86	12.81	12.87
Eh (mV)	-14.4	-11.1	-5.6	2.0
DO (mg/l)	8.60	8.24	7.89	7.40

Methane 0.00 (%)

Oxygen 0.01 (%)

Carbon Dioxide 21.7 (%)

RDP, #2 and #3

RDP, #3 and #4

pH (std)

SC (uS)

Temp (C)

Eh (mV)

DO (mg/l)

Note: Well is considered stable for sampling  
when at least three (3) parameters indicated  
RPD of 20% or less.

**SAMPLE INFORMATION**

Sampling Date: 11/20

Sampling Time: 1310

Sample Appearance/Odor: clear / colorless

Weather Conditions:

Comments: pH and SC meter calibrated prior to use with 4.00, 7.00 and 10.00 pH buffer solution  
and 1413 uS KCl conductivity standard. Eh meter calibrated with 240.0 mV solution.  
GEM 2000 gas detector calibrated using 50% methane, 35% carbon dioxide, nitrogen balance.

Sampler Name (Print): Alex Huang

Signature Alex Huang

"GD MS/MSD" Taken here.



**WEAVER BOOS**  
**CONSULTANTS, LLC**  
7121 Grape Road, Granger, IN 46530  
**FIELD SURVEY REPORT**  
**WATER SAMPLING**

File No: 1873-356-04-00-03  
Facility: Karwick Road Nature Park  
Address: Karwick Road, Michigan City, IN  
Project Name: Site Characterization  
Date: 11/20/14

Sample ID: MW-75

Sample Source: Monitoring Well

Type of Sample: Groundwater

Equipment Used: Purging Bladder Pump / Peristaltic Pump  
Sampling Bladder Pump (VOCs) / Bladder or Peristaltic for Other Parameters

**PURGING INFORMATION**

Purge Date 11/20/14 End Purge \_\_\_\_\_

Water Volume in Casing (gallons) \_\_\_\_\_ Volume purged (liters) \_\_\_\_\_

2-inch well has 0.163 gallons/foot

		MEASUREMENTS				
		1128	1430	1432	1434	1436
Well Diameter	<u>2</u> (inches)	#1	#2	#3	#4	
Stick up	<u>30.1</u> (feet)	pH (std) <u>6.55</u>	<u>6.46</u>	<u>6.48</u>	<u>6.50</u>	<u>6.49</u>
Water Level	<u>11.23</u> (feet)	SC (uS) <u>1.501</u>	<u>1.584</u>	<u>1.805</u>	<u>1.821</u>	<u>1.798</u>
Total Depth	<u>49.9</u> (feet)	Temp (C) <u>11.50</u>	<u>12.14</u>	<u>11.87</u>	<u>11.62</u>	<u>11.56</u>
Height of Water Col.	_____ (feet)	Eh (mV) <u>-21.3</u>	<u>-23.2</u>	<u>-34.3</u>	<u>-44.8</u>	<u>-49.4</u>
		DO (mg/l) <u>4.68</u>	<u>1.34</u>	<u>0.94</u>	<u>0.80</u>	<u>0.79</u>
Methane	<u>7.8</u> (%)	RDP, #2 and #3		RDP, #3 and #4		
Oxygen	<u>19.3</u> (%)					
Carbon Dioxide	<u>2.6</u> (%)	pH (std) _____	_____	_____	_____	
		SC (uS) _____	_____	_____	_____	
Note: Well is considered stable for sampling when at least three (3) parameters indicated RPD of 20% or less.		Temp (C) _____	_____	_____	_____	
		Eh (mV) _____	_____	_____	_____	
		DO (mg/l) _____	_____	_____	_____	

**SAMPLE INFORMATION**

Sampling Date: 11/20

Sampling Time: 1440

Sample Appearance/Odor: moderately turbid, yellow, brown

Weather Conditions: \_\_\_\_\_

Comments: pH and SC meter calibrated prior to use with 4.00, 7.00 and 10.00 pH buffer solution  
and 1413 uS KCl conductivity standard. Eh meter calibrated with 240.0 mV solution.  
GEM 2000 gas detector calibrated using 50% methane, 35% carbon dioxide, nitrogen balance.

Sampler Name (Print): Alex Huang

Signature: Alex Huang

Significantly greener w/  
NaOH



<b>WEAVER BOOS</b> <b>CONSULTANTS, LLC</b> 7121 Grape Road, Granger, IN 46530 <b>FIELD SURVEY REPORT</b> <b>WATER SAMPLING</b>	File No: 1873-356-04-00-03 Facility: Karwick Road Nature Park Address: Karwick Road, Michigan City, IN Project Name: Site Characterization Date: 11/20/18																																			
Sample ID: <u>MW-85</u> Sample Source: <u>Monitoring Well</u>																																				
Type of Sample: <u>Groundwater</u>																																				
Equipment Used:      Purging <u>Bladder Pump / Peristaltic Pump</u> Sampling <u>Bladder Pump (VOCs) / Bladder or Peristaltic for Other Parameters</u>																																				
<b>PURGING INFORMATION</b>																																				
Purge Date: <u>11/20</u> End Purge: _____ Water Volume in Casing (gallons): _____      Volume purged (liters): _____ 2-inch well has 0.163 gallons/foot																																				
<b>MEASUREMENTS</b>																																				
	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th> <th>1205 #1</th> <th>1207 #2</th> <th>1209 #3</th> <th>1211 #4</th> </tr> </thead> <tbody> <tr> <td>Well Diameter <u>2</u> (inches)</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Stick up <u>28.5</u> (feet)</td> <td>pH (std) <u>6.87</u></td> <td><u>6.70</u></td> <td><u>6.70</u></td> <td><u>6.70</u></td> </tr> <tr> <td>Water Level <u>15.70</u> (feet)</td> <td>SC (uS) <u>1.328</u></td> <td><u>1.475</u></td> <td><u>1.796</u></td> <td><u>1.806</u></td> </tr> <tr> <td>Total Depth <u>21.94</u> (feet)</td> <td>Temp (C) <u>10.94</u></td> <td><u>12.16</u></td> <td><u>12.02</u></td> <td><u>11.78</u></td> </tr> <tr> <td>Height of Water Col. _____ (feet)</td> <td><del>Eh (mV)</del> <u>0.9</u></td> <td><u>7.4</u></td> <td><u>7.6</u></td> <td><u>7.9</u></td> </tr> <tr> <td></td> <td>DO (mg/l) <u>3.9</u></td> <td><u>1.26</u></td> <td><u>1.23</u></td> <td></td> </tr> </tbody> </table>		1205 #1	1207 #2	1209 #3	1211 #4	Well Diameter <u>2</u> (inches)					Stick up <u>28.5</u> (feet)	pH (std) <u>6.87</u>	<u>6.70</u>	<u>6.70</u>	<u>6.70</u>	Water Level <u>15.70</u> (feet)	SC (uS) <u>1.328</u>	<u>1.475</u>	<u>1.796</u>	<u>1.806</u>	Total Depth <u>21.94</u> (feet)	Temp (C) <u>10.94</u>	<u>12.16</u>	<u>12.02</u>	<u>11.78</u>	Height of Water Col. _____ (feet)	<del>Eh (mV)</del> <u>0.9</u>	<u>7.4</u>	<u>7.6</u>	<u>7.9</u>		DO (mg/l) <u>3.9</u>	<u>1.26</u>	<u>1.23</u>	
	1205 #1	1207 #2	1209 #3	1211 #4																																
Well Diameter <u>2</u> (inches)																																				
Stick up <u>28.5</u> (feet)	pH (std) <u>6.87</u>	<u>6.70</u>	<u>6.70</u>	<u>6.70</u>																																
Water Level <u>15.70</u> (feet)	SC (uS) <u>1.328</u>	<u>1.475</u>	<u>1.796</u>	<u>1.806</u>																																
Total Depth <u>21.94</u> (feet)	Temp (C) <u>10.94</u>	<u>12.16</u>	<u>12.02</u>	<u>11.78</u>																																
Height of Water Col. _____ (feet)	<del>Eh (mV)</del> <u>0.9</u>	<u>7.4</u>	<u>7.6</u>	<u>7.9</u>																																
	DO (mg/l) <u>3.9</u>	<u>1.26</u>	<u>1.23</u>																																	
Methane <u>0.2</u> (%) Oxygen <u>0.3</u> (%) Carbon Dioxide <u>20.1</u> (%)	RDP, #2 and #3      RDP, #3 and #4 pH (std) _____ SC (uS) _____ Temp (C) _____ Eh (mV) _____ DO (mg/l) _____																																			
Note: Well is considered stable for sampling when at least three (3) parameters indicated RPD of 20% or less.																																				
<b>SAMPLE INFORMATION</b>																																				
Sampling Date: <u>11/20</u> Sampling Time: <u>1220</u> Sample Appearance/Odor: <u>minor turbidity</u> Weather Conditions: _____																																				
Comments: <u>pH and SC meter calibrated prior to use with 4.00, 7.00 and 10.00 pH buffer solution and 1413 uS KCl conductivity standard. Eh meter calibrated with 240.0 mV solution. GEM 2000 gas detector calibrated using 50% methane, 35% carbon dioxide, nitrogen balance.</u>																																				
Sampler Name (Print): <u>Alex Huang</u> Signature: <u>Alex Huang</u>																																				

sample turned slightly green in NaOH bottles. Not as much as 25 and 95.



<b>WEAVER BOOS</b> <b>CONSULTANTS, LLC</b> 7121 Grape Road, Granger, IN 46530 <b>FIELD SURVEY REPORT</b> <b>WATER SAMPLING</b>		File No: 1873-356-04-00-03 Facility: Karwick Road Nature Park Address: Karwick Road, Michigan City, IN Project Name: Site Characterization Date: 11/20/14			
Sample ID: <u>MW-95</u>		Sample Source: <u>Monitoring Well</u>			
Type of Sample: <u>Groundwater</u>					
Equipment Used:		Purging <u>Bladder Pump / Peristaltic Pump</u> Sampling <u>Bladder Pump (VOCs) / Bladder or Peristaltic for Other Parameters</u>			
<b>PURGING INFORMATION</b>					
Purge Date <u>11/20/14</u>		End Purge _____			
Water Volume in Casing (gallons) _____		Volume purged (liters) _____			
2-inch well has 0.163 gallons/foot					
<b>MEASUREMENTS</b>					
Well Diameter	<u>2</u> (inches)	#1	#2	#3	#4
Stick up	<u>70"</u> ( <del>feet</del> )	pH (std)	<u>6.51</u>	<u>6.51</u>	<u>6.51</u>
Water Level	<u>9.44</u> (feet)	SC (uS)	<u>1432</u>	<u>1435</u>	<u>1432</u>
Total Depth	<u>22.96</u> (feet)	Temp (C)	<u>13.09</u>	<u>13.34</u>	<u>12.50</u>
Height of Water Col.	_____ (feet)	Eh (mV)	<u>-55.2</u>	<u>-63.6</u>	<u>-68.5</u>
		DO (mg/l)	<u>1.84</u>	<u>1.14</u>	<u>0.88</u>
Methane	<u>0.1</u> (%)	RDP, #2 and #3		RDP, #3 and #4	
Oxygen	<u>20.9</u> (%)	pH (std)	_____		_____
Carbon Dioxide	<u>0.4</u> (%)	SC (uS)	_____		_____
Note: Well is considered stable for sampling		Temp (C)	_____		_____
when at least three (3) parameters indicated		Eh (mV)	_____		_____
RPD of 20% or less.		DO (mg/l)	_____		_____
<b>SAMPLE INFORMATION</b>					
Sampling Date:		<u>11/20/14</u>			
Sampling Time:		<u>10:30</u>			
Sample Appearance/Odor:		<u>Light grey run bi dirty</u>			
Weather Conditions:		_____			
Comments: pH and SC meter calibrated prior to use with 4.00, 7.00 and 10.00 pH buffer solution and 1413 uS KCl conductivity standard. Eh meter calibrated with 240.0 mV solution. GEM 2000 gas detector calibrated using 50% methane, 35% carbon dioxide, nitrogen balance.					
Sampler Name (Print):		<u>Alex Huang</u>			
		Signature <u>Alex Huang</u>			

95 sample Turned green w/ NaOH bottles



**WEAVER BOOS  
CONSULTANTS, LLC**

7121 Grape Road, Granger, IN 46530

**FIELD SURVEY REPORT  
WATER SAMPLING**

File No: 1873-356-04-00-03

Facility: Karwick Road Nature Park

Address: Karwick Road, Michigan City, IN

Project Name: Site Characterization

Date: 11/20/14

Sample ID: MW-105

Sample Source: Monitoring Well

Type of Sample: Groundwater

Equipment Used: Purging Bladder Pump / Peristaltic Pump  
Sampling Bladder Pump (VOCs) / Bladder or Peristaltic for Other Parameters

**PURGING INFORMATION**

Purge Date 11/20/14 End Purge

Water Volume in Casing (gallons) Volume purged (liters)

2-inch well has 0.163 gallons/foot

**MEASUREMENTS**

	2" (inches)	#1	#2	#3	#4	
Well Diameter	33.5" (feet)	pH (std)	7.45	7.73	7.72	7.70
Stick up	7.03 (feet)	SC (uS)	662	659	655	654
Water Level	16.44 (feet)	Temp (C)	10.62	12.70	12.33	12.75
Total Depth		Eh (mV)	-74.9	-169.6	-141.9	-206.9
Height of Water Col.		DO (mg/l)	9.52	1.73	0.84	0.79
Methane	0.1 (%)					
Oxygen	20.3 (%)	RDP, #2 and #3			RDP, #3 and #4	
Carbon Dioxide	1.1 (%)	pH (std)				
		SC (uS)				
		Temp (C)				
		Eh (mV)				
		DO (mg/l)				

Note: Well is considered stable for sampling when at least three (3) parameters indicated RPD of 20% or less.

**SAMPLE INFORMATION**

Sampling Date: 11/20/14

Sampling Time: 15:20

Sample Appearance/Odor: clear, colorless

Weather Conditions:

Comments: pH and SC meter calibrated prior to use with 4.00, 7.00 and 10.00 pH buffer solution and 1413 uS KCl conductivity standard. Eh meter calibrated with 240.0 mV solution. GEM 2000 gas detector calibrated using 50% methane, 35% carbon dioxide, nitrogen balance.

Sampler Name (Print): Alex Huang

Signature: Alex Huang



<b>WEAVER BOOS</b> <b>CONSULTANTS, LLC</b> 7121 Grape Road, Granger, IN 46530 <b>FIELD SURVEY REPORT</b> <b>WATER SAMPLING</b>	File No: 1873-356-04-00-03 Facility: Karwick Road Nature Park Address: Karwick Road, Michigan City, IN Project Name: Site Characterization Date: 10/20/14																																				
Sample ID: <u>108 MW-100</u> Sample Source: <u>Monitoring Well</u> Type of Sample: <u>Groundwater</u>																																					
Equipment Used:      Purging <u>Bladder Pump / Peristaltic Pump</u> Sampling <u>Bladder Pump (VOCs) / Bladder or Peristaltic for Other Parameters</u>																																					
<b>PURGING INFORMATION</b>																																					
Purge Date <u>11/20/14</u> End Purge _____ Water Volume in Casing (gallons) _____      Volume purged (liters) _____ 2-inch well has 0.163 gallons/foot																																					
<b>MEASUREMENTS</b>																																					
Well Diameter <u>2</u> (inches) Stick up <u>29.5"</u> ( <del>feet</del> ) Water Level <u>6.43</u> (feet) Total Depth <u>42.93</u> (feet) Height of Water Col. _____ (feet)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">1548 #1</th> <th style="text-align: center;">1550 #2</th> <th style="text-align: center;">1552 #3</th> <th style="text-align: center;">1554 #4</th> <th style="text-align: center;">1556</th> </tr> </thead> <tbody> <tr> <td>pH (std)</td> <td style="text-align: center;">7.45</td> <td style="text-align: center;">7.80</td> <td style="text-align: center;">7.94</td> <td style="text-align: center;">7.94</td> <td></td> </tr> <tr> <td>SC (uS)</td> <td style="text-align: center;">498</td> <td style="text-align: center;">424</td> <td style="text-align: center;">368</td> <td style="text-align: center;">361</td> <td></td> </tr> <tr> <td>Temp (C)</td> <td style="text-align: center;">11.08</td> <td style="text-align: center;">11.68</td> <td style="text-align: center;">11.82</td> <td style="text-align: center;">11.48</td> <td></td> </tr> <tr> <td>Eh (mV)</td> <td style="text-align: center;">214.6</td> <td style="text-align: center;">204.9</td> <td style="text-align: center;">194.2</td> <td style="text-align: center;">186.4</td> <td></td> </tr> <tr> <td>DO (mg/l)</td> <td style="text-align: center;">3.73</td> <td style="text-align: center;">4.82</td> <td style="text-align: center;">5.37</td> <td style="text-align: center;">5.48</td> <td></td> </tr> </tbody> </table>		1548 #1	1550 #2	1552 #3	1554 #4	1556	pH (std)	7.45	7.80	7.94	7.94		SC (uS)	498	424	368	361		Temp (C)	11.08	11.68	11.82	11.48		Eh (mV)	214.6	204.9	194.2	186.4		DO (mg/l)	3.73	4.82	5.37	5.48	
	1548 #1	1550 #2	1552 #3	1554 #4	1556																																
pH (std)	7.45	7.80	7.94	7.94																																	
SC (uS)	498	424	368	361																																	
Temp (C)	11.08	11.68	11.82	11.48																																	
Eh (mV)	214.6	204.9	194.2	186.4																																	
DO (mg/l)	3.73	4.82	5.37	5.48																																	
Methane <u>0.1</u> (%) Oxygen <u>7.67</u> (%) Carbon Dioxide <u>0.1</u> (%)	RDP, #2 and #3      RDP, #3 and #4 pH (std) _____ SC (uS) _____ Temp (C) _____ Eh (mV) _____ DO (mg/l) _____																																				
Note: Well is considered stable for sampling when at least three (3) parameters indicated RPD of 20% or less.																																					
<b>SAMPLE INFORMATION</b>																																					
Sampling Date: <u>11/20/14</u> Sampling Time: <u>1600</u> Sample Appearance/Odor: <u>Clear</u> Weather Conditions: _____																																					
Comments: <u>pH and SC meter calibrated prior to use with 4.00, 7.00 and 10.00 pH buffer solution</u> <u>and 1413 uS KCl conductivity standard. Eh meter calibrated with 240.0 mV solution.</u> <u>GEM 2000 gas detector calibrated using 50% methane, 35% carbon dioxide, nitrogen balance.</u>																																					
Sampler Name (Print): <u>Alex Huang</u> Signature <u>Alex Huang</u>																																					



**WEAVER BOOS**  
**CONSULTANTS, LLC**  
7121 Grape Road, Granger, IN 46530  
**FIELD SURVEY REPORT**  
**WATER SAMPLING**

File No: 1873-356-04-00-03  
Facility: Karwick Road Nature Park  
Address: Karwick Road, Michigan City, IN  
Project Name: Site Characterization  
Date: 11/24/14

Sample ID: 55

Sample Source: Monitoring Well

Type of Sample: Groundwater

Equipment Used: Purging Bladder Pump / Peristaltic Pump  
Sampling Bladder Pump (VOCs) / Bladder or Peristaltic for Other Parameters

**PURGING INFORMATION**

Purge Date: \_\_\_\_\_ End Purge: \_\_\_\_\_

Water Volume in Casing (gallons) \_\_\_\_\_ Volume purged (liters) \_\_\_\_\_

2-inch well has 0.163 gallons/foot

**MEASUREMENTS**

		#1	#2	#3	#4	
Well Diameter	(inches)					
Stick up	(feet)					
Water Level	(feet)					
Total Depth	(feet)					
Height of Water Col.	(feet)					
		pH (std)	6.63	6.69	6.63	6.63
		SC (uS)	1770	1815	1876	1882
		Temp (C)	13.12	14.12	14.27	14.32
		Eh (mV)	-35	-78.3	-88.2	-92.7
		DO (mg/l)	6.82	5.84	1.86	1.63

Methane \_\_\_\_\_ (%)  
Oxygen \_\_\_\_\_ (%)  
Carbon Dioxide \_\_\_\_\_ (%)

RDP, #2 and #3

RDP, #3 and #4

pH (std) \_\_\_\_\_

SC (uS) \_\_\_\_\_

Temp (C) \_\_\_\_\_

Eh (mV) \_\_\_\_\_

DO (mg/l) \_\_\_\_\_

Note: Well is considered stable for sampling  
when at least three (3) parameters indicated  
RPD of 20% or less.

**SAMPLE INFORMATION**

Sampling Date: \_\_\_\_\_

Sampling Time: 10:45

Sample Appearance/Odor: \_\_\_\_\_

Weather Conditions: \_\_\_\_\_

Comments: pH and SC meter calibrated prior to use with 4.00, 7.00 and 10.00 pH buffer solution  
and 1413 uS KCl conductivity standard. Eh meter calibrated with 240.0 mV solution.  
GEM 2000 gas detector calibrated using 50% methane, 35% carbon dioxide, nitrogen balance.

Sampler Name (Print):

Alex Huang

Signature

Alex Huang



<b>WEAVER BOOS</b> <b>CONSULTANTS, LLC</b> 7121 Grape Road, Granger, IN 46530 <b>FIELD SURVEY REPORT</b> <b>WATER SAMPLING</b>	File No: 1873-356-04-00-03 Facility: Karwick Road Nature Park Address: Karwick Road, Michigan City, IN Project Name: Site Characterization Date: 11/24/18
--	---

Sample ID: <u>65</u>	Sample Source: <u>Monitoring Well</u>
----------------------	---------------------------------------

Type of Sample: Groundwater

Equipment Used:	Purging	Bladder Pump / Peristaltic Pump
	Sampling	Bladder Pump (VOCs) / Bladder or Peristaltic for Other Parameters

**PURGING INFORMATION**

Purge Date \_\_\_\_\_ End Purge \_\_\_\_\_

Water Volume in Casing (gallons) \_\_\_\_\_ Volume purged (liters) \_\_\_\_\_

2-inch well has 0.163 gallons/foot

**MEASUREMENTS**

		#1	#2	#3	#4
Well Diameter _____ (inches)					
Stick up _____ (feet)	pH (std)	6.57	6.49	6.49	
Water Level _____ (feet)	SC (uS)	1718	1678	1675	
Total Depth _____ (feet)	Temp (C)	7.86	11.42	11.38	
Height of Water Col. _____ (feet)	Eh (mV)	-43.5	-64.3	-67.0	
	DO (mg/l)	2.27	0.71	0.72	

Methane _____ (%)			
Oxygen _____ (%)	RDP, #2 and #3		RDP, #3 and #4
Carbon Dioxide _____ (%)	pH (std) _____		_____
	SC (uS) _____		_____
	Temp (C) _____		_____
	Eh (mV) _____		_____
	DO (mg/l) _____		_____

Note: Well is considered stable for sampling when at least three (3) parameters indicated RPD of 20% or less.

**SAMPLE INFORMATION**

Sampling Date: \_\_\_\_\_

Sampling Time: 12:40

Sample Appearance/Odor: \_\_\_\_\_

Weather Conditions: \_\_\_\_\_

Comments: pH and SC meter calibrated prior to use with 4.00, 7.00 and 10.00 pH buffer solution and 1413 uS KCl conductivity standard. Eh meter calibrated with 240.0 mV solution.

GEM 2000 gas detector calibrated using 50% methane, 35% carbon dioxide, nitrogen balance.

Sampler Name (Print): <u>Alex Huang</u>	Signature: <u>Alex Huang</u>
---	------------------------------



<b>WEAVER BOOS</b> <b>CONSULTANTS, LLC</b> 7121 Grape Road, Granger, IN 46530 <b>FIELD SURVEY REPORT</b> <b>WATER SAMPLING</b>	File No: 1873-356-04-00-03 Facility: Karwick Road Nature Park Address: Karwick Road, Michigan City, IN Project Name: Site Characterization Date: 11/24/14			
Sample ID: <u>MW-6D</u> Sample Source: <u>Monitoring Well</u>				
Type of Sample: <u>Groundwater</u>				
Equipment Used:      Purging <u>Bladder Pump / Peristaltic Pump</u> Sampling <u>Bladder Pump (VOCs) / Bladder or Peristaltic for Other Parameters</u>				
<b>PURGING INFORMATION</b>				
Purge Date _____ End Purge _____ Water Volume in Casing (gallons) _____ Volume purged (liters) _____ 2-inch well has 0.163 gallons/foot				
<b>MEASUREMENTS</b>				
Well Diameter _____ (inches)	#1	#2	#3	#4
Stick up _____ (feet)	pH (std) <u>7.53</u>	<u>7.51</u>	<u>7.50</u>	
Water Level _____ (feet)	SC (uS) <u>1412</u>	<u>1326</u>	<u>1861</u>	
Total Depth _____ (feet)	Temp (C) <u>11.57</u>	<u>12.06</u>	<u>12.16</u>	
Height of Water Col. _____ (feet)	Eh (mV) <u>8.2</u>	<u>-45.1</u>	<u>-60.7</u>	
	DO (mg/l) <u>2.46</u>	<u>0.77</u>	<u>0.57</u>	
Methane _____ (%)	RDP, #2 and #3		RDP, #3 and #4	
Oxygen _____ (%)	pH (std) _____	_____		_____
Carbon Dioxide _____ (%)	SC (uS) _____	_____		_____
Note: Well is considered stable for sampling when at least three (3) parameters indicated RPD of 20% or less.	Temp (C) _____	_____		_____
	Eh (mV) _____	_____		_____
	DO (mg/l) _____	_____		_____
<b>SAMPLE INFORMATION</b>				
Sampling Date: _____ Sampling Time: <u>12:20</u> Sample Appearance/Odor: _____ Weather Conditions: _____				
Comments: <u>pH and SC meter calibrated prior to use with 4.00, 7.00 and 10.00 pH buffer solution</u> <u>and 1413 uS KCl conductivity standard. Eh meter calibrated with 240.0 mV solution.</u> <u>GEM 2000 gas detector calibrated using 50% methane, 35% carbon dioxide, nitrogen balance.</u>				
Sampler Name (Print): <u>Alex Phuang</u>		Signature: <u>Alex Phuang</u>		

6D MS/MSD taken



**WEAVER BOOS**  
**CONSULTANTS, LLC**  
7121 Grape Road, Granger, IN 46530  
**FIELD SURVEY REPORT**  
**WATER SAMPLING**

File No: 1873-356-04-00-03  
Facility: Karwick Road Nature Park  
Address: Karwick Road, Michigan City, IN  
Project Name: Site Characterization  
Date: 11/28/16

Sample ID: 75

Sample Source: Monitoring Well

Type of Sample: Groundwater

Equipment Used: Purging Bladder Pump / Peristaltic Pump  
Sampling Bladder Pump (VOCs) / Bladder or Peristaltic for Other Parameters

**PURGING INFORMATION**

Purge Date: End Purge:

Water Volume in Casing (gallons): Volume purged (liters):

2-inch well has 0.163 gallons/foot

**MEASUREMENTS**

		#1	#2	#3	#4
Well Diameter	(inches)				
Stick up	(feet)	pH (std)	6.54	6.54	6.54
Water Level	(feet)	SC (uS)	1670	1965	1945
Total Depth	(feet)	Temp (C)	10.44	11.43	11.35
Height of Water Col.	(feet)	Eh (mV)	-36.5	-66.5	-68.6
		DO (mg/l)	4.21	0.67	0.59

Methane	(%)		
Oxygen	(%)	RDP, #2 and #3	RDP, #3 and #4
Carbon Dioxide	(%)	pH (std)	
		SC (uS)	
Note: Well is considered stable for sampling		Temp (C)	
when at least three (3) parameters indicated		Eh (mV)	
RPD of 20% or less.		DO (mg/l)	

**SAMPLE INFORMATION**

Sampling Date: 11/28/16  
Sampling Time: 14:05  
Sample Appearance/Odor:  
Weather Conditions:

Comments: pH and SC meter calibrated prior to use with 4.00, 7.00 and 10.00 pH buffer solution  
and 1413 uS KCl conductivity standard. Eh meter calibrated with 240.0 mV solution.  
GEM 2000 gas detector calibrated using 50% methane, 35% carbon dioxide, nitrogen balance.

Sampler Name (Print):

Alex Huang

Signature

Alex Huang



**WEAVER BOOS  
CONSULTANTS, LLC**  
7121 Grape Road, Granger, IN 46530  
**FIELD SURVEY REPORT  
WATER SAMPLING**

File No: 1873-356-04-00-03  
Facility: Karwick Road Nature Park  
Address: Karwick Road, Michigan City, IN  
Project Name: Site Characterization  
Date: 11/28/00

Sample ID: 85

Sample Source: Monitoring Well

Type of Sample: Groundwater

Equipment Used: Purging Bladder Pump / Peristaltic Pump  
Sampling Bladder Pump (VOCs) / Bladder or Peristaltic for Other Parameters

**PURGING INFORMATION**

Purge Date: End Purge:  
Water Volume in Casing (gallons): Volume purged (liters):  
2-inch well has 0.163 gallons/foot

**MEASUREMENTS**

		#1	#2	#3	#4
Well Diameter	(inches)				
Stick up	(feet)				
Water Level	(feet)				
Total Depth	(feet)				
Height of Water Col.	(feet)				
		pH (std)	6.67	6.69	6.69
		SC (uS)	1784	1812	1820
		Temp (C)	11.77	12.01	12.05
		Eh (mV)	-30.9	-51.4	-96.5
		DO (mg/l)	7.01	4.27	0.71

Methane	(%)		
Oxygen	(%)		
Carbon Dioxide	(%)		

RDP, #2 and #3

RDP, #3 and #4

Note: Well is considered stable for sampling  
when at least three (3) parameters indicated  
RPD of 20% or less.

pH (std)		
SC (uS)		
Temp (C)		
Eh (mV)		
DO (mg/l)		

**SAMPLE INFORMATION**

Sampling Date:

Sampling Time:

Sample Appearance/Odor:

Weather Conditions:

Comments: pH and SC meter calibrated prior to use with 4.00, 7.00 and 10.00 pH buffer solution  
and 1413 uS KCl conductivity standard. Eh meter calibrated with 240.0 mV solution.  
GEM 2000 gas detector calibrated using 50% methane, 35% carbon dioxide, nitrogen balance.

Sampler Name (Print):

Alex Huang

Signature

Alex Huang



<b>WEAVER BOOS</b> <b>CONSULTANTS, LLC</b> 7121 Grape Road, Granger, IN 46530 <b>FIELD SURVEY REPORT</b> <b>WATER SAMPLING</b>	File No: 1873-356-04-00-03 Facility: Karwick Road Nature Park Address: Karwick Road, Michigan City, IN Project Name: Site Characterization Date: 11/28/14
--	---

Sample ID: <u>95</u>	Sample Source: <u>Monitoring Well</u>
----------------------	---------------------------------------

Type of Sample: Groundwater

Equipment Used:	Purging	Bladder Pump / Peristaltic Pump
	Sampling	Bladder Pump (VOCs) / Bladder or Peristaltic for Other Parameters

**PURGING INFORMATION**

Purge Date _____	End Purge _____
Water Volume in Casing (gallons) _____	Volume purged (liters) _____

2-inch well has 0.163 gallons/foot

**MEASUREMENTS**

		#1	#2	#3	#4
Well Diameter _____ (inches)					
Stick up _____ (feet)	pH (std)	6.96	6.52	6.52	
Water Level _____ (feet)	SC (uS)	1333	1438	1434	
Total Depth _____ (feet)	Temp (C)	9.94	13.02	13.18	
Height of Water Col. _____ (feet)	Eh (mV)	-27.2	-6.5	-67.6	
	DO (mg/l)	0.04	0.88	0.66	
Methane _____ (%)					
Oxygen _____ (%)	RDP, #2 and #3			RDP, #3 and #4	
Carbon Dioxide _____ (%)	pH (std)	_____		_____	
	SC (uS)	_____		_____	
	Temp (C)	_____		_____	
	Eh (mV)	_____		_____	
	DO (mg/l)	_____		_____	

Note: Well is considered stable for sampling when at least three (3) parameters indicated RPD of 20% or less.

**SAMPLE INFORMATION**

Sampling Date:	<u>11/20</u>
Sampling Time:	_____
Sample Appearance/Odor:	_____
Weather Conditions:	_____

Comments: pH and SC meter calibrated prior to use with 4.00, 7.00 and 10.00 pH buffer solution and 1413 uS KCl conductivity standard. Eh meter calibrated with 240.0 mV solution. GEM 2000 gas detector calibrated using 50% methane, 35% carbon dioxide, nitrogen balance.

Sampler Name (Print): <u>Alex Huang</u>	Signature: <u>Alex Huang</u>
---	------------------------------



**WEAVER BOOS**  
**CONSULTANTS, LLC**  
7121 Grape Road, Granger, IN 46530  
**FIELD SURVEY REPORT**  
**WATER SAMPLING**

File No: 1873-356-04-00-03  
Facility: Karwick Road Nature Park  
Address: Karwick Road, Michigan City, IN  
Project Name: Site Characterization  
Date: 11/28/14

Sample ID: 105 Sample Source: Monitoring Well  
Type of Sample: Groundwater  
Equipment Used: Purging Bladder Pump / Peristaltic Pump  
Sampling Bladder Pump (VOCs) / Bladder or Peristaltic for Other Parameters

**PURGING INFORMATION**

Purge Date \_\_\_\_\_ End Purge \_\_\_\_\_  
Water Volume in Casing (gallons) \_\_\_\_\_ Volume purged (liters) \_\_\_\_\_  
2-inch well has 0.163 gallons/foot

**MEASUREMENTS**

		#1	#2	#3	#4
Well Diameter	_____ (inches)				
Stick up	_____ (feet)	pH (std) <u>7.81</u>	<u>7.69</u>	<u>7.70</u>	
Water Level	_____ (feet)	SC (uS) <u>654</u>	<u>655</u>	<u>655</u>	
Total Depth	_____ (feet)	Temp (C) <u>7.38</u>	<u>10.32</u>	<u>10.22</u>	
Height of Water Col.	_____ (feet)	Eh (mV) <u>-42.9</u>	<u>-147.6</u>	<u>-177.6</u>	
		DO (mg/l) <u>8.10</u>	<u>1.03</u>	<u>0.65</u>	
Methane	_____ (%)				
Oxygen	_____ (%)				
Carbon Dioxide	_____ (%)				
		pH (std) _____			
		SC (uS) _____			
		Temp (C) _____			
		Eh (mV) _____			
		DO (mg/l) _____			

Note: Well is considered stable for sampling when at least three (3) parameters indicated RPD of 20% or less.

**SAMPLE INFORMATION**

Sampling Date: \_\_\_\_\_  
Sampling Time: 15:15  
Sample Appearance/Odor: \_\_\_\_\_  
Weather Conditions: \_\_\_\_\_

Comments: pH and SC meter calibrated prior to use with 4.00, 7.00 and 10.00 pH buffer solution  
and 1413 uS KCl conductivity standard. Eh meter calibrated with 240.0 mV solution.  
GEM 2000 gas detector calibrated using 50% methane, 35% carbon dioxide, nitrogen balance.

Sampler Name (Print): Alex Huang Signature Alex Huang



**WEAVER BOOS  
CONSULTANTS, LLC**

7121 Grape Road, Granger, IN 46530

**FIELD SURVEY REPORT  
WATER SAMPLING**

File No: 1873-356-04-00-03

Facility: Karwick Road Nature Park

Address: Karwick Road, Michigan City, IN

Project Name: Site Characterization

Date: 11/24/09

Sample ID: 10A

Sample Source: Monitoring Well

Type of Sample: Groundwater

Equipment Used: Purging Bladder Pump / Peristaltic Pump  
Sampling Bladder Pump (VOCs) / Bladder or Peristaltic for Other Parameters

**PURGING INFORMATION**

Purge Date: End Purge:

Water Volume in Casing (gallons): Volume purged (liters):

2-inch well has 0.163 gallons/foot

**MEASUREMENTS**

		#1	#2	#3	#4
Well Diameter	(inches)				
Stick up	(feet)				
Water Level	(feet)				
Total Depth	(feet)				
Height of Water Col.	(feet)				
		pH (std)	7.92	7.74	7.74
		SC (uS)	532	638	642
		Temp (C)	9.67	10.45	10.98
		Eh (mV)	0.2	-70.9	-84.7
		DO (mg/l)	6.83	0.82	0.63
Methane	(%)				
Oxygen	(%)				
Carbon Dioxide	(%)				
		pH (std)			
		SC (uS)			
		Temp (C)			
		Eh (mV)			
		DO (mg/l)			

Note: Well is considered stable for sampling when at least three (3) parameters indicated RPD of 20% or less.

**SAMPLE INFORMATION**

Sampling Date:

Sampling Time:

Sample Appearance/Odor: 14.50

Weather Conditions:

Comments: pH and SC meter calibrated prior to use with 4.00, 7.00 and 10.00 pH buffer solution and 1413 uS KCl conductivity standard. Eh meter calibrated with 240.0 mV solution. GEM 2000 gas detector calibrated using 50% methane, 35% carbon dioxide, nitrogen balance.

Sampler Name (Print): Alex Huang

Signature: Alex Huang



December 09, 2014

Mr. Steve Stanford  
Weaver Boos & Gordon  
7121 Grape Road  
Granger, IN 46530

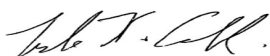
RE: Project: Karwick Nature Park GW  
Pace Project No.: 50107363

Dear Mr. Stanford:

Enclosed are the analytical results for sample(s) received by the laboratory on November 20, 2014. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Lyle Cable  
lyle.cable@pacelabs.com  
Project Manager

Enclosures

cc: Mr. Alex Huang, Weaver Boos



## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## CERTIFICATIONS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

---

### New Orleans Certification IDs

California Env. Lab Accreditation Program Branch:  
11277CA

Florida Department of Health (NELAC): E87595

Illinois Environmental Protection Agency: 0025721

Kansas Department of Health and Environment (NELAC):  
E-10266

Louisiana Dept. of Environmental Quality (NELAC/LELAP):  
02006

Oklahoma Department of Environmental Quality: 2010-  
139

Oregon Environmental Laboratory Accreditation:  
LA200001

Pennsylvania Dept. of Env Protection (NELAC): 68-04202

Texas Commission on Env. Quality (NELAC):

T104704405-09-TX

U.S. Dept. of Agriculture Foreign Soil Import: P330-10-  
00119

Washington Department of Ecology: C2078

---

### Indiana Certification IDs

7726 Moller Road, Indianapolis, IN 46268

Illinois Certification #: 200074

Indiana Certification #: C-49-06

Kansas Certification #: E-10247

Kentucky UST Certification #: 0042

Louisiana/NELAP Certification #: 04076

Ohio VAP Certification #: CL-0065

West Virginia Certification #: 330

---

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## SAMPLE SUMMARY

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Lab ID	Sample ID	Matrix	Date Collected	Date Received
50107363001	MW-1S	Water	11/19/14 10:00	11/20/14 10:20
50107363002	MW-2D	Water	11/19/14 11:40	11/20/14 10:20
50107363003	Field Dup	Water	11/19/14 08:00	11/20/14 10:20
50107363004	MW-2S	Water	11/19/14 13:00	11/20/14 10:20
50107363005	MW-3S	Water	11/19/14 14:20	11/20/14 10:20
50107363006	MW-4D	Water	11/19/14 15:25	11/20/14 10:20
50107363007	Trip Blank	Water	11/19/14 08:00	11/20/14 10:20

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## SAMPLE ANALYTE COUNT

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
50107363001	MW-1S	EPA 8081	SLF	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SNP1	4	PASI-N
		EPA 6010	FRW	20	PASI-I
		EPA 7470	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	48	PASI-I
		EPA 8260	RSW	75	PASI-I
		SM 2320B	SLB	1	PASI-I
		SM 2540C	MLS	1	PASI-I
		SM 4500F/C	TPD	1	PASI-I
		SM 4500-S2-D	TPD	1	PASI-I
		EPA 335.4	ILP	1	PASI-I
		EPA 350.1	DDM	1	PASI-I
		EPA 353.2	ILP	1	PASI-I
50107363002	MW-2D	EPA 8081	SLF	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SNP1	4	PASI-N
		EPA 6010	FRW	20	PASI-I
		EPA 7470	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	48	PASI-I
		EPA 8260	RSW	75	PASI-I
		SM 2320B	SLB	1	PASI-I
		SM 2540C	MLS	1	PASI-I
		SM 4500F/C	TPD	1	PASI-I
		SM 4500-S2-D	TPD	1	PASI-I
		EPA 335.4	ILP	1	PASI-I
		EPA 350.1	DDM	1	PASI-I
		EPA 353.2	ILP	1	PASI-I
50107363003	Field Dup	EPA 8081	SLF	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SNP1	4	PASI-N
		EPA 6010	FRW	20	PASI-I
		EPA 7470	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	48	PASI-I

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## SAMPLE ANALYTE COUNT

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
50107363004	MW-2S	EPA 8260	RSW	75	PASI-I
		SM 2320B	SLB	1	PASI-I
		SM 2540C	MLS	1	PASI-I
		SM 4500F/C	TPD	1	PASI-I
		SM 4500-S2-D	TPD	1	PASI-I
		EPA 335.4	ILP	1	PASI-I
		EPA 350.1	DDM	1	PASI-I
		EPA 353.2	ILP	1	PASI-I
		EPA 8081	SLF	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SNP1	4	PASI-N
		EPA 6010	FRW	20	PASI-I
		EPA 7470	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	48	PASI-I
		EPA 8260	RSW	75	PASI-I
		SM 2320B	SLB	1	PASI-I
		SM 2540C	MLS	1	PASI-I
		SM 4500F/C	TPD	1	PASI-I
		SM 4500-S2-D	TPD	1	PASI-I
		EPA 335.4	ILP	1	PASI-I
		EPA 350.1	DDM	1	PASI-I
50107363005	MW-3S	EPA 353.2	ILP	1	PASI-I
		EPA 8081	SLF	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SNP1	4	PASI-N
		EPA 6010	FRW	20	PASI-I
		EPA 7470	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	48	PASI-I
		EPA 8260	RSW	75	PASI-I
		SM 2320B	SLB	1	PASI-I
		SM 2540C	MLS	1	PASI-I
		SM 4500F/C	TPD	1	PASI-I
		SM 4500-S2-D	TPD	1	PASI-I
		EPA 335.4	ILP	1	PASI-I
		EPA 350.1	DDM	1	PASI-I

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## SAMPLE ANALYTE COUNT

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
50107363006	MW-4D	EPA 353.2	ILP	1	PASI-I
		EPA 8081	SLF	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SNP1	4	PASI-N
		EPA 6010	FRW	20	PASI-I
		EPA 7470	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	48	PASI-I
		EPA 8260	RSW	75	PASI-I
		SM 2320B	SLB	1	PASI-I
		SM 2540C	MLS	1	PASI-I
		SM 4500F/C	TPD	1	PASI-I
		SM 4500-S2-D	TPD	1	PASI-I
		EPA 335.4	ILP	1	PASI-I
		EPA 350.1	DDM	1	PASI-I
50107363007	Trip Blank	EPA 353.2	ILP	1	PASI-I
		EPA 8260	RSW	75	PASI-I

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-1S		Lab ID: 50107363001	Collected: 11/19/14 10:00	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b> Analytical Method: EPA 8081 Preparation Method: EPA 3535								
Aldrin	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 20:50	309-00-2	
alpha-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 20:50	319-84-6	
beta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 20:50	319-85-7	
delta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 20:50	319-86-8	
gamma-BHC (Lindane)	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 20:50	58-89-9	
alpha-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 20:50	5103-71-9	
gamma-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 20:50	5103-74-2	
4,4'-DDD	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 20:50	72-54-8	
4,4'-DDE	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 20:50	72-55-9	
4,4'-DDT	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 20:50	50-29-3	
Dieldrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 20:50	60-57-1	
Endosulfan I	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 20:50	959-98-8	
Endosulfan II	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 20:50	33213-65-9	
Endosulfan sulfate	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 20:50	1031-07-8	
Endrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 20:50	72-20-8	
Endrin aldehyde	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 20:50	7421-93-4	
Endrin ketone	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 20:50	53494-70-5	
Heptachlor	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 20:50	76-44-8	
Heptachlor epoxide	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 20:50	1024-57-3	
Methoxychlor	ND ug/L		0.50	1	11/25/14 14:57	12/05/14 20:50	72-43-5	
Toxaphene	ND ug/L		2.0	1	11/25/14 14:57	12/05/14 20:50	8001-35-2	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	69 %.		10-119	1	11/25/14 14:57	12/05/14 20:50	877-09-8	
Tetrachloro-m-xylene (S)	76 %.		10-119	1	11/25/14 14:57	12/05/14 20:50	877-09-8	
Decachlorobiphenyl (S)	75 %.		14-126	1	11/25/14 14:57	12/05/14 20:50	2051-24-3	
Decachlorobiphenyl (S)	76 %.		14-126	1	11/25/14 14:57	12/05/14 20:50	2051-24-3	
<b>8082 GCS PCB</b> Analytical Method: EPA 8082 Preparation Method: EPA 3510								
PCB-1016 (Aroclor 1016)	ND ug/L		0.50	1	11/20/14 16:45	11/25/14 14:55	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/L		0.50	1	11/20/14 16:45	11/25/14 14:55	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/L		0.50	1	11/20/14 16:45	11/25/14 14:55	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/L		0.50	1	11/20/14 16:45	11/25/14 14:55	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/L		0.50	1	11/20/14 16:45	11/25/14 14:55	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/L		0.50	1	11/20/14 16:45	11/25/14 14:55	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/L		0.50	1	11/20/14 16:45	11/25/14 14:55	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	84 %.		32-115	1	11/20/14 16:45	11/25/14 14:55	877-09-8	
<b>8151 Chlorinated Herbicides</b> Analytical Method: EPA 8151 Preparation Method: EPA 3535A								
2,4-D	ND ug/L		2.0	1	11/24/14 16:03	11/26/14 16:12	94-75-7	
2,4,5-T	ND ug/L		2.0	1	11/24/14 16:03	11/26/14 16:12	93-76-5	
2,4,5-TP (Silvex)	ND ug/L		2.0	1	11/24/14 16:03	11/26/14 16:12	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	87 %.		10-166	1	11/24/14 16:03	11/26/14 16:12	19719-28-9	
2,4-DCAA (S)	90 %.		10-166	1	11/24/14 16:03	11/26/14 16:12	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-1S		Lab ID: 50107363001	Collected: 11/19/14 10:00	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b>		Analytical Method: EPA 6010 Preparation Method: EPA 3010						
Antimony	ND	ug/L	6.0	1	11/21/14 11:54	11/25/14 07:53	7440-36-0	
Arsenic	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:53	7440-38-2	
Barium	25.3	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:53	7440-39-3	
Beryllium	ND	ug/L	4.0	1	11/21/14 11:54	11/25/14 07:53	7440-41-7	
Cadmium	ND	ug/L	2.0	1	11/21/14 11:54	11/25/14 07:53	7440-43-9	
Calcium	66800	ug/L	1000	1	11/21/14 11:54	11/25/14 07:53	7440-70-2	
Chromium	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:53	7440-47-3	
Cobalt	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:53	7440-48-4	
Copper	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:53	7440-50-8	
Iron	372	ug/L	100	1	11/21/14 11:54	11/25/14 07:53	7439-89-6	
Lead	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:53	7439-92-1	
Magnesium	24600	ug/L	1000	1	11/21/14 11:54	11/25/14 07:53	7439-95-4	
Manganese	25.7	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:53	7439-96-5	
Nickel	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:53	7440-02-0	
Potassium	1940	ug/L	1000	1	11/21/14 11:54	11/25/14 07:53	7440-09-7	
Selenium	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:53	7782-49-2	
Silver	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:53	7440-22-4	
Thallium	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:53	7440-28-0	
Vanadium	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:53	7440-62-2	
Zinc	ND	ug/L	20.0	1	11/21/14 11:54	11/25/14 07:53	7440-66-6	
<b>7470 Mercury</b>		Analytical Method: EPA 7470 Preparation Method: EPA 7470						
Mercury	ND	ug/L	2.0	1	11/25/14 11:29	11/26/14 11:16	7439-97-6	
<b>8270 MSSV PAH</b>		Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3510						
Acenaphthene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 12:40	83-32-9	
Acenaphthylene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 12:40	208-96-8	
Anthracene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 12:40	120-12-7	
Benzo(a)anthracene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 12:40	56-55-3	
Benzo(a)pyrene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 12:40	50-32-8	
Benzo(b)fluoranthene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 12:40	205-99-2	
Benzo(g,h,i)perylene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 12:40	191-24-2	
Benzo(k)fluoranthene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 12:40	207-08-9	
Chrysene	ND	ug/L	0.52	1	11/21/14 11:00	11/22/14 12:40	218-01-9	
Dibenz(a,h)anthracene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 12:40	53-70-3	
Fluoranthene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 12:40	206-44-0	
Fluorene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 12:40	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 12:40	193-39-5	
1-Methylnaphthalene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 12:40	90-12-0	
2-Methylnaphthalene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 12:40	91-57-6	
Naphthalene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 12:40	91-20-3	
Phenanthrene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 12:40	85-01-8	
Pyrene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 12:40	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	73 %		21-114	1	11/21/14 11:00	11/22/14 12:40	321-60-8	
p-Terphenyl-d14 (S)	87 %		25-131	1	11/21/14 11:00	11/22/14 12:40	1718-51-0	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-1S		Lab ID: 50107363001	Collected: 11/19/14 10:00	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Benzyl alcohol	ND ug/L		20.8	1	11/21/14 11:00	11/21/14 23:06	100-51-6	
4-Bromophenylphenyl ether	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	101-55-3	
Butylbenzylphthalate	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	85-68-7	
4-Chloro-3-methylphenol	ND ug/L		20.8	1	11/21/14 11:00	11/21/14 23:06	59-50-7	
4-Chloroaniline	ND ug/L		20.8	1	11/21/14 11:00	11/21/14 23:06	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	111-91-1	
bis(2-Chloroethyl) ether	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	111-44-4	
bis(2-Chloroisopropyl) ether	ND ug/L		5.2	1	11/21/14 11:00	11/21/14 23:06	108-60-1	
bis(2chloro1methylethyl) ether	ND ug/L		5.2	1	11/21/14 11:00	11/21/14 23:06	108-60-1	
2-Chloronaphthalene	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	91-58-7	
2-Chlorophenol	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	95-57-8	
4-Chlorophenylphenyl ether	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	7005-72-3	
Dibenzofuran	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	132-64-9	
3,3'-Dichlorobenzidine	ND ug/L		20.8	1	11/21/14 11:00	11/21/14 23:06	91-94-1	
2,4-Dichlorophenol	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	120-83-2	
Diethylphthalate	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	84-66-2	
2,4-Dimethylphenol	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	105-67-9	
Dimethylphthalate	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	131-11-3	
Di-n-butylphthalate	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/L		52.1	1	11/21/14 11:00	11/21/14 23:06	534-52-1	
2,4-Dinitrophenol	ND ug/L		52.1	1	11/21/14 11:00	11/21/14 23:06	51-28-5	
2,4-Dinitrotoluene	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	121-14-2	
2,6-Dinitrotoluene	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	606-20-2	
Di-n-octylphthalate	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/L		5.2	1	11/21/14 11:00	11/21/14 23:06	117-81-7	
Hexachloro-1,3-butadiene	ND ug/L		5.2	1	11/21/14 11:00	11/21/14 23:06	87-68-3	
Hexachlorobenzene	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	118-74-1	
Hexachlorocyclopentadiene	ND ug/L		20.8	1	11/21/14 11:00	11/21/14 23:06	77-47-4	
Hexachloroethane	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	67-72-1	
Isophorone	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/L		20.8	1	11/21/14 11:00	11/21/14 23:06		
2-Nitroaniline	ND ug/L		52.1	1	11/21/14 11:00	11/21/14 23:06	88-74-4	
3-Nitroaniline	ND ug/L		52.1	1	11/21/14 11:00	11/21/14 23:06	99-09-2	
4-Nitroaniline	ND ug/L		52.1	1	11/21/14 11:00	11/21/14 23:06	100-01-6	
Nitrobenzene	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	98-95-3	
2-Nitrophenol	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	88-75-5	
4-Nitrophenol	ND ug/L		52.1	1	11/21/14 11:00	11/21/14 23:06	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	621-64-7	
N-Nitrosodiphenylamine	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	86-30-6	
Pentachlorophenol	ND ug/L		52.1	1	11/21/14 11:00	11/21/14 23:06	87-86-5	
Phenol	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	108-95-2	
2,4,5-Trichlorophenol	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	95-95-4	
2,4,6-Trichlorophenol	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:06	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	88 %.		29-126	1	11/21/14 11:00	11/21/14 23:06	4165-60-0	
Phenol-d5 (S)	16 %.		10-47	1	11/21/14 11:00	11/21/14 23:06	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-1S		Lab ID: 50107363001	Collected: 11/19/14 10:00	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV SCAN		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Surrogates								
2-Fluorophenol (S)	27 %.		10-67	1	11/21/14 11:00	11/21/14 23:06	367-12-4	
2,4,6-Tribromophenol (S)	93 %.		31-161	1	11/21/14 11:00	11/21/14 23:06	118-79-6	
8260 MSV Indiana		Analytical Method: EPA 8260						
Acetone	ND ug/L		100	1		12/01/14 19:09	67-64-1	
Acrolein	ND ug/L		50.0	1		12/01/14 19:09	107-02-8	
Acrylonitrile	ND ug/L		100	1		12/01/14 19:09	107-13-1	
Benzene	ND ug/L		5.0	1		12/01/14 19:09	71-43-2	
Bromobenzene	ND ug/L		5.0	1		12/01/14 19:09	108-86-1	
Bromochloromethane	ND ug/L		5.0	1		12/01/14 19:09	74-97-5	
Bromodichloromethane	ND ug/L		5.0	1		12/01/14 19:09	75-27-4	
Bromoform	ND ug/L		5.0	1		12/01/14 19:09	75-25-2	
Bromomethane	ND ug/L		5.0	1		12/01/14 19:09	74-83-9	
2-Butanone (MEK)	ND ug/L		25.0	1		12/01/14 19:09	78-93-3	
n-Butylbenzene	ND ug/L		5.0	1		12/01/14 19:09	104-51-8	
sec-Butylbenzene	ND ug/L		5.0	1		12/01/14 19:09	135-98-8	
tert-Butylbenzene	ND ug/L		5.0	1		12/01/14 19:09	98-06-6	
Carbon disulfide	ND ug/L		10.0	1		12/01/14 19:09	75-15-0	
Carbon tetrachloride	ND ug/L		5.0	1		12/01/14 19:09	56-23-5	
Chlorobenzene	ND ug/L		5.0	1		12/01/14 19:09	108-90-7	
Chloroethane	ND ug/L		5.0	1		12/01/14 19:09	75-00-3	
Chloroform	ND ug/L		5.0	1		12/01/14 19:09	67-66-3	
Chloromethane	ND ug/L		5.0	1		12/01/14 19:09	74-87-3	
2-Chlorotoluene	ND ug/L		5.0	1		12/01/14 19:09	95-49-8	
4-Chlorotoluene	ND ug/L		5.0	1		12/01/14 19:09	106-43-4	
Dibromochloromethane	ND ug/L		5.0	1		12/01/14 19:09	124-48-1	
1,2-Dibromoethane (EDB)	ND ug/L		5.0	1		12/01/14 19:09	106-93-4	
Dibromomethane	ND ug/L		5.0	1		12/01/14 19:09	74-95-3	
1,2-Dichlorobenzene	ND ug/L		5.0	1		12/01/14 19:09	95-50-1	
1,3-Dichlorobenzene	ND ug/L		5.0	1		12/01/14 19:09	541-73-1	
1,4-Dichlorobenzene	ND ug/L		5.0	1		12/01/14 19:09	106-46-7	
trans-1,4-Dichloro-2-butene	ND ug/L		100	1		12/01/14 19:09	110-57-6	
Dichlorodifluoromethane	ND ug/L		5.0	1		12/01/14 19:09	75-71-8	
1,1-Dichloroethane	ND ug/L		5.0	1		12/01/14 19:09	75-34-3	
1,2-Dichloroethane	ND ug/L		5.0	1		12/01/14 19:09	107-06-2	
1,1-Dichloroethene	ND ug/L		5.0	1		12/01/14 19:09	75-35-4	
cis-1,2-Dichloroethene	ND ug/L		5.0	1		12/01/14 19:09	156-59-2	
trans-1,2-Dichloroethene	ND ug/L		5.0	1		12/01/14 19:09	156-60-5	
1,2-Dichloropropane	ND ug/L		5.0	1		12/01/14 19:09	78-87-5	
1,3-Dichloropropane	ND ug/L		5.0	1		12/01/14 19:09	142-28-9	
2,2-Dichloropropane	ND ug/L		5.0	1		12/01/14 19:09	594-20-7	
1,1-Dichloropropene	ND ug/L		5.0	1		12/01/14 19:09	563-58-6	
cis-1,3-Dichloropropene	ND ug/L		5.0	1		12/01/14 19:09	10061-01-5	
trans-1,3-Dichloropropene	ND ug/L		5.0	1		12/01/14 19:09	10061-02-6	
Ethylbenzene	ND ug/L		5.0	1		12/01/14 19:09	100-41-4	
Ethyl methacrylate	ND ug/L		100	1		12/01/14 19:09	97-63-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-1S		Lab ID: 50107363001	Collected: 11/19/14 10:00	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV Indiana</b>		Analytical Method: EPA 8260						
Hexachloro-1,3-butadiene	ND ug/L		5.0	1		12/01/14 19:09	87-68-3	
n-Hexane	ND ug/L		5.0	1		12/01/14 19:09	110-54-3	
2-Hexanone	ND ug/L		25.0	1		12/01/14 19:09	591-78-6	
Iodomethane	ND ug/L		10.0	1		12/01/14 19:09	74-88-4	
Isopropylbenzene (Cumene)	ND ug/L		5.0	1		12/01/14 19:09	98-82-8	
p-Isopropyltoluene	ND ug/L		5.0	1		12/01/14 19:09	99-87-6	
Methylene Chloride	ND ug/L		5.0	1		12/01/14 19:09	75-09-2	
1-Methylnaphthalene	ND ug/L		5.0	1		12/01/14 19:09	90-12-0	N2
2-Methylnaphthalene	ND ug/L		10.0	1		12/01/14 19:09	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND ug/L		25.0	1		12/01/14 19:09	108-10-1	
Methyl-tert-butyl ether	ND ug/L		4.0	1		12/01/14 19:09	1634-04-4	
Naphthalene	ND ug/L		1.4	1		12/01/14 19:09	91-20-3	
n-Propylbenzene	ND ug/L		5.0	1		12/01/14 19:09	103-65-1	
Styrene	ND ug/L		5.0	1		12/01/14 19:09	100-42-5	
1,1,1,2-Tetrachloroethane	ND ug/L		5.0	1		12/01/14 19:09	630-20-6	
1,1,2,2-Tetrachloroethane	ND ug/L		5.0	1		12/01/14 19:09	79-34-5	
Tetrachloroethene	ND ug/L		5.0	1		12/01/14 19:09	127-18-4	
Toluene	ND ug/L		5.0	1		12/01/14 19:09	108-88-3	
1,2,3-Trichlorobenzene	ND ug/L		5.0	1		12/01/14 19:09	87-61-6	
1,2,4-Trichlorobenzene	ND ug/L		5.0	1		12/01/14 19:09	120-82-1	
1,1,1-Trichloroethane	ND ug/L		5.0	1		12/01/14 19:09	71-55-6	
1,1,2-Trichloroethane	ND ug/L		5.0	1		12/01/14 19:09	79-00-5	
Trichloroethene	ND ug/L		5.0	1		12/01/14 19:09	79-01-6	
Trichlorofluoromethane	ND ug/L		5.0	1		12/01/14 19:09	75-69-4	
1,2,3-Trichloropropane	ND ug/L		5.0	1		12/01/14 19:09	96-18-4	
1,2,4-Trimethylbenzene	ND ug/L		5.0	1		12/01/14 19:09	95-63-6	
1,3,5-Trimethylbenzene	ND ug/L		5.0	1		12/01/14 19:09	108-67-8	
Vinyl acetate	ND ug/L		50.0	1		12/01/14 19:09	108-05-4	
Vinyl chloride	ND ug/L		2.0	1		12/01/14 19:09	75-01-4	
Xylene (Total)	ND ug/L		10.0	1		12/01/14 19:09	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	96 %.		79-116	1		12/01/14 19:09	1868-53-7	
4-Bromofluorobenzene (S)	94 %.		80-114	1		12/01/14 19:09	460-00-4	
Toluene-d8 (S)	99 %.		81-110	1		12/01/14 19:09	2037-26-5	
<b>2320B Alkalinity</b>		Analytical Method: SM 2320B						
Alkalinity, Total as CaCO3	173 mg/L		2.0	1		11/26/14 14:18		
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	435 mg/L		10.0	1		11/23/14 06:35		
<b>4500FC Fluoride</b>		Analytical Method: SM 4500F/C						
Fluoride	ND mg/L		0.10	1		11/24/14 12:50	16984-48-8	
<b>4500S2D Sulfide Water</b>		Analytical Method: SM 4500-S2-D						
Sulfide	ND mg/L		0.10	1		11/20/14 15:12		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-1S		Lab ID: 50107363001		Collected: 11/19/14 10:00		Received: 11/20/14 10:20		Matrix: Water	
Parameters		Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
335.4 Cyanide, Total		Analytical Method: EPA 335.4 Preparation Method: EPA 335.4							
Cyanide	ND	mg/L	0.010	1	11/21/14 13:35	11/22/14 11:11	57-12-5		
350.1 Ammonia		Analytical Method: EPA 350.1 Preparation Method: EPA 350.1							
Nitrogen, Ammonia	ND	mg/L	0.10	1	11/25/14 11:27	11/25/14 16:14	7664-41-7		
353.2 Nitrogen, NO2/NO3 unpres		Analytical Method: EPA 353.2							
Nitrogen, Nitrate	ND	mg/L	0.10	1		11/21/14 09:41			

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-2D		Lab ID: 50107363002	Collected: 11/19/14 11:40	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b> Analytical Method: EPA 8081 Preparation Method: EPA 3535								
Aldrin	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:03	309-00-2	
alpha-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:03	319-84-6	
beta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:03	319-85-7	
delta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:03	319-86-8	
gamma-BHC (Lindane)	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:03	58-89-9	
alpha-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:03	5103-71-9	
gamma-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:03	5103-74-2	
4,4'-DDD	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:03	72-54-8	
4,4'-DDE	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:03	72-55-9	
4,4'-DDT	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:03	50-29-3	
Dieldrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:03	60-57-1	
Endosulfan I	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:03	959-98-8	
Endosulfan II	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:03	33213-65-9	
Endosulfan sulfate	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:03	1031-07-8	
Endrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:03	72-20-8	
Endrin aldehyde	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:03	7421-93-4	
Endrin ketone	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:03	53494-70-5	
Heptachlor	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:03	76-44-8	
Heptachlor epoxide	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:03	1024-57-3	
Methoxychlor	ND ug/L		0.50	1	11/25/14 14:57	12/05/14 21:03	72-43-5	
Toxaphene	ND ug/L		2.0	1	11/25/14 14:57	12/05/14 21:03	8001-35-2	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	62 %.		10-119	1	11/25/14 14:57	12/05/14 21:03	877-09-8	
Tetrachloro-m-xylene (S)	66 %.		10-119	1	11/25/14 14:57	12/05/14 21:03	877-09-8	
Decachlorobiphenyl (S)	72 %.		14-126	1	11/25/14 14:57	12/05/14 21:03	2051-24-3	
Decachlorobiphenyl (S)	70 %.		14-126	1	11/25/14 14:57	12/05/14 21:03	2051-24-3	
<b>8082 GCS PCB</b> Analytical Method: EPA 8082 Preparation Method: EPA 3510								
PCB-1016 (Aroclor 1016)	ND ug/L		0.51	1	11/20/14 16:45	11/25/14 15:02	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/L		0.51	1	11/20/14 16:45	11/25/14 15:02	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/L		0.51	1	11/20/14 16:45	11/25/14 15:02	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/L		0.51	1	11/20/14 16:45	11/25/14 15:02	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/L		0.51	1	11/20/14 16:45	11/25/14 15:02	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/L		0.51	1	11/20/14 16:45	11/25/14 15:02	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/L		0.51	1	11/20/14 16:45	11/25/14 15:02	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	80 %.		32-115	1	11/20/14 16:45	11/25/14 15:02	877-09-8	
<b>8151 Chlorinated Herbicides</b> Analytical Method: EPA 8151 Preparation Method: EPA 3535A								
2,4-D	ND ug/L		2.0	1	11/24/14 16:03	11/26/14 16:28	94-75-7	
2,4,5-T	ND ug/L		2.0	1	11/24/14 16:03	11/26/14 16:28	93-76-5	
2,4,5-TP (Silvex)	ND ug/L		2.0	1	11/24/14 16:03	11/26/14 16:28	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	89 %.		10-166	1	11/24/14 16:03	11/26/14 16:28	19719-28-9	
2,4-DCAA (S)	97 %.		10-166	1	11/24/14 16:03	11/26/14 16:28	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-2D		Lab ID: 50107363002	Collected: 11/19/14 11:40	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b>		Analytical Method: EPA 6010 Preparation Method: EPA 3010						
Antimony	ND	ug/L	6.0	1	11/21/14 11:54	11/25/14 07:55	7440-36-0	
Arsenic	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:55	7440-38-2	
Barium	75.6	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:55	7440-39-3	
Beryllium	ND	ug/L	4.0	1	11/21/14 11:54	11/25/14 07:55	7440-41-7	
Cadmium	ND	ug/L	2.0	1	11/21/14 11:54	11/25/14 07:55	7440-43-9	
Calcium	337000	ug/L	5000	5	11/21/14 11:54	11/26/14 09:59	7440-70-2	
Chromium	10.0	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:55	7440-47-3	
Cobalt	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:55	7440-48-4	
Copper	15.2	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:55	7440-50-8	
Iron	12500	ug/L	100	1	11/21/14 11:54	11/25/14 07:55	7439-89-6	
Lead	10.3	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:55	7439-92-1	
Magnesium	152000	ug/L	1000	1	11/21/14 11:54	11/25/14 07:55	7439-95-4	
Manganese	223	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:55	7439-96-5	
Nickel	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:55	7440-02-0	
Potassium	20800	ug/L	1000	1	11/21/14 11:54	11/25/14 07:55	7440-09-7	
Selenium	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:55	7782-49-2	
Silver	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:55	7440-22-4	
Thallium	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:55	7440-28-0	
Vanadium	27.9	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:55	7440-62-2	
Zinc	38.0	ug/L	20.0	1	11/21/14 11:54	11/25/14 07:55	7440-66-6	
<b>7470 Mercury</b>		Analytical Method: EPA 7470 Preparation Method: EPA 7470						
Mercury	ND	ug/L	2.0	1	11/25/14 11:29	11/26/14 11:22	7439-97-6	
<b>8270 MSSV PAH</b>		Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3510						
Acenaphthene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 12:58	83-32-9	
Acenaphthylene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 12:58	208-96-8	
Anthracene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 12:58	120-12-7	
Benzo(a)anthracene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 12:58	56-55-3	
Benzo(a)pyrene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 12:58	50-32-8	
Benzo(b)fluoranthene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 12:58	205-99-2	
Benzo(g,h,i)perylene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 12:58	191-24-2	
Benzo(k)fluoranthene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 12:58	207-08-9	
Chrysene	ND	ug/L	0.51	1	11/21/14 11:00	11/22/14 12:58	218-01-9	
Dibenz(a,h)anthracene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 12:58	53-70-3	
Fluoranthene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 12:58	206-44-0	
Fluorene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 12:58	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 12:58	193-39-5	
1-Methylnaphthalene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 12:58	90-12-0	
2-Methylnaphthalene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 12:58	91-57-6	
Naphthalene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 12:58	91-20-3	
Phenanthrene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 12:58	85-01-8	
Pyrene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 12:58	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	72 %		21-114	1	11/21/14 11:00	11/22/14 12:58	321-60-8	
p-Terphenyl-d14 (S)	82 %		25-131	1	11/21/14 11:00	11/22/14 12:58	1718-51-0	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-2D		Lab ID: 50107363002	Collected: 11/19/14 11:40	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Benzyl alcohol	ND ug/L		20.4	1	11/21/14 11:00	11/21/14 23:29	100-51-6	
4-Bromophenylphenyl ether	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	101-55-3	
Butylbenzylphthalate	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	85-68-7	
4-Chloro-3-methylphenol	ND ug/L		20.4	1	11/21/14 11:00	11/21/14 23:29	59-50-7	
4-Chloroaniline	ND ug/L		20.4	1	11/21/14 11:00	11/21/14 23:29	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	111-91-1	
bis(2-Chloroethyl) ether	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	111-44-4	
bis(2-Chloroisopropyl) ether	ND ug/L		5.1	1	11/21/14 11:00	11/21/14 23:29	108-60-1	
bis(2chloro1methylethyl) ether	ND ug/L		5.1	1	11/21/14 11:00	11/21/14 23:29	108-60-1	
2-Chloronaphthalene	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	91-58-7	
2-Chlorophenol	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	95-57-8	
4-Chlorophenylphenyl ether	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	7005-72-3	
Dibenzofuran	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	132-64-9	
3,3'-Dichlorobenzidine	ND ug/L		20.4	1	11/21/14 11:00	11/21/14 23:29	91-94-1	
2,4-Dichlorophenol	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	120-83-2	
Diethylphthalate	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	84-66-2	
2,4-Dimethylphenol	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	105-67-9	
Dimethylphthalate	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	131-11-3	
Di-n-butylphthalate	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/L		51.0	1	11/21/14 11:00	11/21/14 23:29	534-52-1	
2,4-Dinitrophenol	ND ug/L		51.0	1	11/21/14 11:00	11/21/14 23:29	51-28-5	
2,4-Dinitrotoluene	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	121-14-2	
2,6-Dinitrotoluene	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	606-20-2	
Di-n-octylphthalate	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	117-84-0	
bis(2-Ethylhexyl)phthalate	11.9 ug/L		5.1	1	11/21/14 11:00	11/21/14 23:29	117-81-7	
Hexachloro-1,3-butadiene	ND ug/L		5.1	1	11/21/14 11:00	11/21/14 23:29	87-68-3	
Hexachlorobenzene	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	118-74-1	
Hexachlorocyclopentadiene	ND ug/L		20.4	1	11/21/14 11:00	11/21/14 23:29	77-47-4	
Hexachloroethane	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	67-72-1	
Isophorone	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/L		20.4	1	11/21/14 11:00	11/21/14 23:29		
2-Nitroaniline	ND ug/L		51.0	1	11/21/14 11:00	11/21/14 23:29	88-74-4	
3-Nitroaniline	ND ug/L		51.0	1	11/21/14 11:00	11/21/14 23:29	99-09-2	
4-Nitroaniline	ND ug/L		51.0	1	11/21/14 11:00	11/21/14 23:29	100-01-6	
Nitrobenzene	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	98-95-3	
2-Nitrophenol	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	88-75-5	
4-Nitrophenol	ND ug/L		51.0	1	11/21/14 11:00	11/21/14 23:29	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	621-64-7	
N-Nitrosodiphenylamine	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	86-30-6	
Pentachlorophenol	ND ug/L		51.0	1	11/21/14 11:00	11/21/14 23:29	87-86-5	
Phenol	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	108-95-2	
2,4,5-Trichlorophenol	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	95-95-4	
2,4,6-Trichlorophenol	ND ug/L		10.2	1	11/21/14 11:00	11/21/14 23:29	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	83 %.		29-126	1	11/21/14 11:00	11/21/14 23:29	4165-60-0	
Phenol-d5 (S)	14 %.		10-47	1	11/21/14 11:00	11/21/14 23:29	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-2D		Lab ID: 50107363002	Collected: 11/19/14 11:40	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV SCAN		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Surrogates								
2-Fluorophenol (S)	25 %.		10-67	1	11/21/14 11:00	11/21/14 23:29	367-12-4	
2,4,6-Tribromophenol (S)	81 %.		31-161	1	11/21/14 11:00	11/21/14 23:29	118-79-6	
8260 MSV Indiana		Analytical Method: EPA 8260						
Acetone	ND ug/L		100	1		12/01/14 20:14	67-64-1	
Acrolein	ND ug/L		50.0	1		12/01/14 20:14	107-02-8	
Acrylonitrile	ND ug/L		100	1		12/01/14 20:14	107-13-1	
Benzene	ND ug/L		5.0	1		12/01/14 20:14	71-43-2	
Bromobenzene	ND ug/L		5.0	1		12/01/14 20:14	108-86-1	
Bromochloromethane	ND ug/L		5.0	1		12/01/14 20:14	74-97-5	
Bromodichloromethane	ND ug/L		5.0	1		12/01/14 20:14	75-27-4	
Bromoform	ND ug/L		5.0	1		12/01/14 20:14	75-25-2	
Bromomethane	ND ug/L		5.0	1		12/01/14 20:14	74-83-9	
2-Butanone (MEK)	ND ug/L		25.0	1		12/01/14 20:14	78-93-3	
n-Butylbenzene	ND ug/L		5.0	1		12/01/14 20:14	104-51-8	
sec-Butylbenzene	ND ug/L		5.0	1		12/01/14 20:14	135-98-8	
tert-Butylbenzene	ND ug/L		5.0	1		12/01/14 20:14	98-06-6	
Carbon disulfide	ND ug/L		10.0	1		12/01/14 20:14	75-15-0	
Carbon tetrachloride	ND ug/L		5.0	1		12/01/14 20:14	56-23-5	
Chlorobenzene	ND ug/L		5.0	1		12/01/14 20:14	108-90-7	
Chloroethane	ND ug/L		5.0	1		12/01/14 20:14	75-00-3	
Chloroform	ND ug/L		5.0	1		12/01/14 20:14	67-66-3	
Chloromethane	ND ug/L		5.0	1		12/01/14 20:14	74-87-3	
2-Chlorotoluene	ND ug/L		5.0	1		12/01/14 20:14	95-49-8	
4-Chlorotoluene	ND ug/L		5.0	1		12/01/14 20:14	106-43-4	
Dibromochloromethane	ND ug/L		5.0	1		12/01/14 20:14	124-48-1	
1,2-Dibromoethane (EDB)	ND ug/L		5.0	1		12/01/14 20:14	106-93-4	
Dibromomethane	ND ug/L		5.0	1		12/01/14 20:14	74-95-3	
1,2-Dichlorobenzene	ND ug/L		5.0	1		12/01/14 20:14	95-50-1	
1,3-Dichlorobenzene	ND ug/L		5.0	1		12/01/14 20:14	541-73-1	
1,4-Dichlorobenzene	ND ug/L		5.0	1		12/01/14 20:14	106-46-7	
trans-1,4-Dichloro-2-butene	ND ug/L		100	1		12/01/14 20:14	110-57-6	
Dichlorodifluoromethane	ND ug/L		5.0	1		12/01/14 20:14	75-71-8	
1,1-Dichloroethane	ND ug/L		5.0	1		12/01/14 20:14	75-34-3	
1,2-Dichloroethane	ND ug/L		5.0	1		12/01/14 20:14	107-06-2	
1,1-Dichloroethene	ND ug/L		5.0	1		12/01/14 20:14	75-35-4	
cis-1,2-Dichloroethene	ND ug/L		5.0	1		12/01/14 20:14	156-59-2	
trans-1,2-Dichloroethene	ND ug/L		5.0	1		12/01/14 20:14	156-60-5	
1,2-Dichloropropane	ND ug/L		5.0	1		12/01/14 20:14	78-87-5	
1,3-Dichloropropane	ND ug/L		5.0	1		12/01/14 20:14	142-28-9	
2,2-Dichloropropane	ND ug/L		5.0	1		12/01/14 20:14	594-20-7	
1,1-Dichloropropene	ND ug/L		5.0	1		12/01/14 20:14	563-58-6	
cis-1,3-Dichloropropene	ND ug/L		5.0	1		12/01/14 20:14	10061-01-5	
trans-1,3-Dichloropropene	ND ug/L		5.0	1		12/01/14 20:14	10061-02-6	
Ethylbenzene	ND ug/L		5.0	1		12/01/14 20:14	100-41-4	
Ethyl methacrylate	ND ug/L		100	1		12/01/14 20:14	97-63-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-2D		Lab ID: 50107363002	Collected: 11/19/14 11:40	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV Indiana</b>		Analytical Method: EPA 8260						
Hexachloro-1,3-butadiene	ND ug/L		5.0	1		12/01/14 20:14	87-68-3	
n-Hexane	ND ug/L		5.0	1		12/01/14 20:14	110-54-3	
2-Hexanone	ND ug/L		25.0	1		12/01/14 20:14	591-78-6	
Iodomethane	ND ug/L		10.0	1		12/01/14 20:14	74-88-4	
Isopropylbenzene (Cumene)	ND ug/L		5.0	1		12/01/14 20:14	98-82-8	
p-Isopropyltoluene	ND ug/L		5.0	1		12/01/14 20:14	99-87-6	
Methylene Chloride	ND ug/L		5.0	1		12/01/14 20:14	75-09-2	
1-Methylnaphthalene	ND ug/L		5.0	1		12/01/14 20:14	90-12-0	N2
2-Methylnaphthalene	ND ug/L		10.0	1		12/01/14 20:14	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND ug/L		25.0	1		12/01/14 20:14	108-10-1	
Methyl-tert-butyl ether	ND ug/L		4.0	1		12/01/14 20:14	1634-04-4	
Naphthalene	ND ug/L		1.4	1		12/01/14 20:14	91-20-3	
n-Propylbenzene	ND ug/L		5.0	1		12/01/14 20:14	103-65-1	
Styrene	ND ug/L		5.0	1		12/01/14 20:14	100-42-5	
1,1,1,2-Tetrachloroethane	ND ug/L		5.0	1		12/01/14 20:14	630-20-6	
1,1,2,2-Tetrachloroethane	ND ug/L		5.0	1		12/01/14 20:14	79-34-5	
Tetrachloroethene	ND ug/L		5.0	1		12/01/14 20:14	127-18-4	
Toluene	ND ug/L		5.0	1		12/01/14 20:14	108-88-3	
1,2,3-Trichlorobenzene	ND ug/L		5.0	1		12/01/14 20:14	87-61-6	
1,2,4-Trichlorobenzene	ND ug/L		5.0	1		12/01/14 20:14	120-82-1	
1,1,1-Trichloroethane	ND ug/L		5.0	1		12/01/14 20:14	71-55-6	
1,1,2-Trichloroethane	ND ug/L		5.0	1		12/01/14 20:14	79-00-5	
Trichloroethene	ND ug/L		5.0	1		12/01/14 20:14	79-01-6	
Trichlorofluoromethane	ND ug/L		5.0	1		12/01/14 20:14	75-69-4	
1,2,3-Trichloropropane	ND ug/L		5.0	1		12/01/14 20:14	96-18-4	
1,2,4-Trimethylbenzene	ND ug/L		5.0	1		12/01/14 20:14	95-63-6	
1,3,5-Trimethylbenzene	ND ug/L		5.0	1		12/01/14 20:14	108-67-8	
Vinyl acetate	ND ug/L		50.0	1		12/01/14 20:14	108-05-4	
Vinyl chloride	ND ug/L		2.0	1		12/01/14 20:14	75-01-4	
Xylene (Total)	ND ug/L		10.0	1		12/01/14 20:14	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	98 %.		79-116	1		12/01/14 20:14	1868-53-7	
4-Bromofluorobenzene (S)	96 %.		80-114	1		12/01/14 20:14	460-00-4	
Toluene-d8 (S)	99 %.		81-110	1		12/01/14 20:14	2037-26-5	
<b>2320B Alkalinity</b>		Analytical Method: SM 2320B						
Alkalinity, Total as CaCO3	329 mg/L		2.0	1		11/26/14 14:18		
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	3140 mg/L		20.0	1		11/23/14 06:36		
<b>4500FC Fluoride</b>		Analytical Method: SM 4500F/C						
Fluoride	0.64 mg/L		0.10	1		11/24/14 12:51	16984-48-8	
<b>4500S2D Sulfide Water</b>		Analytical Method: SM 4500-S2-D						
Sulfide	ND mg/L		0.10	1		11/20/14 15:12		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-2D		Lab ID: 50107363002		Collected: 11/19/14 11:40		Received: 11/20/14 10:20		Matrix: Water	
Parameters		Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
335.4 Cyanide, Total		Analytical Method: EPA 335.4 Preparation Method: EPA 335.4							
Cyanide	ND	mg/L	0.010	1	11/21/14 13:35	11/22/14 11:17	57-12-5		
350.1 Ammonia		Analytical Method: EPA 350.1 Preparation Method: EPA 350.1							
Nitrogen, Ammonia	1.4	mg/L	0.10	1	11/25/14 11:27	11/25/14 16:15	7664-41-7		
353.2 Nitrogen, NO2/NO3 unpres		Analytical Method: EPA 353.2							
Nitrogen, Nitrate	ND	mg/L	0.10	1		11/21/14 09:44			

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: Field Dup		Lab ID: 50107363003	Collected: 11/19/14 08:00	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b>		Analytical Method: EPA 8081 Preparation Method: EPA 3535						
Aldrin	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:15	309-00-2	
alpha-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:15	319-84-6	
beta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:15	319-85-7	
delta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:15	319-86-8	
gamma-BHC (Lindane)	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:15	58-89-9	
alpha-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:15	5103-71-9	
gamma-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:15	5103-74-2	
4,4'-DDD	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:15	72-54-8	
4,4'-DDE	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:15	72-55-9	
4,4'-DDT	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:15	50-29-3	
Dieldrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:15	60-57-1	
Endosulfan I	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:15	959-98-8	
Endosulfan II	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:15	33213-65-9	
Endosulfan sulfate	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:15	1031-07-8	
Endrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:15	72-20-8	
Endrin aldehyde	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:15	7421-93-4	
Endrin ketone	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:15	53494-70-5	
Heptachlor	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:15	76-44-8	
Heptachlor epoxide	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:15	1024-57-3	
Methoxychlor	ND ug/L		0.50	1	11/25/14 14:57	12/05/14 21:15	72-43-5	
Toxaphene	ND ug/L		2.0	1	11/25/14 14:57	12/05/14 21:15	8001-35-2	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	60 %.		10-119	1	11/25/14 14:57	12/05/14 21:15	877-09-8	
Tetrachloro-m-xylene (S)	64 %.		10-119	1	11/25/14 14:57	12/05/14 21:15	877-09-8	
Decachlorobiphenyl (S)	64 %.		14-126	1	11/25/14 14:57	12/05/14 21:15	2051-24-3	
Decachlorobiphenyl (S)	66 %.		14-126	1	11/25/14 14:57	12/05/14 21:15	2051-24-3	
<b>8082 GCS PCB</b>		Analytical Method: EPA 8082 Preparation Method: EPA 3510						
PCB-1016 (Aroclor 1016)	ND ug/L		0.52	1	11/20/14 16:45	11/25/14 15:08	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/L		0.52	1	11/20/14 16:45	11/25/14 15:08	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/L		0.52	1	11/20/14 16:45	11/25/14 15:08	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/L		0.52	1	11/20/14 16:45	11/25/14 15:08	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/L		0.52	1	11/20/14 16:45	11/25/14 15:08	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/L		0.52	1	11/20/14 16:45	11/25/14 15:08	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/L		0.52	1	11/20/14 16:45	11/25/14 15:08	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	83 %.		32-115	1	11/20/14 16:45	11/25/14 15:08	877-09-8	
<b>8151 Chlorinated Herbicides</b>		Analytical Method: EPA 8151 Preparation Method: EPA 3535A						
2,4-D	ND ug/L		2.0	1	11/24/14 16:03	11/26/14 16:44	94-75-7	
2,4,5-T	ND ug/L		2.0	1	11/24/14 16:03	11/26/14 16:44	93-76-5	
2,4,5-TP (Silvex)	ND ug/L		2.0	1	11/24/14 16:03	11/26/14 16:44	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	81 %.		10-166	1	11/24/14 16:03	11/26/14 16:44	19719-28-9	
2,4-DCAA (S)	82 %.		10-166	1	11/24/14 16:03	11/26/14 16:44	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: Field Dup		Lab ID: 50107363003	Collected: 11/19/14 08:00	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b>		Analytical Method: EPA 6010 Preparation Method: EPA 3010						
Antimony	ND	ug/L	6.0	1	11/21/14 11:54	11/25/14 07:58	7440-36-0	
Arsenic	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:58	7440-38-2	
Barium	73.2	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:58	7440-39-3	
Beryllium	ND	ug/L	4.0	1	11/21/14 11:54	11/25/14 07:58	7440-41-7	
Cadmium	ND	ug/L	2.0	1	11/21/14 11:54	11/25/14 07:58	7440-43-9	
Calcium	333000	ug/L	5000	5	11/21/14 11:54	11/25/14 08:46	7440-70-2	
Chromium	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:58	7440-47-3	
Cobalt	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:58	7440-48-4	
Copper	12.9	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:58	7440-50-8	
Iron	11000	ug/L	100	1	11/21/14 11:54	11/25/14 07:58	7439-89-6	
Lead	12.1	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:58	7439-92-1	
Magnesium	155000	ug/L	1000	1	11/21/14 11:54	11/25/14 07:58	7439-95-4	
Manganese	200	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:58	7439-96-5	
Nickel	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:58	7440-02-0	
Potassium	21000	ug/L	1000	1	11/21/14 11:54	11/25/14 07:58	7440-09-7	
Selenium	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:58	7782-49-2	
Silver	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:58	7440-22-4	
Thallium	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:58	7440-28-0	
Vanadium	26.6	ug/L	10.0	1	11/21/14 11:54	11/25/14 07:58	7440-62-2	
Zinc	37.5	ug/L	20.0	1	11/21/14 11:54	11/25/14 07:58	7440-66-6	
<b>7470 Mercury</b>		Analytical Method: EPA 7470 Preparation Method: EPA 7470						
Mercury	ND	ug/L	2.0	1	11/25/14 11:29	11/26/14 11:25	7439-97-6	
<b>8270 MSSV PAH</b>		Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3510						
Acenaphthene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:16	83-32-9	
Acenaphthylene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:16	208-96-8	
Anthracene	0.31	ug/L	0.10	1	11/21/14 11:00	11/22/14 13:16	120-12-7	
Benzo(a)anthracene	0.63	ug/L	0.10	1	11/21/14 11:00	11/22/14 13:16	56-55-3	
Benzo(a)pyrene	0.51	ug/L	0.10	1	11/21/14 11:00	11/22/14 13:16	50-32-8	
Benzo(b)fluoranthene	0.55	ug/L	0.10	1	11/21/14 11:00	11/22/14 13:16	205-99-2	
Benzo(g,h,i)perylene	0.56	ug/L	0.10	1	11/21/14 11:00	11/22/14 13:16	191-24-2	
Benzo(k)fluoranthene	0.59	ug/L	0.10	1	11/21/14 11:00	11/22/14 13:16	207-08-9	
Chrysene	0.71	ug/L	0.52	1	11/21/14 11:00	11/22/14 13:16	218-01-9	
Dibenz(a,h)anthracene	0.53	ug/L	0.10	1	11/21/14 11:00	11/22/14 13:16	53-70-3	
Fluoranthene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:16	206-44-0	
Fluorene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:16	86-73-7	
Indeno(1,2,3-cd)pyrene	0.53	ug/L	0.10	1	11/21/14 11:00	11/22/14 13:16	193-39-5	
1-Methylnaphthalene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:16	90-12-0	
2-Methylnaphthalene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:16	91-57-6	
Naphthalene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:16	91-20-3	
Phenanthrene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:16	85-01-8	
Pyrene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:16	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	68 %		21-114	1	11/21/14 11:00	11/22/14 13:16	321-60-8	
p-Terphenyl-d14 (S)	69 %		25-131	1	11/21/14 11:00	11/22/14 13:16	1718-51-0	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: Field Dup		Lab ID: 50107363003	Collected: 11/19/14 08:00	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Benzyl alcohol	ND ug/L		20.8	1	11/21/14 11:00	11/21/14 23:51	100-51-6	
4-Bromophenylphenyl ether	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	101-55-3	
Butylbenzylphthalate	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	85-68-7	
4-Chloro-3-methylphenol	ND ug/L		20.8	1	11/21/14 11:00	11/21/14 23:51	59-50-7	
4-Chloroaniline	ND ug/L		20.8	1	11/21/14 11:00	11/21/14 23:51	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	111-91-1	
bis(2-Chloroethyl) ether	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	111-44-4	
bis(2-Chloroisopropyl) ether	ND ug/L		5.2	1	11/21/14 11:00	11/21/14 23:51	108-60-1	
bis(2chloro1methylethyl) ether	ND ug/L		5.2	1	11/21/14 11:00	11/21/14 23:51	108-60-1	
2-Chloronaphthalene	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	91-58-7	
2-Chlorophenol	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	95-57-8	
4-Chlorophenylphenyl ether	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	7005-72-3	
Dibenzofuran	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	132-64-9	
3,3'-Dichlorobenzidine	ND ug/L		20.8	1	11/21/14 11:00	11/21/14 23:51	91-94-1	
2,4-Dichlorophenol	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	120-83-2	
Diethylphthalate	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	84-66-2	
2,4-Dimethylphenol	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	105-67-9	
Dimethylphthalate	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	131-11-3	
Di-n-butylphthalate	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/L		52.1	1	11/21/14 11:00	11/21/14 23:51	534-52-1	
2,4-Dinitrophenol	ND ug/L		52.1	1	11/21/14 11:00	11/21/14 23:51	51-28-5	
2,4-Dinitrotoluene	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	121-14-2	
2,6-Dinitrotoluene	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	606-20-2	
Di-n-octylphthalate	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/L		5.2	1	11/21/14 11:00	11/21/14 23:51	117-81-7	
Hexachloro-1,3-butadiene	ND ug/L		5.2	1	11/21/14 11:00	11/21/14 23:51	87-68-3	
Hexachlorobenzene	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	118-74-1	
Hexachlorocyclopentadiene	ND ug/L		20.8	1	11/21/14 11:00	11/21/14 23:51	77-47-4	
Hexachloroethane	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	67-72-1	
Isophorone	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/L		20.8	1	11/21/14 11:00	11/21/14 23:51		
2-Nitroaniline	ND ug/L		52.1	1	11/21/14 11:00	11/21/14 23:51	88-74-4	
3-Nitroaniline	ND ug/L		52.1	1	11/21/14 11:00	11/21/14 23:51	99-09-2	
4-Nitroaniline	ND ug/L		52.1	1	11/21/14 11:00	11/21/14 23:51	100-01-6	
Nitrobenzene	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	98-95-3	
2-Nitrophenol	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	88-75-5	
4-Nitrophenol	ND ug/L		52.1	1	11/21/14 11:00	11/21/14 23:51	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	621-64-7	
N-Nitrosodiphenylamine	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	86-30-6	
Pentachlorophenol	ND ug/L		52.1	1	11/21/14 11:00	11/21/14 23:51	87-86-5	
Phenol	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	108-95-2	
2,4,5-Trichlorophenol	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	95-95-4	
2,4,6-Trichlorophenol	ND ug/L		10.4	1	11/21/14 11:00	11/21/14 23:51	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	81 %.		29-126	1	11/21/14 11:00	11/21/14 23:51	4165-60-0	
Phenol-d5 (S)	15 %.		10-47	1	11/21/14 11:00	11/21/14 23:51	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: Field Dup		Lab ID: 50107363003	Collected: 11/19/14 08:00	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV SCAN		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Surrogates								
2-Fluorophenol (S)	26 %.		10-67	1	11/21/14 11:00	11/21/14 23:51	367-12-4	
2,4,6-Tribromophenol (S)	88 %.		31-161	1	11/21/14 11:00	11/21/14 23:51	118-79-6	
8260 MSV Indiana		Analytical Method: EPA 8260						
Acetone	ND ug/L		100	1		12/01/14 21:19	67-64-1	
Acrolein	ND ug/L		50.0	1		12/01/14 21:19	107-02-8	
Acrylonitrile	ND ug/L		100	1		12/01/14 21:19	107-13-1	
Benzene	ND ug/L		5.0	1		12/01/14 21:19	71-43-2	
Bromobenzene	ND ug/L		5.0	1		12/01/14 21:19	108-86-1	
Bromochloromethane	ND ug/L		5.0	1		12/01/14 21:19	74-97-5	
Bromodichloromethane	ND ug/L		5.0	1		12/01/14 21:19	75-27-4	
Bromoform	ND ug/L		5.0	1		12/01/14 21:19	75-25-2	
Bromomethane	ND ug/L		5.0	1		12/01/14 21:19	74-83-9	
2-Butanone (MEK)	ND ug/L		25.0	1		12/01/14 21:19	78-93-3	
n-Butylbenzene	ND ug/L		5.0	1		12/01/14 21:19	104-51-8	
sec-Butylbenzene	ND ug/L		5.0	1		12/01/14 21:19	135-98-8	
tert-Butylbenzene	ND ug/L		5.0	1		12/01/14 21:19	98-06-6	
Carbon disulfide	ND ug/L		10.0	1		12/01/14 21:19	75-15-0	
Carbon tetrachloride	ND ug/L		5.0	1		12/01/14 21:19	56-23-5	
Chlorobenzene	ND ug/L		5.0	1		12/01/14 21:19	108-90-7	
Chloroethane	ND ug/L		5.0	1		12/01/14 21:19	75-00-3	
Chloroform	ND ug/L		5.0	1		12/01/14 21:19	67-66-3	
Chloromethane	ND ug/L		5.0	1		12/01/14 21:19	74-87-3	
2-Chlorotoluene	ND ug/L		5.0	1		12/01/14 21:19	95-49-8	
4-Chlorotoluene	ND ug/L		5.0	1		12/01/14 21:19	106-43-4	
Dibromochloromethane	ND ug/L		5.0	1		12/01/14 21:19	124-48-1	
1,2-Dibromoethane (EDB)	ND ug/L		5.0	1		12/01/14 21:19	106-93-4	
Dibromomethane	ND ug/L		5.0	1		12/01/14 21:19	74-95-3	
1,2-Dichlorobenzene	ND ug/L		5.0	1		12/01/14 21:19	95-50-1	
1,3-Dichlorobenzene	ND ug/L		5.0	1		12/01/14 21:19	541-73-1	
1,4-Dichlorobenzene	ND ug/L		5.0	1		12/01/14 21:19	106-46-7	
trans-1,4-Dichloro-2-butene	ND ug/L		100	1		12/01/14 21:19	110-57-6	
Dichlorodifluoromethane	ND ug/L		5.0	1		12/01/14 21:19	75-71-8	
1,1-Dichloroethane	ND ug/L		5.0	1		12/01/14 21:19	75-34-3	
1,2-Dichloroethane	ND ug/L		5.0	1		12/01/14 21:19	107-06-2	
1,1-Dichloroethene	ND ug/L		5.0	1		12/01/14 21:19	75-35-4	
cis-1,2-Dichloroethene	ND ug/L		5.0	1		12/01/14 21:19	156-59-2	
trans-1,2-Dichloroethene	ND ug/L		5.0	1		12/01/14 21:19	156-60-5	
1,2-Dichloropropane	ND ug/L		5.0	1		12/01/14 21:19	78-87-5	
1,3-Dichloropropane	ND ug/L		5.0	1		12/01/14 21:19	142-28-9	
2,2-Dichloropropane	ND ug/L		5.0	1		12/01/14 21:19	594-20-7	
1,1-Dichloropropene	ND ug/L		5.0	1		12/01/14 21:19	563-58-6	
cis-1,3-Dichloropropene	ND ug/L		5.0	1		12/01/14 21:19	10061-01-5	
trans-1,3-Dichloropropene	ND ug/L		5.0	1		12/01/14 21:19	10061-02-6	
Ethylbenzene	ND ug/L		5.0	1		12/01/14 21:19	100-41-4	
Ethyl methacrylate	ND ug/L		100	1		12/01/14 21:19	97-63-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: Field Dup		Lab ID: 50107363003	Collected: 11/19/14 08:00	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV Indiana</b>		Analytical Method: EPA 8260						
Hexachloro-1,3-butadiene	ND ug/L		5.0	1		12/01/14 21:19	87-68-3	
n-Hexane	ND ug/L		5.0	1		12/01/14 21:19	110-54-3	
2-Hexanone	ND ug/L		25.0	1		12/01/14 21:19	591-78-6	
Iodomethane	ND ug/L		10.0	1		12/01/14 21:19	74-88-4	
Isopropylbenzene (Cumene)	ND ug/L		5.0	1		12/01/14 21:19	98-82-8	
p-Isopropyltoluene	ND ug/L		5.0	1		12/01/14 21:19	99-87-6	
Methylene Chloride	ND ug/L		5.0	1		12/01/14 21:19	75-09-2	
1-Methylnaphthalene	ND ug/L		5.0	1		12/01/14 21:19	90-12-0	N2
2-Methylnaphthalene	ND ug/L		10.0	1		12/01/14 21:19	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND ug/L		25.0	1		12/01/14 21:19	108-10-1	
Methyl-tert-butyl ether	ND ug/L		4.0	1		12/01/14 21:19	1634-04-4	
Naphthalene	ND ug/L		1.4	1		12/01/14 21:19	91-20-3	
n-Propylbenzene	ND ug/L		5.0	1		12/01/14 21:19	103-65-1	
Styrene	ND ug/L		5.0	1		12/01/14 21:19	100-42-5	
1,1,1,2-Tetrachloroethane	ND ug/L		5.0	1		12/01/14 21:19	630-20-6	
1,1,2,2-Tetrachloroethane	ND ug/L		5.0	1		12/01/14 21:19	79-34-5	
Tetrachloroethene	ND ug/L		5.0	1		12/01/14 21:19	127-18-4	
Toluene	ND ug/L		5.0	1		12/01/14 21:19	108-88-3	
1,2,3-Trichlorobenzene	ND ug/L		5.0	1		12/01/14 21:19	87-61-6	
1,2,4-Trichlorobenzene	ND ug/L		5.0	1		12/01/14 21:19	120-82-1	
1,1,1-Trichloroethane	ND ug/L		5.0	1		12/01/14 21:19	71-55-6	
1,1,2-Trichloroethane	ND ug/L		5.0	1		12/01/14 21:19	79-00-5	
Trichloroethene	ND ug/L		5.0	1		12/01/14 21:19	79-01-6	
Trichlorofluoromethane	ND ug/L		5.0	1		12/01/14 21:19	75-69-4	
1,2,3-Trichloropropane	ND ug/L		5.0	1		12/01/14 21:19	96-18-4	
1,2,4-Trimethylbenzene	ND ug/L		5.0	1		12/01/14 21:19	95-63-6	
1,3,5-Trimethylbenzene	ND ug/L		5.0	1		12/01/14 21:19	108-67-8	
Vinyl acetate	ND ug/L		50.0	1		12/01/14 21:19	108-05-4	
Vinyl chloride	ND ug/L		2.0	1		12/01/14 21:19	75-01-4	
Xylene (Total)	ND ug/L		10.0	1		12/01/14 21:19	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	96 %.		79-116	1		12/01/14 21:19	1868-53-7	
4-Bromofluorobenzene (S)	96 %.		80-114	1		12/01/14 21:19	460-00-4	
Toluene-d8 (S)	101 %.		81-110	1		12/01/14 21:19	2037-26-5	
<b>2320B Alkalinity</b>		Analytical Method: SM 2320B						
Alkalinity, Total as CaCO3	326 mg/L		2.0	1		11/26/14 14:18		
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	3140 mg/L		20.0	1		11/23/14 06:36		
<b>4500FC Fluoride</b>		Analytical Method: SM 4500F/C						
Fluoride	0.64 mg/L		0.10	1		11/24/14 12:52	16984-48-8	
<b>4500S2D Sulfide Water</b>		Analytical Method: SM 4500-S2-D						
Sulfide	ND mg/L		0.10	1		11/20/14 15:13		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: Field Dup		Lab ID: 50107363003	Collected: 11/19/14 08:00	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>335.4 Cyanide, Total</b>	Analytical Method: EPA 335.4 Preparation Method: EPA 335.4							
Cyanide	ND	mg/L	0.010	1	11/21/14 13:35	11/22/14 11:18	57-12-5	
<b>350.1 Ammonia</b>	Analytical Method: EPA 350.1 Preparation Method: EPA 350.1							
Nitrogen, Ammonia	1.4	mg/L	0.10	1	11/25/14 11:27	11/25/14 16:16	7664-41-7	
<b>353.2 Nitrogen, NO2/NO3 unpres</b>	Analytical Method: EPA 353.2							
Nitrogen, Nitrate	0.13	mg/L	0.10	1		11/21/14 09:40		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-2S		Lab ID: 50107363004	Collected: 11/19/14 13:00	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b>		Analytical Method: EPA 8081 Preparation Method: EPA 3535						
Aldrin	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:28	309-00-2	
alpha-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:28	319-84-6	
beta-BHC	0.12 ug/L		0.050	1	11/25/14 14:57	12/05/14 21:28	319-85-7	C2
delta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:28	319-86-8	
gamma-BHC (Lindane)	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:28	58-89-9	
alpha-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:28	5103-71-9	
gamma-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:28	5103-74-2	
4,4'-DDD	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:28	72-54-8	
4,4'-DDE	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:28	72-55-9	
4,4'-DDT	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:28	50-29-3	
Dieldrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:28	60-57-1	
Endosulfan I	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:28	959-98-8	
Endosulfan II	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:28	33213-65-9	
Endosulfan sulfate	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:28	1031-07-8	
Endrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:28	72-20-8	
Endrin aldehyde	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:28	7421-93-4	
Endrin ketone	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:28	53494-70-5	
Heptachlor	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:28	76-44-8	
Heptachlor epoxide	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:28	1024-57-3	
Methoxychlor	ND ug/L		0.50	1	11/25/14 14:57	12/05/14 21:28	72-43-5	
Toxaphene	ND ug/L		2.0	1	11/25/14 14:57	12/05/14 21:28	8001-35-2	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	258 %.		10-119	1	11/25/14 14:57	12/05/14 21:28	877-09-8	S5
Tetrachloro-m-xylene (S)	58 %.		10-119	1	11/25/14 14:57	12/05/14 21:28	877-09-8	
Decachlorobiphenyl (S)	68 %.		14-126	1	11/25/14 14:57	12/05/14 21:28	2051-24-3	
Decachlorobiphenyl (S)	66 %.		14-126	1	11/25/14 14:57	12/05/14 21:28	2051-24-3	
<b>8082 GCS PCB</b>		Analytical Method: EPA 8082 Preparation Method: EPA 3510						
PCB-1016 (Aroclor 1016)	ND ug/L		0.51	1	11/20/14 16:45	11/25/14 15:14	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/L		0.51	1	11/20/14 16:45	11/25/14 15:14	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/L		0.51	1	11/20/14 16:45	11/25/14 15:14	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/L		0.51	1	11/20/14 16:45	11/25/14 15:14	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/L		0.51	1	11/20/14 16:45	11/25/14 15:14	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/L		0.51	1	11/20/14 16:45	11/25/14 15:14	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/L		0.51	1	11/20/14 16:45	11/25/14 15:14	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	83 %.		32-115	1	11/20/14 16:45	11/25/14 15:14	877-09-8	
<b>8151 Chlorinated Herbicides</b>		Analytical Method: EPA 8151 Preparation Method: EPA 3535A						
2,4-D	ND ug/L		2.0	1	11/24/14 16:03	11/26/14 17:00	94-75-7	
2,4,5-T	ND ug/L		2.0	1	11/24/14 16:03	11/26/14 17:00	93-76-5	
2,4,5-TP (Silvex)	ND ug/L		2.0	1	11/24/14 16:03	11/26/14 17:00	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	112 %.		10-166	1	11/24/14 16:03	11/26/14 17:00	19719-28-9	
2,4-DCAA (S)	95 %.		10-166	1	11/24/14 16:03	11/26/14 17:00	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-2S		Lab ID: 50107363004	Collected: 11/19/14 13:00	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b>		Analytical Method: EPA 6010 Preparation Method: EPA 3010						
Antimony	ND	ug/L	6.0	1	11/21/14 11:54	11/25/14 08:00	7440-36-0	
Arsenic	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:00	7440-38-2	
Barium	76.4	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:00	7440-39-3	
Beryllium	ND	ug/L	4.0	1	11/21/14 11:54	11/25/14 08:00	7440-41-7	
Cadmium	ND	ug/L	2.0	1	11/21/14 11:54	11/25/14 08:00	7440-43-9	
Calcium	98600	ug/L	1000	1	11/21/14 11:54	11/25/14 08:00	7440-70-2	
Chromium	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:00	7440-47-3	
Cobalt	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:00	7440-48-4	
Copper	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:00	7440-50-8	
Iron	40700	ug/L	100	1	11/21/14 11:54	11/25/14 08:00	7439-89-6	
Lead	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:00	7439-92-1	
Magnesium	40000	ug/L	1000	1	11/21/14 11:54	11/25/14 08:00	7439-95-4	
Manganese	153	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:00	7439-96-5	
Nickel	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:00	7440-02-0	
Potassium	30400	ug/L	1000	1	11/21/14 11:54	11/25/14 08:00	7440-09-7	
Selenium	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:00	7782-49-2	
Silver	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:00	7440-22-4	
Thallium	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:00	7440-28-0	
Vanadium	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:00	7440-62-2	
Zinc	ND	ug/L	20.0	1	11/21/14 11:54	11/25/14 08:00	7440-66-6	
<b>7470 Mercury</b>		Analytical Method: EPA 7470 Preparation Method: EPA 7470						
Mercury	ND	ug/L	2.0	1	11/25/14 11:29	11/26/14 11:27	7439-97-6	
<b>8270 MSSV PAH</b>		Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3510						
Acenaphthene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:34	83-32-9	
Acenaphthylene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:34	208-96-8	
Anthracene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 13:34	120-12-7	
Benzo(a)anthracene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 13:34	56-55-3	
Benzo(a)pyrene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 13:34	50-32-8	
Benzo(b)fluoranthene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 13:34	205-99-2	
Benzo(g,h,i)perylene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 13:34	191-24-2	
Benzo(k)fluoranthene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 13:34	207-08-9	
Chrysene	ND	ug/L	0.52	1	11/21/14 11:00	11/22/14 13:34	218-01-9	
Dibenz(a,h)anthracene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 13:34	53-70-3	
Fluoranthene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:34	206-44-0	
Fluorene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:34	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 13:34	193-39-5	
1-Methylnaphthalene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:34	90-12-0	
2-Methylnaphthalene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:34	91-57-6	
Naphthalene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:34	91-20-3	
Phenanthrene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:34	85-01-8	
Pyrene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:34	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	73 %		21-114	1	11/21/14 11:00	11/22/14 13:34	321-60-8	
p-Terphenyl-d14 (S)	69 %		25-131	1	11/21/14 11:00	11/22/14 13:34	1718-51-0	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-2S		Lab ID: 50107363004	Collected: 11/19/14 13:00	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Benzyl alcohol	ND ug/L		20.6	1	11/21/14 11:00	11/22/14 00:14	100-51-6	
4-Bromophenylphenyl ether	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	101-55-3	
Butylbenzylphthalate	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	85-68-7	
4-Chloro-3-methylphenol	ND ug/L		20.6	1	11/21/14 11:00	11/22/14 00:14	59-50-7	
4-Chloroaniline	ND ug/L		20.6	1	11/21/14 11:00	11/22/14 00:14	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	111-91-1	
bis(2-Chloroethyl) ether	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	111-44-4	
bis(2-Chloroisopropyl) ether	ND ug/L		5.2	1	11/21/14 11:00	11/22/14 00:14	108-60-1	
bis(2chloro1methylethyl) ether	ND ug/L		5.2	1	11/21/14 11:00	11/22/14 00:14	108-60-1	
2-Chloronaphthalene	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	91-58-7	
2-Chlorophenol	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	95-57-8	
4-Chlorophenylphenyl ether	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	7005-72-3	
Dibenzofuran	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	132-64-9	
3,3'-Dichlorobenzidine	ND ug/L		20.6	1	11/21/14 11:00	11/22/14 00:14	91-94-1	
2,4-Dichlorophenol	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	120-83-2	
Diethylphthalate	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	84-66-2	
2,4-Dimethylphenol	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	105-67-9	
Dimethylphthalate	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	131-11-3	
Di-n-butylphthalate	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/L		51.5	1	11/21/14 11:00	11/22/14 00:14	534-52-1	
2,4-Dinitrophenol	ND ug/L		51.5	1	11/21/14 11:00	11/22/14 00:14	51-28-5	
2,4-Dinitrotoluene	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	121-14-2	
2,6-Dinitrotoluene	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	606-20-2	
Di-n-octylphthalate	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/L		5.2	1	11/21/14 11:00	11/22/14 00:14	117-81-7	
Hexachloro-1,3-butadiene	ND ug/L		5.2	1	11/21/14 11:00	11/22/14 00:14	87-68-3	
Hexachlorobenzene	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	118-74-1	
Hexachlorocyclopentadiene	ND ug/L		20.6	1	11/21/14 11:00	11/22/14 00:14	77-47-4	
Hexachloroethane	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	67-72-1	
Isophorone	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/L		20.6	1	11/21/14 11:00	11/22/14 00:14		
2-Nitroaniline	ND ug/L		51.5	1	11/21/14 11:00	11/22/14 00:14	88-74-4	
3-Nitroaniline	ND ug/L		51.5	1	11/21/14 11:00	11/22/14 00:14	99-09-2	
4-Nitroaniline	ND ug/L		51.5	1	11/21/14 11:00	11/22/14 00:14	100-01-6	
Nitrobenzene	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	98-95-3	
2-Nitrophenol	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	88-75-5	
4-Nitrophenol	ND ug/L		51.5	1	11/21/14 11:00	11/22/14 00:14	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	621-64-7	
N-Nitrosodiphenylamine	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	86-30-6	
Pentachlorophenol	ND ug/L		51.5	1	11/21/14 11:00	11/22/14 00:14	87-86-5	
Phenol	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	108-95-2	
2,4,5-Trichlorophenol	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	95-95-4	
2,4,6-Trichlorophenol	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:14	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	78 %.		29-126	1	11/21/14 11:00	11/22/14 00:14	4165-60-0	
Phenol-d5 (S)	13 %.		10-47	1	11/21/14 11:00	11/22/14 00:14	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-2S		Lab ID: 50107363004	Collected: 11/19/14 13:00	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV SCAN		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Surrogates								
2-Fluorophenol (S)	23 %.		10-67	1	11/21/14 11:00	11/22/14 00:14	367-12-4	
2,4,6-Tribromophenol (S)	90 %.		31-161	1	11/21/14 11:00	11/22/14 00:14	118-79-6	
8260 MSV Indiana		Analytical Method: EPA 8260						
Acetone	ND ug/L		100	1		12/02/14 01:07	67-64-1	
Acrolein	ND ug/L		50.0	1		12/02/14 01:07	107-02-8	
Acrylonitrile	ND ug/L		100	1		12/02/14 01:07	107-13-1	
Benzene	ND ug/L		5.0	1		12/02/14 01:07	71-43-2	
Bromobenzene	ND ug/L		5.0	1		12/02/14 01:07	108-86-1	
Bromochloromethane	ND ug/L		5.0	1		12/02/14 01:07	74-97-5	
Bromodichloromethane	ND ug/L		5.0	1		12/02/14 01:07	75-27-4	
Bromoform	ND ug/L		5.0	1		12/02/14 01:07	75-25-2	
Bromomethane	ND ug/L		5.0	1		12/02/14 01:07	74-83-9	
2-Butanone (MEK)	ND ug/L		25.0	1		12/02/14 01:07	78-93-3	
n-Butylbenzene	ND ug/L		5.0	1		12/02/14 01:07	104-51-8	
sec-Butylbenzene	ND ug/L		5.0	1		12/02/14 01:07	135-98-8	
tert-Butylbenzene	ND ug/L		5.0	1		12/02/14 01:07	98-06-6	
Carbon disulfide	ND ug/L		10.0	1		12/02/14 01:07	75-15-0	
Carbon tetrachloride	ND ug/L		5.0	1		12/02/14 01:07	56-23-5	
Chlorobenzene	28.5 ug/L		5.0	1		12/02/14 01:07	108-90-7	
Chloroethane	ND ug/L		5.0	1		12/02/14 01:07	75-00-3	
Chloroform	ND ug/L		5.0	1		12/02/14 01:07	67-66-3	
Chloromethane	ND ug/L		5.0	1		12/02/14 01:07	74-87-3	
2-Chlorotoluene	ND ug/L		5.0	1		12/02/14 01:07	95-49-8	
4-Chlorotoluene	ND ug/L		5.0	1		12/02/14 01:07	106-43-4	
Dibromochloromethane	ND ug/L		5.0	1		12/02/14 01:07	124-48-1	
1,2-Dibromoethane (EDB)	ND ug/L		5.0	1		12/02/14 01:07	106-93-4	
Dibromomethane	ND ug/L		5.0	1		12/02/14 01:07	74-95-3	
1,2-Dichlorobenzene	ND ug/L		5.0	1		12/02/14 01:07	95-50-1	
1,3-Dichlorobenzene	ND ug/L		5.0	1		12/02/14 01:07	541-73-1	
1,4-Dichlorobenzene	5.5 ug/L		5.0	1		12/02/14 01:07	106-46-7	
trans-1,4-Dichloro-2-butene	ND ug/L		100	1		12/02/14 01:07	110-57-6	
Dichlorodifluoromethane	ND ug/L		5.0	1		12/02/14 01:07	75-71-8	
1,1-Dichloroethane	ND ug/L		5.0	1		12/02/14 01:07	75-34-3	
1,2-Dichloroethane	ND ug/L		5.0	1		12/02/14 01:07	107-06-2	
1,1-Dichloroethene	ND ug/L		5.0	1		12/02/14 01:07	75-35-4	
cis-1,2-Dichloroethene	ND ug/L		5.0	1		12/02/14 01:07	156-59-2	
trans-1,2-Dichloroethene	ND ug/L		5.0	1		12/02/14 01:07	156-60-5	
1,2-Dichloropropane	ND ug/L		5.0	1		12/02/14 01:07	78-87-5	
1,3-Dichloropropane	ND ug/L		5.0	1		12/02/14 01:07	142-28-9	
2,2-Dichloropropane	ND ug/L		5.0	1		12/02/14 01:07	594-20-7	
1,1-Dichloropropene	ND ug/L		5.0	1		12/02/14 01:07	563-58-6	
cis-1,3-Dichloropropene	ND ug/L		5.0	1		12/02/14 01:07	10061-01-5	
trans-1,3-Dichloropropene	ND ug/L		5.0	1		12/02/14 01:07	10061-02-6	
Ethylbenzene	ND ug/L		5.0	1		12/02/14 01:07	100-41-4	
Ethyl methacrylate	ND ug/L		100	1		12/02/14 01:07	97-63-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-2S		Lab ID: 50107363004	Collected: 11/19/14 13:00	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV Indiana</b>		Analytical Method: EPA 8260						
Hexachloro-1,3-butadiene	ND ug/L		5.0	1		12/02/14 01:07	87-68-3	
n-Hexane	ND ug/L		5.0	1		12/02/14 01:07	110-54-3	
2-Hexanone	ND ug/L		25.0	1		12/02/14 01:07	591-78-6	
Iodomethane	ND ug/L		10.0	1		12/02/14 01:07	74-88-4	
Isopropylbenzene (Cumene)	5.5 ug/L		5.0	1		12/02/14 01:07	98-82-8	
p-Isopropyltoluene	ND ug/L		5.0	1		12/02/14 01:07	99-87-6	
Methylene Chloride	ND ug/L		5.0	1		12/02/14 01:07	75-09-2	
1-Methylnaphthalene	ND ug/L		5.0	1		12/02/14 01:07	90-12-0	N2
2-Methylnaphthalene	ND ug/L		10.0	1		12/02/14 01:07	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND ug/L		25.0	1		12/02/14 01:07	108-10-1	
Methyl-tert-butyl ether	ND ug/L		4.0	1		12/02/14 01:07	1634-04-4	
Naphthalene	ND ug/L		1.4	1		12/02/14 01:07	91-20-3	
n-Propylbenzene	ND ug/L		5.0	1		12/02/14 01:07	103-65-1	
Styrene	ND ug/L		5.0	1		12/02/14 01:07	100-42-5	
1,1,1,2-Tetrachloroethane	ND ug/L		5.0	1		12/02/14 01:07	630-20-6	
1,1,2,2-Tetrachloroethane	ND ug/L		5.0	1		12/02/14 01:07	79-34-5	
Tetrachloroethene	ND ug/L		5.0	1		12/02/14 01:07	127-18-4	
Toluene	ND ug/L		5.0	1		12/02/14 01:07	108-88-3	
1,2,3-Trichlorobenzene	ND ug/L		5.0	1		12/02/14 01:07	87-61-6	
1,2,4-Trichlorobenzene	ND ug/L		5.0	1		12/02/14 01:07	120-82-1	
1,1,1-Trichloroethane	ND ug/L		5.0	1		12/02/14 01:07	71-55-6	
1,1,2-Trichloroethane	ND ug/L		5.0	1		12/02/14 01:07	79-00-5	
Trichloroethene	ND ug/L		5.0	1		12/02/14 01:07	79-01-6	
Trichlorofluoromethane	ND ug/L		5.0	1		12/02/14 01:07	75-69-4	
1,2,3-Trichloropropane	ND ug/L		5.0	1		12/02/14 01:07	96-18-4	
1,2,4-Trimethylbenzene	ND ug/L		5.0	1		12/02/14 01:07	95-63-6	
1,3,5-Trimethylbenzene	ND ug/L		5.0	1		12/02/14 01:07	108-67-8	
Vinyl acetate	ND ug/L		50.0	1		12/02/14 01:07	108-05-4	
Vinyl chloride	ND ug/L		2.0	1		12/02/14 01:07	75-01-4	
Xylene (Total)	ND ug/L		10.0	1		12/02/14 01:07	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	98 %.		79-116	1		12/02/14 01:07	1868-53-7	
4-Bromofluorobenzene (S)	98 %.		80-114	1		12/02/14 01:07	460-00-4	
Toluene-d8 (S)	97 %.		81-110	1		12/02/14 01:07	2037-26-5	
<b>2320B Alkalinity</b>		Analytical Method: SM 2320B						
Alkalinity, Total as CaCO3	788 mg/L		2.0	1		11/26/14 14:18		
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	498 mg/L		20.0	1		11/23/14 06:36		
<b>4500FC Fluoride</b>		Analytical Method: SM 4500F/C						
Fluoride	ND mg/L		0.10	1		11/24/14 12:56	16984-48-8	
<b>4500S2D Sulfide Water</b>		Analytical Method: SM 4500-S2-D						
Sulfide	ND mg/L		0.10	1		11/20/14 15:14		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-2S		Lab ID: 50107363004		Collected: 11/19/14 13:00		Received: 11/20/14 10:20		Matrix: Water	
Parameters		Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
335.4 Cyanide, Total		Analytical Method: EPA 335.4 Preparation Method: EPA 335.4							
Cyanide	ND	mg/L	0.010	1	11/21/14 13:35	11/22/14 11:19	57-12-5		
350.1 Ammonia		Analytical Method: EPA 350.1 Preparation Method: EPA 350.1							
Nitrogen, Ammonia	86.4	mg/L	2.0	20	11/25/14 11:27	11/25/14 16:51	7664-41-7		
353.2 Nitrogen, NO2/NO3 unpres		Analytical Method: EPA 353.2							
Nitrogen, Nitrate	ND	mg/L	0.10	1	11/21/14 09:45				

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-3S		Lab ID: 50107363005	Collected: 11/19/14 14:20	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b>		Analytical Method: EPA 8081 Preparation Method: EPA 3535						
Aldrin	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:41	309-00-2	
alpha-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:41	319-84-6	
beta-BHC	0.12 ug/L		0.050	1	11/25/14 14:57	12/05/14 21:41	319-85-7	
delta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:41	319-86-8	
gamma-BHC (Lindane)	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:41	58-89-9	
alpha-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:41	5103-71-9	
gamma-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:41	5103-74-2	
4,4'-DDD	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:41	72-54-8	
4,4'-DDE	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:41	72-55-9	
4,4'-DDT	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:41	50-29-3	
Dieldrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:41	60-57-1	
Endosulfan I	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:41	959-98-8	
Endosulfan II	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:41	33213-65-9	
Endosulfan sulfate	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:41	1031-07-8	
Endrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:41	72-20-8	
Endrin aldehyde	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:41	7421-93-4	
Endrin ketone	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:41	53494-70-5	
Heptachlor	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:41	76-44-8	
Heptachlor epoxide	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:41	1024-57-3	
Methoxychlor	ND ug/L		0.50	1	11/25/14 14:57	12/05/14 21:41	72-43-5	
Toxaphene	ND ug/L		2.0	1	11/25/14 14:57	12/05/14 21:41	8001-35-2	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	53 %.		10-119	1	11/25/14 14:57	12/05/14 21:41	877-09-8	
Tetrachloro-m-xylene (S)	55 %.		10-119	1	11/25/14 14:57	12/05/14 21:41	877-09-8	
Decachlorobiphenyl (S)	63 %.		14-126	1	11/25/14 14:57	12/05/14 21:41	2051-24-3	
Decachlorobiphenyl (S)	67 %.		14-126	1	11/25/14 14:57	12/05/14 21:41	2051-24-3	
<b>8082 GCS PCB</b>		Analytical Method: EPA 8082 Preparation Method: EPA 3510						
PCB-1016 (Aroclor 1016)	ND ug/L		0.52	1	11/20/14 16:45	11/25/14 15:21	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/L		0.52	1	11/20/14 16:45	11/25/14 15:21	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/L		0.52	1	11/20/14 16:45	11/25/14 15:21	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/L		0.52	1	11/20/14 16:45	11/25/14 15:21	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/L		0.52	1	11/20/14 16:45	11/25/14 15:21	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/L		0.52	1	11/20/14 16:45	11/25/14 15:21	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/L		0.52	1	11/20/14 16:45	11/25/14 15:21	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	78 %.		32-115	1	11/20/14 16:45	11/25/14 15:21	877-09-8	
<b>8151 Chlorinated Herbicides</b>		Analytical Method: EPA 8151 Preparation Method: EPA 3535A						
2,4-D	ND ug/L		2.0	1	11/24/14 16:03	11/26/14 17:16	94-75-7	
2,4,5-T	ND ug/L		2.0	1	11/24/14 16:03	11/26/14 17:16	93-76-5	
2,4,5-TP (Silvex)	ND ug/L		2.0	1	11/24/14 16:03	11/26/14 17:16	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	85 %.		10-166	1	11/24/14 16:03	11/26/14 17:16	19719-28-9	
2,4-DCAA (S)	90 %.		10-166	1	11/24/14 16:03	11/26/14 17:16	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-3S		Lab ID: 50107363005	Collected: 11/19/14 14:20	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b>		Analytical Method: EPA 6010 Preparation Method: EPA 3010						
Antimony	ND	ug/L	6.0	1	11/21/14 11:54	11/25/14 08:02	7440-36-0	
Arsenic	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:02	7440-38-2	
Barium	362	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:02	7440-39-3	
Beryllium	ND	ug/L	4.0	1	11/21/14 11:54	11/25/14 08:02	7440-41-7	
Cadmium	ND	ug/L	2.0	1	11/21/14 11:54	11/25/14 08:02	7440-43-9	
Calcium	163000	ug/L	1000	1	11/21/14 11:54	11/25/14 08:02	7440-70-2	
Chromium	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:02	7440-47-3	
Cobalt	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:02	7440-48-4	
Copper	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:02	7440-50-8	
Iron	7830	ug/L	100	1	11/21/14 11:54	11/25/14 08:02	7439-89-6	
Lead	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:02	7439-92-1	
Magnesium	58700	ug/L	1000	1	11/21/14 11:54	11/25/14 08:02	7439-95-4	
Manganese	224	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:02	7439-96-5	
Nickel	37.9	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:02	7440-02-0	
Potassium	32700	ug/L	1000	1	11/21/14 11:54	11/25/14 08:02	7440-09-7	
Selenium	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:02	7782-49-2	
Silver	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:02	7440-22-4	
Thallium	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:02	7440-28-0	
Vanadium	10.7	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:02	7440-62-2	
Zinc	23.5	ug/L	20.0	1	11/21/14 11:54	11/25/14 08:02	7440-66-6	
<b>7470 Mercury</b>		Analytical Method: EPA 7470 Preparation Method: EPA 7470						
Mercury	ND	ug/L	2.0	1	11/25/14 11:29	11/26/14 11:29	7439-97-6	
<b>8270 MSSV PAH</b>		Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3510						
Acenaphthene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:52	83-32-9	
Acenaphthylene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:52	208-96-8	
Anthracene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 13:52	120-12-7	
Benzo(a)anthracene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 13:52	56-55-3	
Benzo(a)pyrene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 13:52	50-32-8	
Benzo(b)fluoranthene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 13:52	205-99-2	
Benzo(g,h,i)perylene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 13:52	191-24-2	
Benzo(k)fluoranthene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 13:52	207-08-9	
Chrysene	ND	ug/L	0.52	1	11/21/14 11:00	11/22/14 13:52	218-01-9	
Dibenz(a,h)anthracene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 13:52	53-70-3	
Fluoranthene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:52	206-44-0	
Fluorene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:52	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/L	0.10	1	11/21/14 11:00	11/22/14 13:52	193-39-5	
1-Methylnaphthalene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:52	90-12-0	
2-Methylnaphthalene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:52	91-57-6	
Naphthalene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:52	91-20-3	
Phenanthrene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:52	85-01-8	
Pyrene	ND	ug/L	1.0	1	11/21/14 11:00	11/22/14 13:52	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	67 %		21-114	1	11/21/14 11:00	11/22/14 13:52	321-60-8	
p-Terphenyl-d14 (S)	64 %		25-131	1	11/21/14 11:00	11/22/14 13:52	1718-51-0	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-3S		Lab ID: 50107363005	Collected: 11/19/14 14:20	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Benzyl alcohol	ND ug/L		20.6	1	11/21/14 11:00	11/22/14 00:36	100-51-6	
4-Bromophenylphenyl ether	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	101-55-3	
Butylbenzylphthalate	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	85-68-7	
4-Chloro-3-methylphenol	ND ug/L		20.6	1	11/21/14 11:00	11/22/14 00:36	59-50-7	
4-Chloroaniline	ND ug/L		20.6	1	11/21/14 11:00	11/22/14 00:36	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	111-91-1	
bis(2-Chloroethyl) ether	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	111-44-4	
bis(2-Chloroisopropyl) ether	ND ug/L		5.2	1	11/21/14 11:00	11/22/14 00:36	108-60-1	
bis(2chloro1methylethyl) ether	ND ug/L		5.2	1	11/21/14 11:00	11/22/14 00:36	108-60-1	
2-Chloronaphthalene	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	91-58-7	
2-Chlorophenol	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	95-57-8	
4-Chlorophenylphenyl ether	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	7005-72-3	
Dibenzofuran	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	132-64-9	
3,3'-Dichlorobenzidine	ND ug/L		20.6	1	11/21/14 11:00	11/22/14 00:36	91-94-1	
2,4-Dichlorophenol	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	120-83-2	
Diethylphthalate	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	84-66-2	
2,4-Dimethylphenol	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	105-67-9	
Dimethylphthalate	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	131-11-3	
Di-n-butylphthalate	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/L		51.5	1	11/21/14 11:00	11/22/14 00:36	534-52-1	
2,4-Dinitrophenol	ND ug/L		51.5	1	11/21/14 11:00	11/22/14 00:36	51-28-5	
2,4-Dinitrotoluene	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	121-14-2	
2,6-Dinitrotoluene	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	606-20-2	
Di-n-octylphthalate	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/L		5.2	1	11/21/14 11:00	11/22/14 00:36	117-81-7	
Hexachloro-1,3-butadiene	ND ug/L		5.2	1	11/21/14 11:00	11/22/14 00:36	87-68-3	
Hexachlorobenzene	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	118-74-1	
Hexachlorocyclopentadiene	ND ug/L		20.6	1	11/21/14 11:00	11/22/14 00:36	77-47-4	
Hexachloroethane	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	67-72-1	
Isophorone	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/L		20.6	1	11/21/14 11:00	11/22/14 00:36		
2-Nitroaniline	ND ug/L		51.5	1	11/21/14 11:00	11/22/14 00:36	88-74-4	
3-Nitroaniline	ND ug/L		51.5	1	11/21/14 11:00	11/22/14 00:36	99-09-2	
4-Nitroaniline	ND ug/L		51.5	1	11/21/14 11:00	11/22/14 00:36	100-01-6	
Nitrobenzene	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	98-95-3	
2-Nitrophenol	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	88-75-5	
4-Nitrophenol	ND ug/L		51.5	1	11/21/14 11:00	11/22/14 00:36	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	621-64-7	
N-Nitrosodiphenylamine	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	86-30-6	
Pentachlorophenol	ND ug/L		51.5	1	11/21/14 11:00	11/22/14 00:36	87-86-5	
Phenol	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	108-95-2	
2,4,5-Trichlorophenol	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	95-95-4	
2,4,6-Trichlorophenol	ND ug/L		10.3	1	11/21/14 11:00	11/22/14 00:36	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	77 %.		29-126	1	11/21/14 11:00	11/22/14 00:36	4165-60-0	
Phenol-d5 (S)	13 %.		10-47	1	11/21/14 11:00	11/22/14 00:36	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-3S		Lab ID: 50107363005	Collected: 11/19/14 14:20	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV SCAN		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Surrogates								
2-Fluorophenol (S)	22 %.		10-67	1	11/21/14 11:00	11/22/14 00:36	367-12-4	
2,4,6-Tribromophenol (S)	91 %.		31-161	1	11/21/14 11:00	11/22/14 00:36	118-79-6	
8260 MSV Indiana		Analytical Method: EPA 8260						
Acetone	ND ug/L		100	1		12/02/14 01:40	67-64-1	
Acrolein	ND ug/L		50.0	1		12/02/14 01:40	107-02-8	
Acrylonitrile	ND ug/L		100	1		12/02/14 01:40	107-13-1	
Benzene	ND ug/L		5.0	1		12/02/14 01:40	71-43-2	
Bromobenzene	ND ug/L		5.0	1		12/02/14 01:40	108-86-1	
Bromochloromethane	ND ug/L		5.0	1		12/02/14 01:40	74-97-5	
Bromodichloromethane	ND ug/L		5.0	1		12/02/14 01:40	75-27-4	
Bromoform	ND ug/L		5.0	1		12/02/14 01:40	75-25-2	
Bromomethane	ND ug/L		5.0	1		12/02/14 01:40	74-83-9	
2-Butanone (MEK)	ND ug/L		25.0	1		12/02/14 01:40	78-93-3	
n-Butylbenzene	ND ug/L		5.0	1		12/02/14 01:40	104-51-8	
sec-Butylbenzene	ND ug/L		5.0	1		12/02/14 01:40	135-98-8	
tert-Butylbenzene	ND ug/L		5.0	1		12/02/14 01:40	98-06-6	
Carbon disulfide	ND ug/L		10.0	1		12/02/14 01:40	75-15-0	
Carbon tetrachloride	ND ug/L		5.0	1		12/02/14 01:40	56-23-5	
Chlorobenzene	ND ug/L		5.0	1		12/02/14 01:40	108-90-7	
Chloroethane	ND ug/L		5.0	1		12/02/14 01:40	75-00-3	
Chloroform	ND ug/L		5.0	1		12/02/14 01:40	67-66-3	
Chloromethane	ND ug/L		5.0	1		12/02/14 01:40	74-87-3	
2-Chlorotoluene	ND ug/L		5.0	1		12/02/14 01:40	95-49-8	
4-Chlorotoluene	ND ug/L		5.0	1		12/02/14 01:40	106-43-4	
Dibromochloromethane	ND ug/L		5.0	1		12/02/14 01:40	124-48-1	
1,2-Dibromoethane (EDB)	ND ug/L		5.0	1		12/02/14 01:40	106-93-4	
Dibromomethane	ND ug/L		5.0	1		12/02/14 01:40	74-95-3	
1,2-Dichlorobenzene	ND ug/L		5.0	1		12/02/14 01:40	95-50-1	
1,3-Dichlorobenzene	ND ug/L		5.0	1		12/02/14 01:40	541-73-1	
1,4-Dichlorobenzene	ND ug/L		5.0	1		12/02/14 01:40	106-46-7	
trans-1,4-Dichloro-2-butene	ND ug/L		100	1		12/02/14 01:40	110-57-6	
Dichlorodifluoromethane	ND ug/L		5.0	1		12/02/14 01:40	75-71-8	
1,1-Dichloroethane	ND ug/L		5.0	1		12/02/14 01:40	75-34-3	
1,2-Dichloroethane	ND ug/L		5.0	1		12/02/14 01:40	107-06-2	
1,1-Dichloroethene	ND ug/L		5.0	1		12/02/14 01:40	75-35-4	
cis-1,2-Dichloroethene	ND ug/L		5.0	1		12/02/14 01:40	156-59-2	
trans-1,2-Dichloroethene	ND ug/L		5.0	1		12/02/14 01:40	156-60-5	
1,2-Dichloropropane	ND ug/L		5.0	1		12/02/14 01:40	78-87-5	
1,3-Dichloropropane	ND ug/L		5.0	1		12/02/14 01:40	142-28-9	
2,2-Dichloropropane	ND ug/L		5.0	1		12/02/14 01:40	594-20-7	
1,1-Dichloropropene	ND ug/L		5.0	1		12/02/14 01:40	563-58-6	
cis-1,3-Dichloropropene	ND ug/L		5.0	1		12/02/14 01:40	10061-01-5	
trans-1,3-Dichloropropene	ND ug/L		5.0	1		12/02/14 01:40	10061-02-6	
Ethylbenzene	ND ug/L		5.0	1		12/02/14 01:40	100-41-4	
Ethyl methacrylate	ND ug/L		100	1		12/02/14 01:40	97-63-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-3S		Lab ID: 50107363005	Collected: 11/19/14 14:20	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV Indiana</b>		Analytical Method: EPA 8260						
Hexachloro-1,3-butadiene	ND ug/L		5.0	1		12/02/14 01:40	87-68-3	
n-Hexane	ND ug/L		5.0	1		12/02/14 01:40	110-54-3	
2-Hexanone	ND ug/L		25.0	1		12/02/14 01:40	591-78-6	
Iodomethane	ND ug/L		10.0	1		12/02/14 01:40	74-88-4	
Isopropylbenzene (Cumene)	ND ug/L		5.0	1		12/02/14 01:40	98-82-8	
p-Isopropyltoluene	ND ug/L		5.0	1		12/02/14 01:40	99-87-6	
Methylene Chloride	ND ug/L		5.0	1		12/02/14 01:40	75-09-2	
1-Methylnaphthalene	ND ug/L		5.0	1		12/02/14 01:40	90-12-0	N2
2-Methylnaphthalene	ND ug/L		10.0	1		12/02/14 01:40	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND ug/L		25.0	1		12/02/14 01:40	108-10-1	
Methyl-tert-butyl ether	ND ug/L		4.0	1		12/02/14 01:40	1634-04-4	
Naphthalene	ND ug/L		1.4	1		12/02/14 01:40	91-20-3	
n-Propylbenzene	ND ug/L		5.0	1		12/02/14 01:40	103-65-1	
Styrene	ND ug/L		5.0	1		12/02/14 01:40	100-42-5	
1,1,1,2-Tetrachloroethane	ND ug/L		5.0	1		12/02/14 01:40	630-20-6	
1,1,2,2-Tetrachloroethane	ND ug/L		5.0	1		12/02/14 01:40	79-34-5	
Tetrachloroethene	ND ug/L		5.0	1		12/02/14 01:40	127-18-4	
Toluene	ND ug/L		5.0	1		12/02/14 01:40	108-88-3	
1,2,3-Trichlorobenzene	ND ug/L		5.0	1		12/02/14 01:40	87-61-6	
1,2,4-Trichlorobenzene	ND ug/L		5.0	1		12/02/14 01:40	120-82-1	
1,1,1-Trichloroethane	ND ug/L		5.0	1		12/02/14 01:40	71-55-6	
1,1,2-Trichloroethane	ND ug/L		5.0	1		12/02/14 01:40	79-00-5	
Trichloroethene	ND ug/L		5.0	1		12/02/14 01:40	79-01-6	
Trichlorofluoromethane	ND ug/L		5.0	1		12/02/14 01:40	75-69-4	
1,2,3-Trichloropropane	ND ug/L		5.0	1		12/02/14 01:40	96-18-4	
1,2,4-Trimethylbenzene	ND ug/L		5.0	1		12/02/14 01:40	95-63-6	
1,3,5-Trimethylbenzene	ND ug/L		5.0	1		12/02/14 01:40	108-67-8	
Vinyl acetate	ND ug/L		50.0	1		12/02/14 01:40	108-05-4	
Vinyl chloride	ND ug/L		2.0	1		12/02/14 01:40	75-01-4	
Xylene (Total)	ND ug/L		10.0	1		12/02/14 01:40	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	93 %.		79-116	1		12/02/14 01:40	1868-53-7	
4-Bromofluorobenzene (S)	98 %.		80-114	1		12/02/14 01:40	460-00-4	
Toluene-d8 (S)	100 %.		81-110	1		12/02/14 01:40	2037-26-5	
<b>2320B Alkalinity</b>		Analytical Method: SM 2320B						
Alkalinity, Total as CaCO3	929 mg/L		2.0	1		11/26/14 14:18		
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	1010 mg/L		10.0	1		11/23/14 06:37		
<b>4500FC Fluoride</b>		Analytical Method: SM 4500F/C						
Fluoride	0.49 mg/L		0.10	1		12/01/14 11:15	16984-48-8	
<b>4500S2D Sulfide Water</b>		Analytical Method: SM 4500-S2-D						
Sulfide	ND mg/L		0.10	1		11/20/14 15:15		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-3S		Lab ID: 50107363005		Collected: 11/19/14 14:20		Received: 11/20/14 10:20		Matrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual	
335.4 Cyanide, Total	Analytical Method: EPA 335.4 Preparation Method: EPA 335.4								
Cyanide	ND	mg/L	0.010	1	11/21/14 13:35	11/22/14 11:20	57-12-5		
350.1 Ammonia	Analytical Method: EPA 350.1 Preparation Method: EPA 350.1								
Nitrogen, Ammonia	84.4	mg/L	2.0	20	11/25/14 11:27	11/25/14 16:51	7664-41-7		
353.2 Nitrogen, NO2/NO3 unpres	Analytical Method: EPA 353.2								
Nitrogen, Nitrate	ND	mg/L	0.10	1		11/21/14 09:46			

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-4D		Lab ID: 50107363006	Collected: 11/19/14 15:25	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b> Analytical Method: EPA 8081 Preparation Method: EPA 3535								
Aldrin	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:53	309-00-2	
alpha-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:53	319-84-6	
beta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:53	319-85-7	
delta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:53	319-86-8	
gamma-BHC (Lindane)	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:53	58-89-9	
alpha-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:53	5103-71-9	
gamma-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:53	5103-74-2	
4,4'-DDD	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:53	72-54-8	
4,4'-DDE	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:53	72-55-9	
4,4'-DDT	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:53	50-29-3	
Dieldrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:53	60-57-1	
Endosulfan I	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:53	959-98-8	
Endosulfan II	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:53	33213-65-9	
Endosulfan sulfate	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:53	1031-07-8	
Endrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:53	72-20-8	
Endrin aldehyde	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:53	7421-93-4	
Endrin ketone	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 21:53	53494-70-5	
Heptachlor	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:53	76-44-8	
Heptachlor epoxide	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 21:53	1024-57-3	
Methoxychlor	ND ug/L		0.50	1	11/25/14 14:57	12/05/14 21:53	72-43-5	
Toxaphene	ND ug/L		2.0	1	11/25/14 14:57	12/05/14 21:53	8001-35-2	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	40 %.		10-119	1	11/25/14 14:57	12/05/14 21:53	877-09-8	
Tetrachloro-m-xylene (S)	43 %.		10-119	1	11/25/14 14:57	12/05/14 21:53	877-09-8	
Decachlorobiphenyl (S)	57 %.		14-126	1	11/25/14 14:57	12/05/14 21:53	2051-24-3	
Decachlorobiphenyl (S)	56 %.		14-126	1	11/25/14 14:57	12/05/14 21:53	2051-24-3	
<b>8082 GCS PCB</b> Analytical Method: EPA 8082 Preparation Method: EPA 3510								
PCB-1016 (Aroclor 1016)	ND ug/L		0.52	1	11/20/14 16:45	11/25/14 15:27	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/L		0.52	1	11/20/14 16:45	11/25/14 15:27	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/L		0.52	1	11/20/14 16:45	11/25/14 15:27	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/L		0.52	1	11/20/14 16:45	11/25/14 15:27	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/L		0.52	1	11/20/14 16:45	11/25/14 15:27	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/L		0.52	1	11/20/14 16:45	11/25/14 15:27	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/L		0.52	1	11/20/14 16:45	11/25/14 15:27	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	82 %.		32-115	1	11/20/14 16:45	11/25/14 15:27	877-09-8	
<b>8151 Chlorinated Herbicides</b> Analytical Method: EPA 8151 Preparation Method: EPA 3535A								
2,4-D	ND ug/L		2.0	1	11/24/14 16:03	11/26/14 17:32	94-75-7	
2,4,5-T	ND ug/L		2.0	1	11/24/14 16:03	11/26/14 17:32	93-76-5	
2,4,5-TP (Silvex)	ND ug/L		2.0	1	11/24/14 16:03	11/26/14 17:32	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	82 %.		10-166	1	11/24/14 16:03	11/26/14 17:32	19719-28-9	
2,4-DCAA (S)	75 %.		10-166	1	11/24/14 16:03	11/26/14 17:32	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-4D		Lab ID: 50107363006	Collected: 11/19/14 15:25	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b>		Analytical Method: EPA 6010 Preparation Method: EPA 3010						
Antimony	ND	ug/L	6.0	1	11/21/14 11:54	11/25/14 08:05	7440-36-0	
Arsenic	27.0	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:05	7440-38-2	
Barium	289	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:05	7440-39-3	
Beryllium	ND	ug/L	4.0	1	11/21/14 11:54	11/25/14 08:05	7440-41-7	
Cadmium	ND	ug/L	2.0	1	11/21/14 11:54	11/25/14 08:05	7440-43-9	
Calcium	164000	ug/L	1000	1	11/21/14 11:54	11/25/14 08:05	7440-70-2	
Chromium	29.6	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:05	7440-47-3	
Cobalt	14.6	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:05	7440-48-4	
Copper	40.5	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:05	7440-50-8	
Iron	36900	ug/L	100	1	11/21/14 11:54	11/25/14 08:05	7439-89-6	
Lead	30.5	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:05	7439-92-1	
Magnesium	85800	ug/L	1000	1	11/21/14 11:54	11/25/14 08:05	7439-95-4	
Manganese	998	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:05	7439-96-5	
Nickel	39.0	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:05	7440-02-0	
Potassium	15100	ug/L	1000	1	11/21/14 11:54	11/25/14 08:05	7440-09-7	
Selenium	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:05	7782-49-2	
Silver	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:05	7440-22-4	
Thallium	ND	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:05	7440-28-0	
Vanadium	56.8	ug/L	10.0	1	11/21/14 11:54	11/25/14 08:05	7440-62-2	
Zinc	136	ug/L	20.0	1	11/21/14 11:54	11/25/14 08:05	7440-66-6	
<b>7470 Mercury</b>		Analytical Method: EPA 7470 Preparation Method: EPA 7470						
Mercury	ND	ug/L	2.0	1	11/25/14 11:29	11/26/14 11:31	7439-97-6	
<b>8270 MSSV PAH</b>		Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3510						
Acenaphthene	ND	ug/L	1.1	1	11/21/14 11:00	11/22/14 14:10	83-32-9	
Acenaphthylene	ND	ug/L	1.1	1	11/21/14 11:00	11/22/14 14:10	208-96-8	
Anthracene	ND	ug/L	0.11	1	11/21/14 11:00	11/22/14 14:10	120-12-7	
Benzo(a)anthracene	ND	ug/L	0.11	1	11/21/14 11:00	11/22/14 14:10	56-55-3	
Benzo(a)pyrene	ND	ug/L	0.11	1	11/21/14 11:00	11/22/14 14:10	50-32-8	
Benzo(b)fluoranthene	ND	ug/L	0.11	1	11/21/14 11:00	11/22/14 14:10	205-99-2	
Benzo(g,h,i)perylene	ND	ug/L	0.11	1	11/21/14 11:00	11/22/14 14:10	191-24-2	
Benzo(k)fluoranthene	ND	ug/L	0.11	1	11/21/14 11:00	11/22/14 14:10	207-08-9	
Chrysene	ND	ug/L	0.53	1	11/21/14 11:00	11/22/14 14:10	218-01-9	
Dibenz(a,h)anthracene	ND	ug/L	0.11	1	11/21/14 11:00	11/22/14 14:10	53-70-3	
Fluoranthene	ND	ug/L	1.1	1	11/21/14 11:00	11/22/14 14:10	206-44-0	
Fluorene	ND	ug/L	1.1	1	11/21/14 11:00	11/22/14 14:10	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/L	0.11	1	11/21/14 11:00	11/22/14 14:10	193-39-5	
1-Methylnaphthalene	ND	ug/L	1.1	1	11/21/14 11:00	11/22/14 14:10	90-12-0	
2-Methylnaphthalene	ND	ug/L	1.1	1	11/21/14 11:00	11/22/14 14:10	91-57-6	
Naphthalene	ND	ug/L	1.1	1	11/21/14 11:00	11/22/14 14:10	91-20-3	
Phenanthrene	ND	ug/L	1.1	1	11/21/14 11:00	11/22/14 14:10	85-01-8	
Pyrene	ND	ug/L	1.1	1	11/21/14 11:00	11/22/14 14:10	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	80 %.		21-114	1	11/21/14 11:00	11/22/14 14:10	321-60-8	
p-Terphenyl-d14 (S)	68 %.		25-131	1	11/21/14 11:00	11/22/14 14:10	1718-51-0	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-4D		Lab ID: 50107363006	Collected: 11/19/14 15:25	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Benzyl alcohol	ND ug/L		21.1	1	11/21/14 11:00	11/22/14 00:59	100-51-6	
4-Bromophenylphenyl ether	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	101-55-3	
Butylbenzylphthalate	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	85-68-7	
4-Chloro-3-methylphenol	ND ug/L		21.1	1	11/21/14 11:00	11/22/14 00:59	59-50-7	
4-Chloroaniline	ND ug/L		21.1	1	11/21/14 11:00	11/22/14 00:59	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	111-91-1	
bis(2-Chloroethyl) ether	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	111-44-4	
bis(2-Chloroisopropyl) ether	ND ug/L		5.3	1	11/21/14 11:00	11/22/14 00:59	108-60-1	
bis(2chloro1methylethyl) ether	ND ug/L		5.3	1	11/21/14 11:00	11/22/14 00:59	108-60-1	
2-Chloronaphthalene	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	91-58-7	
2-Chlorophenol	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	95-57-8	
4-Chlorophenylphenyl ether	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	7005-72-3	
Dibenzofuran	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	132-64-9	
3,3'-Dichlorobenzidine	ND ug/L		21.1	1	11/21/14 11:00	11/22/14 00:59	91-94-1	
2,4-Dichlorophenol	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	120-83-2	
Diethylphthalate	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	84-66-2	
2,4-Dimethylphenol	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	105-67-9	
Dimethylphthalate	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	131-11-3	
Di-n-butylphthalate	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/L		52.6	1	11/21/14 11:00	11/22/14 00:59	534-52-1	
2,4-Dinitrophenol	ND ug/L		52.6	1	11/21/14 11:00	11/22/14 00:59	51-28-5	
2,4-Dinitrotoluene	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	121-14-2	
2,6-Dinitrotoluene	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	606-20-2	
Di-n-octylphthalate	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/L		5.3	1	11/21/14 11:00	11/22/14 00:59	117-81-7	
Hexachloro-1,3-butadiene	ND ug/L		5.3	1	11/21/14 11:00	11/22/14 00:59	87-68-3	
Hexachlorobenzene	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	118-74-1	
Hexachlorocyclopentadiene	ND ug/L		21.1	1	11/21/14 11:00	11/22/14 00:59	77-47-4	
Hexachloroethane	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	67-72-1	
Isophorone	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/L		21.1	1	11/21/14 11:00	11/22/14 00:59		
2-Nitroaniline	ND ug/L		52.6	1	11/21/14 11:00	11/22/14 00:59	88-74-4	
3-Nitroaniline	ND ug/L		52.6	1	11/21/14 11:00	11/22/14 00:59	99-09-2	
4-Nitroaniline	ND ug/L		52.6	1	11/21/14 11:00	11/22/14 00:59	100-01-6	
Nitrobenzene	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	98-95-3	
2-Nitrophenol	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	88-75-5	
4-Nitrophenol	ND ug/L		52.6	1	11/21/14 11:00	11/22/14 00:59	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	621-64-7	
N-Nitrosodiphenylamine	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	86-30-6	
Pentachlorophenol	ND ug/L		52.6	1	11/21/14 11:00	11/22/14 00:59	87-86-5	
Phenol	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	108-95-2	
2,4,5-Trichlorophenol	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	95-95-4	
2,4,6-Trichlorophenol	ND ug/L		10.5	1	11/21/14 11:00	11/22/14 00:59	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	84 %.		29-126	1	11/21/14 11:00	11/22/14 00:59	4165-60-0	
Phenol-d5 (S)	15 %.		10-47	1	11/21/14 11:00	11/22/14 00:59	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-4D		Lab ID: 50107363006	Collected: 11/19/14 15:25	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV SCAN		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Surrogates								
2-Fluorophenol (S)	27 %.		10-67	1	11/21/14 11:00	11/22/14 00:59	367-12-4	
2,4,6-Tribromophenol (S)	88 %.		31-161	1	11/21/14 11:00	11/22/14 00:59	118-79-6	
8260 MSV Indiana		Analytical Method: EPA 8260						
Acetone	ND ug/L		100	1		12/02/14 02:13	67-64-1	
Acrolein	ND ug/L		50.0	1		12/02/14 02:13	107-02-8	
Acrylonitrile	ND ug/L		100	1		12/02/14 02:13	107-13-1	
Benzene	ND ug/L		5.0	1		12/02/14 02:13	71-43-2	
Bromobenzene	ND ug/L		5.0	1		12/02/14 02:13	108-86-1	
Bromochloromethane	ND ug/L		5.0	1		12/02/14 02:13	74-97-5	
Bromodichloromethane	ND ug/L		5.0	1		12/02/14 02:13	75-27-4	
Bromoform	ND ug/L		5.0	1		12/02/14 02:13	75-25-2	
Bromomethane	ND ug/L		5.0	1		12/02/14 02:13	74-83-9	
2-Butanone (MEK)	ND ug/L		25.0	1		12/02/14 02:13	78-93-3	
n-Butylbenzene	ND ug/L		5.0	1		12/02/14 02:13	104-51-8	
sec-Butylbenzene	ND ug/L		5.0	1		12/02/14 02:13	135-98-8	
tert-Butylbenzene	ND ug/L		5.0	1		12/02/14 02:13	98-06-6	
Carbon disulfide	ND ug/L		10.0	1		12/02/14 02:13	75-15-0	
Carbon tetrachloride	ND ug/L		5.0	1		12/02/14 02:13	56-23-5	
Chlorobenzene	ND ug/L		5.0	1		12/02/14 02:13	108-90-7	
Chloroethane	ND ug/L		5.0	1		12/02/14 02:13	75-00-3	
Chloroform	ND ug/L		5.0	1		12/02/14 02:13	67-66-3	
Chloromethane	ND ug/L		5.0	1		12/02/14 02:13	74-87-3	
2-Chlorotoluene	ND ug/L		5.0	1		12/02/14 02:13	95-49-8	
4-Chlorotoluene	ND ug/L		5.0	1		12/02/14 02:13	106-43-4	
Dibromochloromethane	ND ug/L		5.0	1		12/02/14 02:13	124-48-1	
1,2-Dibromoethane (EDB)	ND ug/L		5.0	1		12/02/14 02:13	106-93-4	
Dibromomethane	ND ug/L		5.0	1		12/02/14 02:13	74-95-3	
1,2-Dichlorobenzene	ND ug/L		5.0	1		12/02/14 02:13	95-50-1	
1,3-Dichlorobenzene	ND ug/L		5.0	1		12/02/14 02:13	541-73-1	
1,4-Dichlorobenzene	ND ug/L		5.0	1		12/02/14 02:13	106-46-7	
trans-1,4-Dichloro-2-butene	ND ug/L		100	1		12/02/14 02:13	110-57-6	
Dichlorodifluoromethane	ND ug/L		5.0	1		12/02/14 02:13	75-71-8	
1,1-Dichloroethane	ND ug/L		5.0	1		12/02/14 02:13	75-34-3	
1,2-Dichloroethane	ND ug/L		5.0	1		12/02/14 02:13	107-06-2	
1,1-Dichloroethene	ND ug/L		5.0	1		12/02/14 02:13	75-35-4	
cis-1,2-Dichloroethene	ND ug/L		5.0	1		12/02/14 02:13	156-59-2	
trans-1,2-Dichloroethene	ND ug/L		5.0	1		12/02/14 02:13	156-60-5	
1,2-Dichloropropane	ND ug/L		5.0	1		12/02/14 02:13	78-87-5	
1,3-Dichloropropane	ND ug/L		5.0	1		12/02/14 02:13	142-28-9	
2,2-Dichloropropane	ND ug/L		5.0	1		12/02/14 02:13	594-20-7	
1,1-Dichloropropene	ND ug/L		5.0	1		12/02/14 02:13	563-58-6	
cis-1,3-Dichloropropene	ND ug/L		5.0	1		12/02/14 02:13	10061-01-5	
trans-1,3-Dichloropropene	ND ug/L		5.0	1		12/02/14 02:13	10061-02-6	
Ethylbenzene	ND ug/L		5.0	1		12/02/14 02:13	100-41-4	
Ethyl methacrylate	ND ug/L		100	1		12/02/14 02:13	97-63-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-4D		Lab ID: 50107363006	Collected: 11/19/14 15:25	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV Indiana</b>		Analytical Method: EPA 8260						
Hexachloro-1,3-butadiene	ND ug/L		5.0	1		12/02/14 02:13	87-68-3	
n-Hexane	ND ug/L		5.0	1		12/02/14 02:13	110-54-3	
2-Hexanone	ND ug/L		25.0	1		12/02/14 02:13	591-78-6	
Iodomethane	ND ug/L		10.0	1		12/02/14 02:13	74-88-4	
Isopropylbenzene (Cumene)	ND ug/L		5.0	1		12/02/14 02:13	98-82-8	
p-Isopropyltoluene	ND ug/L		5.0	1		12/02/14 02:13	99-87-6	
Methylene Chloride	ND ug/L		5.0	1		12/02/14 02:13	75-09-2	
1-Methylnaphthalene	ND ug/L		5.0	1		12/02/14 02:13	90-12-0	N2
2-Methylnaphthalene	ND ug/L		10.0	1		12/02/14 02:13	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND ug/L		25.0	1		12/02/14 02:13	108-10-1	
Methyl-tert-butyl ether	ND ug/L		4.0	1		12/02/14 02:13	1634-04-4	
Naphthalene	ND ug/L		1.4	1		12/02/14 02:13	91-20-3	
n-Propylbenzene	ND ug/L		5.0	1		12/02/14 02:13	103-65-1	
Styrene	ND ug/L		5.0	1		12/02/14 02:13	100-42-5	
1,1,1,2-Tetrachloroethane	ND ug/L		5.0	1		12/02/14 02:13	630-20-6	
1,1,2,2-Tetrachloroethane	ND ug/L		5.0	1		12/02/14 02:13	79-34-5	
Tetrachloroethene	ND ug/L		5.0	1		12/02/14 02:13	127-18-4	
Toluene	ND ug/L		5.0	1		12/02/14 02:13	108-88-3	
1,2,3-Trichlorobenzene	ND ug/L		5.0	1		12/02/14 02:13	87-61-6	
1,2,4-Trichlorobenzene	ND ug/L		5.0	1		12/02/14 02:13	120-82-1	
1,1,1-Trichloroethane	ND ug/L		5.0	1		12/02/14 02:13	71-55-6	
1,1,2-Trichloroethane	ND ug/L		5.0	1		12/02/14 02:13	79-00-5	
Trichloroethene	ND ug/L		5.0	1		12/02/14 02:13	79-01-6	
Trichlorofluoromethane	ND ug/L		5.0	1		12/02/14 02:13	75-69-4	
1,2,3-Trichloropropane	ND ug/L		5.0	1		12/02/14 02:13	96-18-4	
1,2,4-Trimethylbenzene	ND ug/L		5.0	1		12/02/14 02:13	95-63-6	
1,3,5-Trimethylbenzene	ND ug/L		5.0	1		12/02/14 02:13	108-67-8	
Vinyl acetate	ND ug/L		50.0	1		12/02/14 02:13	108-05-4	
Vinyl chloride	ND ug/L		2.0	1		12/02/14 02:13	75-01-4	
Xylene (Total)	ND ug/L		10.0	1		12/02/14 02:13	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	98 %.		79-116	1		12/02/14 02:13	1868-53-7	
4-Bromofluorobenzene (S)	96 %.		80-114	1		12/02/14 02:13	460-00-4	
Toluene-d8 (S)	98 %.		81-110	1		12/02/14 02:13	2037-26-5	
<b>2320B Alkalinity</b>		Analytical Method: SM 2320B						
Alkalinity, Total as CaCO3	306 mg/L		2.0	1		11/26/14 14:18		
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	1090 mg/L		20.0	1		11/23/14 06:37		
<b>4500FC Fluoride</b>		Analytical Method: SM 4500F/C						
Fluoride	0.67 mg/L		0.10	1		12/01/14 11:17	16984-48-8	
<b>4500S2D Sulfide Water</b>		Analytical Method: SM 4500-S2-D						
Sulfide	ND mg/L		0.10	1		11/20/14 15:16		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: MW-4D		Lab ID: 50107363006	Collected: 11/19/14 15:25	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>335.4 Cyanide, Total</b>	Analytical Method: EPA 335.4 Preparation Method: EPA 335.4							
Cyanide	ND	mg/L	0.010	1	11/21/14 13:35	11/22/14 11:21	57-12-5	
<b>350.1 Ammonia</b>	Analytical Method: EPA 350.1 Preparation Method: EPA 350.1							
Nitrogen, Ammonia	<b>0.96</b>	mg/L	0.10	1	11/25/14 11:27	11/25/14 16:20	7664-41-7	
<b>353.2 Nitrogen, NO2/NO3 unpres</b>	Analytical Method: EPA 353.2							
Nitrogen, Nitrate	ND	mg/L	0.10	1		11/21/14 09:47		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: Trip Blank		Lab ID: 50107363007		Collected: 11/19/14 08:00		Received: 11/20/14 10:20		Matrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual	
8260 MSV Indiana		Analytical Method: EPA 8260							
Acetone	ND	ug/L	100	1		12/01/14 18:36	67-64-1		
Acrolein	ND	ug/L	50.0	1		12/01/14 18:36	107-02-8		
Acrylonitrile	ND	ug/L	100	1		12/01/14 18:36	107-13-1		
Benzene	ND	ug/L	5.0	1		12/01/14 18:36	71-43-2		
Bromobenzene	ND	ug/L	5.0	1		12/01/14 18:36	108-86-1		
Bromochloromethane	ND	ug/L	5.0	1		12/01/14 18:36	74-97-5		
Bromodichloromethane	ND	ug/L	5.0	1		12/01/14 18:36	75-27-4		
Bromoform	ND	ug/L	5.0	1		12/01/14 18:36	75-25-2		
Bromomethane	ND	ug/L	5.0	1		12/01/14 18:36	74-83-9		
2-Butanone (MEK)	ND	ug/L	25.0	1		12/01/14 18:36	78-93-3		
n-Butylbenzene	ND	ug/L	5.0	1		12/01/14 18:36	104-51-8		
sec-Butylbenzene	ND	ug/L	5.0	1		12/01/14 18:36	135-98-8		
tert-Butylbenzene	ND	ug/L	5.0	1		12/01/14 18:36	98-06-6		
Carbon disulfide	ND	ug/L	10.0	1		12/01/14 18:36	75-15-0		
Carbon tetrachloride	ND	ug/L	5.0	1		12/01/14 18:36	56-23-5		
Chlorobenzene	ND	ug/L	5.0	1		12/01/14 18:36	108-90-7		
Chloroethane	ND	ug/L	5.0	1		12/01/14 18:36	75-00-3		
Chloroform	ND	ug/L	5.0	1		12/01/14 18:36	67-66-3		
Chloromethane	ND	ug/L	5.0	1		12/01/14 18:36	74-87-3		
2-Chlorotoluene	ND	ug/L	5.0	1		12/01/14 18:36	95-49-8		
4-Chlorotoluene	ND	ug/L	5.0	1		12/01/14 18:36	106-43-4		
Dibromochloromethane	ND	ug/L	5.0	1		12/01/14 18:36	124-48-1		
1,2-Dibromoethane (EDB)	ND	ug/L	5.0	1		12/01/14 18:36	106-93-4		
Dibromomethane	ND	ug/L	5.0	1		12/01/14 18:36	74-95-3		
1,2-Dichlorobenzene	ND	ug/L	5.0	1		12/01/14 18:36	95-50-1		
1,3-Dichlorobenzene	ND	ug/L	5.0	1		12/01/14 18:36	541-73-1		
1,4-Dichlorobenzene	ND	ug/L	5.0	1		12/01/14 18:36	106-46-7		
trans-1,4-Dichloro-2-butene	ND	ug/L	100	1		12/01/14 18:36	110-57-6		
Dichlorodifluoromethane	ND	ug/L	5.0	1		12/01/14 18:36	75-71-8		
1,1-Dichloroethane	ND	ug/L	5.0	1		12/01/14 18:36	75-34-3		
1,2-Dichloroethane	ND	ug/L	5.0	1		12/01/14 18:36	107-06-2		
1,1-Dichloroethene	ND	ug/L	5.0	1		12/01/14 18:36	75-35-4		
cis-1,2-Dichloroethene	ND	ug/L	5.0	1		12/01/14 18:36	156-59-2		
trans-1,2-Dichloroethene	ND	ug/L	5.0	1		12/01/14 18:36	156-60-5		
1,2-Dichloropropane	ND	ug/L	5.0	1		12/01/14 18:36	78-87-5		
1,3-Dichloropropane	ND	ug/L	5.0	1		12/01/14 18:36	142-28-9		
2,2-Dichloropropane	ND	ug/L	5.0	1		12/01/14 18:36	594-20-7		
1,1-Dichloropropene	ND	ug/L	5.0	1		12/01/14 18:36	563-58-6		
cis-1,3-Dichloropropene	ND	ug/L	5.0	1		12/01/14 18:36	10061-01-5		
trans-1,3-Dichloropropene	ND	ug/L	5.0	1		12/01/14 18:36	10061-02-6		
Ethylbenzene	ND	ug/L	5.0	1		12/01/14 18:36	100-41-4		
Ethyl methacrylate	ND	ug/L	100	1		12/01/14 18:36	97-63-2		
Hexachloro-1,3-butadiene	ND	ug/L	5.0	1		12/01/14 18:36	87-68-3		
n-Hexane	ND	ug/L	5.0	1		12/01/14 18:36	110-54-3		
2-Hexanone	ND	ug/L	25.0	1		12/01/14 18:36	591-78-6		
Iodomethane	ND	ug/L	10.0	1		12/01/14 18:36	74-88-4		
Isopropylbenzene (Cumene)	ND	ug/L	5.0	1		12/01/14 18:36	98-82-8		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Sample: Trip Blank		Lab ID: 50107363007	Collected: 11/19/14 08:00	Received: 11/20/14 10:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV Indiana</b>		Analytical Method: EPA 8260						
p-Isopropyltoluene	ND ug/L		5.0	1		12/01/14 18:36	99-87-6	
Methylene Chloride	ND ug/L		5.0	1		12/01/14 18:36	75-09-2	
1-Methylnaphthalene	ND ug/L		5.0	1		12/01/14 18:36	90-12-0	N2
2-Methylnaphthalene	ND ug/L		10.0	1		12/01/14 18:36	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND ug/L		25.0	1		12/01/14 18:36	108-10-1	
Methyl-tert-butyl ether	ND ug/L		4.0	1		12/01/14 18:36	1634-04-4	
Naphthalene	ND ug/L		1.4	1		12/01/14 18:36	91-20-3	
n-Propylbenzene	ND ug/L		5.0	1		12/01/14 18:36	103-65-1	
Styrene	ND ug/L		5.0	1		12/01/14 18:36	100-42-5	
1,1,1,2-Tetrachloroethane	ND ug/L		5.0	1		12/01/14 18:36	630-20-6	
1,1,2,2-Tetrachloroethane	ND ug/L		5.0	1		12/01/14 18:36	79-34-5	
Tetrachloroethene	ND ug/L		5.0	1		12/01/14 18:36	127-18-4	
Toluene	ND ug/L		5.0	1		12/01/14 18:36	108-88-3	
1,2,3-Trichlorobenzene	ND ug/L		5.0	1		12/01/14 18:36	87-61-6	
1,2,4-Trichlorobenzene	ND ug/L		5.0	1		12/01/14 18:36	120-82-1	
1,1,1-Trichloroethane	ND ug/L		5.0	1		12/01/14 18:36	71-55-6	
1,1,2-Trichloroethane	ND ug/L		5.0	1		12/01/14 18:36	79-00-5	
Trichloroethene	ND ug/L		5.0	1		12/01/14 18:36	79-01-6	
Trichlorofluoromethane	ND ug/L		5.0	1		12/01/14 18:36	75-69-4	
1,2,3-Trichloropropane	ND ug/L		5.0	1		12/01/14 18:36	96-18-4	
1,2,4-Trimethylbenzene	ND ug/L		5.0	1		12/01/14 18:36	95-63-6	
1,3,5-Trimethylbenzene	ND ug/L		5.0	1		12/01/14 18:36	108-67-8	
Vinyl acetate	ND ug/L		50.0	1		12/01/14 18:36	108-05-4	
Vinyl chloride	ND ug/L		2.0	1		12/01/14 18:36	75-01-4	
Xylene (Total)	ND ug/L		10.0	1		12/01/14 18:36	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	99 %.		79-116	1		12/01/14 18:36	1868-53-7	
4-Bromofluorobenzene (S)	99 %.		80-114	1		12/01/14 18:36	460-00-4	
Toluene-d8 (S)	95 %.		81-110	1		12/01/14 18:36	2037-26-5	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

QC Batch: MERP/5863

Analysis Method: EPA 7470

QC Batch Method: EPA 7470

Analysis Description: 7470 Mercury

Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006

METHOD BLANK: 1194266

Matrix: Water

Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	ND	2.0	11/26/14 10:58	

LABORATORY CONTROL SAMPLE: 1194267

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	4.8	97	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1194268 1194269

Parameter	Units	50107327009 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	ND	5	5	4.3	4.1	86	82	75-125	5	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1194270 1194271

Parameter	Units	50107512005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	ND	5	5	5.0	5.0	101	100	75-125	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

QC Batch:	MPRP/14637	Analysis Method:	EPA 6010
QC Batch Method:	EPA 3010	Analysis Description:	6010 MET
Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006			

METHOD BLANK: 1192693 Matrix: Water

Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	ug/L	6.1	6.0	11/25/14 07:27	P8
Arsenic	ug/L	ND	10.0	11/25/14 07:27	
Barium	ug/L	ND	10.0	11/25/14 07:27	
Beryllium	ug/L	ND	4.0	11/25/14 07:27	
Cadmium	ug/L	ND	2.0	11/25/14 07:27	
Calcium	ug/L	ND	1000	11/25/14 07:27	
Chromium	ug/L	ND	10.0	11/25/14 07:27	
Cobalt	ug/L	ND	10.0	11/25/14 07:27	
Copper	ug/L	ND	10.0	11/25/14 07:27	
Iron	ug/L	ND	100	11/25/14 07:27	
Lead	ug/L	ND	10.0	11/25/14 07:27	
Magnesium	ug/L	ND	1000	11/25/14 07:27	
Manganese	ug/L	ND	10.0	11/25/14 07:27	
Nickel	ug/L	ND	10.0	11/25/14 07:27	
Potassium	ug/L	ND	1000	11/25/14 07:27	
Selenium	ug/L	ND	10.0	11/25/14 07:27	
Silver	ug/L	ND	10.0	11/25/14 07:27	
Thallium	ug/L	ND	10.0	11/25/14 07:27	
Vanadium	ug/L	ND	10.0	11/25/14 07:27	
Zinc	ug/L	ND	20.0	11/25/14 07:27	

LABORATORY CONTROL SAMPLE: 1192694

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	1000	1070	107	80-120	
Arsenic	ug/L	1000	1060	106	80-120	
Barium	ug/L	1000	1030	103	80-120	
Beryllium	ug/L	1000	1050	105	80-120	
Cadmium	ug/L	1000	1040	104	80-120	
Calcium	ug/L	10000	10200	102	80-120	
Chromium	ug/L	1000	1030	103	80-120	
Cobalt	ug/L	1000	1030	103	80-120	
Copper	ug/L	1000	1010	101	80-120	
Iron	ug/L	10000	10400	104	80-120	
Lead	ug/L	1000	1040	104	80-120	
Magnesium	ug/L	10000	10400	104	80-120	
Manganese	ug/L	1000	1020	102	80-120	
Nickel	ug/L	1000	1030	103	80-120	
Potassium	ug/L	10000	10300	103	80-120	
Selenium	ug/L	1000	1050	105	80-120	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

LABORATORY CONTROL SAMPLE: 1192694

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Silver	ug/L	500	487	97	80-120	
Thallium	ug/L	1000	1020	102	80-120	
Vanadium	ug/L	1000	1060	106	80-120	
Zinc	ug/L	1000	1030	103	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1192695 1192696

Parameter	Units	50107383010	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		Result	Conc.	Conc.	Result	Result	% Rec	% Rec	Limits			
Antimony	ug/L	ND	1000	1000	1080	1070	107	107	75-125	1	20	
Arsenic	ug/L	0.012 mg/L	1000	1000	1100	1100	109	109	75-125	0	20	
Barium	ug/L	0.15 mg/L	1000	1000	1190	1190	105	104	75-125	1	20	
Beryllium	ug/L	ND	1000	1000	1070	1060	107	105	75-125	1	20	
Cadmium	ug/L	0.0043 mg/L	1000	1000	1080	1080	108	107	75-125	0	20	
Calcium	ug/L	126 mg/L	10000	10000	133000	137000	73	113	75-125	3	20	
Chromium	ug/L	ND	1000	1000	1030	1020	102	101	75-125	1	20	
Cobalt	ug/L	ND	1000	1000	1030	1030	103	102	75-125	0	20	
Copper	ug/L	0.013 mg/L	1000	1000	1020	1020	101	101	75-125	0	20	
Iron	ug/L	12.3 mg/L	10000	10000	23100	23400	108	111	75-125	1	20	
Lead	ug/L	ND	1000	1000	1050	1040	105	104	75-125	1	20	
Magnesium	ug/L	45.2 mg/L	10000	10000	55400	56400	102	112	75-125	2	20	
Manganese	ug/L	0.38 mg/L	1000	1000	1390	1390	101	102	75-125	0	20	
Nickel	ug/L	0.015 mg/L	1000	1000	1040	1030	102	102	75-125	1	20	
Potassium	ug/L	4.3 mg/L	10000	10000	15000	14900	107	106	75-125	1	20	
Selenium	ug/L	ND	1000	1000	1100	1090	109	109	75-125	1	20	
Silver	ug/L	ND	500	500	496	490	99	98	75-125	1	20	
Thallium	ug/L	ND	1000	1000	1040	1040	104	104	75-125	0	20	
Vanadium	ug/L	0.027 mg/L	1000	1000	1110	1100	108	107	75-125	1	20	
Zinc	ug/L	0.040 mg/L	1000	1000	1050	1050	101	101	75-125	0	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1192697 1192698

Parameter	Units	50107391002	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		Result	Conc.	Conc.	Result	Result	% Rec	% Rec	Limits			
Antimony	ug/L	ND	1000	1000	1080	1100	108	110	75-125	2	20	
Arsenic	ug/L	ND	1000	1000	1070	1090	107	109	75-125	2	20	
Barium	ug/L	63.1	1000	1000	1080	1110	101	105	75-125	3	20	
Beryllium	ug/L	ND	1000	1000	1030	1070	103	107	75-125	3	20	
Cadmium	ug/L	ND	1000	1000	1050	1070	105	107	75-125	2	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1192697											
1192698											
Parameter	Units	50107391002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	Qual
Calcium	ug/L	92200	10000	10000	101000	104000	90	119	75-125	3	20
Chromium	ug/L	ND	1000	1000	996	1030	100	103	75-125	4	20
Cobalt	ug/L	ND	1000	1000	1000	1020	100	102	75-125	2	20
Copper	ug/L	ND	1000	1000	987	1020	98	102	75-125	3	20
Iron	ug/L	148	10000	10000	10400	10600	102	105	75-125	2	20
Lead	ug/L	ND	1000	1000	1020	1050	102	105	75-125	2	20
Magnesium	ug/L	33300	10000	10000	44200	45300	108	120	75-125	3	20
Manganese	ug/L	40.4	1000	1000	1050	1070	101	103	75-125	2	20
Nickel	ug/L	ND	1000	1000	1000	1030	100	103	75-125	2	20
Potassium	ug/L	2260	10000	10000	12400	12800	101	105	75-125	4	20
Selenium	ug/L	ND	1000	1000	1070	1090	107	109	75-125	2	20
Silver	ug/L	ND	500	500	478	496	95	98	75-125	4	20
Thallium	ug/L	ND	1000	1000	1020	1040	102	104	75-125	2	20
Vanadium	ug/L	ND	1000	1000	1060	1080	105	108	75-125	3	20
Zinc	ug/L	356	1000	1000	1350	1370	99	102	75-125	2	20

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

QC Batch: MSV/71349

Analysis Method: EPA 8260

QC Batch Method: EPA 8260

Analysis Description: 8260 MSV

Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363007

METHOD BLANK: 1197389

Matrix: Water

Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	ND	5.0	12/01/14 12:38	
1,1,1-Trichloroethane	ug/L	ND	5.0	12/01/14 12:38	
1,1,2,2-Tetrachloroethane	ug/L	ND	5.0	12/01/14 12:38	
1,1,2-Trichloroethane	ug/L	ND	5.0	12/01/14 12:38	
1,1-Dichloroethane	ug/L	ND	5.0	12/01/14 12:38	
1,1-Dichloroethene	ug/L	ND	5.0	12/01/14 12:38	
1,1-Dichloropropene	ug/L	ND	5.0	12/01/14 12:38	
1,2,3-Trichlorobenzene	ug/L	ND	5.0	12/01/14 12:38	
1,2,3-Trichloropropane	ug/L	ND	5.0	12/01/14 12:38	
1,2,4-Trichlorobenzene	ug/L	ND	5.0	12/01/14 12:38	
1,2,4-Trimethylbenzene	ug/L	ND	5.0	12/01/14 12:38	
1,2-Dibromoethane (EDB)	ug/L	ND	5.0	12/01/14 12:38	
1,2-Dichlorobenzene	ug/L	ND	5.0	12/01/14 12:38	
1,2-Dichloroethane	ug/L	ND	5.0	12/01/14 12:38	
1,2-Dichloropropane	ug/L	ND	5.0	12/01/14 12:38	
1,3,5-Trimethylbenzene	ug/L	ND	5.0	12/01/14 12:38	
1,3-Dichlorobenzene	ug/L	ND	5.0	12/01/14 12:38	
1,3-Dichloropropane	ug/L	ND	5.0	12/01/14 12:38	
1,4-Dichlorobenzene	ug/L	ND	5.0	12/01/14 12:38	
1-Methylnaphthalene	ug/L	ND	5.0	12/01/14 12:38	N2
2,2-Dichloropropane	ug/L	ND	5.0	12/01/14 12:38	
2-Butanone (MEK)	ug/L	ND	25.0	12/01/14 12:38	
2-Chlorotoluene	ug/L	ND	5.0	12/01/14 12:38	
2-Hexanone	ug/L	ND	25.0	12/01/14 12:38	
2-Methylnaphthalene	ug/L	ND	10.0	12/01/14 12:38	
4-Chlorotoluene	ug/L	ND	5.0	12/01/14 12:38	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	25.0	12/01/14 12:38	
Acetone	ug/L	ND	100	12/01/14 12:38	
Acrolein	ug/L	ND	50.0	12/01/14 12:38	
Acrylonitrile	ug/L	ND	100	12/01/14 12:38	
Benzene	ug/L	ND	5.0	12/01/14 12:38	
Bromobenzene	ug/L	ND	5.0	12/01/14 12:38	
Bromochloromethane	ug/L	ND	5.0	12/01/14 12:38	
Bromodichloromethane	ug/L	ND	5.0	12/01/14 12:38	
Bromoform	ug/L	ND	5.0	12/01/14 12:38	
Bromomethane	ug/L	ND	5.0	12/01/14 12:38	
Carbon disulfide	ug/L	ND	10.0	12/01/14 12:38	
Carbon tetrachloride	ug/L	ND	5.0	12/01/14 12:38	
Chlorobenzene	ug/L	ND	5.0	12/01/14 12:38	
Chloroethane	ug/L	ND	5.0	12/01/14 12:38	
Chloroform	ug/L	ND	5.0	12/01/14 12:38	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

METHOD BLANK: 1197389

Matrix: Water

Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloromethane	ug/L	ND	5.0	12/01/14 12:38	
cis-1,2-Dichloroethene	ug/L	ND	5.0	12/01/14 12:38	
cis-1,3-Dichloropropene	ug/L	ND	5.0	12/01/14 12:38	
Dibromochloromethane	ug/L	ND	5.0	12/01/14 12:38	
Dibromomethane	ug/L	ND	5.0	12/01/14 12:38	
Dichlorodifluoromethane	ug/L	ND	5.0	12/01/14 12:38	
Ethyl methacrylate	ug/L	ND	100	12/01/14 12:38	
Ethylbenzene	ug/L	ND	5.0	12/01/14 12:38	
Hexachloro-1,3-butadiene	ug/L	ND	5.0	12/01/14 12:38	
Iodomethane	ug/L	ND	10.0	12/01/14 12:38	
Isopropylbenzene (Cumene)	ug/L	ND	5.0	12/01/14 12:38	
Methyl-tert-butyl ether	ug/L	ND	4.0	12/01/14 12:38	
Methylene Chloride	ug/L	ND	5.0	12/01/14 12:38	
n-Butylbenzene	ug/L	ND	5.0	12/01/14 12:38	
n-Hexane	ug/L	ND	5.0	12/01/14 12:38	
n-Propylbenzene	ug/L	ND	5.0	12/01/14 12:38	
Naphthalene	ug/L	ND	1.4	12/01/14 12:38	
p-Isopropyltoluene	ug/L	ND	5.0	12/01/14 12:38	
sec-Butylbenzene	ug/L	ND	5.0	12/01/14 12:38	
Styrene	ug/L	ND	5.0	12/01/14 12:38	
tert-Butylbenzene	ug/L	ND	5.0	12/01/14 12:38	
Tetrachloroethene	ug/L	ND	5.0	12/01/14 12:38	
Toluene	ug/L	ND	5.0	12/01/14 12:38	
trans-1,2-Dichloroethene	ug/L	ND	5.0	12/01/14 12:38	
trans-1,3-Dichloropropene	ug/L	ND	5.0	12/01/14 12:38	
trans-1,4-Dichloro-2-butene	ug/L	ND	100	12/01/14 12:38	
Trichloroethene	ug/L	ND	5.0	12/01/14 12:38	
Trichlorofluoromethane	ug/L	ND	5.0	12/01/14 12:38	
Vinyl acetate	ug/L	ND	50.0	12/01/14 12:38	
Vinyl chloride	ug/L	ND	2.0	12/01/14 12:38	
Xylene (Total)	ug/L	ND	10.0	12/01/14 12:38	
4-Bromofluorobenzene (S)	%	96	80-114	12/01/14 12:38	
Dibromofluoromethane (S)	%	98	79-116	12/01/14 12:38	
Toluene-d8 (S)	%	100	81-110	12/01/14 12:38	

LABORATORY CONTROL SAMPLE: 1197390

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	50	46.4	93	61-135	
1,1,1-Trichloroethane	ug/L	50	46.4	93	71-129	
1,1,2,2-Tetrachloroethane	ug/L	50	45.2	90	66-126	
1,1,2-Trichloroethane	ug/L	50	46.3	93	77-130	
1,1-Dichloroethane	ug/L	50	46.5	93	75-130	
1,1-Dichloroethene	ug/L	50	52.2	104	68-127	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

LABORATORY CONTROL SAMPLE: 1197390

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1-Dichloropropene	ug/L	50	50.2	100	78-130	
1,2,3-Trichlorobenzene	ug/L	50	52.3	105	70-130	
1,2,3-Trichloropropane	ug/L	50	44.3	89	58-142	
1,2,4-Trichlorobenzene	ug/L	50	45.9	92	68-131	
1,2,4-Trimethylbenzene	ug/L	50	48.7	97	69-127	
1,2-Dibromoethane (EDB)	ug/L	50	47.9	96	76-125	
1,2-Dichlorobenzene	ug/L	50	48.8	98	75-123	
1,2-Dichloroethane	ug/L	50	48.1	96	75-128	
1,2-Dichloropropane	ug/L	50	46.6	93	74-121	
1,3,5-Trimethylbenzene	ug/L	50	48.5	97	70-126	
1,3-Dichlorobenzene	ug/L	50	49.1	98	74-122	
1,3-Dichloropropane	ug/L	50	50.3	101	74-123	
1,4-Dichlorobenzene	ug/L	50	49.8	100	76-120	
1-Methylnaphthalene	ug/L	50	48.9	98	39-141	N2
2,2-Dichloropropane	ug/L	50	46.7	93	50-137	
2-Butanone (MEK)	ug/L	250	245	98	58-139	
2-Chlorotoluene	ug/L	50	45.4	91	74-122	
2-Hexanone	ug/L	250	266	106	54-140	
2-Methylnaphthalene	ug/L	50	44.3	89	54-151	
4-Chlorotoluene	ug/L	50	49.3	99	77-123	
4-Methyl-2-pentanone (MIBK)	ug/L	250	267	107	58-138	
Acetone	ug/L	250	266	106	49-150	
Acrolein	ug/L	1000	1470	147	41-200	
Acrylonitrile	ug/L	1000	1180	118	63-137	
Benzene	ug/L	50	49.2	98	74-122	
Bromobenzene	ug/L	50	48.3	97	72-127	
Bromochloromethane	ug/L	50	51.0	102	63-132	
Bromodichloromethane	ug/L	50	43.7	87	62-136	
Bromoform	ug/L	50	44.7	89	44-134	
Bromomethane	ug/L	50	66.1	132	22-181	
Carbon disulfide	ug/L	100	112	112	59-132	
Carbon tetrachloride	ug/L	50	44.9	90	56-137	
Chlorobenzene	ug/L	50	49.6	99	78-123	
Chloroethane	ug/L	50	63.1	126	60-144	
Chloroform	ug/L	50	44.5	89	78-126	
Chloromethane	ug/L	50	48.6	97	42-134	
cis-1,2-Dichloroethene	ug/L	50	49.5	99	75-122	
cis-1,3-Dichloropropene	ug/L	50	50.1	100	64-126	
Dibromochloromethane	ug/L	50	48.0	96	58-128	
Dibromomethane	ug/L	50	47.3	95	73-125	
Dichlorodifluoromethane	ug/L	50	52.1	104	35-181	
Ethyl methacrylate	ug/L	200	191	96	69-133	
Ethylbenzene	ug/L	50	47.8	96	66-133	
Hexachloro-1,3-butadiene	ug/L	50	49.6	99	59-145	
Iodomethane	ug/L	100	106	106	21-170	
Isopropylbenzene (Cumene)	ug/L	50	49.4	99	69-124	
Methyl-tert-butyl ether	ug/L	100	99.8	100	69-122	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

LABORATORY CONTROL SAMPLE: 1197390

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Methylene Chloride	ug/L	50	45.1	90	68-132	
n-Butylbenzene	ug/L	50	52.2	104	70-126	
n-Hexane	ug/L	50	54.3	109	51-125	
n-Propylbenzene	ug/L	50	49.3	99	71-122	
Naphthalene	ug/L	50	47.8	96	68-127	
p-Isopropyltoluene	ug/L	50	49.0	98	72-132	
sec-Butylbenzene	ug/L	50	48.7	97	70-128	
Styrene	ug/L	50	50.8	102	74-126	
tert-Butylbenzene	ug/L	50	38.7	77	51-118	
Tetrachloroethene	ug/L	50	48.0	96	69-130	
Toluene	ug/L	50	47.8	96	72-122	
trans-1,2-Dichloroethene	ug/L	50	52.0	104	72-124	
trans-1,3-Dichloropropene	ug/L	50	52.4	105	64-121	
trans-1,4-Dichloro-2-butene	ug/L	200	193	96	56-133	
Trichloroethene	ug/L	50	47.4	95	76-126	
Trichlorofluoromethane	ug/L	50	56.5	113	76-149	
Vinyl acetate	ug/L	200	202	101	45-151	
Vinyl chloride	ug/L	50	42.5	85	59-126	
Xylene (Total)	ug/L	150	149	100	70-124	
4-Bromofluorobenzene (S)	%			97	80-114	
Dibromofluoromethane (S)	%			101	79-116	
Toluene-d8 (S)	%			102	81-110	

MATRIX SPIKE SAMPLE: 1197491

Parameter	Units	50107363001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	ND	50	39.4	79	50-132	
1,1,1-Trichloroethane	ug/L	ND	50	39.9	80	60-138	
1,1,2,2-Tetrachloroethane	ug/L	ND	50	38.4	77	55-128	
1,1,2-Trichloroethane	ug/L	ND	50	41.3	83	61-139	
1,1-Dichloroethane	ug/L	ND	50	34.5	69	57-147	
1,1-Dichloroethene	ug/L	ND	50	51.5	103	55-145	
1,1-Dichloropropene	ug/L	ND	50	46.8	94	55-147	
1,2,3-Trichlorobenzene	ug/L	ND	50	42.9	86	31-141	
1,2,3-Trichloropropane	ug/L	ND	50	38.5	77	58-133	
1,2,4-Trichlorobenzene	ug/L	ND	50	35.7	71	25-143	
1,2,4-Trimethylbenzene	ug/L	ND	50	42.6	85	18-149	
1,2-Dibromoethane (EDB)	ug/L	ND	50	42.7	85	63-129	
1,2-Dichlorobenzene	ug/L	ND	50	41.3	83	38-136	
1,2-Dichloroethane	ug/L	ND	50	42.7	85	62-138	
1,2-Dichloropropane	ug/L	ND	50	41.1	82	59-130	
1,3,5-Trimethylbenzene	ug/L	ND	50	42.7	85	20-147	
1,3-Dichlorobenzene	ug/L	ND	50	42.2	84	28-141	
1,3-Dichloropropane	ug/L	ND	50	44.0	88	62-127	
1,4-Dichlorobenzene	ug/L	ND	50	42.4	85	30-139	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

MATRIX SPIKE SAMPLE:		1197491					
Parameter	Units	50107363001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
1-Methylnaphthalene	ug/L	ND	50	40.0	80	23-143	N2
2,2-Dichloropropane	ug/L	ND	50	31.7	63	37-139	
2-Butanone (MEK)	ug/L	ND	250	221	89	37-156	
2-Chlorotoluene	ug/L	ND	50	39.9	80	27-142	
2-Hexanone	ug/L	ND	250	239	96	44-143	
2-Methylnaphthalene	ug/L	ND	50	33.3	67	24-151	
4-Chlorotoluene	ug/L	ND	50	42.7	85	27-144	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	250	234	94	46-144	
Acetone	ug/L	ND	250	239	96	39-156	
Acrolein	ug/L	ND	1000	1270	127	33-200	
Acrylonitrile	ug/L	ND	1000	1060	106	48-149	
Benzene	ug/L	ND	50	44.8	90	62-129	
Bromobenzene	ug/L	ND	50	42.2	84	39-140	
Bromochloromethane	ug/L	ND	50	46.2	92	49-142	
Bromodichloromethane	ug/L	ND	50	36.3	73	50-142	
Bromoform	ug/L	ND	50	28.0	56	36-125	
Bromomethane	ug/L	ND	50	37.4	75	13-179	
Carbon disulfide	ug/L	ND	100	102	102	45-142	
Carbon tetrachloride	ug/L	ND	50	36.5	73	46-142	
Chlorobenzene	ug/L	ND	50	44.6	89	49-136	
Chloroethane	ug/L	ND	50	57.1	114	47-160	
Chloroform	ug/L	ND	50	41.2	82	54-150	
Chloromethane	ug/L	ND	50	45.5	91	30-148	
cis-1,2-Dichloroethene	ug/L	ND	50	44.9	90	60-135	
cis-1,3-Dichloropropene	ug/L	ND	50	38.7	77	52-123	
Dibromochloromethane	ug/L	ND	50	35.6	71	48-125	
Dibromomethane	ug/L	ND	50	42.1	84	59-134	
Dichlorodifluoromethane	ug/L	ND	50	52.3	105	24-197	
Ethyl methacrylate	ug/L	ND	200	163	81	55-139	
Ethylbenzene	ug/L	ND	50	43.5	87	28-153	
Hexachloro-1,3-butadiene	ug/L	ND	50	41.2	82	10-176	
Iodomethane	ug/L	ND	100	73.8	74	17-157	
Isopropylbenzene (Cumene)	ug/L	ND	50	44.7	89	18-152	
Methyl-tert-butyl ether	ug/L	ND	100	79.2	79	63-130	
Methylene Chloride	ug/L	ND	50	41.6	83	45-156	
n-Butylbenzene	ug/L	ND	50	44.5	89	10-161	
n-Hexane	ug/L	ND	50	48.5	97	33-144	
n-Propylbenzene	ug/L	ND	50	42.8	86	16-150	
Naphthalene	ug/L	ND	50	39.6	79	39-140	
p-Isopropyltoluene	ug/L	ND	50	42.5	85	10-163	
sec-Butylbenzene	ug/L	ND	50	42.9	86	10-160	
Styrene	ug/L	ND	50	45.3	91	36-139	
tert-Butylbenzene	ug/L	ND	50	34.8	70	12-134	
Tetrachloroethene	ug/L	ND	50	43.6	87	33-151	
Toluene	ug/L	ND	50	43.8	88	50-132	
trans-1,2-Dichloroethene	ug/L	ND	50	49.1	98	40-153	
trans-1,3-Dichloropropene	ug/L	ND	50	38.0	76	48-122	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

MATRIX SPIKE SAMPLE: 1197491		50107363001	Spike	MS	MS	% Rec	
Parameter	Units	Result	Conc.	Result	% Rec	Limits	Qualifiers
trans-1,4-Dichloro-2-butene	ug/L	ND	200	147	73	32-139	
Trichloroethene	ug/L	ND	50	43.6	87	50-143	
Trichlorofluoromethane	ug/L	ND	50	56.6	113	60-175	
Vinyl acetate	ug/L	ND	200	152	76	17-142	
Vinyl chloride	ug/L	ND	50	42.2	84	44-145	
Xylene (Total)	ug/L	ND	150	134	90	29-145	
4-Bromofluorobenzene (S)	%				102	80-114	
Dibromofluoromethane (S)	%				98	79-116	
Toluene-d8 (S)	%				103	81-110	

SAMPLE DUPLICATE: 1197492

Parameter	Units	50107363002	Dup	RPD	Max	
		Result	Result		RPD	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	ND	ND		20	
1,1,1-Trichloroethane	ug/L	ND	ND		20	
1,1,2,2-Tetrachloroethane	ug/L	ND	ND		20	
1,1,2-Trichloroethane	ug/L	ND	ND		20	
1,1-Dichloroethane	ug/L	ND	ND		20	
1,1-Dichloroethene	ug/L	ND	ND		20	
1,1-Dichloropropene	ug/L	ND	ND		20	
1,2,3-Trichlorobenzene	ug/L	ND	ND		20	
1,2,3-Trichloropropane	ug/L	ND	ND		20	
1,2,4-Trichlorobenzene	ug/L	ND	ND		20	
1,2,4-Trimethylbenzene	ug/L	ND	ND		20	
1,2-Dibromoethane (EDB)	ug/L	ND	ND		20	
1,2-Dichlorobenzene	ug/L	ND	ND		20	
1,2-Dichloroethane	ug/L	ND	ND		20	
1,2-Dichloropropane	ug/L	ND	ND		20	
1,3,5-Trimethylbenzene	ug/L	ND	ND		20	
1,3-Dichlorobenzene	ug/L	ND	ND		20	
1,3-Dichloropropane	ug/L	ND	ND		20	
1,4-Dichlorobenzene	ug/L	ND	ND		20	
1-Methylnaphthalene	ug/L	ND	ND		20	N2
2,2-Dichloropropane	ug/L	ND	ND		20	
2-Butanone (MEK)	ug/L	ND	ND		20	
2-Chlorotoluene	ug/L	ND	ND		20	
2-Hexanone	ug/L	ND	ND		20	
2-Methylnaphthalene	ug/L	ND	ND		20	
4-Chlorotoluene	ug/L	ND	ND		20	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	ND		20	
Acetone	ug/L	ND	ND		20	
Acrolein	ug/L	ND	ND		20	
Acrylonitrile	ug/L	ND	ND		20	
Benzene	ug/L	ND	ND		20	
Bromobenzene	ug/L	ND	ND		20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

SAMPLE DUPLICATE: 1197492

Parameter	Units	50107363002 Result	Dup Result	RPD	Max RPD	Qualifiers
Bromochloromethane	ug/L	ND	ND		20	
Bromodichloromethane	ug/L	ND	ND		20	
Bromoform	ug/L	ND	ND		20	
Bromomethane	ug/L	ND	ND		20	
Carbon disulfide	ug/L	ND	ND		20	
Carbon tetrachloride	ug/L	ND	ND		20	
Chlorobenzene	ug/L	ND	ND		20	
Chloroethane	ug/L	ND	ND		20	
Chloroform	ug/L	ND	ND		20	
Chloromethane	ug/L	ND	ND		20	
cis-1,2-Dichloroethene	ug/L	ND	ND		20	
cis-1,3-Dichloropropene	ug/L	ND	ND		20	
Dibromochloromethane	ug/L	ND	ND		20	
Dibromomethane	ug/L	ND	ND		20	
Dichlorodifluoromethane	ug/L	ND	ND		20	
Ethyl methacrylate	ug/L	ND	ND		20	
Ethylbenzene	ug/L	ND	ND		20	
Hexachloro-1,3-butadiene	ug/L	ND	ND		20	
Iodomethane	ug/L	ND	ND		20	
Isopropylbenzene (Cumene)	ug/L	ND	ND		20	
Methyl-tert-butyl ether	ug/L	ND	ND		20	
Methylene Chloride	ug/L	ND	ND		20	
n-Butylbenzene	ug/L	ND	ND		20	
n-Hexane	ug/L	ND	ND		20	
n-Propylbenzene	ug/L	ND	ND		20	
Naphthalene	ug/L	ND	ND		20	
p-Isopropyltoluene	ug/L	ND	ND		20	
sec-Butylbenzene	ug/L	ND	ND		20	
Styrene	ug/L	ND	ND		20	
tert-Butylbenzene	ug/L	ND	ND		20	
Tetrachloroethene	ug/L	ND	ND		20	
Toluene	ug/L	ND	ND		20	
trans-1,2-Dichloroethene	ug/L	ND	ND		20	
trans-1,3-Dichloropropene	ug/L	ND	ND		20	
trans-1,4-Dichloro-2-butene	ug/L	ND	ND		20	
Trichloroethene	ug/L	ND	ND		20	
Trichlorofluoromethane	ug/L	ND	ND		20	
Vinyl acetate	ug/L	ND	ND		20	
Vinyl chloride	ug/L	ND	ND		20	
Xylene (Total)	ug/L	ND	ND		20	
4-Bromofluorobenzene (S)	%.	96	96	0		
Dibromofluoromethane (S)	%.	98	95	3		
Toluene-d8 (S)	%.	99	100	1		

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

QC Batch: MSV/71363

Analysis Method: EPA 8260

QC Batch Method: EPA 8260

Analysis Description: 8260 MSV

Associated Lab Samples: 50107363004, 50107363005, 50107363006

METHOD BLANK: 1197496

Matrix: Water

Associated Lab Samples: 50107363004, 50107363005, 50107363006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	ND	5.0	12/02/14 00:35	
1,1,1-Trichloroethane	ug/L	ND	5.0	12/02/14 00:35	
1,1,2,2-Tetrachloroethane	ug/L	ND	5.0	12/02/14 00:35	
1,1,2-Trichloroethane	ug/L	ND	5.0	12/02/14 00:35	
1,1-Dichloroethane	ug/L	ND	5.0	12/02/14 00:35	
1,1-Dichloroethene	ug/L	ND	5.0	12/02/14 00:35	
1,1-Dichloropropene	ug/L	ND	5.0	12/02/14 00:35	
1,2,3-Trichlorobenzene	ug/L	ND	5.0	12/02/14 00:35	
1,2,3-Trichloropropane	ug/L	ND	5.0	12/02/14 00:35	
1,2,4-Trichlorobenzene	ug/L	ND	5.0	12/02/14 00:35	
1,2,4-Trimethylbenzene	ug/L	ND	5.0	12/02/14 00:35	
1,2-Dibromoethane (EDB)	ug/L	ND	5.0	12/02/14 00:35	
1,2-Dichlorobenzene	ug/L	ND	5.0	12/02/14 00:35	
1,2-Dichloroethane	ug/L	ND	5.0	12/02/14 00:35	
1,2-Dichloropropane	ug/L	ND	5.0	12/02/14 00:35	
1,3,5-Trimethylbenzene	ug/L	ND	5.0	12/02/14 00:35	
1,3-Dichlorobenzene	ug/L	ND	5.0	12/02/14 00:35	
1,3-Dichloropropane	ug/L	ND	5.0	12/02/14 00:35	
1,4-Dichlorobenzene	ug/L	ND	5.0	12/02/14 00:35	
1-Methylnaphthalene	ug/L	ND	5.0	12/02/14 00:35	N2
2,2-Dichloropropane	ug/L	ND	5.0	12/02/14 00:35	
2-Butanone (MEK)	ug/L	ND	25.0	12/02/14 00:35	
2-Chlorotoluene	ug/L	ND	5.0	12/02/14 00:35	
2-Hexanone	ug/L	ND	25.0	12/02/14 00:35	
2-Methylnaphthalene	ug/L	ND	10.0	12/02/14 00:35	
4-Chlorotoluene	ug/L	ND	5.0	12/02/14 00:35	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	25.0	12/02/14 00:35	
Acetone	ug/L	ND	100	12/02/14 00:35	
Acrolein	ug/L	ND	50.0	12/02/14 00:35	
Acrylonitrile	ug/L	ND	100	12/02/14 00:35	
Benzene	ug/L	ND	5.0	12/02/14 00:35	
Bromobenzene	ug/L	ND	5.0	12/02/14 00:35	
Bromochloromethane	ug/L	ND	5.0	12/02/14 00:35	
Bromodichloromethane	ug/L	ND	5.0	12/02/14 00:35	
Bromoform	ug/L	ND	5.0	12/02/14 00:35	
Bromomethane	ug/L	ND	5.0	12/02/14 00:35	
Carbon disulfide	ug/L	ND	10.0	12/02/14 00:35	
Carbon tetrachloride	ug/L	ND	5.0	12/02/14 00:35	
Chlorobenzene	ug/L	ND	5.0	12/02/14 00:35	
Chloroethane	ug/L	ND	5.0	12/02/14 00:35	
Chloroform	ug/L	ND	5.0	12/02/14 00:35	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

METHOD BLANK: 1197496

Matrix: Water

Associated Lab Samples: 50107363004, 50107363005, 50107363006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloromethane	ug/L	ND	5.0	12/02/14 00:35	
cis-1,2-Dichloroethene	ug/L	ND	5.0	12/02/14 00:35	
cis-1,3-Dichloropropene	ug/L	ND	5.0	12/02/14 00:35	
Dibromochloromethane	ug/L	ND	5.0	12/02/14 00:35	
Dibromomethane	ug/L	ND	5.0	12/02/14 00:35	
Dichlorodifluoromethane	ug/L	ND	5.0	12/02/14 00:35	
Ethyl methacrylate	ug/L	ND	100	12/02/14 00:35	
Ethylbenzene	ug/L	ND	5.0	12/02/14 00:35	
Hexachloro-1,3-butadiene	ug/L	ND	5.0	12/02/14 00:35	
Iodomethane	ug/L	ND	10.0	12/02/14 00:35	
Isopropylbenzene (Cumene)	ug/L	ND	5.0	12/02/14 00:35	
Methyl-tert-butyl ether	ug/L	ND	4.0	12/02/14 00:35	
Methylene Chloride	ug/L	ND	5.0	12/02/14 00:35	
n-Butylbenzene	ug/L	ND	5.0	12/02/14 00:35	
n-Hexane	ug/L	ND	5.0	12/02/14 00:35	
n-Propylbenzene	ug/L	ND	5.0	12/02/14 00:35	
Naphthalene	ug/L	ND	1.4	12/02/14 00:35	
p-Isopropyltoluene	ug/L	ND	5.0	12/02/14 00:35	
sec-Butylbenzene	ug/L	ND	5.0	12/02/14 00:35	
Styrene	ug/L	ND	5.0	12/02/14 00:35	
tert-Butylbenzene	ug/L	ND	5.0	12/02/14 00:35	
Tetrachloroethene	ug/L	ND	5.0	12/02/14 00:35	
Toluene	ug/L	ND	5.0	12/02/14 00:35	
trans-1,2-Dichloroethene	ug/L	ND	5.0	12/02/14 00:35	
trans-1,3-Dichloropropene	ug/L	ND	5.0	12/02/14 00:35	
trans-1,4-Dichloro-2-butene	ug/L	ND	100	12/02/14 00:35	
Trichloroethene	ug/L	ND	5.0	12/02/14 00:35	
Trichlorofluoromethane	ug/L	ND	5.0	12/02/14 00:35	
Vinyl acetate	ug/L	ND	50.0	12/02/14 00:35	
Vinyl chloride	ug/L	ND	2.0	12/02/14 00:35	
Xylene (Total)	ug/L	ND	10.0	12/02/14 00:35	
4-Bromofluorobenzene (S)	%	95	80-114	12/02/14 00:35	
Dibromofluoromethane (S)	%	95	79-116	12/02/14 00:35	
Toluene-d8 (S)	%	97	81-110	12/02/14 00:35	

LABORATORY CONTROL SAMPLE: 1197497

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	50	42.4	85	61-135	
1,1,1-Trichloroethane	ug/L	50	42.5	85	71-129	
1,1,2,2-Tetrachloroethane	ug/L	50	41.8	84	66-126	
1,1,2-Trichloroethane	ug/L	50	42.5	85	77-130	
1,1-Dichloroethane	ug/L	50	39.7	79	75-130	
1,1-Dichloroethene	ug/L	50	51.2	102	68-127	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

LABORATORY CONTROL SAMPLE: 1197497

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1-Dichloropropene	ug/L	50	47.9	96	78-130	
1,2,3-Trichlorobenzene	ug/L	50	47.5	95	70-130	
1,2,3-Trichloropropane	ug/L	50	42.3	85	58-142	
1,2,4-Trichlorobenzene	ug/L	50	40.2	80	68-131	
1,2,4-Trimethylbenzene	ug/L	50	45.5	91	69-127	
1,2-Dibromoethane (EDB)	ug/L	50	44.9	90	76-125	
1,2-Dichlorobenzene	ug/L	50	45.3	91	75-123	
1,2-Dichloroethane	ug/L	50	47.2	94	75-128	
1,2-Dichloropropane	ug/L	50	44.0	88	74-121	
1,3,5-Trimethylbenzene	ug/L	50	44.7	89	70-126	
1,3-Dichlorobenzene	ug/L	50	46.8	94	74-122	
1,3-Dichloropropane	ug/L	50	46.4	93	74-123	
1,4-Dichlorobenzene	ug/L	50	46.0	92	76-120	
1-Methylnaphthalene	ug/L	50	44.9	90	39-141	N2
2,2-Dichloropropane	ug/L	50	28.3	57	50-137	
2-Butanone (MEK)	ug/L	250	234	93	58-139	
2-Chlorotoluene	ug/L	50	42.3	85	74-122	
2-Hexanone	ug/L	250	248	99	54-140	
2-Methylnaphthalene	ug/L	50	38.6	77	54-151	
4-Chlorotoluene	ug/L	50	45.9	92	77-123	
4-Methyl-2-pentanone (MIBK)	ug/L	250	241	96	58-138	
Acetone	ug/L	250	250	100	49-150	
Acrolein	ug/L	1000	1330	133	41-200	
Acrylonitrile	ug/L	1000	1100	110	63-137	
Benzene	ug/L	50	46.3	93	74-122	
Bromobenzene	ug/L	50	44.3	89	72-127	
Bromochloromethane	ug/L	50	49.1	98	63-132	
Bromodichloromethane	ug/L	50	40.5	81	62-136	
Bromoform	ug/L	50	35.2	70	44-134	
Bromomethane	ug/L	50	51.3	103	22-181	
Carbon disulfide	ug/L	100	101	101	59-132	
Carbon tetrachloride	ug/L	50	40.6	81	56-137	
Chlorobenzene	ug/L	50	46.6	93	78-123	
Chloroethane	ug/L	50	56.4	113	60-144	
Chloroform	ug/L	50	43.8	88	78-126	
Chloromethane	ug/L	50	44.9	90	42-134	
cis-1,2-Dichloroethene	ug/L	50	47.4	95	75-122	
cis-1,3-Dichloropropene	ug/L	50	41.3	83	64-126	
Dibromochloromethane	ug/L	50	40.3	81	58-128	
Dibromomethane	ug/L	50	46.2	92	73-125	
Dichlorodifluoromethane	ug/L	50	48.5	97	35-181	
Ethyl methacrylate	ug/L	200	174	87	69-133	
Ethylbenzene	ug/L	50	44.5	89	66-133	
Hexachloro-1,3-butadiene	ug/L	50	42.7	85	59-145	
Iodomethane	ug/L	100	100	100	21-170	
Isopropylbenzene (Cumene)	ug/L	50	45.9	92	69-124	
Methyl-tert-butyl ether	ug/L	100	86.2	86	69-122	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

LABORATORY CONTROL SAMPLE: 1197497

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Methylene Chloride	ug/L	50	42.0	84	68-132	
n-Butylbenzene	ug/L	50	45.4	91	70-126	
n-Hexane	ug/L	50	43.9	88	51-125	
n-Propylbenzene	ug/L	50	45.4	91	71-122	
Naphthalene	ug/L	50	44.1	88	68-127	
p-Isopropyltoluene	ug/L	50	44.8	90	72-132	
sec-Butylbenzene	ug/L	50	44.0	88	70-128	
Styrene	ug/L	50	46.6	93	74-126	
tert-Butylbenzene	ug/L	50	35.4	71	51-118	
Tetrachloroethene	ug/L	50	44.5	89	69-130	
Toluene	ug/L	50	44.4	89	72-122	
trans-1,2-Dichloroethene	ug/L	50	50.4	101	72-124	
trans-1,3-Dichloropropene	ug/L	50	40.2	80	64-121	
trans-1,4-Dichloro-2-butene	ug/L	200	148	74	56-133	
Trichloroethene	ug/L	50	45.7	91	76-126	
Trichlorofluoromethane	ug/L	50	55.7	111	76-149	
Vinyl acetate	ug/L	200	181	90	45-151	
Vinyl chloride	ug/L	50	41.4	83	59-126	
Xylene (Total)	ug/L	150	135	90	70-124	
4-Bromofluorobenzene (S)	%			96	80-114	
Dibromofluoromethane (S)	%			101	79-116	
Toluene-d8 (S)	%			99	81-110	

MATRIX SPIKE SAMPLE: 1197498

Parameter	Units	50107419003 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	ND	50	39.4	79	50-132	
1,1,1-Trichloroethane	ug/L	ND	50	41.0	82	60-138	
1,1,2,2-Tetrachloroethane	ug/L	ND	50	38.7	77	55-128	
1,1,2-Trichloroethane	ug/L	ND	50	40.1	80	61-139	
1,1-Dichloroethane	ug/L	ND	50	41.0	82	57-147	
1,1-Dichloroethene	ug/L	ND	50	51.0	102	55-145	
1,1-Dichloropropene	ug/L	ND	50	47.3	95	55-147	
1,2,3-Trichlorobenzene	ug/L	ND	50	44.4	89	31-141	
1,2,3-Trichloropropane	ug/L	ND	50	40.3	81	58-133	
1,2,4-Trichlorobenzene	ug/L	ND	50	37.3	75	25-143	
1,2,4-Trimethylbenzene	ug/L	ND	50	42.0	84	18-149	
1,2-Dibromoethane (EDB)	ug/L	ND	50	42.3	85	63-129	
1,2-Dichlorobenzene	ug/L	ND	50	42.8	86	38-136	
1,2-Dichloroethane	ug/L	ND	50	43.0	86	62-138	
1,2-Dichloropropane	ug/L	ND	50	41.5	83	59-130	
1,3,5-Trimethylbenzene	ug/L	ND	50	42.1	84	20-147	
1,3-Dichlorobenzene	ug/L	ND	50	42.9	86	28-141	
1,3-Dichloropropane	ug/L	ND	50	42.8	86	62-127	
1,4-Dichlorobenzene	ug/L	ND	50	42.8	86	30-139	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

MATRIX SPIKE SAMPLE:		1197498					
Parameter	Units	50107419003 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
1-Methylnaphthalene	ug/L	ND	50	39.9	80	23-143	N2
2,2-Dichloropropane	ug/L	ND	50	27.2	54	37-139	
2-Butanone (MEK)	ug/L	ND	250	221	89	37-156	
2-Chlorotoluene	ug/L	ND	50	39.9	80	27-142	
2-Hexanone	ug/L	ND	250	231	92	44-143	
2-Methylnaphthalene	ug/L	ND	50	34.8	70	24-151	
4-Chlorotoluene	ug/L	ND	50	43.6	87	27-144	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	250	225	90	46-144	
Acetone	ug/L	ND	250	228	91	39-156	
Acrolein	ug/L	ND	1000	1130	113	33-200	
Acrylonitrile	ug/L	ND	1000	1040	104	48-149	
Benzene	ug/L	ND	50	45.5	91	62-129	
Bromobenzene	ug/L	ND	50	41.9	84	39-140	
Bromochloromethane	ug/L	ND	50	45.1	90	49-142	
Bromodichloromethane	ug/L	ND	50	37.1	74	50-142	
Bromoform	ug/L	ND	50	31.5	63	36-125	
Bromomethane	ug/L	ND	50	47.7	95	13-179	
Carbon disulfide	ug/L	ND	100	101	101	45-142	
Carbon tetrachloride	ug/L	ND	50	39.1	78	46-142	
Chlorobenzene	ug/L	ND	50	44.7	89	49-136	
Chloroethane	ug/L	ND	50	57.3	115	47-160	
Chloroform	ug/L	ND	50	41.5	83	54-150	
Chloromethane	ug/L	ND	50	46.1	92	30-148	
cis-1,2-Dichloroethene	ug/L	ND	50	45.5	91	60-135	
cis-1,3-Dichloropropene	ug/L	ND	50	37.6	75	52-123	
Dibromochloromethane	ug/L	ND	50	36.2	72	48-125	
Dibromomethane	ug/L	ND	50	42.5	85	59-134	
Dichlorodifluoromethane	ug/L	ND	50	50.2	100	24-197	
Ethyl methacrylate	ug/L	ND	200	161	81	55-139	
Ethylbenzene	ug/L	ND	50	42.5	85	28-153	
Hexachloro-1,3-butadiene	ug/L	ND	50	39.8	80	10-176	
Iodomethane	ug/L	ND	100	80.3	80	17-157	
Isopropylbenzene (Cumene)	ug/L	ND	50	44.1	88	18-152	
Methyl-tert-butyl ether	ug/L	ND	100	78.7	79	63-130	
Methylene Chloride	ug/L	ND	50	40.0	80	45-156	
n-Butylbenzene	ug/L	ND	50	43.8	88	10-161	
n-Hexane	ug/L	ND	50	47.5	95	33-144	
n-Propylbenzene	ug/L	ND	50	43.5	87	16-150	
Naphthalene	ug/L	ND	50	40.4	81	39-140	
p-Isopropyltoluene	ug/L	ND	50	43.1	86	10-163	
sec-Butylbenzene	ug/L	ND	50	42.8	86	10-160	
Styrene	ug/L	ND	50	44.1	88	36-139	
tert-Butylbenzene	ug/L	ND	50	35.5	71	12-134	
Tetrachloroethene	ug/L	ND	50	42.8	86	33-151	
Toluene	ug/L	ND	50	43.1	86	50-132	
trans-1,2-Dichloroethene	ug/L	ND	50	49.3	99	40-153	
trans-1,3-Dichloropropene	ug/L	ND	50	36.2	72	48-122	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

MATRIX SPIKE SAMPLE:		1197498					
Parameter	Units	50107419003 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
trans-1,4-Dichloro-2-butene	ug/L	ND	200	134	67	32-139	
Trichloroethene	ug/L	ND	50	45.3	91	50-143	
Trichlorofluoromethane	ug/L	ND	50	56.6	113	60-175	
Vinyl acetate	ug/L	ND	200	118	59	17-142	
Vinyl chloride	ug/L	ND	50	41.4	83	44-145	
Xylene (Total)	ug/L	ND	150	130	87	29-145	
4-Bromofluorobenzene (S)	%				99	80-114	
Dibromofluoromethane (S)	%				103	79-116	
Toluene-d8 (S)	%				99	81-110	

SAMPLE DUPLICATE: 1197499

Parameter	Units	50107419004 Result	Dup Result	RPD	Max RPD	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	ND	ND		20	
1,1,1-Trichloroethane	ug/L	ND	ND		20	
1,1,2,2-Tetrachloroethane	ug/L	ND	ND		20	
1,1,2-Trichloroethane	ug/L	ND	ND		20	
1,1-Dichloroethane	ug/L	ND	ND		20	
1,1-Dichloroethene	ug/L	ND	ND		20	
1,1-Dichloropropene	ug/L	ND	ND		20	
1,2,3-Trichlorobenzene	ug/L	ND	ND		20	
1,2,3-Trichloropropane	ug/L	ND	ND		20	
1,2,4-Trichlorobenzene	ug/L	ND	ND		20	
1,2,4-Trimethylbenzene	ug/L	ND	ND		20	
1,2-Dibromoethane (EDB)	ug/L	ND	ND		20	
1,2-Dichlorobenzene	ug/L	ND	ND		20	
1,2-Dichloroethane	ug/L	ND	ND		20	
1,2-Dichloropropane	ug/L	ND	ND		20	
1,3,5-Trimethylbenzene	ug/L	ND	ND		20	
1,3-Dichlorobenzene	ug/L	ND	ND		20	
1,3-Dichloropropane	ug/L	ND	ND		20	
1,4-Dichlorobenzene	ug/L	ND	ND		20	
1-Methylnaphthalene	ug/L	ND	ND		20	N2
2,2-Dichloropropane	ug/L	ND	ND		20	
2-Butanone (MEK)	ug/L	ND	ND		20	
2-Chlorotoluene	ug/L	ND	ND		20	
2-Hexanone	ug/L	ND	ND		20	
2-Methylnaphthalene	ug/L	ND	ND		20	
4-Chlorotoluene	ug/L	ND	ND		20	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	ND		20	
Acetone	ug/L	ND	ND		20	
Acrolein	ug/L	ND	ND		20	
Acrylonitrile	ug/L	ND	ND		20	
Benzene	ug/L	ND	ND		20	
Bromobenzene	ug/L	ND	ND		20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

SAMPLE DUPLICATE: 1197499

Parameter	Units	50107419004 Result	Dup Result	RPD	Max RPD	Qualifiers
Bromochloromethane	ug/L	ND	ND		20	
Bromodichloromethane	ug/L	ND	ND		20	
Bromoform	ug/L	ND	ND		20	
Bromomethane	ug/L	ND	ND		20	
Carbon disulfide	ug/L	ND	ND		20	
Carbon tetrachloride	ug/L	ND	ND		20	
Chlorobenzene	ug/L	ND	ND		20	
Chloroethane	ug/L	ND	ND		20	
Chloroform	ug/L	ND	ND		20	
Chloromethane	ug/L	ND	ND		20	
cis-1,2-Dichloroethene	ug/L	ND	ND		20	
cis-1,3-Dichloropropene	ug/L	ND	ND		20	
Dibromochloromethane	ug/L	ND	ND		20	
Dibromomethane	ug/L	ND	ND		20	
Dichlorodifluoromethane	ug/L	ND	ND		20	
Ethyl methacrylate	ug/L	ND	ND		20	
Ethylbenzene	ug/L	ND	ND		20	
Hexachloro-1,3-butadiene	ug/L	ND	ND		20	
Iodomethane	ug/L	ND	ND		20	
Isopropylbenzene (Cumene)	ug/L	ND	ND		20	
Methyl-tert-butyl ether	ug/L	ND	ND		20	
Methylene Chloride	ug/L	ND	ND		20	
n-Butylbenzene	ug/L	ND	ND		20	
n-Hexane	ug/L	ND	ND		20	
n-Propylbenzene	ug/L	ND	ND		20	
Naphthalene	ug/L	ND	ND		20	
p-Isopropyltoluene	ug/L	ND	ND		20	
sec-Butylbenzene	ug/L	ND	ND		20	
Styrene	ug/L	ND	ND		20	
tert-Butylbenzene	ug/L	ND	ND		20	
Tetrachloroethene	ug/L	ND	ND		20	
Toluene	ug/L	ND	ND		20	
trans-1,2-Dichloroethene	ug/L	ND	ND		20	
trans-1,3-Dichloropropene	ug/L	ND	ND		20	
trans-1,4-Dichloro-2-butene	ug/L	ND	ND		20	
Trichloroethene	ug/L	ND	ND		20	
Trichlorofluoromethane	ug/L	ND	ND		20	
Vinyl acetate	ug/L	ND	ND		20	
Vinyl chloride	ug/L	ND	ND		20	
Xylene (Total)	ug/L	ND	ND		20	
4-Bromofluorobenzene (S)	%	94	96	2		
Dibromofluoromethane (S)	%	98	99	1		
Toluene-d8 (S)	%	99	97	1		

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

QC Batch: OEXT/3518

Analysis Method: EPA 8081

QC Batch Method: EPA 3535

Analysis Description: 8081A GCS Pesticides

Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006

METHOD BLANK: 74615

Matrix: Water

Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
4,4'-DDD	ug/L	ND	0.10	12/05/14 20:24	
4,4'-DDE	ug/L	ND	0.10	12/05/14 20:24	
4,4'-DDT	ug/L	ND	0.10	12/05/14 20:24	
Aldrin	ug/L	ND	0.050	12/05/14 20:24	
alpha-BHC	ug/L	ND	0.050	12/05/14 20:24	
alpha-Chlordane	ug/L	ND	0.050	12/05/14 20:24	
beta-BHC	ug/L	ND	0.050	12/05/14 20:24	
delta-BHC	ug/L	ND	0.050	12/05/14 20:24	
Dieldrin	ug/L	ND	0.10	12/05/14 20:24	
Endosulfan I	ug/L	ND	0.050	12/05/14 20:24	
Endosulfan II	ug/L	ND	0.10	12/05/14 20:24	
Endosulfan sulfate	ug/L	ND	0.10	12/05/14 20:24	
Endrin	ug/L	ND	0.10	12/05/14 20:24	
Endrin aldehyde	ug/L	ND	0.10	12/05/14 20:24	
Endrin ketone	ug/L	ND	0.10	12/05/14 20:24	
gamma-BHC (Lindane)	ug/L	ND	0.050	12/05/14 20:24	
gamma-Chlordane	ug/L	ND	0.050	12/05/14 20:24	
Heptachlor	ug/L	ND	0.050	12/05/14 20:24	
Heptachlor epoxide	ug/L	ND	0.050	12/05/14 20:24	
Methoxychlor	ug/L	ND	0.50	12/05/14 20:24	
Toxaphene	ug/L	ND	2.0	12/05/14 20:24	
Decachlorobiphenyl (S)	%	75	14-126	12/05/14 20:24	
Decachlorobiphenyl (S)	%	77	14-126	12/05/14 20:24	
Tetrachloro-m-xylene (S)	%	56	10-119	12/05/14 20:24	
Tetrachloro-m-xylene (S)	%	61	10-119	12/05/14 20:24	

LABORATORY CONTROL SAMPLE: 74616

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
4,4'-DDD	ug/L	.5	0.34	67	29-130	
4,4'-DDE	ug/L	.5	0.27	54	15-115	
4,4'-DDT	ug/L	.5	0.30	61	24-115	
Aldrin	ug/L	.5	0.14	28	10-115	
alpha-BHC	ug/L	.5	0.36	72	27-124	
alpha-Chlordane	ug/L	.5	0.31	62	21-116	
beta-BHC	ug/L	.5	0.35	70	32-131	
delta-BHC	ug/L	.5	0.36	73	28-134	
Dieldrin	ug/L	.5	0.35	71	31-121	
Endosulfan I	ug/L	.5	0.25	51	13-115	
Endosulfan II	ug/L	.5	0.29	58	14-115	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

LABORATORY CONTROL SAMPLE: 74616

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Endosulfan sulfate	ug/L	.5	0.31	62	33-133	
Endrin	ug/L	.5	0.36	72	20-153	
Endrin aldehyde	ug/L	.5	0.36	73	27-129	
Endrin ketone	ug/L	.5	0.38	76	34-129	
gamma-BHC (Lindane)	ug/L	.5	0.38	75	28-128	
gamma-Chlordane	ug/L	.5	0.31	61	16-116	
Heptachlor	ug/L	.5	0.26	52	10-115	
Heptachlor epoxide	ug/L	.5	0.37	74	30-119	
Methoxychlor	ug/L	.5	.3J	59	21-150	
Decachlorobiphenyl (S)	%			59	14-126	
Decachlorobiphenyl (S)	%			58	14-126	
Tetrachloro-m-xylene (S)	%			47	10-119	
Tetrachloro-m-xylene (S)	%			52	10-119	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 74617 74618

Parameter	Units	50107512005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
4,4'-DDD	ug/L	ND	.5	.5	0.35	0.37	70	74	22-141	6	20	
4,4'-DDE	ug/L	ND	.5	.5	0.27	0.29	53	58	11-125	8	20	
4,4'-DDT	ug/L	ND	.5	.5	0.30	0.32	60	64	16-133	8	20	
Aldrin	ug/L	ND	.5	.5	0.20	0.22	41	44	10-115	7	20	
alpha-BHC	ug/L	ND	.5	.5	0.36	0.40	72	79	14-145	9	20	
alpha-Chlordane	ug/L	ND	.5	.5	0.33	0.35	66	71	16-135	7	20	
beta-BHC	ug/L	ND	.5	.5	0.36	0.39	70	77	18-155	9	20	
delta-BHC	ug/L	ND	.5	.5	0.39	0.42	76	82	16-153	8	20	
Dieldrin	ug/L	ND	.5	.5	0.37	0.39	74	78	14-148	4	20	
Endosulfan I	ug/L	ND	.5	.5	0.30	0.31	59	62	10-126	5	20	
Endosulfan II	ug/L	ND	.5	.5	0.32	0.34	65	67	10-133	4	20	
Endosulfan sulfate	ug/L	ND	.5	.5	0.34	0.35	67	70	24-149	5	20	
Endrin	ug/L	ND	.5	.5	0.39	0.41	78	82	22-160	5	20	
Endrin aldehyde	ug/L	ND	.5	.5	0.37	0.39	74	79	12-139	6	20	
Endrin ketone	ug/L	ND	.5	.5	0.39	0.42	77	82	20-153	6	20	
gamma-BHC (Lindane)	ug/L	ND	.5	.5	0.39	0.42	77	83	17-149	8	20	
gamma-Chlordane	ug/L	ND	.5	.5	0.32	0.34	62	67	13-136	8	20	
Heptachlor	ug/L	ND	.5	.5	0.25	0.28	50	56	10-134	10	20	
Heptachlor epoxide	ug/L	ND	.5	.5	0.39	0.41	78	82	13-147	5	20	
Methoxychlor	ug/L	ND	.5	.5	.33J	.34J	63	66	17-166		20	
Decachlorobiphenyl (S)	%						62	72	14-126			
Decachlorobiphenyl (S)	%						62	71	14-126			
Tetrachloro-m-xylene (S)	%						52	62	10-119			
Tetrachloro-m-xylene (S)	%						57	66	10-119			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

QC Batch: OEXT/37508

Analysis Method: EPA 8082

QC Batch Method: EPA 3510

Analysis Description: 8082 GCS PCB Mod

Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006

METHOD BLANK: 1192182

Matrix: Water

Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
PCB-1016 (Aroclor 1016)	ug/L	ND	0.50	11/25/14 14:42	
PCB-1221 (Aroclor 1221)	ug/L	ND	0.50	11/25/14 14:42	
PCB-1232 (Aroclor 1232)	ug/L	ND	0.50	11/25/14 14:42	
PCB-1242 (Aroclor 1242)	ug/L	ND	0.50	11/25/14 14:42	
PCB-1248 (Aroclor 1248)	ug/L	ND	0.50	11/25/14 14:42	
PCB-1254 (Aroclor 1254)	ug/L	ND	0.50	11/25/14 14:42	
PCB-1260 (Aroclor 1260)	ug/L	ND	0.50	11/25/14 14:42	
Tetrachloro-m-xylene (S)	%.	67	32-115	11/25/14 14:42	

LABORATORY CONTROL SAMPLE: 1192183

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
PCB-1016 (Aroclor 1016)	ug/L	5	4.8	96	50-114	
PCB-1260 (Aroclor 1260)	ug/L	5	4.4	88	44-120	
Tetrachloro-m-xylene (S)	%.			87	32-115	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

QC Batch: OEXT/3513

Analysis Method: EPA 8151

QC Batch Method: EPA 3535A

Analysis Description: 8151A GCS Herbicides

Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006

METHOD BLANK: 74378

Matrix: Water

Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
2,4,5-T	ug/L	ND	2.0	11/26/14 15:07	
2,4,5-TP (Silvex)	ug/L	ND	2.0	11/26/14 15:07	
2,4-D	ug/L	ND	2.0	11/26/14 15:07	
2,4-DCAA (S)	%.	82	10-166	11/26/14 15:07	
2,4-DCAA (S)	%.	87	10-166	11/26/14 15:07	

LABORATORY CONTROL SAMPLE: 74379

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
2,4,5-T	ug/L	2	1.7J	86	10-169	
2,4,5-TP (Silvex)	ug/L	2	1.9J	93	22-158	
2,4-D	ug/L	20	18.0	90	10-151	
2,4-DCAA (S)	%.			94	10-166	
2,4-DCAA (S)	%.			98	10-166	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

QC Batch: OEXT/37522 Analysis Method: EPA 8270 by SIM  
QC Batch Method: EPA 3510 Analysis Description: 8270 Water PAH  
Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006

METHOD BLANK: 1192582 Matrix: Water  
Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1-Methylnaphthalene	ug/L	ND	1.0	11/22/14 12:04	
2-Methylnaphthalene	ug/L	ND	1.0	11/22/14 12:04	
Acenaphthene	ug/L	ND	1.0	11/22/14 12:04	
Acenaphthylene	ug/L	ND	1.0	11/22/14 12:04	
Anthracene	ug/L	ND	0.10	11/22/14 12:04	
Benzo(a)anthracene	ug/L	ND	0.10	11/22/14 12:04	
Benzo(a)pyrene	ug/L	ND	0.10	11/22/14 12:04	
Benzo(b)fluoranthene	ug/L	ND	0.10	11/22/14 12:04	
Benzo(g,h,i)perylene	ug/L	ND	0.10	11/22/14 12:04	
Benzo(k)fluoranthene	ug/L	ND	0.10	11/22/14 12:04	
Chrysene	ug/L	ND	0.50	11/22/14 12:04	
Dibenz(a,h)anthracene	ug/L	ND	0.10	11/22/14 12:04	
Fluoranthene	ug/L	ND	1.0	11/22/14 12:04	
Fluorene	ug/L	ND	1.0	11/22/14 12:04	
Indeno(1,2,3-cd)pyrene	ug/L	ND	0.10	11/22/14 12:04	
Naphthalene	ug/L	ND	1.0	11/22/14 12:04	
Phenanthrene	ug/L	ND	1.0	11/22/14 12:04	
Pyrene	ug/L	ND	1.0	11/22/14 12:04	
2-Fluorobiphenyl (S)	%	69	21-114	11/22/14 12:04	
p-Terphenyl-d14 (S)	%	88	25-131	11/22/14 12:04	

LABORATORY CONTROL SAMPLE: 1192583

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1-Methylnaphthalene	ug/L	10	8.2	82	29-112	
2-Methylnaphthalene	ug/L	10	7.6	76	29-110	
Acenaphthene	ug/L	10	8.5	85	39-117	
Acenaphthylene	ug/L	10	8.5	85	40-120	
Anthracene	ug/L	10	8.9	89	48-126	
Benzo(a)anthracene	ug/L	10	8.4	84	51-134	
Benzo(a)pyrene	ug/L	10	6.0	60	48-141	
Benzo(b)fluoranthene	ug/L	10	6.6	66	49-139	
Benzo(g,h,i)perylene	ug/L	10	5.4	54	44-134	
Benzo(k)fluoranthene	ug/L	10	6.3	63	48-140	
Chrysene	ug/L	10	8.4	84	53-136	
Dibenz(a,h)anthracene	ug/L	10	5.1	51	44-132	
Fluoranthene	ug/L	10	9.2	92	50-135	
Fluorene	ug/L	10	8.5	85	44-124	
Indeno(1,2,3-cd)pyrene	ug/L	10	5.3	53	45-132	
Naphthalene	ug/L	10	8.2	82	30-112	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

LABORATORY CONTROL SAMPLE: 1192583

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phenanthrene	ug/L	10	8.7	87	47-128	
Pyrene	ug/L	10	8.7	87	50-134	
2-Fluorobiphenyl (S)	%.			78	21-114	
p-Terphenyl-d14 (S)	%.			83	25-131	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

QC Batch: OEXT/37521

Analysis Method: EPA 8270

QC Batch Method: EPA 3510

Analysis Description: 8270 Water Scan

Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006

METHOD BLANK: 1192579

Matrix: Water

Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
2,4,5-Trichlorophenol	ug/L	ND	10.0	11/21/14 22:21	
2,4,6-Trichlorophenol	ug/L	ND	10.0	11/21/14 22:21	
2,4-Dichlorophenol	ug/L	ND	10.0	11/21/14 22:21	
2,4-Dimethylphenol	ug/L	ND	10.0	11/21/14 22:21	
2,4-Dinitrophenol	ug/L	ND	50.0	11/21/14 22:21	
2,4-Dinitrotoluene	ug/L	ND	10.0	11/21/14 22:21	
2,6-Dinitrotoluene	ug/L	ND	10.0	11/21/14 22:21	
2-Chloronaphthalene	ug/L	ND	10.0	11/21/14 22:21	
2-Chlorophenol	ug/L	ND	10.0	11/21/14 22:21	
2-Methylphenol(o-Cresol)	ug/L	ND	10.0	11/21/14 22:21	
2-Nitroaniline	ug/L	ND	50.0	11/21/14 22:21	
2-Nitrophenol	ug/L	ND	10.0	11/21/14 22:21	
3&4-Methylphenol(m&p Cresol)	ug/L	ND	20.0	11/21/14 22:21	
3,3'-Dichlorobenzidine	ug/L	ND	20.0	11/21/14 22:21	
3-Nitroaniline	ug/L	ND	50.0	11/21/14 22:21	
4,6-Dinitro-2-methylphenol	ug/L	ND	50.0	11/21/14 22:21	
4-Bromophenylphenyl ether	ug/L	ND	10.0	11/21/14 22:21	
4-Chloro-3-methylphenol	ug/L	ND	20.0	11/21/14 22:21	
4-Chloroaniline	ug/L	ND	20.0	11/21/14 22:21	
4-Chlorophenylphenyl ether	ug/L	ND	10.0	11/21/14 22:21	
4-Nitroaniline	ug/L	ND	50.0	11/21/14 22:21	
4-Nitrophenol	ug/L	ND	50.0	11/21/14 22:21	
Benzyl alcohol	ug/L	ND	20.0	11/21/14 22:21	
bis(2-Chloroethoxy)methane	ug/L	ND	10.0	11/21/14 22:21	
bis(2-Chloroethyl) ether	ug/L	ND	10.0	11/21/14 22:21	
bis(2-Chloroisopropyl) ether	ug/L	ND	5.0	11/21/14 22:21	
bis(2-Ethylhexyl)phthalate	ug/L	ND	5.0	11/21/14 22:21	
bis(2chloro1 methylethyl) ether	ug/L	ND	5.0	11/21/14 22:21	
Butylbenzylphthalate	ug/L	ND	10.0	11/21/14 22:21	
Di-n-butylphthalate	ug/L	ND	10.0	11/21/14 22:21	
Di-n-octylphthalate	ug/L	ND	10.0	11/21/14 22:21	
Dibenzofuran	ug/L	ND	10.0	11/21/14 22:21	
Diethylphthalate	ug/L	ND	10.0	11/21/14 22:21	
Dimethylphthalate	ug/L	ND	10.0	11/21/14 22:21	
Hexachloro-1,3-butadiene	ug/L	ND	5.0	11/21/14 22:21	
Hexachlorobenzene	ug/L	ND	10.0	11/21/14 22:21	
Hexachlorocyclopentadiene	ug/L	ND	20.0	11/21/14 22:21	
Hexachloroethane	ug/L	ND	10.0	11/21/14 22:21	
Isophorone	ug/L	ND	10.0	11/21/14 22:21	
N-Nitroso-di-n-propylamine	ug/L	ND	10.0	11/21/14 22:21	
N-Nitrosodiphenylamine	ug/L	ND	10.0	11/21/14 22:21	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

METHOD BLANK: 1192579

Matrix: Water

Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrobenzene	ug/L	ND	10.0	11/21/14 22:21	
Pentachlorophenol	ug/L	ND	50.0	11/21/14 22:21	
Phenol	ug/L	ND	10.0	11/21/14 22:21	
2,4,6-Tribromophenol (S)	%	88	31-161	11/21/14 22:21	
2-Fluorophenol (S)	%	26	10-67	11/21/14 22:21	
Nitrobenzene-d5 (S)	%	82	29-126	11/21/14 22:21	
Phenol-d5 (S)	%	14	10-47	11/21/14 22:21	

LABORATORY CONTROL SAMPLE: 1192580

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
2,4-Dinitrotoluene	ug/L	100	92.9	93	36-126	
2-Chlorophenol	ug/L	100	60.9	61	40-98	
4-Chloro-3-methylphenol	ug/L	100	72.0	72	43-113	
4-Nitrophenol	ug/L	100	ND	15	10-42	
N-Nitroso-di-n-propylamine	ug/L	100	93.7	94	43-120	
Pentachlorophenol	ug/L	100	67.9	68	31-125	
Phenol	ug/L	100	15.4	15	10-37	
2,4,6-Tribromophenol (S)	%			93	31-161	
2-Fluorophenol (S)	%			27	10-67	
Nitrobenzene-d5 (S)	%			89	29-126	
Phenol-d5 (S)	%			15	10-47	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

QC Batch:	WET/18507	Analysis Method:	SM 2320B
QC Batch Method:	SM 2320B	Analysis Description:	2320B Alkalinity
Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006			

METHOD BLANK:	1195720	Matrix:	Water
Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006			

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity, Total as CaCO <sub>3</sub>	mg/L	ND	2.0	11/26/14 14:18	

LABORATORY CONTROL SAMPLE: 1195721						
Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO <sub>3</sub>	mg/L	50	49.1	98	90-110	

SAMPLE DUPLICATE: 1195722						
Parameter	Units	50107312001 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO <sub>3</sub>	mg/L	349	336	4	20	

SAMPLE DUPLICATE: 1195723						
Parameter	Units	50107258065 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO <sub>3</sub>	mg/L	291	298	2	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

QC Batch:	WET/18446	Analysis Method:	SM 2540C
QC Batch Method:	SM 2540C	Analysis Description:	2540C Total Dissolved Solids
Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006			

METHOD BLANK:	1193865	Matrix:	Water
Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006			

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	ND	10.0	11/23/14 06:27	

LABORATORY CONTROL SAMPLE: 1193866						
Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	300	309	103	80-120	

SAMPLE DUPLICATE: 1193867						
Parameter	Units	50107452007 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	1330	1300	3	10	

SAMPLE DUPLICATE: 1193868						
Parameter	Units	50107377007 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	475	495	4	10	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

QC Batch: WET/18463

Analysis Method: SM 4500F/C

QC Batch Method: SM 4500F/C

Analysis Description: SM4500FC Fluoride Water

Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004

METHOD BLANK: 1194117

Matrix: Water

Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Fluoride	mg/L	ND	0.10	11/24/14 11:46	

LABORATORY CONTROL SAMPLE: 1194118

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Fluoride	mg/L	1	1.1	110	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1194119 1194120

Parameter	Units	50107246002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Fluoride	mg/L	0.85	1	1	2.0	2.0	110	111	90-110	1	20	M0

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1194121 1194122

Parameter	Units	50107327009 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Fluoride	mg/L	0.48	1	1	1.4	1.4	92	96	90-110	3	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

QC Batch: WET/18544

Analysis Method: SM 4500F/C

QC Batch Method: SM 4500F/C

Analysis Description: SM4500FC Fluoride Water

Associated Lab Samples: 50107363005, 50107363006

METHOD BLANK: 1197308

Matrix: Water

Associated Lab Samples: 50107363005, 50107363006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Fluoride	mg/L	ND	0.10	12/01/14 09:41	

LABORATORY CONTROL SAMPLE: 1197309

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Fluoride	mg/L	1	1.0	101	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1197310 1197311

Parameter	Units	50107140011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Fluoride	mg/L	ND	1	1	1.0	1.0	96	95	90-110	1	20	

MATRIX SPIKE SAMPLE: 1197312

Parameter	Units	50107463001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Fluoride	mg/L	ND	1	1.0	96	90-110	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

QC Batch: WET/18397 Analysis Method: SM 4500-S2-D  
QC Batch Method: SM 4500-S2-D Analysis Description: 4500S2D Sulfide Water  
Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006

METHOD BLANK: 1192090 Matrix: Water  
Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfide	mg/L	ND	0.10	11/20/14 14:59	

LABORATORY CONTROL SAMPLE: 1192091

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfide	mg/L	.5	0.48	95	90-110	

MATRIX SPIKE SAMPLE: 1192094

Parameter	Units	50107363001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Sulfide	mg/L	ND	.5	0.44	89	90-110	M0

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1192119 1192120

Parameter	Units	50104995003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Sulfide	mg/L	ND	.5	.5	0.49	0.49	98	98	90-110	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

QC Batch: WETA/13783

Analysis Method: EPA 335.4

QC Batch Method: EPA 335.4

Analysis Description: 335.4 Cyanide, Total

Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006

METHOD BLANK: 1192738

Matrix: Water

Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Cyanide	mg/L	ND	0.010	11/22/14 11:05	

LABORATORY CONTROL SAMPLE: 1192739

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cyanide	mg/L	.2	0.22	109	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1192740 1192741

Parameter	Units	50107363001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cyanide	mg/L	ND	.2	.2	0.22	0.21	109	105	90-110	4	20	

MATRIX SPIKE SAMPLE: 1192742

Parameter	Units	50107363006 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cyanide	mg/L	ND	.2	0.22	110	90-110	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

QC Batch: WETA/13803 Analysis Method: EPA 350.1  
QC Batch Method: EPA 350.1 Analysis Description: 350.1 Ammonia  
Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006

METHOD BLANK: 1194644 Matrix: Water  
Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Ammonia	mg/L	ND	0.10	11/25/14 16:10	

LABORATORY CONTROL SAMPLE: 1194645

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Ammonia	mg/L	1.7	1.8	110	90-110	

MATRIX SPIKE SAMPLE: 1194646

Parameter	Units	10288636016 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Nitrogen, Ammonia	mg/L	ND	1.7	1.9	110	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1194647 1194648

Parameter	Units	50107512005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Nitrogen, Ammonia	mg/L	0.67	1.7	1.7	2.5	2.6	111	114	90-110	3	20	M3

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Nature Park GW

Pace Project No.: 50107363

QC Batch: WETA/13776

Analysis Method: EPA 353.2

QC Batch Method: EPA 353.2

Analysis Description: 353.2 Nitrate + Nitrite, Unpres.

Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006

METHOD BLANK: 1192558

Matrix: Water

Associated Lab Samples: 50107363001, 50107363002, 50107363003, 50107363004, 50107363005, 50107363006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Nitrate	mg/L	ND	0.10	11/21/14 09:38	

LABORATORY CONTROL SAMPLE: 1192559

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Nitrate	mg/L	2	1.9	93	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1192561 1192562

Parameter	Units	50107363001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Nitrogen, Nitrate	mg/L	ND	2	2	2.1	2.1	101	102	90-110	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALIFIERS

Project: Karwick Nature Park GW

Pace Project No.: 50107363

### DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

### LABORATORIES

PASI-I Pace Analytical Services - Indianapolis

PASI-N Pace Analytical Services - New Orleans

### BATCH QUALIFIERS

Batch: GCSV/2897

[M5] A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

### ANALYTE QUALIFIERS

C2 Relative percent difference between results from each column was greater than 40%. The lower of the two results was reported.

M0 Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.

M3 Matrix spike recovery was outside laboratory control limits due to matrix interferences.

N2 The lab does not hold TNI accreditation for this parameter.

P8 Analyte was detected in the method blank. All associated samples had concentrations of at least ten times greater than the blank or were below the reporting limit.

S5 Surrogate recovery outside control limits due to matrix interferences (not confirmed by re-analysis).

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
50107363001	MW-1S	EPA 3535	OEXT/3518	EPA 8081	GCSV/2974
50107363002	MW-2D	EPA 3535	OEXT/3518	EPA 8081	GCSV/2974
50107363003	Field Dup	EPA 3535	OEXT/3518	EPA 8081	GCSV/2974
50107363004	MW-2S	EPA 3535	OEXT/3518	EPA 8081	GCSV/2974
50107363005	MW-3S	EPA 3535	OEXT/3518	EPA 8081	GCSV/2974
50107363006	MW-4D	EPA 3535	OEXT/3518	EPA 8081	GCSV/2974
50107363001	MW-1S	EPA 3510	OEXT/37508	EPA 8082	GCSV/13549
50107363002	MW-2D	EPA 3510	OEXT/37508	EPA 8082	GCSV/13549
50107363003	Field Dup	EPA 3510	OEXT/37508	EPA 8082	GCSV/13549
50107363004	MW-2S	EPA 3510	OEXT/37508	EPA 8082	GCSV/13549
50107363005	MW-3S	EPA 3510	OEXT/37508	EPA 8082	GCSV/13549
50107363006	MW-4D	EPA 3510	OEXT/37508	EPA 8082	GCSV/13549
50107363001	MW-1S	EPA 3535A	OEXT/3513	EPA 8151	GCSV/2897
50107363002	MW-2D	EPA 3535A	OEXT/3513	EPA 8151	GCSV/2897
50107363003	Field Dup	EPA 3535A	OEXT/3513	EPA 8151	GCSV/2897
50107363004	MW-2S	EPA 3535A	OEXT/3513	EPA 8151	GCSV/2897
50107363005	MW-3S	EPA 3535A	OEXT/3513	EPA 8151	GCSV/2897
50107363006	MW-4D	EPA 3535A	OEXT/3513	EPA 8151	GCSV/2897
50107363001	MW-1S	EPA 3010	MPRP/14637	EPA 6010	ICP/17531
50107363002	MW-2D	EPA 3010	MPRP/14637	EPA 6010	ICP/17531
50107363003	Field Dup	EPA 3010	MPRP/14637	EPA 6010	ICP/17531
50107363004	MW-2S	EPA 3010	MPRP/14637	EPA 6010	ICP/17531
50107363005	MW-3S	EPA 3010	MPRP/14637	EPA 6010	ICP/17531
50107363006	MW-4D	EPA 3010	MPRP/14637	EPA 6010	ICP/17531
50107363001	MW-1S	EPA 7470	MERP/5863	EPA 7470	MERC/6536
50107363002	MW-2D	EPA 7470	MERP/5863	EPA 7470	MERC/6536
50107363003	Field Dup	EPA 7470	MERP/5863	EPA 7470	MERC/6536
50107363004	MW-2S	EPA 7470	MERP/5863	EPA 7470	MERC/6536
50107363005	MW-3S	EPA 7470	MERP/5863	EPA 7470	MERC/6536
50107363006	MW-4D	EPA 7470	MERP/5863	EPA 7470	MERC/6536
50107363001	MW-1S	EPA 3510	OEXT/37522	EPA 8270 by SIM	MSSV/16600
50107363002	MW-2D	EPA 3510	OEXT/37522	EPA 8270 by SIM	MSSV/16600
50107363003	Field Dup	EPA 3510	OEXT/37522	EPA 8270 by SIM	MSSV/16600
50107363004	MW-2S	EPA 3510	OEXT/37522	EPA 8270 by SIM	MSSV/16600
50107363005	MW-3S	EPA 3510	OEXT/37522	EPA 8270 by SIM	MSSV/16600
50107363006	MW-4D	EPA 3510	OEXT/37522	EPA 8270 by SIM	MSSV/16600
50107363001	MW-1S	EPA 3510	OEXT/37521	EPA 8270	MSSV/16605
50107363002	MW-2D	EPA 3510	OEXT/37521	EPA 8270	MSSV/16605
50107363003	Field Dup	EPA 3510	OEXT/37521	EPA 8270	MSSV/16605
50107363004	MW-2S	EPA 3510	OEXT/37521	EPA 8270	MSSV/16605
50107363005	MW-3S	EPA 3510	OEXT/37521	EPA 8270	MSSV/16605
50107363006	MW-4D	EPA 3510	OEXT/37521	EPA 8270	MSSV/16605
50107363001	MW-1S	EPA 8260	MSV/71349		
50107363002	MW-2D	EPA 8260	MSV/71349		
50107363003	Field Dup	EPA 8260	MSV/71349		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
50107363004	MW-2S	EPA 8260	MSV/71363		
50107363005	MW-3S	EPA 8260	MSV/71363		
50107363006	MW-4D	EPA 8260	MSV/71363		
50107363007	Trip Blank	EPA 8260	MSV/71349		
50107363001	MW-1S	SM 2320B	WET/18507		
50107363002	MW-2D	SM 2320B	WET/18507		
50107363003	Field Dup	SM 2320B	WET/18507		
50107363004	MW-2S	SM 2320B	WET/18507		
50107363005	MW-3S	SM 2320B	WET/18507		
50107363006	MW-4D	SM 2320B	WET/18507		
50107363001	MW-1S	SM 2540C	WET/18446		
50107363002	MW-2D	SM 2540C	WET/18446		
50107363003	Field Dup	SM 2540C	WET/18446		
50107363004	MW-2S	SM 2540C	WET/18446		
50107363005	MW-3S	SM 2540C	WET/18446		
50107363006	MW-4D	SM 2540C	WET/18446		
50107363001	MW-1S	SM 4500F/C	WET/18463		
50107363002	MW-2D	SM 4500F/C	WET/18463		
50107363003	Field Dup	SM 4500F/C	WET/18463		
50107363004	MW-2S	SM 4500F/C	WET/18463		
50107363005	MW-3S	SM 4500F/C	WET/18544		
50107363006	MW-4D	SM 4500F/C	WET/18544		
50107363001	MW-1S	SM 4500-S2-D	WET/18397		
50107363002	MW-2D	SM 4500-S2-D	WET/18397		
50107363003	Field Dup	SM 4500-S2-D	WET/18397		
50107363004	MW-2S	SM 4500-S2-D	WET/18397		
50107363005	MW-3S	SM 4500-S2-D	WET/18397		
50107363006	MW-4D	SM 4500-S2-D	WET/18397		
50107363001	MW-1S	EPA 335.4	WETA/13783	EPA 335.4	WETA/13792
50107363002	MW-2D	EPA 335.4	WETA/13783	EPA 335.4	WETA/13792
50107363003	Field Dup	EPA 335.4	WETA/13783	EPA 335.4	WETA/13792
50107363004	MW-2S	EPA 335.4	WETA/13783	EPA 335.4	WETA/13792
50107363005	MW-3S	EPA 335.4	WETA/13783	EPA 335.4	WETA/13792
50107363006	MW-4D	EPA 335.4	WETA/13783	EPA 335.4	WETA/13792
50107363001	MW-1S	EPA 350.1	WETA/13803	EPA 350.1	WETA/13817
50107363002	MW-2D	EPA 350.1	WETA/13803	EPA 350.1	WETA/13817
50107363003	Field Dup	EPA 350.1	WETA/13803	EPA 350.1	WETA/13817
50107363004	MW-2S	EPA 350.1	WETA/13803	EPA 350.1	WETA/13817
50107363005	MW-3S	EPA 350.1	WETA/13803	EPA 350.1	WETA/13817
50107363006	MW-4D	EPA 350.1	WETA/13803	EPA 350.1	WETA/13817
50107363001	MW-1S	EPA 353.2	WETA/13776		
50107363002	MW-2D	EPA 353.2	WETA/13776		
50107363003	Field Dup	EPA 353.2	WETA/13776		
50107363004	MW-2S	EPA 353.2	WETA/13776		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Karwick Nature Park GW

Pace Project No.: 50107363

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
50107363005	MW-3S	EPA 353.2	WETA/13776		
50107363006	MW-4D	EPA 353.2	WETA/13776		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..







# Sample Condition Upon Receipt

Face Analytical

Client Name: Weaver Boos

Project # SO107363

Courier: ☒ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other

Tracking #: Master# 8066 0864 3853

Custody Seal on Cooler/Box Present: ☒ yes ☐ no Seals intact: ☒ yes ☐ no

Date/Time 5035A kits placed in freezer

Packing Material: ☐ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other

Thermometer 1 2 3 4 5 6 A B C D E F

Type of Ice: Wet Blue None

☐ Samples on ice, cooling process has begun

Cooler Temperature 0.3°C, 0.6°C, 5.4°C  
(Corrected, if applicable) 3.1°C, 5.9°C

Ice Visible in Sample Containers: ☐ yes ☒ no

Temp should be above freezing to 6°C

Comments:

Date and Initials of person examining contents: Ree 11-20-14

Chain of Custody Present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	1.
Chain of Custody Filled Out:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	2.
Chain of Custody Relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	3.
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	4.
Short Hold Time Analysis (<72hr):	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	5. <u>Nitrates</u>
Rush Turn Around Time Requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	6.
Containers Intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	7.
Sample Labels match COC:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	8.
-Includes date/time/ID/Analysis		
All containers needing acid/base pres. have been checked?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	9.
exceptions: VOA, coliform, TOC, O&G		
All containers needing preservation are found to be in compliance with EPA recommendation (<2, >9, >12) unless otherwise noted.		
Headspace in VOA Vials (>6mm):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	10.
Trip Blank Present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	11.
Trip Blank Custody Seals Present	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Project Manager Review		
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	12.
Sufficient Volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	13.
Correct Containers Used:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	14.

Client Notification/ Resolution:

Field Data Required? Y / N

Person Contacted: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Comments/ Resolution: \_\_\_\_\_

Project Manager Review:

Date: 11-20-14



# Sample Container Count



CLIENT: Weaver Boos

COC PAGE 1 of 1  
COC ID# 1880221

Project # 82107363

Sample Line

Item	DG9H	AG1U	WG1U	AG0U	R	4/6	BP2N	BP2U	BP2S	BP3N	BP3U	BP3S	AG3S	AG1H	BP3C	BP1U	SPST	pH <2	pH >12	Comments
1	3	8																1	✓	✓
2	1																			
3	3	8																1	✓	✓
4	1																	1	✓	✓
5	1																	1	✓	✓
6	1																	1	✓	✓
7	1																	1	✓	✓
8																				
9																				
10																				
11																				
12																				

## Container Codes

DG9H	40mL HCL amber vial	AG0U	100mL unpreserved amber glass	BP1N	1 liter HNO3 plastic	DG9P	40mL TSP amber vial
AG1U	1liter unpreserved amber glass	AG1H	1 liter HCL amber glass	BP1S	1 liter H2SO4 plastic	DG9S	40mL H2SO4 amber vial
WG1U	4oz clear soil jar	AG1S	1 liter H2SO4 amber glass	BP1U	1 liter unpreserved plastic	DG9T	40mL Na Thio amber vial
R	terra core kit	AG1T	1 liter Na Thiosulfate amber glass	BP1Z	1 liter NaOH, Zn, Ac	DG9U	40mL unpreserved amber vial
BP2N	500mL HNO3 plastic	AG2N	500mL HNO3 amber glass	BP2A	500mL NaOH, Asc Acid plastic	I	Wipe/Swab
BP2U	500mL unpreserved plastic	AG2S	500mL H2SO4 amber glass	BP2O	500mL NaOH plastic	JGFU	4oz unpreserved amber wide
BP2S	500mL H2SO4 plastic	AG2U	500mL unpreserved amber glass	BP2Z	500mL NaOH, Zn Ac	U	Summa Can
BP3N	250mL HNO3 plastic	AG3U	250mL unpreserved amber glass	AF	Air Filter	VG9H	40mL HCL clear vial
BP3U	250mL unpreserved plastic	BG1H	1 liter HCL clear glass	BP3C	250mL NaOH plastic	VG9T	40mL Na Thio. clear vial
BP3S	250mL H2SO4 plastic	BG1S	1 liter H2SO4 clear glass	BP3Z	250mL NaOH, Zn Ac plastic	VG9U	40mL unpreserved clear vial
AG3S	250mL H2SO4 glass amber	BG1T	1 liter Na Thiosulfate clear glass	C	Air Cassettes	VSG	Headspace septa vial & HCL
AG1S	1 liter H2SO4 amber glass	BG1U	1 liter unpreserved glass	DG9B	40mL Na Bisulfate amber vial	WGFU	4oz wide jar w/hexane wipe
BP1U	1 liter unpreserved plastic	BP1A	1 liter NaOH, Asc Acid plastic	DG9M	40mL MeOH clear vial	ZPLC	Ziploc Bag



December 09, 2014

Mr. Steve Stanford  
Weaver Boos & Gordon  
7121 Grape Road  
Granger, IN 46530

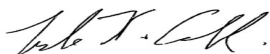
RE: Project: Karwick Road Nature Park GW  
Pace Project No.: 50107512

Dear Mr. Stanford:

Enclosed are the analytical results for sample(s) received by the laboratory on November 21, 2014. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Lyle Cable  
lyle.cable@pacelabs.com  
Project Manager

Enclosures

cc: Mr. Alex Huang, Weaver Boos



## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## CERTIFICATIONS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

---

### New Orleans Certification IDs

California Env. Lab Accreditation Program Branch:  
11277CA

Florida Department of Health (NELAC): E87595

Illinois Environmental Protection Agency: 0025721

Kansas Department of Health and Environment (NELAC):  
E-10266

Louisiana Dept. of Environmental Quality (NELAC/LELAP):  
02006

Oklahoma Department of Environmental Quality: 2010-  
139

Oregon Environmental Laboratory Accreditation:  
LA200001

Pennsylvania Dept. of Env Protection (NELAC): 68-04202

Texas Commission on Env. Quality (NELAC):

T104704405-09-TX

U.S. Dept. of Agriculture Foreign Soil Import: P330-10-  
00119

Washington Department of Ecology: C2078

---

### Indiana Certification IDs

7726 Moller Road, Indianapolis, IN 46268

Illinois Certification #: 200074

Indiana Certification #: C-49-06

Kansas Certification #: E-10247

Kentucky UST Certification #: 0042

Louisiana/NELAP Certification #: 04076

Ohio VAP Certification #: CL-0065

West Virginia Certification #: 330

---

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## SAMPLE SUMMARY

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Lab ID	Sample ID	Matrix	Date Collected	Date Received
50107512001	MW-4S	Water	11/20/14 09:00	11/21/14 12:00
50107512002	MW-5S	Water	11/20/14 10:30	11/21/14 12:00
50107512003	MW-9S	Water	11/20/14 11:30	11/21/14 12:00
50107512004	MW-8S	Water	11/20/14 12:20	11/21/14 12:00
50107512005	MW-6D	Water	11/20/14 13:10	11/21/14 12:00
50107512006	MW-6S	Water	11/20/14 14:00	11/21/14 12:00
50107512007	MW-7S	Water	11/20/14 14:40	11/21/14 12:00
50107512008	MW-10S	Water	11/20/14 15:20	11/21/14 12:00
50107512009	MW-10D	Water	11/20/14 16:00	11/21/14 12:00
50107512010	Trip Blank	Water	11/20/14 08:00	11/21/14 12:00

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## SAMPLE ANALYTE COUNT

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
50107512001	MW-4S	EPA 8081	SLF	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SNP1	4	PASI-N
		EPA 6010	FRW	20	PASI-I
		EPA 7470	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	48	PASI-I
		EPA 8260	BJG	75	PASI-I
		SM 2320B	SLB	1	PASI-I
		SM 2540C	MLS	1	PASI-I
		SM 4500F/C	TPD	1	PASI-I
		SM 4500-S2-D	TPD	1	PASI-I
		EPA 335.4	DDM	1	PASI-I
		EPA 350.1	DDM	1	PASI-I
		EPA 353.2	ILP	1	PASI-I
50107512002	MW-5S	EPA 8081	SLF	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SNP1	4	PASI-N
		EPA 6010	FRW	20	PASI-I
		EPA 7470	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	48	PASI-I
		SM 2320B	SLB	1	PASI-I
		SM 2540C	MLS	1	PASI-I
		SM 4500F/C	TPD	1	PASI-I
		SM 4500-S2-D	TPD	1	PASI-I
		EPA 335.4	DDM	1	PASI-I
		EPA 350.1	DDM	1	PASI-I
		EPA 353.2	ILP	1	PASI-I
50107512003	MW-9S	EPA 8081	SLF	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SNP1	4	PASI-N
		EPA 6010	FRW	20	PASI-I
		EPA 7470	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	48	PASI-I
		SM 2320B	SLB	1	PASI-I

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## SAMPLE ANALYTE COUNT

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
50107512004	MW-8S	SM 2540C	MLS	1	PASI-I
		SM 4500F/C	TPD	1	PASI-I
		SM 4500-S2-D	TPD	1	PASI-I
		EPA 335.4	DDM	1	PASI-I
		EPA 350.1	DDM	1	PASI-I
		EPA 353.2	ILP	1	PASI-I
		EPA 8081	SLF	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SNP1	4	PASI-N
		EPA 6010	FRW	20	PASI-I
		EPA 7470	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	48	PASI-I
		SM 2320B	SLB	1	PASI-I
		SM 2540C	MLS	1	PASI-I
		SM 4500F/C	TPD	1	PASI-I
		SM 4500-S2-D	TPD	1	PASI-I
		EPA 335.4	DDM	1	PASI-I
		EPA 350.1	DDM	1	PASI-I
		EPA 353.2	ILP	1	PASI-I
50107512005	MW-6D	EPA 8081	SLF	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SNP1	4	PASI-N
		EPA 6010	FRW	20	PASI-I
		EPA 7470	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	48	PASI-I
		SM 2320B	SLB	1	PASI-I
		SM 2540C	MLS	1	PASI-I
		SM 4500F/C	TPD	1	PASI-I
		SM 4500-S2-D	TPD	1	PASI-I
		EPA 335.4	DDM	1	PASI-I
		EPA 350.1	DDM	1	PASI-I
		EPA 353.2	ILP	1	PASI-I
		EPA 8081	SLF	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SNP1	4	PASI-N
50107512006	MW-6S	EPA 6010	FRW	20	PASI-I
		EPA 7470	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	48	PASI-I
		SM 2320B	SLB	1	PASI-I
		SM 2540C	MLS	1	PASI-I
		SM 4500F/C	TPD	1	PASI-I

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## SAMPLE ANALYTE COUNT

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
50107512007	MW-7S	EPA 6010	FRW	20	PASI-I
		EPA 7470	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	48	PASI-I
		SM 2320B	SLB	1	PASI-I
		SM 2540C	MLS	1	PASI-I
		SM 4500F/C	TPD	1	PASI-I
		SM 4500-S2-D	TPD	1	PASI-I
		EPA 335.4	DDM	1	PASI-I
		EPA 350.1	DDM	1	PASI-I
		EPA 353.2	ILP	1	PASI-I
		EPA 8081	SLF	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SNP1	4	PASI-N
		EPA 6010	FRW	20	PASI-I
		EPA 7470	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	48	PASI-I
		SM 2320B	SLB	1	PASI-I
		SM 2540C	MLS	1	PASI-I
		SM 4500F/C	TPD	1	PASI-I
		SM 4500-S2-D	TPD	1	PASI-I
50107512008	MW-10S	EPA 335.4	DDM	1	PASI-I
		EPA 350.1	DDM	1	PASI-I
		EPA 353.2	ILP	1	PASI-I
		EPA 8081	SLF	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SNP1	4	PASI-N
		EPA 6010	FRW	20	PASI-I
		EPA 7470	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	48	PASI-I
		SM 2320B	SLB	1	PASI-I
		SM 2540C	MLS	1	PASI-I
		SM 4500F/C	TPD	1	PASI-I
		SM 4500-S2-D	TPD	1	PASI-I
		EPA 335.4	DDM	1	PASI-I

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## SAMPLE ANALYTE COUNT

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
50107512009	MW-10D	EPA 350.1	DDM	1	PASI-I
		EPA 353.2	ILP	1	PASI-I
		EPA 8081	SLF	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SNP1	4	PASI-N
		EPA 6010	FRW	20	PASI-I
		EPA 7470	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	48	PASI-I
		SM 2320B	SLB	1	PASI-I
		SM 2540C	MLS	1	PASI-I
		SM 4500F/C	TPD	1	PASI-I
		SM 4500-S2-D	TPD	1	PASI-I
		EPA 335.4	DDM	1	PASI-I
		EPA 350.1	DDM	1	PASI-I
50107512010	Trip Blank	EPA 353.2	ILP	1	PASI-I
		EPA 8260	BJG	75	PASI-I

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-4S		Lab ID: 50107512001	Collected: 11/20/14 09:00	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b> Analytical Method: EPA 8081 Preparation Method: EPA 3535								
Aldrin	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:06	309-00-2	
alpha-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:06	319-84-6	
beta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:06	319-85-7	
delta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:06	319-86-8	
gamma-BHC (Lindane)	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:06	58-89-9	
alpha-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:06	5103-71-9	
gamma-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:06	5103-74-2	
4,4'-DDD	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:06	72-54-8	
4,4'-DDE	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:06	72-55-9	
4,4'-DDT	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:06	50-29-3	
Dieldrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:06	60-57-1	
Endosulfan I	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:06	959-98-8	
Endosulfan II	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:06	33213-65-9	
Endosulfan sulfate	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:06	1031-07-8	
Endrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:06	72-20-8	
Endrin aldehyde	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:06	7421-93-4	
Endrin ketone	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:06	53494-70-5	
Heptachlor	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:06	76-44-8	
Heptachlor epoxide	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:06	1024-57-3	
Methoxychlor	ND ug/L		0.50	1	11/25/14 14:57	12/05/14 22:06	72-43-5	
Toxaphene	ND ug/L		2.0	1	11/25/14 14:57	12/05/14 22:06	8001-35-2	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	54 %.		10-119	1	11/25/14 14:57	12/05/14 22:06	877-09-8	
Tetrachloro-m-xylene (S)	46 %.		10-119	1	11/25/14 14:57	12/05/14 22:06	877-09-8	
Decachlorobiphenyl (S)	61 %.		14-126	1	11/25/14 14:57	12/05/14 22:06	2051-24-3	
Decachlorobiphenyl (S)	58 %.		14-126	1	11/25/14 14:57	12/05/14 22:06	2051-24-3	
<b>8082 GCS PCB</b> Analytical Method: EPA 8082 Preparation Method: EPA 3510								
PCB-1016 (Aroclor 1016)	ND ug/L		0.51	1	11/24/14 16:45	12/08/14 01:14	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/L		0.51	1	11/24/14 16:45	12/08/14 01:14	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/L		0.51	1	11/24/14 16:45	12/08/14 01:14	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/L		0.51	1	11/24/14 16:45	12/08/14 01:14	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/L		0.51	1	11/24/14 16:45	12/08/14 01:14	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/L		0.51	1	11/24/14 16:45	12/08/14 01:14	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/L		0.51	1	11/24/14 16:45	12/08/14 01:14	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	56 %.		32-115	1	11/24/14 16:45	12/08/14 01:14	877-09-8	
<b>8151 Chlorinated Herbicides</b> Analytical Method: EPA 8151 Preparation Method: EPA 3535A								
2,4-D	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 20:35	94-75-7	
2,4,5-T	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 20:35	93-76-5	
2,4,5-TP (Silvex)	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 20:35	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	124 %.		10-166	1	11/26/14 10:57	12/03/14 20:35	19719-28-9	
2,4-DCAA (S)	130 %.		10-166	1	11/26/14 10:57	12/03/14 20:35	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-4S		Lab ID: 50107512001	Collected: 11/20/14 09:00	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b>		Analytical Method: EPA 6010 Preparation Method: EPA 3010						
Antimony	ND	ug/L	6.0	1	11/25/14 07:25	11/26/14 08:37	7440-36-0	
Arsenic	13.1	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:37	7440-38-2	
Barium	222	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:37	7440-39-3	
Beryllium	ND	ug/L	4.0	1	11/25/14 07:25	11/26/14 08:37	7440-41-7	
Cadmium	ND	ug/L	2.0	1	11/25/14 07:25	11/26/14 08:37	7440-43-9	
Calcium	126000	ug/L	1000	1	11/25/14 07:25	11/26/14 08:37	7440-70-2	
Chromium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:37	7440-47-3	
Cobalt	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:37	7440-48-4	
Copper	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:37	7440-50-8	
Iron	35700	ug/L	100	1	11/25/14 07:25	11/26/14 08:37	7439-89-6	
Lead	19.5	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:37	7439-92-1	
Magnesium	61100	ug/L	1000	1	11/25/14 07:25	11/26/14 08:37	7439-95-4	
Manganese	213	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:37	7439-96-5	
Nickel	74.1	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:37	7440-02-0	
Potassium	57100	ug/L	1000	1	11/25/14 07:25	11/26/14 08:37	7440-09-7	
Selenium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:37	7782-49-2	
Silver	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:37	7440-22-4	
Thallium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:37	7440-28-0	
Vanadium	11.7	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:37	7440-62-2	
Zinc	117	ug/L	20.0	1	11/25/14 07:25	11/26/14 08:37	7440-66-6	
<b>7470 Mercury</b>		Analytical Method: EPA 7470 Preparation Method: EPA 7470						
Mercury	ND	ug/L	2.0	1	11/25/14 11:29	11/26/14 11:33	7439-97-6	
<b>8270 MSSV PAH</b>		Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3510						
Acenaphthene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 08:43	83-32-9	
Acenaphthylene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 08:43	208-96-8	
Anthracene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 08:43	120-12-7	
Benzo(a)anthracene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 08:43	56-55-3	
Benzo(a)pyrene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 08:43	50-32-8	
Benzo(b)fluoranthene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 08:43	205-99-2	
Benzo(g,h,i)perylene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 08:43	191-24-2	
Benzo(k)fluoranthene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 08:43	207-08-9	
Chrysene	ND	ug/L	0.51	1	11/24/14 12:20	11/25/14 08:43	218-01-9	
Dibenz(a,h)anthracene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 08:43	53-70-3	
Fluoranthene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 08:43	206-44-0	
Fluorene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 08:43	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 08:43	193-39-5	
1-Methylnaphthalene	1.7	ug/L	1.0	1	11/24/14 12:20	11/25/14 08:43	90-12-0	
2-Methylnaphthalene	2.4	ug/L	1.0	1	11/24/14 12:20	11/25/14 08:43	91-57-6	
Naphthalene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 08:43	91-20-3	
Phenanthrene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 08:43	85-01-8	
Pyrene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 08:43	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	72 %		21-114	1	11/24/14 12:20	11/25/14 08:43	321-60-8	
p-Terphenyl-d14 (S)	27 %		25-131	1	11/24/14 12:20	11/25/14 08:43	1718-51-0	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-4S		Lab ID: 50107512001	Collected: 11/20/14 09:00	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Benzyl alcohol	ND ug/L		20.2	1	11/24/14 12:20	11/25/14 15:28	100-51-6	
4-Bromophenylphenyl ether	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	101-55-3	
Butylbenzylphthalate	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	85-68-7	
4-Chloro-3-methylphenol	ND ug/L		20.2	1	11/24/14 12:20	11/25/14 15:28	59-50-7	
4-Chloroaniline	ND ug/L		20.2	1	11/24/14 12:20	11/25/14 15:28	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	111-91-1	
bis(2-Chloroethyl) ether	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	111-44-4	
bis(2-Chloroisopropyl) ether	ND ug/L		5.1	1	11/24/14 12:20	11/25/14 15:28	108-60-1	
bis(2chloro1methylethyl) ether	ND ug/L		5.1	1	11/24/14 12:20	11/25/14 15:28	108-60-1	
2-Chloronaphthalene	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	91-58-7	
2-Chlorophenol	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	95-57-8	
4-Chlorophenylphenyl ether	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	7005-72-3	
Dibenzofuran	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	132-64-9	
3,3'-Dichlorobenzidine	ND ug/L		20.2	1	11/24/14 12:20	11/25/14 15:28	91-94-1	
2,4-Dichlorophenol	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	120-83-2	
Diethylphthalate	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	84-66-2	
2,4-Dimethylphenol	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	105-67-9	
Dimethylphthalate	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	131-11-3	
Di-n-butylphthalate	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/L		50.5	1	11/24/14 12:20	11/25/14 15:28	534-52-1	
2,4-Dinitrophenol	ND ug/L		50.5	1	11/24/14 12:20	11/25/14 15:28	51-28-5	
2,4-Dinitrotoluene	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	121-14-2	
2,6-Dinitrotoluene	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	606-20-2	
Di-n-octylphthalate	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/L		5.1	1	11/24/14 12:20	11/25/14 15:28	117-81-7	
Hexachloro-1,3-butadiene	ND ug/L		5.1	1	11/24/14 12:20	11/25/14 15:28	87-68-3	
Hexachlorobenzene	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	118-74-1	
Hexachlorocyclopentadiene	ND ug/L		20.2	1	11/24/14 12:20	11/25/14 15:28	77-47-4	
Hexachloroethane	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	67-72-1	
Isophorone	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/L		20.2	1	11/24/14 12:20	11/25/14 15:28		
2-Nitroaniline	ND ug/L		50.5	1	11/24/14 12:20	11/25/14 15:28	88-74-4	
3-Nitroaniline	ND ug/L		50.5	1	11/24/14 12:20	11/25/14 15:28	99-09-2	
4-Nitroaniline	ND ug/L		50.5	1	11/24/14 12:20	11/25/14 15:28	100-01-6	
Nitrobenzene	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	98-95-3	
2-Nitrophenol	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	88-75-5	
4-Nitrophenol	ND ug/L		50.5	1	11/24/14 12:20	11/25/14 15:28	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	621-64-7	
N-Nitrosodiphenylamine	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	86-30-6	
Pentachlorophenol	ND ug/L		50.5	1	11/24/14 12:20	11/25/14 15:28	87-86-5	
Phenol	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	108-95-2	
2,4,5-Trichlorophenol	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	95-95-4	
2,4,6-Trichlorophenol	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 15:28	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	89 %.		29-126	1	11/24/14 12:20	11/25/14 15:28	4165-60-0	
Phenol-d5 (S)	17 %.		10-47	1	11/24/14 12:20	11/25/14 15:28	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-4S		Lab ID: 50107512001	Collected: 11/20/14 09:00	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV SCAN		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Surrogates								
2-Fluorophenol (S)	28 %.		10-67	1	11/24/14 12:20	11/25/14 15:28	367-12-4	
2,4,6-Tribromophenol (S)	96 %.		31-161	1	11/24/14 12:20	11/25/14 15:28	118-79-6	
8260 MSV Indiana		Analytical Method: EPA 8260						
Acetone	ND ug/L		100	1		12/03/14 16:42	67-64-1	
Acrolein	ND ug/L		50.0	1		12/03/14 16:42	107-02-8	
Acrylonitrile	ND ug/L		100	1		12/03/14 16:42	107-13-1	
Benzene	ND ug/L		5.0	1		12/03/14 16:42	71-43-2	
Bromobenzene	ND ug/L		5.0	1		12/03/14 16:42	108-86-1	
Bromochloromethane	ND ug/L		5.0	1		12/03/14 16:42	74-97-5	
Bromodichloromethane	ND ug/L		5.0	1		12/03/14 16:42	75-27-4	
Bromoform	ND ug/L		5.0	1		12/03/14 16:42	75-25-2	
Bromomethane	ND ug/L		5.0	1		12/03/14 16:42	74-83-9	
2-Butanone (MEK)	ND ug/L		25.0	1		12/03/14 16:42	78-93-3	
n-Butylbenzene	ND ug/L		5.0	1		12/03/14 16:42	104-51-8	
sec-Butylbenzene	ND ug/L		5.0	1		12/03/14 16:42	135-98-8	
tert-Butylbenzene	ND ug/L		5.0	1		12/03/14 16:42	98-06-6	
Carbon disulfide	ND ug/L		10.0	1		12/03/14 16:42	75-15-0	
Carbon tetrachloride	ND ug/L		5.0	1		12/03/14 16:42	56-23-5	
Chlorobenzene	16.8 ug/L		5.0	1		12/03/14 16:42	108-90-7	
Chloroethane	6.7 ug/L		5.0	1		12/03/14 16:42	75-00-3	
Chloroform	ND ug/L		5.0	1		12/03/14 16:42	67-66-3	
Chloromethane	ND ug/L		5.0	1		12/03/14 16:42	74-87-3	
2-Chlorotoluene	ND ug/L		5.0	1		12/03/14 16:42	95-49-8	
4-Chlorotoluene	ND ug/L		5.0	1		12/03/14 16:42	106-43-4	
Dibromochloromethane	ND ug/L		5.0	1		12/03/14 16:42	124-48-1	
1,2-Dibromoethane (EDB)	ND ug/L		5.0	1		12/03/14 16:42	106-93-4	
Dibromomethane	ND ug/L		5.0	1		12/03/14 16:42	74-95-3	
1,2-Dichlorobenzene	ND ug/L		5.0	1		12/03/14 16:42	95-50-1	
1,3-Dichlorobenzene	ND ug/L		5.0	1		12/03/14 16:42	541-73-1	
1,4-Dichlorobenzene	ND ug/L		5.0	1		12/03/14 16:42	106-46-7	
trans-1,4-Dichloro-2-butene	ND ug/L		100	1		12/03/14 16:42	110-57-6	
Dichlorodifluoromethane	ND ug/L		5.0	1		12/03/14 16:42	75-71-8	
1,1-Dichloroethane	ND ug/L		5.0	1		12/03/14 16:42	75-34-3	
1,2-Dichloroethane	ND ug/L		5.0	1		12/03/14 16:42	107-06-2	
1,1-Dichloroethene	ND ug/L		5.0	1		12/03/14 16:42	75-35-4	
cis-1,2-Dichloroethene	ND ug/L		5.0	1		12/03/14 16:42	156-59-2	
trans-1,2-Dichloroethene	ND ug/L		5.0	1		12/03/14 16:42	156-60-5	
1,2-Dichloropropane	ND ug/L		5.0	1		12/03/14 16:42	78-87-5	
1,3-Dichloropropane	ND ug/L		5.0	1		12/03/14 16:42	142-28-9	
2,2-Dichloropropane	ND ug/L		5.0	1		12/03/14 16:42	594-20-7	
1,1-Dichloropropene	ND ug/L		5.0	1		12/03/14 16:42	563-58-6	
cis-1,3-Dichloropropene	ND ug/L		5.0	1		12/03/14 16:42	10061-01-5	
trans-1,3-Dichloropropene	ND ug/L		5.0	1		12/03/14 16:42	10061-02-6	
Ethylbenzene	ND ug/L		5.0	1		12/03/14 16:42	100-41-4	
Ethyl methacrylate	ND ug/L		100	1		12/03/14 16:42	97-63-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-4S		Lab ID: 50107512001	Collected: 11/20/14 09:00	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV Indiana</b>		Analytical Method: EPA 8260						
Hexachloro-1,3-butadiene	ND ug/L		5.0	1		12/03/14 16:42	87-68-3	
n-Hexane	ND ug/L		5.0	1		12/03/14 16:42	110-54-3	
2-Hexanone	ND ug/L		25.0	1		12/03/14 16:42	591-78-6	
Iodomethane	ND ug/L		10.0	1		12/03/14 16:42	74-88-4	
Isopropylbenzene (Cumene)	ND ug/L		5.0	1		12/03/14 16:42	98-82-8	
p-Isopropyltoluene	ND ug/L		5.0	1		12/03/14 16:42	99-87-6	
Methylene Chloride	ND ug/L		5.0	1		12/03/14 16:42	75-09-2	
1-Methylnaphthalene	ND ug/L		5.0	1		12/03/14 16:42	90-12-0	N2
2-Methylnaphthalene	ND ug/L		10.0	1		12/03/14 16:42	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND ug/L		25.0	1		12/03/14 16:42	108-10-1	
Methyl-tert-butyl ether	ND ug/L		4.0	1		12/03/14 16:42	1634-04-4	
Naphthalene	ND ug/L		1.4	1		12/03/14 16:42	91-20-3	
n-Propylbenzene	ND ug/L		5.0	1		12/03/14 16:42	103-65-1	
Styrene	ND ug/L		5.0	1		12/03/14 16:42	100-42-5	
1,1,1,2-Tetrachloroethane	ND ug/L		5.0	1		12/03/14 16:42	630-20-6	
1,1,2,2-Tetrachloroethane	ND ug/L		5.0	1		12/03/14 16:42	79-34-5	
Tetrachloroethene	ND ug/L		5.0	1		12/03/14 16:42	127-18-4	
Toluene	ND ug/L		5.0	1		12/03/14 16:42	108-88-3	
1,2,3-Trichlorobenzene	ND ug/L		5.0	1		12/03/14 16:42	87-61-6	
1,2,4-Trichlorobenzene	ND ug/L		5.0	1		12/03/14 16:42	120-82-1	
1,1,1-Trichloroethane	ND ug/L		5.0	1		12/03/14 16:42	71-55-6	
1,1,2-Trichloroethane	ND ug/L		5.0	1		12/03/14 16:42	79-00-5	
Trichloroethene	ND ug/L		5.0	1		12/03/14 16:42	79-01-6	
Trichlorofluoromethane	ND ug/L		5.0	1		12/03/14 16:42	75-69-4	
1,2,3-Trichloropropane	ND ug/L		5.0	1		12/03/14 16:42	96-18-4	
1,2,4-Trimethylbenzene	ND ug/L		5.0	1		12/03/14 16:42	95-63-6	
1,3,5-Trimethylbenzene	ND ug/L		5.0	1		12/03/14 16:42	108-67-8	
Vinyl acetate	ND ug/L		50.0	1		12/03/14 16:42	108-05-4	
Vinyl chloride	ND ug/L		2.0	1		12/03/14 16:42	75-01-4	
Xylene (Total)	ND ug/L		10.0	1		12/03/14 16:42	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	97 %.		79-116	1		12/03/14 16:42	1868-53-7	
4-Bromofluorobenzene (S)	94 %.		80-114	1		12/03/14 16:42	460-00-4	
Toluene-d8 (S)	96 %.		81-110	1		12/03/14 16:42	2037-26-5	
<b>2320B Alkalinity</b>		Analytical Method: SM 2320B						
Alkalinity, Total as CaCO3	991 mg/L		2.0	1		12/02/14 12:31		
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	732 mg/L		20.0	1		11/26/14 07:03		
<b>4500FC Fluoride</b>		Analytical Method: SM 4500F/C						
Fluoride	ND mg/L		0.10	1		12/02/14 09:42	16984-48-8	
<b>4500S2D Sulfide Water</b>		Analytical Method: SM 4500-S2-D						
Sulfide	ND mg/L		0.10	1		11/21/14 16:39		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-4S		Lab ID: 50107512001	Collected: 11/20/14 09:00	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>335.4 Cyanide, Total</b>	Analytical Method: EPA 335.4 Preparation Method: EPA 335.4							
Cyanide	ND	mg/L	0.010	1	11/25/14 15:19	11/29/14 13:25	57-12-5	
<b>350.1 Ammonia</b>	Analytical Method: EPA 350.1 Preparation Method: EPA 350.1							
Nitrogen, Ammonia	<b>131</b>	mg/L	2.0	20	11/25/14 11:27	11/25/14 16:52	7664-41-7	
<b>353.2 Nitrogen, NO2/NO3 unpres</b>	Analytical Method: EPA 353.2							
Nitrogen, Nitrate	ND	mg/L	0.10	1		11/22/14 07:59		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-5S		Lab ID: 50107512002	Collected: 11/20/14 10:30	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b>		Analytical Method: EPA 8081 Preparation Method: EPA 3535						
Aldrin	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:19	309-00-2	
alpha-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:19	319-84-6	
beta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:19	319-85-7	
delta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:19	319-86-8	
gamma-BHC (Lindane)	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:19	58-89-9	
alpha-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:19	5103-71-9	
gamma-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:19	5103-74-2	
4,4'-DDD	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:19	72-54-8	
4,4'-DDE	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:19	72-55-9	
4,4'-DDT	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:19	50-29-3	
Dieldrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:19	60-57-1	
Endosulfan I	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:19	959-98-8	
Endosulfan II	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:19	33213-65-9	
Endosulfan sulfate	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:19	1031-07-8	
Endrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:19	72-20-8	
Endrin aldehyde	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:19	7421-93-4	
Endrin ketone	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:19	53494-70-5	
Heptachlor	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:19	76-44-8	
Heptachlor epoxide	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:19	1024-57-3	
Methoxychlor	ND ug/L		0.50	1	11/25/14 14:57	12/05/14 22:19	72-43-5	
Toxaphene	ND ug/L		2.0	1	11/25/14 14:57	12/05/14 22:19	8001-35-2	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	155 %.		10-119	1	11/25/14 14:57	12/05/14 22:19	877-09-8	S3
Tetrachloro-m-xylene (S)	46 %.		10-119	1	11/25/14 14:57	12/05/14 22:19	877-09-8	
Decachlorobiphenyl (S)	64 %.		14-126	1	11/25/14 14:57	12/05/14 22:19	2051-24-3	
Decachlorobiphenyl (S)	60 %.		14-126	1	11/25/14 14:57	12/05/14 22:19	2051-24-3	
<b>8082 GCS PCB</b>		Analytical Method: EPA 8082 Preparation Method: EPA 3510						
PCB-1016 (Aroclor 1016)	ND ug/L		0.52	1	11/24/14 16:45	12/04/14 19:52	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/L		0.52	1	11/24/14 16:45	12/04/14 19:52	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/L		0.52	1	11/24/14 16:45	12/04/14 19:52	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/L		0.52	1	11/24/14 16:45	12/04/14 19:52	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/L		0.52	1	11/24/14 16:45	12/04/14 19:52	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/L		0.52	1	11/24/14 16:45	12/04/14 19:52	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/L		0.52	1	11/24/14 16:45	12/04/14 19:52	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	82 %.		32-115	1	11/24/14 16:45	12/04/14 19:52	877-09-8	
<b>8151 Chlorinated Herbicides</b>		Analytical Method: EPA 8151 Preparation Method: EPA 3535A						
2,4-D	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 20:51	94-75-7	
2,4,5-T	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 20:51	93-76-5	
2,4,5-TP (Silvex)	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 20:51	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	85 %.		10-166	1	11/26/14 10:57	12/03/14 20:51	19719-28-9	
2,4-DCAA (S)	83 %.		10-166	1	11/26/14 10:57	12/03/14 20:51	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-5S		Lab ID: 50107512002	Collected: 11/20/14 10:30	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b>		Analytical Method: EPA 6010 Preparation Method: EPA 3010						
Antimony	ND	ug/L	6.0	1	11/25/14 07:25	11/26/14 08:40	7440-36-0	
Arsenic	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:40	7440-38-2	
Barium	403	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:40	7440-39-3	
Beryllium	ND	ug/L	4.0	1	11/25/14 07:25	11/26/14 08:40	7440-41-7	
Cadmium	ND	ug/L	2.0	1	11/25/14 07:25	11/26/14 08:40	7440-43-9	
Calcium	140000	ug/L	1000	1	11/25/14 07:25	11/26/14 08:40	7440-70-2	
Chromium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:40	7440-47-3	
Cobalt	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:40	7440-48-4	
Copper	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:40	7440-50-8	
Iron	30200	ug/L	100	1	11/25/14 07:25	11/26/14 08:40	7439-89-6	
Lead	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:40	7439-92-1	
Magnesium	47900	ug/L	1000	1	11/25/14 07:25	11/26/14 08:40	7439-95-4	
Manganese	480	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:40	7439-96-5	
Nickel	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:40	7440-02-0	
Potassium	34200	ug/L	1000	1	11/25/14 07:25	11/26/14 08:40	7440-09-7	
Selenium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:40	7782-49-2	
Silver	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:40	7440-22-4	
Thallium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:40	7440-28-0	
Vanadium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:40	7440-62-2	
Zinc	ND	ug/L	20.0	1	11/25/14 07:25	11/26/14 08:40	7440-66-6	
<b>7470 Mercury</b>		Analytical Method: EPA 7470 Preparation Method: EPA 7470						
Mercury	ND	ug/L	2.0	1	11/25/14 11:29	11/26/14 11:35	7439-97-6	
<b>8270 MSSV PAH</b>		Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3510						
Acenaphthene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:01	83-32-9	
Acenaphthylene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:01	208-96-8	
Anthracene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 09:01	120-12-7	
Benzo(a)anthracene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 09:01	56-55-3	
Benzo(a)pyrene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 09:01	50-32-8	
Benzo(b)fluoranthene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 09:01	205-99-2	
Benzo(g,h,i)perylene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 09:01	191-24-2	
Benzo(k)fluoranthene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 09:01	207-08-9	
Chrysene	ND	ug/L	0.51	1	11/24/14 12:20	11/25/14 09:01	218-01-9	
Dibenz(a,h)anthracene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 09:01	53-70-3	
Fluoranthene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:01	206-44-0	
Fluorene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:01	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 09:01	193-39-5	
1-Methylnaphthalene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:01	90-12-0	
2-Methylnaphthalene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:01	91-57-6	
Naphthalene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:01	91-20-3	
Phenanthrene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:01	85-01-8	
Pyrene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:01	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	73 %		21-114	1	11/24/14 12:20	11/25/14 09:01	321-60-8	
p-Terphenyl-d14 (S)	45 %		25-131	1	11/24/14 12:20	11/25/14 09:01	1718-51-0	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-5S		Lab ID: 50107512002	Collected: 11/20/14 10:30	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Benzyl alcohol	ND ug/L		20.4	1	11/24/14 12:20	11/25/14 15:50	100-51-6	
4-Bromophenylphenyl ether	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	101-55-3	
Butylbenzylphthalate	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	85-68-7	
4-Chloro-3-methylphenol	ND ug/L		20.4	1	11/24/14 12:20	11/25/14 15:50	59-50-7	
4-Chloroaniline	ND ug/L		20.4	1	11/24/14 12:20	11/25/14 15:50	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	111-91-1	
bis(2-Chloroethyl) ether	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	111-44-4	
bis(2-Chloroisopropyl) ether	ND ug/L		5.1	1	11/24/14 12:20	11/25/14 15:50	108-60-1	
bis(2chloro1methylethyl) ether	ND ug/L		5.1	1	11/24/14 12:20	11/25/14 15:50	108-60-1	
2-Chloronaphthalene	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	91-58-7	
2-Chlorophenol	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	95-57-8	
4-Chlorophenylphenyl ether	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	7005-72-3	
Dibenzofuran	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	132-64-9	
3,3'-Dichlorobenzidine	ND ug/L		20.4	1	11/24/14 12:20	11/25/14 15:50	91-94-1	
2,4-Dichlorophenol	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	120-83-2	
Diethylphthalate	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	84-66-2	
2,4-Dimethylphenol	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	105-67-9	
Dimethylphthalate	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	131-11-3	
Di-n-butylphthalate	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/L		51.0	1	11/24/14 12:20	11/25/14 15:50	534-52-1	
2,4-Dinitrophenol	ND ug/L		51.0	1	11/24/14 12:20	11/25/14 15:50	51-28-5	
2,4-Dinitrotoluene	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	121-14-2	
2,6-Dinitrotoluene	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	606-20-2	
Di-n-octylphthalate	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/L		5.1	1	11/24/14 12:20	11/25/14 15:50	117-81-7	
Hexachloro-1,3-butadiene	ND ug/L		5.1	1	11/24/14 12:20	11/25/14 15:50	87-68-3	
Hexachlorobenzene	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	118-74-1	
Hexachlorocyclopentadiene	ND ug/L		20.4	1	11/24/14 12:20	11/25/14 15:50	77-47-4	
Hexachloroethane	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	67-72-1	
Isophorone	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/L		20.4	1	11/24/14 12:20	11/25/14 15:50		
2-Nitroaniline	ND ug/L		51.0	1	11/24/14 12:20	11/25/14 15:50	88-74-4	
3-Nitroaniline	ND ug/L		51.0	1	11/24/14 12:20	11/25/14 15:50	99-09-2	
4-Nitroaniline	ND ug/L		51.0	1	11/24/14 12:20	11/25/14 15:50	100-01-6	
Nitrobenzene	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	98-95-3	
2-Nitrophenol	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	88-75-5	
4-Nitrophenol	ND ug/L		51.0	1	11/24/14 12:20	11/25/14 15:50	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	621-64-7	
N-Nitrosodiphenylamine	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	86-30-6	
Pentachlorophenol	ND ug/L		51.0	1	11/24/14 12:20	11/25/14 15:50	87-86-5	
Phenol	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	108-95-2	
2,4,5-Trichlorophenol	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	95-95-4	
2,4,6-Trichlorophenol	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 15:50	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	88 %.		29-126	1	11/24/14 12:20	11/25/14 15:50	4165-60-0	
Phenol-d5 (S)	14 %.		10-47	1	11/24/14 12:20	11/25/14 15:50	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-5S		Lab ID: 50107512002		Collected: 11/20/14 10:30		Received: 11/21/14 12:00		Matrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual	
8270 MSSV SCAN		Analytical Method: EPA 8270 Preparation Method: EPA 3510							
Surrogates									
2-Fluorophenol (S)	25 %.		10-67	1	11/24/14 12:20	11/25/14 15:50	367-12-4		
2,4,6-Tribromophenol (S)	94 %.		31-161	1	11/24/14 12:20	11/25/14 15:50	118-79-6		
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	815 mg/L		2.0	1		12/02/14 12:31			
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	734 mg/L		20.0	1		11/26/14 07:03			
4500FC Fluoride		Analytical Method: SM 4500F/C							
Fluoride	0.20 mg/L		0.10	1		12/02/14 09:45	16984-48-8		
4500S2D Sulfide Water		Analytical Method: SM 4500-S2-D							
Sulfide	ND mg/L		0.10	1		11/21/14 16:40			
335.4 Cyanide, Total		Analytical Method: EPA 335.4 Preparation Method: EPA 335.4							
Cyanide	ND mg/L		0.010	1	11/25/14 15:19	11/29/14 13:25	57-12-5		
350.1 Ammonia		Analytical Method: EPA 350.1 Preparation Method: EPA 350.1							
Nitrogen, Ammonia	56.0 mg/L		1.0	10	11/25/14 11:27	11/25/14 16:53	7664-41-7		
353.2 Nitrogen, NO2/NO3 unpres		Analytical Method: EPA 353.2							
Nitrogen, Nitrate	ND mg/L		0.10	1		11/22/14 08:11			

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-9S		Lab ID: 50107512003	Collected: 11/20/14 11:30	Received: 11/21/14 12:00	Matrix: Water				
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual	
8081 Organochlorine Pesticides		Analytical Method: EPA 8081 Preparation Method: EPA 3535							
Aldrin	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:31	309-00-2	S3	
alpha-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:31	319-84-6		
beta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:31	319-85-7		
delta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:31	319-86-8		
gamma-BHC (Lindane)	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:31	58-89-9		
alpha-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:31	5103-71-9		
gamma-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:31	5103-74-2		
4,4'-DDD	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:31	72-54-8		
4,4'-DDE	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:31	72-55-9		
4,4'-DDT	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:31	50-29-3		
Dieldrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:31	60-57-1		
Endosulfan I	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:31	959-98-8		
Endosulfan II	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:31	33213-65-9		
Endosulfan sulfate	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:31	1031-07-8		
Endrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:31	72-20-8		
Endrin aldehyde	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:31	7421-93-4		
Endrin ketone	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:31	53494-70-5		
Heptachlor	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:31	76-44-8		
Heptachlor epoxide	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:31	1024-57-3		
Methoxychlor	ND ug/L		0.50	1	11/25/14 14:57	12/05/14 22:31	72-43-5		
Toxaphene	ND ug/L		2.0	1	11/25/14 14:57	12/05/14 22:31	8001-35-2		
Surrogates									
Tetrachloro-m-xylene (S)	51 %.		10-119	1	11/25/14 14:57	12/05/14 22:31	877-09-8		
Tetrachloro-m-xylene (S)	195 %.		10-119	1	11/25/14 14:57	12/05/14 22:31	877-09-8		
Decachlorobiphenyl (S)	61 %.		14-126	1	11/25/14 14:57	12/05/14 22:31	2051-24-3		
Decachlorobiphenyl (S)	63 %.		14-126	1	11/25/14 14:57	12/05/14 22:31	2051-24-3		
8082 GCS PCB		Analytical Method: EPA 8082 Preparation Method: EPA 3510							
PCB-1016 (Aroclor 1016)	ND ug/L		0.51	1	11/24/14 16:45	12/04/14 19:58	12674-11-2		
PCB-1221 (Aroclor 1221)	ND ug/L		0.51	1	11/24/14 16:45	12/04/14 19:58	11104-28-2		
PCB-1232 (Aroclor 1232)	ND ug/L		0.51	1	11/24/14 16:45	12/04/14 19:58	11141-16-5		
PCB-1242 (Aroclor 1242)	ND ug/L		0.51	1	11/24/14 16:45	12/04/14 19:58	53469-21-9		
PCB-1248 (Aroclor 1248)	ND ug/L		0.51	1	11/24/14 16:45	12/04/14 19:58	12672-29-6		
PCB-1254 (Aroclor 1254)	ND ug/L		0.51	1	11/24/14 16:45	12/04/14 19:58	11097-69-1		
PCB-1260 (Aroclor 1260)	ND ug/L		0.51	1	11/24/14 16:45	12/04/14 19:58	11096-82-5		
Surrogates									
Tetrachloro-m-xylene (S)	87 %.		32-115	1	11/24/14 16:45	12/04/14 19:58	877-09-8		
8151 Chlorinated Herbicides		Analytical Method: EPA 8151 Preparation Method: EPA 3535A							
2,4-D	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 21:39	94-75-7		
2,4,5-T	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 21:39	93-76-5		
2,4,5-TP (Silvex)	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 21:39	93-72-1		
Surrogates									
2,4-DCAA (S)	94 %.		10-166	1	11/26/14 10:57	12/03/14 21:39	19719-28-9		
2,4-DCAA (S)	93 %.		10-166	1	11/26/14 10:57	12/03/14 21:39	19719-28-9		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-9S		Lab ID: 50107512003	Collected: 11/20/14 11:30	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b>		Analytical Method: EPA 6010 Preparation Method: EPA 3010						
Antimony	ND	ug/L	6.0	1	11/25/14 07:25	11/26/14 08:42	7440-36-0	
Arsenic	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:42	7440-38-2	
Barium	146	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:42	7440-39-3	
Beryllium	ND	ug/L	4.0	1	11/25/14 07:25	11/26/14 08:42	7440-41-7	
Cadmium	ND	ug/L	2.0	1	11/25/14 07:25	11/26/14 08:42	7440-43-9	
Calcium	97000	ug/L	1000	1	11/25/14 07:25	11/26/14 08:42	7440-70-2	
Chromium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:42	7440-47-3	
Cobalt	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:42	7440-48-4	
Copper	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:42	7440-50-8	
Iron	67400	ug/L	100	1	11/25/14 07:25	11/26/14 08:42	7439-89-6	
Lead	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:42	7439-92-1	
Magnesium	32100	ug/L	1000	1	11/25/14 07:25	11/26/14 08:42	7439-95-4	
Manganese	243	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:42	7439-96-5	
Nickel	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:42	7440-02-0	
Potassium	11300	ug/L	1000	1	11/25/14 07:25	11/26/14 08:42	7440-09-7	
Selenium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:42	7782-49-2	
Silver	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:42	7440-22-4	
Thallium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:42	7440-28-0	
Vanadium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:42	7440-62-2	
Zinc	ND	ug/L	20.0	1	11/25/14 07:25	11/26/14 08:42	7440-66-6	
<b>7470 Mercury</b>		Analytical Method: EPA 7470 Preparation Method: EPA 7470						
Mercury	ND	ug/L	2.0	1	11/25/14 11:29	11/26/14 11:37	7439-97-6	
<b>8270 MSSV PAH</b>		Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3510						
Acenaphthene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:19	83-32-9	
Acenaphthylene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:19	208-96-8	
Anthracene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 09:19	120-12-7	
Benzo(a)anthracene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 09:19	56-55-3	
Benzo(a)pyrene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 09:19	50-32-8	
Benzo(b)fluoranthene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 09:19	205-99-2	
Benzo(g,h,i)perylene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 09:19	191-24-2	
Benzo(k)fluoranthene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 09:19	207-08-9	
Chrysene	ND	ug/L	0.51	1	11/24/14 12:20	11/25/14 09:19	218-01-9	
Dibenz(a,h)anthracene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 09:19	53-70-3	
Fluoranthene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:19	206-44-0	
Fluorene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:19	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 09:19	193-39-5	
1-Methylnaphthalene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:19	90-12-0	
2-Methylnaphthalene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:19	91-57-6	
Naphthalene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:19	91-20-3	
Phenanthrene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:19	85-01-8	
Pyrene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:19	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	26 %.		21-114	1	11/24/14 12:20	11/25/14 09:19	321-60-8	
p-Terphenyl-d14 (S)	25 %.		25-131	1	11/24/14 12:20	11/25/14 09:19	1718-51-0	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-9S		Lab ID: 50107512003	Collected: 11/20/14 11:30	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Benzyl alcohol	ND ug/L		20.2	1	11/24/14 12:20	11/25/14 16:13	100-51-6	
4-Bromophenylphenyl ether	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	101-55-3	
Butylbenzylphthalate	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	85-68-7	
4-Chloro-3-methylphenol	ND ug/L		20.2	1	11/24/14 12:20	11/25/14 16:13	59-50-7	
4-Chloroaniline	ND ug/L		20.2	1	11/24/14 12:20	11/25/14 16:13	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	111-91-1	
bis(2-Chloroethyl) ether	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	111-44-4	
bis(2-Chloroisopropyl) ether	ND ug/L		5.1	1	11/24/14 12:20	11/25/14 16:13	108-60-1	
bis(2chloro1methylethyl) ether	ND ug/L		5.1	1	11/24/14 12:20	11/25/14 16:13	108-60-1	
2-Chloronaphthalene	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	91-58-7	
2-Chlorophenol	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	95-57-8	
4-Chlorophenylphenyl ether	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	7005-72-3	
Dibenzofuran	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	132-64-9	
3,3'-Dichlorobenzidine	ND ug/L		20.2	1	11/24/14 12:20	11/25/14 16:13	91-94-1	
2,4-Dichlorophenol	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	120-83-2	
Diethylphthalate	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	84-66-2	
2,4-Dimethylphenol	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	105-67-9	
Dimethylphthalate	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	131-11-3	
Di-n-butylphthalate	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/L		50.5	1	11/24/14 12:20	11/25/14 16:13	534-52-1	
2,4-Dinitrophenol	ND ug/L		50.5	1	11/24/14 12:20	11/25/14 16:13	51-28-5	
2,4-Dinitrotoluene	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	121-14-2	
2,6-Dinitrotoluene	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	606-20-2	
Di-n-octylphthalate	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/L		5.1	1	11/24/14 12:20	11/25/14 16:13	117-81-7	
Hexachloro-1,3-butadiene	ND ug/L		5.1	1	11/24/14 12:20	11/25/14 16:13	87-68-3	
Hexachlorobenzene	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	118-74-1	
Hexachlorocyclopentadiene	ND ug/L		20.2	1	11/24/14 12:20	11/25/14 16:13	77-47-4	
Hexachloroethane	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	67-72-1	
Isophorone	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/L		20.2	1	11/24/14 12:20	11/25/14 16:13		
2-Nitroaniline	ND ug/L		50.5	1	11/24/14 12:20	11/25/14 16:13	88-74-4	
3-Nitroaniline	ND ug/L		50.5	1	11/24/14 12:20	11/25/14 16:13	99-09-2	
4-Nitroaniline	ND ug/L		50.5	1	11/24/14 12:20	11/25/14 16:13	100-01-6	
Nitrobenzene	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	98-95-3	
2-Nitrophenol	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	88-75-5	
4-Nitrophenol	ND ug/L		50.5	1	11/24/14 12:20	11/25/14 16:13	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	621-64-7	
N-Nitrosodiphenylamine	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	86-30-6	
Pentachlorophenol	ND ug/L		50.5	1	11/24/14 12:20	11/25/14 16:13	87-86-5	
Phenol	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	108-95-2	
2,4,5-Trichlorophenol	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	95-95-4	
2,4,6-Trichlorophenol	ND ug/L		10.1	1	11/24/14 12:20	11/25/14 16:13	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	30 %.		29-126	1	11/24/14 12:20	11/25/14 16:13	4165-60-0	
Phenol-d5 (S)	3 %.		10-47	1	11/24/14 12:20	11/25/14 16:13	4165-62-2	2d

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-9S		Lab ID: 50107512003	Collected: 11/20/14 11:30	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
<b>Surrogates</b>								
2-Fluorophenol (S)	4 %.		10-67	1	11/24/14 12:20	11/25/14 16:13	367-12-4	1d
2,4,6-Tribromophenol (S)	14 %.		31-161	1	11/24/14 12:20	11/25/14 16:13	118-79-6	1d
<b>2320B Alkalinity</b>		Analytical Method: SM 2320B						
Alkalinity, Total as CaCO <sub>3</sub>	434 mg/L		2.0	1		12/02/14 12:31		
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	612 mg/L		20.0	1		11/26/14 07:03		
<b>4500FC Fluoride</b>		Analytical Method: SM 4500F/C						
Fluoride	ND mg/L		0.10	1		12/02/14 09:47	16984-48-8	
<b>4500S2D Sulfide Water</b>		Analytical Method: SM 4500-S2-D						
Sulfide	ND mg/L		0.10	1		11/21/14 16:41		
<b>335.4 Cyanide, Total</b>		Analytical Method: EPA 335.4 Preparation Method: EPA 335.4						
Cyanide	ND mg/L		0.010	1	11/25/14 15:19	11/29/14 13:26	57-12-5	
<b>350.1 Ammonia</b>		Analytical Method: EPA 350.1 Preparation Method: EPA 350.1						
Nitrogen, Ammonia	27.5 mg/L		1.0	10	11/25/14 11:27	11/25/14 16:54	7664-41-7	
<b>353.2 Nitrogen, NO<sub>2</sub>/NO<sub>3</sub> unpres</b>		Analytical Method: EPA 353.2						
Nitrogen, Nitrate	ND mg/L		0.10	1		11/22/14 08:27		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-8S		Lab ID: 50107512004	Collected: 11/20/14 12:20	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b>		Analytical Method: EPA 8081 Preparation Method: EPA 3535						
Aldrin	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:44	309-00-2	
alpha-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:44	319-84-6	
beta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:44	319-85-7	
delta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:44	319-86-8	
gamma-BHC (Lindane)	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:44	58-89-9	
alpha-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:44	5103-71-9	
gamma-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:44	5103-74-2	
4,4'-DDD	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:44	72-54-8	
4,4'-DDE	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:44	72-55-9	
4,4'-DDT	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:44	50-29-3	
Dieldrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:44	60-57-1	
Endosulfan I	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:44	959-98-8	
Endosulfan II	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:44	33213-65-9	
Endosulfan sulfate	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:44	1031-07-8	
Endrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:44	72-20-8	
Endrin aldehyde	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:44	7421-93-4	
Endrin ketone	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:44	53494-70-5	
Heptachlor	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:44	76-44-8	
Heptachlor epoxide	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:44	1024-57-3	
Methoxychlor	ND ug/L		0.50	1	11/25/14 14:57	12/05/14 22:44	72-43-5	
Toxaphene	ND ug/L		2.0	1	11/25/14 14:57	12/05/14 22:44	8001-35-2	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	59 %.		10-119	1	11/25/14 14:57	12/05/14 22:44	877-09-8	
Tetrachloro-m-xylene (S)	50 %.		10-119	1	11/25/14 14:57	12/05/14 22:44	877-09-8	
Decachlorobiphenyl (S)	68 %.		14-126	1	11/25/14 14:57	12/05/14 22:44	2051-24-3	
Decachlorobiphenyl (S)	68 %.		14-126	1	11/25/14 14:57	12/05/14 22:44	2051-24-3	
<b>8082 GCS PCB</b>		Analytical Method: EPA 8082 Preparation Method: EPA 3510						
PCB-1016 (Aroclor 1016)	ND ug/L		0.51	1	11/24/14 16:45	12/04/14 20:05	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/L		0.51	1	11/24/14 16:45	12/04/14 20:05	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/L		0.51	1	11/24/14 16:45	12/04/14 20:05	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/L		0.51	1	11/24/14 16:45	12/04/14 20:05	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/L		0.51	1	11/24/14 16:45	12/04/14 20:05	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/L		0.51	1	11/24/14 16:45	12/04/14 20:05	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/L		0.51	1	11/24/14 16:45	12/04/14 20:05	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	82 %.		32-115	1	11/24/14 16:45	12/04/14 20:05	877-09-8	
<b>8151 Chlorinated Herbicides</b>		Analytical Method: EPA 8151 Preparation Method: EPA 3535A						
2,4-D	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 21:55	94-75-7	
2,4,5-T	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 21:55	93-76-5	
2,4,5-TP (Silvex)	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 21:55	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	87 %.		10-166	1	11/26/14 10:57	12/03/14 21:55	19719-28-9	
2,4-DCAA (S)	87 %.		10-166	1	11/26/14 10:57	12/03/14 21:55	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-8S		Lab ID: 50107512004		Collected: 11/20/14 12:20		Received: 11/21/14 12:00		Matrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual	
6010 MET ICP		Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Antimony	ND ug/L		6.0	1	11/25/14 07:25	11/26/14 08:44	7440-36-0		
Arsenic	13.5 ug/L		10.0	1	11/25/14 07:25	11/26/14 08:44	7440-38-2		
Barium	146 ug/L		10.0	1	11/25/14 07:25	11/26/14 08:44	7440-39-3		
Beryllium	ND ug/L		4.0	1	11/25/14 07:25	11/26/14 08:44	7440-41-7		
Cadmium	ND ug/L		2.0	1	11/25/14 07:25	11/26/14 08:44	7440-43-9		
Calcium	93100 ug/L		1000	1	11/25/14 07:25	11/26/14 08:44	7440-70-2		
Chromium	ND ug/L		10.0	1	11/25/14 07:25	11/26/14 08:44	7440-47-3		
Cobalt	ND ug/L		10.0	1	11/25/14 07:25	11/26/14 08:44	7440-48-4		
Copper	ND ug/L		10.0	1	11/25/14 07:25	11/26/14 08:44	7440-50-8		
Iron	33500 ug/L		100	1	11/25/14 07:25	11/26/14 08:44	7439-89-6		
Lead	ND ug/L		10.0	1	11/25/14 07:25	11/26/14 08:44	7439-92-1		
Magnesium	26600 ug/L		1000	1	11/25/14 07:25	11/26/14 08:44	7439-95-4		
Manganese	549 ug/L		10.0	1	11/25/14 07:25	11/26/14 08:44	7439-96-5		
Nickel	ND ug/L		10.0	1	11/25/14 07:25	11/26/14 08:44	7440-02-0		
Potassium	14900 ug/L		1000	1	11/25/14 07:25	11/26/14 08:44	7440-09-7		
Selenium	ND ug/L		10.0	1	11/25/14 07:25	11/26/14 08:44	7782-49-2		
Silver	ND ug/L		10.0	1	11/25/14 07:25	11/26/14 08:44	7440-22-4		
Thallium	ND ug/L		10.0	1	11/25/14 07:25	11/26/14 08:44	7440-28-0		
Vanadium	ND ug/L		10.0	1	11/25/14 07:25	11/26/14 08:44	7440-62-2		
Zinc	ND ug/L		20.0	1	11/25/14 07:25	11/26/14 08:44	7440-66-6		
7470 Mercury		Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury	ND ug/L		2.0	1	11/25/14 11:29	11/26/14 11:39	7439-97-6		
8270 MSSV PAH		Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3510							
Acenaphthene	ND ug/L		1.0	1	11/24/14 12:20	11/25/14 09:37	83-32-9		
Acenaphthylene	ND ug/L		1.0	1	11/24/14 12:20	11/25/14 09:37	208-96-8		
Anthracene	ND ug/L		0.10	1	11/24/14 12:20	11/25/14 09:37	120-12-7		
Benzo(a)anthracene	ND ug/L		0.10	1	11/24/14 12:20	11/25/14 09:37	56-55-3		
Benzo(a)pyrene	ND ug/L		0.10	1	11/24/14 12:20	11/25/14 09:37	50-32-8		
Benzo(b)fluoranthene	ND ug/L		0.10	1	11/24/14 12:20	11/25/14 09:37	205-99-2		
Benzo(g,h,i)perylene	ND ug/L		0.10	1	11/24/14 12:20	11/25/14 09:37	191-24-2		
Benzo(k)fluoranthene	ND ug/L		0.10	1	11/24/14 12:20	11/25/14 09:37	207-08-9		
Chrysene	ND ug/L		0.52	1	11/24/14 12:20	11/25/14 09:37	218-01-9		
Dibenz(a,h)anthracene	ND ug/L		0.10	1	11/24/14 12:20	11/25/14 09:37	53-70-3		
Fluoranthene	ND ug/L		1.0	1	11/24/14 12:20	11/25/14 09:37	206-44-0		
Fluorene	ND ug/L		1.0	1	11/24/14 12:20	11/25/14 09:37	86-73-7		
Indeno(1,2,3-cd)pyrene	ND ug/L		0.10	1	11/24/14 12:20	11/25/14 09:37	193-39-5		
1-Methylnaphthalene	ND ug/L		1.0	1	11/24/14 12:20	11/25/14 09:37	90-12-0		
2-Methylnaphthalene	ND ug/L		1.0	1	11/24/14 12:20	11/25/14 09:37	91-57-6		
Naphthalene	ND ug/L		1.0	1	11/24/14 12:20	11/25/14 09:37	91-20-3		
Phenanthrene	ND ug/L		1.0	1	11/24/14 12:20	11/25/14 09:37	85-01-8		
Pyrene	ND ug/L		1.0	1	11/24/14 12:20	11/25/14 09:37	129-00-0		
Surrogates									
2-Fluorobiphenyl (S)	75 %.		21-114	1	11/24/14 12:20	11/25/14 09:37	321-60-8		
p-Terphenyl-d14 (S)	52 %.		25-131	1	11/24/14 12:20	11/25/14 09:37	1718-51-0		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-8S		Lab ID: 50107512004	Collected: 11/20/14 12:20	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Benzyl alcohol	ND ug/L		20.6	1	11/24/14 12:20	11/25/14 16:35	100-51-6	
4-Bromophenylphenyl ether	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	101-55-3	
Butylbenzylphthalate	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	85-68-7	
4-Chloro-3-methylphenol	ND ug/L		20.6	1	11/24/14 12:20	11/25/14 16:35	59-50-7	
4-Chloroaniline	ND ug/L		20.6	1	11/24/14 12:20	11/25/14 16:35	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	111-91-1	
bis(2-Chloroethyl) ether	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	111-44-4	
bis(2-Chloroisopropyl) ether	ND ug/L		5.2	1	11/24/14 12:20	11/25/14 16:35	108-60-1	
bis(2chloro1methylethyl) ether	ND ug/L		5.2	1	11/24/14 12:20	11/25/14 16:35	108-60-1	
2-Chloronaphthalene	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	91-58-7	
2-Chlorophenol	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	95-57-8	
4-Chlorophenylphenyl ether	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	7005-72-3	
Dibenzofuran	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	132-64-9	
3,3'-Dichlorobenzidine	ND ug/L		20.6	1	11/24/14 12:20	11/25/14 16:35	91-94-1	
2,4-Dichlorophenol	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	120-83-2	
Diethylphthalate	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	84-66-2	
2,4-Dimethylphenol	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	105-67-9	
Dimethylphthalate	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	131-11-3	
Di-n-butylphthalate	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/L		51.5	1	11/24/14 12:20	11/25/14 16:35	534-52-1	
2,4-Dinitrophenol	ND ug/L		51.5	1	11/24/14 12:20	11/25/14 16:35	51-28-5	
2,4-Dinitrotoluene	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	121-14-2	
2,6-Dinitrotoluene	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	606-20-2	
Di-n-octylphthalate	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/L		5.2	1	11/24/14 12:20	11/25/14 16:35	117-81-7	
Hexachloro-1,3-butadiene	ND ug/L		5.2	1	11/24/14 12:20	11/25/14 16:35	87-68-3	
Hexachlorobenzene	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	118-74-1	
Hexachlorocyclopentadiene	ND ug/L		20.6	1	11/24/14 12:20	11/25/14 16:35	77-47-4	
Hexachloroethane	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	67-72-1	
Isophorone	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/L		20.6	1	11/24/14 12:20	11/25/14 16:35		
2-Nitroaniline	ND ug/L		51.5	1	11/24/14 12:20	11/25/14 16:35	88-74-4	
3-Nitroaniline	ND ug/L		51.5	1	11/24/14 12:20	11/25/14 16:35	99-09-2	
4-Nitroaniline	ND ug/L		51.5	1	11/24/14 12:20	11/25/14 16:35	100-01-6	
Nitrobenzene	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	98-95-3	
2-Nitrophenol	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	88-75-5	
4-Nitrophenol	ND ug/L		51.5	1	11/24/14 12:20	11/25/14 16:35	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	621-64-7	
N-Nitrosodiphenylamine	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	86-30-6	
Pentachlorophenol	ND ug/L		51.5	1	11/24/14 12:20	11/25/14 16:35	87-86-5	
Phenol	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	108-95-2	
2,4,5-Trichlorophenol	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	95-95-4	
2,4,6-Trichlorophenol	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 16:35	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	85 %.		29-126	1	11/24/14 12:20	11/25/14 16:35	4165-60-0	
Phenol-d5 (S)	17 %.		10-47	1	11/24/14 12:20	11/25/14 16:35	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-8S		Lab ID: 50107512004	Collected: 11/20/14 12:20	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
<b>Surrogates</b>								
2-Fluorophenol (S)	28 %.		10-67	1	11/24/14 12:20	11/25/14 16:35	367-12-4	
2,4,6-Tribromophenol (S)	94 %.		31-161	1	11/24/14 12:20	11/25/14 16:35	118-79-6	
<b>2320B Alkalinity</b>		Analytical Method: SM 2320B						
Alkalinity, Total as CaCO <sub>3</sub>	392 mg/L		2.0	1		12/02/14 12:31		
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	441 mg/L		10.0	1		11/26/14 07:04		
<b>4500FC Fluoride</b>		Analytical Method: SM 4500F/C						
Fluoride	0.20 mg/L		0.10	1		12/02/14 09:48	16984-48-8	
<b>4500S2D Sulfide Water</b>		Analytical Method: SM 4500-S2-D						
Sulfide	ND mg/L		0.10	1		11/21/14 16:42		
<b>335.4 Cyanide, Total</b>		Analytical Method: EPA 335.4 Preparation Method: EPA 335.4						
Cyanide	ND mg/L		0.010	1	11/25/14 15:19	11/29/14 13:27	57-12-5	
<b>350.1 Ammonia</b>		Analytical Method: EPA 350.1 Preparation Method: EPA 350.1						
Nitrogen, Ammonia	21.7 mg/L		1.0	10	11/25/14 11:27	11/25/14 16:55	7664-41-7	
<b>353.2 Nitrogen, NO<sub>2</sub>/NO<sub>3</sub> unpres</b>		Analytical Method: EPA 353.2						
Nitrogen, Nitrate	ND mg/L		0.10	1		11/22/14 08:31		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-6D		Lab ID: 50107512005	Collected: 11/20/14 13:10	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b>		Analytical Method: EPA 8081 Preparation Method: EPA 3535						
Aldrin	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:57	309-00-2	
alpha-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:57	319-84-6	
beta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:57	319-85-7	
delta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:57	319-86-8	
gamma-BHC (Lindane)	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:57	58-89-9	
alpha-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:57	5103-71-9	
gamma-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:57	5103-74-2	
4,4'-DDD	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:57	72-54-8	
4,4'-DDE	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:57	72-55-9	
4,4'-DDT	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:57	50-29-3	
Dieldrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:57	60-57-1	
Endosulfan I	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:57	959-98-8	
Endosulfan II	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:57	33213-65-9	
Endosulfan sulfate	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:57	1031-07-8	
Endrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:57	72-20-8	
Endrin aldehyde	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:57	7421-93-4	
Endrin ketone	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 22:57	53494-70-5	
Heptachlor	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:57	76-44-8	
Heptachlor epoxide	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 22:57	1024-57-3	
Methoxychlor	ND ug/L		0.50	1	11/25/14 14:57	12/05/14 22:57	72-43-5	
Toxaphene	ND ug/L		2.0	1	11/25/14 14:57	12/05/14 22:57	8001-35-2	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	58 %.		10-119	1	11/25/14 14:57	12/05/14 22:57	877-09-8	
Tetrachloro-m-xylene (S)	48 %.		10-119	1	11/25/14 14:57	12/05/14 22:57	877-09-8	
Decachlorobiphenyl (S)	68 %.		14-126	1	11/25/14 14:57	12/05/14 22:57	2051-24-3	
Decachlorobiphenyl (S)	102 %.		14-126	1	11/25/14 14:57	12/05/14 22:57	2051-24-3	
<b>8082 GCS PCB</b>		Analytical Method: EPA 8082 Preparation Method: EPA 3510						
PCB-1016 (Aroclor 1016)	ND ug/L		0.51	1	11/24/14 16:45	12/02/14 02:19	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/L		0.51	1	11/24/14 16:45	12/02/14 02:19	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/L		0.51	1	11/24/14 16:45	12/02/14 02:19	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/L		0.51	1	11/24/14 16:45	12/02/14 02:19	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/L		0.51	1	11/24/14 16:45	12/02/14 02:19	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/L		0.51	1	11/24/14 16:45	12/02/14 02:19	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/L		0.51	1	11/24/14 16:45	12/02/14 02:19	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	89 %.		32-115	1	11/24/14 16:45	12/02/14 02:19	877-09-8	
<b>8151 Chlorinated Herbicides</b>		Analytical Method: EPA 8151 Preparation Method: EPA 3535A						
2,4-D	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 22:11	94-75-7	
2,4,5-T	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 22:11	93-76-5	
2,4,5-TP (Silvex)	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 22:11	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	74 %.		10-166	1	11/26/14 10:57	12/03/14 22:11	19719-28-9	
2,4-DCAA (S)	71 %.		10-166	1	11/26/14 10:57	12/03/14 22:11	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-6D		Lab ID: 50107512005	Collected: 11/20/14 13:10	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b>		Analytical Method: EPA 6010 Preparation Method: EPA 3010						
Antimony	ND	ug/L	6.0	1	11/25/14 07:25	11/26/14 08:48	7440-36-0	
Arsenic	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:48	7440-38-2	
Barium	10.7	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:48	7440-39-3	
Beryllium	ND	ug/L	4.0	1	11/25/14 07:25	11/26/14 08:48	7440-41-7	
Cadmium	ND	ug/L	2.0	1	11/25/14 07:25	11/26/14 08:48	7440-43-9	
Calcium	103000	ug/L	1000	1	11/25/14 07:25	11/26/14 08:48	7440-70-2	
Chromium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:48	7440-47-3	
Cobalt	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:48	7440-48-4	
Copper	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:48	7440-50-8	
Iron	841	ug/L	100	1	11/25/14 07:25	11/26/14 08:48	7439-89-6	
Lead	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:48	7439-92-1	
Magnesium	55000	ug/L	1000	1	11/25/14 07:25	11/26/14 08:48	7439-95-4	
Manganese	34.7	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:48	7439-96-5	
Nickel	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:48	7440-02-0	
Potassium	8640	ug/L	1000	1	11/25/14 07:25	11/26/14 08:48	7440-09-7	
Selenium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:48	7782-49-2	
Silver	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:48	7440-22-4	
Thallium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:48	7440-28-0	
Vanadium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 08:48	7440-62-2	
Zinc	ND	ug/L	20.0	1	11/25/14 07:25	11/26/14 08:48	7440-66-6	
<b>7470 Mercury</b>		Analytical Method: EPA 7470 Preparation Method: EPA 7470						
Mercury	ND	ug/L	2.0	1	11/25/14 11:29	11/26/14 11:41	7439-97-6	
<b>8270 MSSV PAH</b>		Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3510						
Acenaphthene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:55	83-32-9	
Acenaphthylene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:55	208-96-8	
Anthracene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 09:55	120-12-7	
Benzo(a)anthracene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 09:55	56-55-3	
Benzo(a)pyrene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 09:55	50-32-8	
Benzo(b)fluoranthene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 09:55	205-99-2	
Benzo(g,h,i)perylene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 09:55	191-24-2	
Benzo(k)fluoranthene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 09:55	207-08-9	
Chrysene	ND	ug/L	0.52	1	11/24/14 12:20	11/25/14 09:55	218-01-9	
Dibenz(a,h)anthracene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 09:55	53-70-3	
Fluoranthene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:55	206-44-0	
Fluorene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:55	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 09:55	193-39-5	
1-Methylnaphthalene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:55	90-12-0	
2-Methylnaphthalene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:55	91-57-6	
Naphthalene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:55	91-20-3	
Phenanthrene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:55	85-01-8	
Pyrene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 09:55	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	70 %.		21-114	1	11/24/14 12:20	11/25/14 09:55	321-60-8	
p-Terphenyl-d14 (S)	63 %.		25-131	1	11/24/14 12:20	11/25/14 09:55	1718-51-0	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-6D		Lab ID: 50107512005	Collected: 11/20/14 13:10	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Benzyl alcohol	ND ug/L		20.8	1	11/24/14 12:20	11/25/14 16:58	100-51-6	
4-Bromophenylphenyl ether	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	101-55-3	
Butylbenzylphthalate	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	85-68-7	
4-Chloro-3-methylphenol	ND ug/L		20.8	1	11/24/14 12:20	11/25/14 16:58	59-50-7	
4-Chloroaniline	ND ug/L		20.8	1	11/24/14 12:20	11/25/14 16:58	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	111-91-1	
bis(2-Chloroethyl) ether	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	111-44-4	
bis(2-Chloroisopropyl) ether	ND ug/L		5.2	1	11/24/14 12:20	11/25/14 16:58	108-60-1	
bis(2chloro1methylethyl) ether	ND ug/L		5.2	1	11/24/14 12:20	11/25/14 16:58	108-60-1	
2-Chloronaphthalene	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	91-58-7	
2-Chlorophenol	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	95-57-8	
4-Chlorophenylphenyl ether	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	7005-72-3	
Dibenzofuran	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	132-64-9	
3,3'-Dichlorobenzidine	ND ug/L		20.8	1	11/24/14 12:20	11/25/14 16:58	91-94-1	
2,4-Dichlorophenol	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	120-83-2	
Diethylphthalate	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	84-66-2	
2,4-Dimethylphenol	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	105-67-9	
Dimethylphthalate	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	131-11-3	
Di-n-butylphthalate	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/L		52.1	1	11/24/14 12:20	11/25/14 16:58	534-52-1	
2,4-Dinitrophenol	ND ug/L		52.1	1	11/24/14 12:20	11/25/14 16:58	51-28-5	
2,4-Dinitrotoluene	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	121-14-2	
2,6-Dinitrotoluene	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	606-20-2	
Di-n-octylphthalate	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/L		5.2	1	11/24/14 12:20	11/25/14 16:58	117-81-7	
Hexachloro-1,3-butadiene	ND ug/L		5.2	1	11/24/14 12:20	11/25/14 16:58	87-68-3	
Hexachlorobenzene	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	118-74-1	
Hexachlorocyclopentadiene	ND ug/L		20.8	1	11/24/14 12:20	11/25/14 16:58	77-47-4	
Hexachloroethane	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	67-72-1	
Isophorone	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/L		20.8	1	11/24/14 12:20	11/25/14 16:58		
2-Nitroaniline	ND ug/L		52.1	1	11/24/14 12:20	11/25/14 16:58	88-74-4	
3-Nitroaniline	ND ug/L		52.1	1	11/24/14 12:20	11/25/14 16:58	99-09-2	
4-Nitroaniline	ND ug/L		52.1	1	11/24/14 12:20	11/25/14 16:58	100-01-6	
Nitrobenzene	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	98-95-3	
2-Nitrophenol	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	88-75-5	
4-Nitrophenol	ND ug/L		52.1	1	11/24/14 12:20	11/25/14 16:58	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	621-64-7	
N-Nitrosodiphenylamine	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	86-30-6	
Pentachlorophenol	ND ug/L		52.1	1	11/24/14 12:20	11/25/14 16:58	87-86-5	
Phenol	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	108-95-2	
2,4,5-Trichlorophenol	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	95-95-4	
2,4,6-Trichlorophenol	ND ug/L		10.4	1	11/24/14 12:20	11/25/14 16:58	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	87 %.		29-126	1	11/24/14 12:20	11/25/14 16:58	4165-60-0	
Phenol-d5 (S)	17 %.		10-47	1	11/24/14 12:20	11/25/14 16:58	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-6D		Lab ID: 50107512005	Collected: 11/20/14 13:10	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
<b>Surrogates</b>								
2-Fluorophenol (S)	29 %.		10-67	1	11/24/14 12:20	11/25/14 16:58	367-12-4	
2,4,6-Tribromophenol (S)	93 %.		31-161	1	11/24/14 12:20	11/25/14 16:58	118-79-6	
<b>2320B Alkalinity</b>		Analytical Method: SM 2320B						
Alkalinity, Total as CaCO <sub>3</sub>	287 mg/L		2.0	1		12/02/14 12:31		
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	1020 mg/L		10.0	1		11/26/14 07:04		
<b>4500FC Fluoride</b>		Analytical Method: SM 4500F/C						
Fluoride	0.64 mg/L		0.10	1		12/02/14 09:50	16984-48-8	
<b>4500S2D Sulfide Water</b>		Analytical Method: SM 4500-S2-D						
Sulfide	ND mg/L		0.10	1		11/21/14 16:43		
<b>335.4 Cyanide, Total</b>		Analytical Method: EPA 335.4 Preparation Method: EPA 335.4						
Cyanide	ND mg/L		0.010	1	11/25/14 15:19	11/29/14 13:28	57-12-5	
<b>350.1 Ammonia</b>		Analytical Method: EPA 350.1 Preparation Method: EPA 350.1						
Nitrogen, Ammonia	0.67 mg/L		0.10	1	11/25/14 11:27	11/25/14 16:28	7664-41-7	
<b>353.2 Nitrogen, NO<sub>2</sub>/NO<sub>3</sub> unpres</b>		Analytical Method: EPA 353.2						
Nitrogen, Nitrate	0.16 mg/L		0.10	1		11/22/14 08:32		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-6S		Lab ID: 50107512006	Collected: 11/20/14 14:00	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b>		Analytical Method: EPA 8081 Preparation Method: EPA 3535						
Aldrin	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 23:35	309-00-2	
alpha-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 23:35	319-84-6	
beta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 23:35	319-85-7	
delta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 23:35	319-86-8	
gamma-BHC (Lindane)	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 23:35	58-89-9	
alpha-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 23:35	5103-71-9	
gamma-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 23:35	5103-74-2	
4,4'-DDD	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 23:35	72-54-8	
4,4'-DDE	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 23:35	72-55-9	
4,4'-DDT	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 23:35	50-29-3	
Dieldrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 23:35	60-57-1	
Endosulfan I	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 23:35	959-98-8	
Endosulfan II	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 23:35	33213-65-9	
Endosulfan sulfate	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 23:35	1031-07-8	
Endrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 23:35	72-20-8	
Endrin aldehyde	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 23:35	7421-93-4	
Endrin ketone	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 23:35	53494-70-5	
Heptachlor	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 23:35	76-44-8	
Heptachlor epoxide	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 23:35	1024-57-3	
Methoxychlor	ND ug/L		0.50	1	11/25/14 14:57	12/05/14 23:35	72-43-5	
Toxaphene	ND ug/L		2.0	1	11/25/14 14:57	12/05/14 23:35	8001-35-2	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	204 %.		10-119	1	11/25/14 14:57	12/05/14 23:35	877-09-8	S3
Tetrachloro-m-xylene (S)	55 %.		10-119	1	11/25/14 14:57	12/05/14 23:35	877-09-8	
Decachlorobiphenyl (S)	73 %.		14-126	1	11/25/14 14:57	12/05/14 23:35	2051-24-3	
Decachlorobiphenyl (S)	71 %.		14-126	1	11/25/14 14:57	12/05/14 23:35	2051-24-3	
<b>8082 GCS PCB</b>		Analytical Method: EPA 8082 Preparation Method: EPA 3510						
PCB-1016 (Aroclor 1016)	ND ug/L		0.52	1	11/24/14 16:45	12/04/14 20:11	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/L		0.52	1	11/24/14 16:45	12/04/14 20:11	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/L		0.52	1	11/24/14 16:45	12/04/14 20:11	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/L		0.52	1	11/24/14 16:45	12/04/14 20:11	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/L		0.52	1	11/24/14 16:45	12/04/14 20:11	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/L		0.52	1	11/24/14 16:45	12/04/14 20:11	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/L		0.52	1	11/24/14 16:45	12/04/14 20:11	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	87 %.		32-115	1	11/24/14 16:45	12/04/14 20:11	877-09-8	
<b>8151 Chlorinated Herbicides</b>		Analytical Method: EPA 8151 Preparation Method: EPA 3535A						
2,4-D	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 23:00	94-75-7	
2,4,5-T	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 23:00	93-76-5	
2,4,5-TP (Silvex)	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 23:00	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	85 %.		10-166	1	11/26/14 10:57	12/03/14 23:00	19719-28-9	
2,4-DCAA (S)	104 %.		10-166	1	11/26/14 10:57	12/03/14 23:00	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-6S		Lab ID: 50107512006	Collected: 11/20/14 14:00	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b>		Analytical Method: EPA 6010 Preparation Method: EPA 3010						
Antimony	ND	ug/L	6.0	1	11/25/14 07:25	11/26/14 09:14	7440-36-0	
Arsenic	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:14	7440-38-2	
Barium	146	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:14	7440-39-3	
Beryllium	ND	ug/L	4.0	1	11/25/14 07:25	11/26/14 09:14	7440-41-7	
Cadmium	ND	ug/L	2.0	1	11/25/14 07:25	11/26/14 09:14	7440-43-9	
Calcium	102000	ug/L	1000	1	11/25/14 07:25	11/26/14 09:14	7440-70-2	
Chromium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:14	7440-47-3	
Cobalt	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:14	7440-48-4	
Copper	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:14	7440-50-8	
Iron	43700	ug/L	100	1	11/25/14 07:25	11/26/14 09:14	7439-89-6	
Lead	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:14	7439-92-1	
Magnesium	39300	ug/L	1000	1	11/25/14 07:25	11/26/14 09:14	7439-95-4	
Manganese	227	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:14	7439-96-5	
Nickel	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:14	7440-02-0	
Potassium	26500	ug/L	1000	1	11/25/14 07:25	11/26/14 09:14	7440-09-7	
Selenium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:14	7782-49-2	
Silver	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:14	7440-22-4	
Thallium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:14	7440-28-0	
Vanadium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:14	7440-62-2	
Zinc	ND	ug/L	20.0	1	11/25/14 07:25	11/26/14 09:14	7440-66-6	
<b>7470 Mercury</b>		Analytical Method: EPA 7470 Preparation Method: EPA 7470						
Mercury	ND	ug/L	2.0	1	11/25/14 11:29	11/26/14 11:53	7439-97-6	
<b>8270 MSSV PAH</b>		Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3510						
Acenaphthene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 10:49	83-32-9	
Acenaphthylene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 10:49	208-96-8	
Anthracene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 10:49	120-12-7	
Benzo(a)anthracene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 10:49	56-55-3	
Benzo(a)pyrene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 10:49	50-32-8	
Benzo(b)fluoranthene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 10:49	205-99-2	
Benzo(g,h,i)perylene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 10:49	191-24-2	
Benzo(k)fluoranthene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 10:49	207-08-9	
Chrysene	ND	ug/L	0.52	1	11/24/14 12:20	11/25/14 10:49	218-01-9	
Dibenz(a,h)anthracene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 10:49	53-70-3	
Fluoranthene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 10:49	206-44-0	
Fluorene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 10:49	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 10:49	193-39-5	
1-Methylnaphthalene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 10:49	90-12-0	
2-Methylnaphthalene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 10:49	91-57-6	
Naphthalene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 10:49	91-20-3	
Phenanthrene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 10:49	85-01-8	
Pyrene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 10:49	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	78 %		21-114	1	11/24/14 12:20	11/25/14 10:49	321-60-8	
p-Terphenyl-d14 (S)	56 %		25-131	1	11/24/14 12:20	11/25/14 10:49	1718-51-0	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-6S		Lab ID: 50107512006	Collected: 11/20/14 14:00	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Benzyl alcohol	ND ug/L		20.6	1	11/24/14 12:20	11/25/14 18:05	100-51-6	
4-Bromophenylphenyl ether	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	101-55-3	
Butylbenzylphthalate	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	85-68-7	
4-Chloro-3-methylphenol	ND ug/L		20.6	1	11/24/14 12:20	11/25/14 18:05	59-50-7	
4-Chloroaniline	ND ug/L		20.6	1	11/24/14 12:20	11/25/14 18:05	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	111-91-1	
bis(2-Chloroethyl) ether	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	111-44-4	
bis(2-Chloroisopropyl) ether	ND ug/L		5.2	1	11/24/14 12:20	11/25/14 18:05	108-60-1	
bis(2chloro1methylethyl) ether	ND ug/L		5.2	1	11/24/14 12:20	11/25/14 18:05	108-60-1	
2-Chloronaphthalene	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	91-58-7	
2-Chlorophenol	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	95-57-8	
4-Chlorophenylphenyl ether	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	7005-72-3	
Dibenzofuran	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	132-64-9	
3,3'-Dichlorobenzidine	ND ug/L		20.6	1	11/24/14 12:20	11/25/14 18:05	91-94-1	
2,4-Dichlorophenol	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	120-83-2	
Diethylphthalate	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	84-66-2	
2,4-Dimethylphenol	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	105-67-9	
Dimethylphthalate	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	131-11-3	
Di-n-butylphthalate	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/L		51.5	1	11/24/14 12:20	11/25/14 18:05	534-52-1	
2,4-Dinitrophenol	ND ug/L		51.5	1	11/24/14 12:20	11/25/14 18:05	51-28-5	
2,4-Dinitrotoluene	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	121-14-2	
2,6-Dinitrotoluene	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	606-20-2	
Di-n-octylphthalate	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/L		5.2	1	11/24/14 12:20	11/25/14 18:05	117-81-7	
Hexachloro-1,3-butadiene	ND ug/L		5.2	1	11/24/14 12:20	11/25/14 18:05	87-68-3	
Hexachlorobenzene	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	118-74-1	
Hexachlorocyclopentadiene	ND ug/L		20.6	1	11/24/14 12:20	11/25/14 18:05	77-47-4	
Hexachloroethane	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	67-72-1	
Isophorone	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/L		20.6	1	11/24/14 12:20	11/25/14 18:05		
2-Nitroaniline	ND ug/L		51.5	1	11/24/14 12:20	11/25/14 18:05	88-74-4	
3-Nitroaniline	ND ug/L		51.5	1	11/24/14 12:20	11/25/14 18:05	99-09-2	
4-Nitroaniline	ND ug/L		51.5	1	11/24/14 12:20	11/25/14 18:05	100-01-6	
Nitrobenzene	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	98-95-3	
2-Nitrophenol	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	88-75-5	
4-Nitrophenol	ND ug/L		51.5	1	11/24/14 12:20	11/25/14 18:05	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	621-64-7	
N-Nitrosodiphenylamine	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	86-30-6	
Pentachlorophenol	ND ug/L		51.5	1	11/24/14 12:20	11/25/14 18:05	87-86-5	
Phenol	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	108-95-2	
2,4,5-Trichlorophenol	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	95-95-4	
2,4,6-Trichlorophenol	ND ug/L		10.3	1	11/24/14 12:20	11/25/14 18:05	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	85 %.		29-126	1	11/24/14 12:20	11/25/14 18:05	4165-60-0	
Phenol-d5 (S)	17 %.		10-47	1	11/24/14 12:20	11/25/14 18:05	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-6S		Lab ID: 50107512006	Collected: 11/20/14 14:00	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
<b>Surrogates</b>								
2-Fluorophenol (S)	28 %.		10-67	1	11/24/14 12:20	11/25/14 18:05	367-12-4	
2,4,6-Tribromophenol (S)	95 %.		31-161	1	11/24/14 12:20	11/25/14 18:05	118-79-6	
<b>2320B Alkalinity</b>		Analytical Method: SM 2320B						
Alkalinity, Total as CaCO <sub>3</sub>	667 mg/L		2.0	1		12/02/14 12:31		
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	604 mg/L		20.0	1		11/26/14 07:04		
<b>4500FC Fluoride</b>		Analytical Method: SM 4500F/C						
Fluoride	0.12 mg/L		0.10	1		12/02/14 09:56	16984-48-8	
<b>4500S2D Sulfide Water</b>		Analytical Method: SM 4500-S2-D						
Sulfide	ND mg/L		0.10	1		11/21/14 16:44		
<b>335.4 Cyanide, Total</b>		Analytical Method: EPA 335.4 Preparation Method: EPA 335.4						
Cyanide	ND mg/L		0.010	1	11/25/14 15:19	11/29/14 13:34	57-12-5	
<b>350.1 Ammonia</b>		Analytical Method: EPA 350.1 Preparation Method: EPA 350.1						
Nitrogen, Ammonia	69.0 mg/L		2.0	20	11/25/14 11:27	11/25/14 16:57	7664-41-7	
<b>353.2 Nitrogen, NO<sub>2</sub>/NO<sub>3</sub> unpres</b>		Analytical Method: EPA 353.2						
Nitrogen, Nitrate	ND mg/L		0.10	1		11/22/14 08:39		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-7S		Lab ID: 50107512007	Collected: 11/20/14 14:40	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b>		Analytical Method: EPA 8081 Preparation Method: EPA 3535						
Aldrin	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 23:48	309-00-2	
alpha-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 23:48	319-84-6	
beta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 23:48	319-85-7	
delta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 23:48	319-86-8	
gamma-BHC (Lindane)	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 23:48	58-89-9	
alpha-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 23:48	5103-71-9	
gamma-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 23:48	5103-74-2	
4,4'-DDD	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 23:48	72-54-8	
4,4'-DDE	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 23:48	72-55-9	
4,4'-DDT	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 23:48	50-29-3	
Dieldrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 23:48	60-57-1	
Endosulfan I	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 23:48	959-98-8	
Endosulfan II	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 23:48	33213-65-9	
Endosulfan sulfate	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 23:48	1031-07-8	
Endrin	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 23:48	72-20-8	
Endrin aldehyde	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 23:48	7421-93-4	
Endrin ketone	ND ug/L		0.10	1	11/25/14 14:57	12/05/14 23:48	53494-70-5	
Heptachlor	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 23:48	76-44-8	
Heptachlor epoxide	ND ug/L		0.050	1	11/25/14 14:57	12/05/14 23:48	1024-57-3	
Methoxychlor	ND ug/L		0.50	1	11/25/14 14:57	12/05/14 23:48	72-43-5	
Toxaphene	ND ug/L		2.0	1	11/25/14 14:57	12/05/14 23:48	8001-35-2	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	52 %.		10-119	1	11/25/14 14:57	12/05/14 23:48	877-09-8	
Tetrachloro-m-xylene (S)	63 %.		10-119	1	11/25/14 14:57	12/05/14 23:48	877-09-8	
Decachlorobiphenyl (S)	64 %.		14-126	1	11/25/14 14:57	12/05/14 23:48	2051-24-3	
Decachlorobiphenyl (S)	65 %.		14-126	1	11/25/14 14:57	12/05/14 23:48	2051-24-3	
<b>8082 GCS PCB</b>		Analytical Method: EPA 8082 Preparation Method: EPA 3510						
PCB-1016 (Aroclor 1016)	ND ug/L		0.51	1	11/24/14 16:45	12/04/14 20:18	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/L		0.51	1	11/24/14 16:45	12/04/14 20:18	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/L		0.51	1	11/24/14 16:45	12/04/14 20:18	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/L		0.51	1	11/24/14 16:45	12/04/14 20:18	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/L		0.51	1	11/24/14 16:45	12/04/14 20:18	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/L		0.51	1	11/24/14 16:45	12/04/14 20:18	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/L		0.51	1	11/24/14 16:45	12/04/14 20:18	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	80 %.		32-115	1	11/24/14 16:45	12/04/14 20:18	877-09-8	
<b>8151 Chlorinated Herbicides</b>		Analytical Method: EPA 8151 Preparation Method: EPA 3535A						
2,4-D	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 23:16	94-75-7	
2,4,5-T	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 23:16	93-76-5	
2,4,5-TP (Silvex)	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 23:16	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	61 %.		10-166	1	11/26/14 10:57	12/03/14 23:16	19719-28-9	
2,4-DCAA (S)	69 %.		10-166	1	11/26/14 10:57	12/03/14 23:16	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-7S		Lab ID: 50107512007		Collected: 11/20/14 14:40		Received: 11/21/14 12:00		Matrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual	
6010 MET ICP		Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Antimony	ND ug/L		6.0	1	11/25/14 07:25	11/26/14 09:16	7440-36-0		
Arsenic	ND ug/L		10.0	1	11/25/14 07:25	11/26/14 09:16	7440-38-2		
Barium	340 ug/L		10.0	1	11/25/14 07:25	11/26/14 09:16	7440-39-3		
Beryllium	ND ug/L		4.0	1	11/25/14 07:25	11/26/14 09:16	7440-41-7		
Cadmium	ND ug/L		2.0	1	11/25/14 07:25	11/26/14 09:16	7440-43-9		
Calcium	96600 ug/L		1000	1	11/25/14 07:25	11/26/14 09:16	7440-70-2		
Chromium	ND ug/L		10.0	1	11/25/14 07:25	11/26/14 09:16	7440-47-3		
Cobalt	ND ug/L		10.0	1	11/25/14 07:25	11/26/14 09:16	7440-48-4		
Copper	ND ug/L		10.0	1	11/25/14 07:25	11/26/14 09:16	7440-50-8		
Iron	68800 ug/L		100	1	11/25/14 07:25	11/26/14 09:16	7439-89-6		
Lead	14.3 ug/L		10.0	1	11/25/14 07:25	11/26/14 09:16	7439-92-1		
Magnesium	37600 ug/L		1000	1	11/25/14 07:25	11/26/14 09:16	7439-95-4		
Manganese	327 ug/L		10.0	1	11/25/14 07:25	11/26/14 09:16	7439-96-5		
Nickel	14.2 ug/L		10.0	1	11/25/14 07:25	11/26/14 09:16	7440-02-0		
Potassium	19900 ug/L		1000	1	11/25/14 07:25	11/26/14 09:16	7440-09-7		
Selenium	ND ug/L		10.0	1	11/25/14 07:25	11/26/14 09:16	7782-49-2		
Silver	ND ug/L		10.0	1	11/25/14 07:25	11/26/14 09:16	7440-22-4		
Thallium	ND ug/L		10.0	1	11/25/14 07:25	11/26/14 09:16	7440-28-0		
Vanadium	ND ug/L		10.0	1	11/25/14 07:25	11/26/14 09:16	7440-62-2		
Zinc	ND ug/L		20.0	1	11/25/14 07:25	11/26/14 09:16	7440-66-6		
7470 Mercury		Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury	ND ug/L		2.0	1	11/25/14 11:29	11/26/14 11:55	7439-97-6		
8270 MSSV PAH		Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3510							
Acenaphthene	ND ug/L		1.0	1	11/24/14 12:20	11/25/14 11:07	83-32-9		
Acenaphthylene	ND ug/L		1.0	1	11/24/14 12:20	11/25/14 11:07	208-96-8		
Anthracene	ND ug/L		0.10	1	11/24/14 12:20	11/25/14 11:07	120-12-7		
Benzo(a)anthracene	ND ug/L		0.10	1	11/24/14 12:20	11/25/14 11:07	56-55-3		
Benzo(a)pyrene	ND ug/L		0.10	1	11/24/14 12:20	11/25/14 11:07	50-32-8		
Benzo(b)fluoranthene	ND ug/L		0.10	1	11/24/14 12:20	11/25/14 11:07	205-99-2		
Benzo(g,h,i)perylene	ND ug/L		0.10	1	11/24/14 12:20	11/25/14 11:07	191-24-2		
Benzo(k)fluoranthene	ND ug/L		0.10	1	11/24/14 12:20	11/25/14 11:07	207-08-9		
Chrysene	ND ug/L		0.50	1	11/24/14 12:20	11/25/14 11:07	218-01-9		
Dibenz(a,h)anthracene	ND ug/L		0.10	1	11/24/14 12:20	11/25/14 11:07	53-70-3		
Fluoranthene	ND ug/L		1.0	1	11/24/14 12:20	11/25/14 11:07	206-44-0		
Fluorene	ND ug/L		1.0	1	11/24/14 12:20	11/25/14 11:07	86-73-7		
Indeno(1,2,3-cd)pyrene	ND ug/L		0.10	1	11/24/14 12:20	11/25/14 11:07	193-39-5		
1-Methylnaphthalene	1.3 ug/L		1.0	1	11/24/14 12:20	11/25/14 11:07	90-12-0		
2-Methylnaphthalene	ND ug/L		1.0	1	11/24/14 12:20	11/25/14 11:07	91-57-6		
Naphthalene	ND ug/L		1.0	1	11/24/14 12:20	11/25/14 11:07	91-20-3		
Phenanthrene	ND ug/L		1.0	1	11/24/14 12:20	11/25/14 11:07	85-01-8		
Pyrene	ND ug/L		1.0	1	11/24/14 12:20	11/25/14 11:07	129-00-0		
Surrogates									
2-Fluorobiphenyl (S)	78 %.		21-114	1	11/24/14 12:20	11/25/14 11:07	321-60-8		
p-Terphenyl-d14 (S)	52 %.		25-131	1	11/24/14 12:20	11/25/14 11:07	1718-51-0		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-7S		Lab ID: 50107512007	Collected: 11/20/14 14:40	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Benzyl alcohol	ND ug/L		20.0	1	11/24/14 12:20	11/25/14 18:28	100-51-6	
4-Bromophenylphenyl ether	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	101-55-3	
Butylbenzylphthalate	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	85-68-7	
4-Chloro-3-methylphenol	ND ug/L		20.0	1	11/24/14 12:20	11/25/14 18:28	59-50-7	
4-Chloroaniline	ND ug/L		20.0	1	11/24/14 12:20	11/25/14 18:28	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	111-91-1	
bis(2-Chloroethyl) ether	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	111-44-4	
bis(2-Chloroisopropyl) ether	ND ug/L		5.0	1	11/24/14 12:20	11/25/14 18:28	108-60-1	
bis(2chloro1methylethyl) ether	ND ug/L		5.0	1	11/24/14 12:20	11/25/14 18:28	108-60-1	
2-Chloronaphthalene	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	91-58-7	
2-Chlorophenol	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	95-57-8	
4-Chlorophenylphenyl ether	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	7005-72-3	
Dibenzofuran	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	132-64-9	
3,3'-Dichlorobenzidine	ND ug/L		20.0	1	11/24/14 12:20	11/25/14 18:28	91-94-1	
2,4-Dichlorophenol	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	120-83-2	
Diethylphthalate	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	84-66-2	
2,4-Dimethylphenol	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	105-67-9	
Dimethylphthalate	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	131-11-3	
Di-n-butylphthalate	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/L		50.0	1	11/24/14 12:20	11/25/14 18:28	534-52-1	
2,4-Dinitrophenol	ND ug/L		50.0	1	11/24/14 12:20	11/25/14 18:28	51-28-5	
2,4-Dinitrotoluene	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	121-14-2	
2,6-Dinitrotoluene	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	606-20-2	
Di-n-octylphthalate	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/L		5.0	1	11/24/14 12:20	11/25/14 18:28	117-81-7	
Hexachloro-1,3-butadiene	ND ug/L		5.0	1	11/24/14 12:20	11/25/14 18:28	87-68-3	
Hexachlorobenzene	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	118-74-1	
Hexachlorocyclopentadiene	ND ug/L		20.0	1	11/24/14 12:20	11/25/14 18:28	77-47-4	
Hexachloroethane	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	67-72-1	
Isophorone	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/L		20.0	1	11/24/14 12:20	11/25/14 18:28		
2-Nitroaniline	ND ug/L		50.0	1	11/24/14 12:20	11/25/14 18:28	88-74-4	
3-Nitroaniline	ND ug/L		50.0	1	11/24/14 12:20	11/25/14 18:28	99-09-2	
4-Nitroaniline	ND ug/L		50.0	1	11/24/14 12:20	11/25/14 18:28	100-01-6	
Nitrobenzene	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	98-95-3	
2-Nitrophenol	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	88-75-5	
4-Nitrophenol	ND ug/L		50.0	1	11/24/14 12:20	11/25/14 18:28	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	621-64-7	
N-Nitrosodiphenylamine	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	86-30-6	
Pentachlorophenol	ND ug/L		50.0	1	11/24/14 12:20	11/25/14 18:28	87-86-5	
Phenol	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	108-95-2	
2,4,5-Trichlorophenol	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	95-95-4	
2,4,6-Trichlorophenol	ND ug/L		10.0	1	11/24/14 12:20	11/25/14 18:28	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	89 %.		29-126	1	11/24/14 12:20	11/25/14 18:28	4165-60-0	
Phenol-d5 (S)	17 %.		10-47	1	11/24/14 12:20	11/25/14 18:28	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-7S		Lab ID: 50107512007	Collected: 11/20/14 14:40	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
<b>Surrogates</b>								
2-Fluorophenol (S)	29 %.		10-67	1	11/24/14 12:20	11/25/14 18:28	367-12-4	
2,4,6-Tribromophenol (S)	103 %.		31-161	1	11/24/14 12:20	11/25/14 18:28	118-79-6	
<b>2320B Alkalinity</b>		Analytical Method: SM 2320B						
Alkalinity, Total as CaCO <sub>3</sub>	538 mg/L		2.0	1		12/02/14 12:31		
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	494 mg/L		20.0	1		11/26/14 07:04		
<b>4500FC Fluoride</b>		Analytical Method: SM 4500F/C						
Fluoride	ND mg/L		0.10	1		12/02/14 10:04	16984-48-8	
<b>4500S2D Sulfide Water</b>		Analytical Method: SM 4500-S2-D						
Sulfide	ND mg/L		0.10	1		11/21/14 16:46		
<b>335.4 Cyanide, Total</b>		Analytical Method: EPA 335.4 Preparation Method: EPA 335.4						
Cyanide	ND mg/L		0.010	1	11/25/14 15:19	11/29/14 13:35	57-12-5	
<b>350.1 Ammonia</b>		Analytical Method: EPA 350.1 Preparation Method: EPA 350.1						
Nitrogen, Ammonia	53.5 mg/L		2.0	20	11/25/14 11:27	11/25/14 16:58	7664-41-7	
<b>353.2 Nitrogen, NO<sub>2</sub>/NO<sub>3</sub> unpres</b>		Analytical Method: EPA 353.2						
Nitrogen, Nitrate	ND mg/L		0.10	1		11/22/14 08:40		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-10S		Lab ID: 50107512008	Collected: 11/20/14 15:20	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b> Analytical Method: EPA 8081 Preparation Method: EPA 3535								
Aldrin	ND ug/L		0.050	1	11/25/14 14:57	12/06/14 00:00	309-00-2	
alpha-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/06/14 00:00	319-84-6	
beta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/06/14 00:00	319-85-7	
delta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/06/14 00:00	319-86-8	
gamma-BHC (Lindane)	ND ug/L		0.050	1	11/25/14 14:57	12/06/14 00:00	58-89-9	
alpha-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/06/14 00:00	5103-71-9	
gamma-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/06/14 00:00	5103-74-2	
4,4'-DDD	ND ug/L		0.10	1	11/25/14 14:57	12/06/14 00:00	72-54-8	
4,4'-DDE	ND ug/L		0.10	1	11/25/14 14:57	12/06/14 00:00	72-55-9	
4,4'-DDT	ND ug/L		0.10	1	11/25/14 14:57	12/06/14 00:00	50-29-3	
Dieldrin	ND ug/L		0.10	1	11/25/14 14:57	12/06/14 00:00	60-57-1	
Endosulfan I	ND ug/L		0.050	1	11/25/14 14:57	12/06/14 00:00	959-98-8	
Endosulfan II	ND ug/L		0.10	1	11/25/14 14:57	12/06/14 00:00	33213-65-9	
Endosulfan sulfate	ND ug/L		0.10	1	11/25/14 14:57	12/06/14 00:00	1031-07-8	
Endrin	ND ug/L		0.10	1	11/25/14 14:57	12/06/14 00:00	72-20-8	
Endrin aldehyde	ND ug/L		0.10	1	11/25/14 14:57	12/06/14 00:00	7421-93-4	
Endrin ketone	ND ug/L		0.10	1	11/25/14 14:57	12/06/14 00:00	53494-70-5	
Heptachlor	ND ug/L		0.050	1	11/25/14 14:57	12/06/14 00:00	76-44-8	
Heptachlor epoxide	ND ug/L		0.050	1	11/25/14 14:57	12/06/14 00:00	1024-57-3	
Methoxychlor	ND ug/L		0.50	1	11/25/14 14:57	12/06/14 00:00	72-43-5	
Toxaphene	ND ug/L		2.0	1	11/25/14 14:57	12/06/14 00:00	8001-35-2	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	67 %.		10-119	1	11/25/14 14:57	12/06/14 00:00	877-09-8	
Tetrachloro-m-xylene (S)	59 %.		10-119	1	11/25/14 14:57	12/06/14 00:00	877-09-8	
Decachlorobiphenyl (S)	69 %.		14-126	1	11/25/14 14:57	12/06/14 00:00	2051-24-3	
Decachlorobiphenyl (S)	68 %.		14-126	1	11/25/14 14:57	12/06/14 00:00	2051-24-3	
<b>8082 GCS PCB</b> Analytical Method: EPA 8082 Preparation Method: EPA 3510								
PCB-1016 (Aroclor 1016)	ND ug/L		0.51	1	11/24/14 16:45	12/02/14 02:51	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/L		0.51	1	11/24/14 16:45	12/02/14 02:51	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/L		0.51	1	11/24/14 16:45	12/02/14 02:51	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/L		0.51	1	11/24/14 16:45	12/02/14 02:51	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/L		0.51	1	11/24/14 16:45	12/02/14 02:51	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/L		0.51	1	11/24/14 16:45	12/02/14 02:51	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/L		0.51	1	11/24/14 16:45	12/02/14 02:51	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	78 %.		32-115	1	11/24/14 16:45	12/02/14 02:51	877-09-8	
<b>8151 Chlorinated Herbicides</b> Analytical Method: EPA 8151 Preparation Method: EPA 3535A								
2,4-D	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 23:32	94-75-7	
2,4,5-T	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 23:32	93-76-5	
2,4,5-TP (Silvex)	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 23:32	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	82 %.		10-166	1	11/26/14 10:57	12/03/14 23:32	19719-28-9	
2,4-DCAA (S)	83 %.		10-166	1	11/26/14 10:57	12/03/14 23:32	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-10S		Lab ID: 50107512008	Collected: 11/20/14 15:20	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b>		Analytical Method: EPA 6010 Preparation Method: EPA 3010						
Antimony	ND	ug/L	6.0	1	11/25/14 07:25	11/26/14 09:18	7440-36-0	
Arsenic	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:18	7440-38-2	
Barium	60.6	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:18	7440-39-3	
Beryllium	ND	ug/L	4.0	1	11/25/14 07:25	11/26/14 09:18	7440-41-7	
Cadmium	ND	ug/L	2.0	1	11/25/14 07:25	11/26/14 09:18	7440-43-9	
Calcium	59600	ug/L	1000	1	11/25/14 07:25	11/26/14 09:18	7440-70-2	
Chromium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:18	7440-47-3	
Cobalt	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:18	7440-48-4	
Copper	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:18	7440-50-8	
Iron	864	ug/L	100	1	11/25/14 07:25	11/26/14 09:18	7439-89-6	
Lead	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:18	7439-92-1	
Magnesium	21400	ug/L	1000	1	11/25/14 07:25	11/26/14 09:18	7439-95-4	
Manganese	67.3	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:18	7439-96-5	
Nickel	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:18	7440-02-0	
Potassium	2200	ug/L	1000	1	11/25/14 07:25	11/26/14 09:18	7440-09-7	
Selenium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:18	7782-49-2	
Silver	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:18	7440-22-4	
Thallium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:18	7440-28-0	
Vanadium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:18	7440-62-2	
Zinc	ND	ug/L	20.0	1	11/25/14 07:25	11/26/14 09:18	7440-66-6	
<b>7470 Mercury</b>		Analytical Method: EPA 7470 Preparation Method: EPA 7470						
Mercury	ND	ug/L	2.0	1	11/25/14 11:29	11/26/14 11:57	7439-97-6	
<b>8270 MSSV PAH</b>		Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3510						
Acenaphthene	ND	ug/L	1.2	1	11/24/14 12:20	11/25/14 11:25	83-32-9	
Acenaphthylene	ND	ug/L	1.2	1	11/24/14 12:20	11/25/14 11:25	208-96-8	
Anthracene	ND	ug/L	0.12	1	11/24/14 12:20	11/25/14 11:25	120-12-7	
Benzo(a)anthracene	ND	ug/L	0.12	1	11/24/14 12:20	11/25/14 11:25	56-55-3	
Benzo(a)pyrene	ND	ug/L	0.12	1	11/24/14 12:20	11/25/14 11:25	50-32-8	
Benzo(b)fluoranthene	ND	ug/L	0.12	1	11/24/14 12:20	11/25/14 11:25	205-99-2	
Benzo(g,h,i)perylene	ND	ug/L	0.12	1	11/24/14 12:20	11/25/14 11:25	191-24-2	
Benzo(k)fluoranthene	ND	ug/L	0.12	1	11/24/14 12:20	11/25/14 11:25	207-08-9	
Chrysene	ND	ug/L	0.62	1	11/24/14 12:20	11/25/14 11:25	218-01-9	
Dibenz(a,h)anthracene	ND	ug/L	0.12	1	11/24/14 12:20	11/25/14 11:25	53-70-3	
Fluoranthene	ND	ug/L	1.2	1	11/24/14 12:20	11/25/14 11:25	206-44-0	
Fluorene	ND	ug/L	1.2	1	11/24/14 12:20	11/25/14 11:25	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/L	0.12	1	11/24/14 12:20	11/25/14 11:25	193-39-5	
1-Methylnaphthalene	ND	ug/L	1.2	1	11/24/14 12:20	11/25/14 11:25	90-12-0	
2-Methylnaphthalene	ND	ug/L	1.2	1	11/24/14 12:20	11/25/14 11:25	91-57-6	
Naphthalene	ND	ug/L	1.2	1	11/24/14 12:20	11/25/14 11:25	91-20-3	
Phenanthrene	ND	ug/L	1.2	1	11/24/14 12:20	11/25/14 11:25	85-01-8	
Pyrene	ND	ug/L	1.2	1	11/24/14 12:20	11/25/14 11:25	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	72 %		21-114	1	11/24/14 12:20	11/25/14 11:25	321-60-8	
p-Terphenyl-d14 (S)	63 %		25-131	1	11/24/14 12:20	11/25/14 11:25	1718-51-0	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-10S		Lab ID: 50107512008	Collected: 11/20/14 15:20	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Benzyl alcohol	ND ug/L		25.0	1	11/24/14 12:20	11/25/14 18:50	100-51-6	
4-Bromophenylphenyl ether	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	101-55-3	
Butylbenzylphthalate	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	85-68-7	
4-Chloro-3-methylphenol	ND ug/L		25.0	1	11/24/14 12:20	11/25/14 18:50	59-50-7	
4-Chloroaniline	ND ug/L		25.0	1	11/24/14 12:20	11/25/14 18:50	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	111-91-1	
bis(2-Chloroethyl) ether	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	111-44-4	
bis(2-Chloroisopropyl) ether	ND ug/L		6.2	1	11/24/14 12:20	11/25/14 18:50	108-60-1	
bis(2chloro1methylethyl) ether	ND ug/L		6.2	1	11/24/14 12:20	11/25/14 18:50	108-60-1	
2-Chloronaphthalene	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	91-58-7	
2-Chlorophenol	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	95-57-8	
4-Chlorophenylphenyl ether	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	7005-72-3	
Dibenzofuran	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	132-64-9	
3,3'-Dichlorobenzidine	ND ug/L		25.0	1	11/24/14 12:20	11/25/14 18:50	91-94-1	
2,4-Dichlorophenol	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	120-83-2	
Diethylphthalate	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	84-66-2	
2,4-Dimethylphenol	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	105-67-9	
Dimethylphthalate	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	131-11-3	
Di-n-butylphthalate	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/L		62.5	1	11/24/14 12:20	11/25/14 18:50	534-52-1	
2,4-Dinitrophenol	ND ug/L		62.5	1	11/24/14 12:20	11/25/14 18:50	51-28-5	
2,4-Dinitrotoluene	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	121-14-2	
2,6-Dinitrotoluene	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	606-20-2	
Di-n-octylphthalate	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/L		6.2	1	11/24/14 12:20	11/25/14 18:50	117-81-7	
Hexachloro-1,3-butadiene	ND ug/L		6.2	1	11/24/14 12:20	11/25/14 18:50	87-68-3	
Hexachlorobenzene	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	118-74-1	
Hexachlorocyclopentadiene	ND ug/L		25.0	1	11/24/14 12:20	11/25/14 18:50	77-47-4	
Hexachloroethane	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	67-72-1	
Isophorone	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/L		25.0	1	11/24/14 12:20	11/25/14 18:50		
2-Nitroaniline	ND ug/L		62.5	1	11/24/14 12:20	11/25/14 18:50	88-74-4	
3-Nitroaniline	ND ug/L		62.5	1	11/24/14 12:20	11/25/14 18:50	99-09-2	
4-Nitroaniline	ND ug/L		62.5	1	11/24/14 12:20	11/25/14 18:50	100-01-6	
Nitrobenzene	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	98-95-3	
2-Nitrophenol	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	88-75-5	
4-Nitrophenol	ND ug/L		62.5	1	11/24/14 12:20	11/25/14 18:50	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	621-64-7	
N-Nitrosodiphenylamine	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	86-30-6	
Pentachlorophenol	ND ug/L		62.5	1	11/24/14 12:20	11/25/14 18:50	87-86-5	
Phenol	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	108-95-2	
2,4,5-Trichlorophenol	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	95-95-4	
2,4,6-Trichlorophenol	ND ug/L		12.5	1	11/24/14 12:20	11/25/14 18:50	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	90 %.		29-126	1	11/24/14 12:20	11/25/14 18:50	4165-60-0	
Phenol-d5 (S)	19 %.		10-47	1	11/24/14 12:20	11/25/14 18:50	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-10S		Lab ID: 50107512008	Collected: 11/20/14 15:20	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
<b>Surrogates</b>								
2-Fluorophenol (S)	32 %.		10-67	1	11/24/14 12:20	11/25/14 18:50	367-12-4	
2,4,6-Tribromophenol (S)	100 %.		31-161	1	11/24/14 12:20	11/25/14 18:50	118-79-6	
<b>2320B Alkalinity</b>		Analytical Method: SM 2320B						
Alkalinity, Total as CaCO <sub>3</sub>	200 mg/L		2.0	1		12/02/14 12:31		
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	340 mg/L		10.0	1		11/26/14 07:05		
<b>4500FC Fluoride</b>		Analytical Method: SM 4500F/C						
Fluoride	ND mg/L		0.10	1		12/02/14 10:07	16984-48-8	
<b>4500S2D Sulfide Water</b>		Analytical Method: SM 4500-S2-D						
Sulfide	2.3 mg/L		1.0	10		11/21/14 16:47		
<b>335.4 Cyanide, Total</b>		Analytical Method: EPA 335.4 Preparation Method: EPA 335.4						
Cyanide	ND mg/L		0.010	1	11/25/14 15:19	11/29/14 13:36	57-12-5	
<b>350.1 Ammonia</b>		Analytical Method: EPA 350.1 Preparation Method: EPA 350.1						
Nitrogen, Ammonia	1.6 mg/L		0.10	1	11/25/14 11:27	11/25/14 16:32	7664-41-7	
<b>353.2 Nitrogen, NO<sub>2</sub>/NO<sub>3</sub> unpres</b>		Analytical Method: EPA 353.2						
Nitrogen, Nitrate	ND mg/L		0.10	1		11/22/14 08:41		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-10D		Lab ID: 50107512009	Collected: 11/20/14 16:00	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b>		Analytical Method: EPA 8081 Preparation Method: EPA 3535						
Aldrin	ND ug/L		0.050	1	11/25/14 14:57	12/06/14 00:13	309-00-2	
alpha-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/06/14 00:13	319-84-6	
beta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/06/14 00:13	319-85-7	
delta-BHC	ND ug/L		0.050	1	11/25/14 14:57	12/06/14 00:13	319-86-8	
gamma-BHC (Lindane)	ND ug/L		0.050	1	11/25/14 14:57	12/06/14 00:13	58-89-9	
alpha-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/06/14 00:13	5103-71-9	
gamma-Chlordane	ND ug/L		0.050	1	11/25/14 14:57	12/06/14 00:13	5103-74-2	
4,4'-DDD	ND ug/L		0.10	1	11/25/14 14:57	12/06/14 00:13	72-54-8	
4,4'-DDE	ND ug/L		0.10	1	11/25/14 14:57	12/06/14 00:13	72-55-9	
4,4'-DDT	ND ug/L		0.10	1	11/25/14 14:57	12/06/14 00:13	50-29-3	
Dieldrin	ND ug/L		0.10	1	11/25/14 14:57	12/06/14 00:13	60-57-1	
Endosulfan I	ND ug/L		0.050	1	11/25/14 14:57	12/06/14 00:13	959-98-8	
Endosulfan II	ND ug/L		0.10	1	11/25/14 14:57	12/06/14 00:13	33213-65-9	
Endosulfan sulfate	ND ug/L		0.10	1	11/25/14 14:57	12/06/14 00:13	1031-07-8	
Endrin	ND ug/L		0.10	1	11/25/14 14:57	12/06/14 00:13	72-20-8	
Endrin aldehyde	ND ug/L		0.10	1	11/25/14 14:57	12/06/14 00:13	7421-93-4	
Endrin ketone	ND ug/L		0.10	1	11/25/14 14:57	12/06/14 00:13	53494-70-5	
Heptachlor	ND ug/L		0.050	1	11/25/14 14:57	12/06/14 00:13	76-44-8	
Heptachlor epoxide	ND ug/L		0.050	1	11/25/14 14:57	12/06/14 00:13	1024-57-3	
Methoxychlor	ND ug/L		0.50	1	11/25/14 14:57	12/06/14 00:13	72-43-5	
Toxaphene	ND ug/L		2.0	1	11/25/14 14:57	12/06/14 00:13	8001-35-2	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	67 %.		10-119	1	11/25/14 14:57	12/06/14 00:13	877-09-8	
Tetrachloro-m-xylene (S)	55 %.		10-119	1	11/25/14 14:57	12/06/14 00:13	877-09-8	
Decachlorobiphenyl (S)	66 %.		14-126	1	11/25/14 14:57	12/06/14 00:13	2051-24-3	
Decachlorobiphenyl (S)	68 %.		14-126	1	11/25/14 14:57	12/06/14 00:13	2051-24-3	
<b>8082 GCS PCB</b>		Analytical Method: EPA 8082 Preparation Method: EPA 3510						
PCB-1016 (Aroclor 1016)	ND ug/L		0.51	1	11/24/14 16:45	12/02/14 02:58	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/L		0.51	1	11/24/14 16:45	12/02/14 02:58	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/L		0.51	1	11/24/14 16:45	12/02/14 02:58	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/L		0.51	1	11/24/14 16:45	12/02/14 02:58	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/L		0.51	1	11/24/14 16:45	12/02/14 02:58	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/L		0.51	1	11/24/14 16:45	12/02/14 02:58	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/L		0.51	1	11/24/14 16:45	12/02/14 02:58	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	77 %.		32-115	1	11/24/14 16:45	12/02/14 02:58	877-09-8	
<b>8151 Chlorinated Herbicides</b>		Analytical Method: EPA 8151 Preparation Method: EPA 3535A						
2,4-D	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 23:48	94-75-7	
2,4,5-T	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 23:48	93-76-5	
2,4,5-TP (Silvex)	ND ug/L		2.0	1	11/26/14 10:57	12/03/14 23:48	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	93 %.		10-166	1	11/26/14 10:57	12/03/14 23:48	19719-28-9	
2,4-DCAA (S)	94 %.		10-166	1	11/26/14 10:57	12/03/14 23:48	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-10D		Lab ID: 50107512009	Collected: 11/20/14 16:00	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b>		Analytical Method: EPA 6010 Preparation Method: EPA 3010						
Antimony	ND	ug/L	6.0	1	11/25/14 07:25	11/26/14 09:20	7440-36-0	
Arsenic	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:20	7440-38-2	
Barium	116	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:20	7440-39-3	
Beryllium	ND	ug/L	4.0	1	11/25/14 07:25	11/26/14 09:20	7440-41-7	
Cadmium	ND	ug/L	2.0	1	11/25/14 07:25	11/26/14 09:20	7440-43-9	
Calcium	47000	ug/L	1000	1	11/25/14 07:25	11/26/14 09:20	7440-70-2	
Chromium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:20	7440-47-3	
Cobalt	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:20	7440-48-4	
Copper	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:20	7440-50-8	
Iron	1490	ug/L	100	1	11/25/14 07:25	11/26/14 09:20	7439-89-6	
Lead	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:20	7439-92-1	
Magnesium	26200	ug/L	1000	1	11/25/14 07:25	11/26/14 09:20	7439-95-4	
Manganese	69.5	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:20	7439-96-5	
Nickel	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:20	7440-02-0	
Potassium	3450	ug/L	1000	1	11/25/14 07:25	11/26/14 09:20	7440-09-7	
Selenium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:20	7782-49-2	
Silver	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:20	7440-22-4	
Thallium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:20	7440-28-0	
Vanadium	ND	ug/L	10.0	1	11/25/14 07:25	11/26/14 09:20	7440-62-2	
Zinc	ND	ug/L	20.0	1	11/25/14 07:25	11/26/14 09:20	7440-66-6	
<b>7470 Mercury</b>		Analytical Method: EPA 7470 Preparation Method: EPA 7470						
Mercury	ND	ug/L	2.0	1	11/25/14 11:29	11/26/14 11:59	7439-97-6	
<b>8270 MSSV PAH</b>		Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3510						
Acenaphthene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 11:43	83-32-9	
Acenaphthylene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 11:43	208-96-8	
Anthracene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 11:43	120-12-7	
Benzo(a)anthracene	0.22	ug/L	0.10	1	11/24/14 12:20	11/25/14 11:43	56-55-3	
Benzo(a)pyrene	0.16	ug/L	0.10	1	11/24/14 12:20	11/25/14 11:43	50-32-8	
Benzo(b)fluoranthene	0.16	ug/L	0.10	1	11/24/14 12:20	11/25/14 11:43	205-99-2	
Benzo(g,h,i)perylene	0.12	ug/L	0.10	1	11/24/14 12:20	11/25/14 11:43	191-24-2	
Benzo(k)fluoranthene	0.21	ug/L	0.10	1	11/24/14 12:20	11/25/14 11:43	207-08-9	
Chrysene	ND	ug/L	0.51	1	11/24/14 12:20	11/25/14 11:43	218-01-9	
Dibenz(a,h)anthracene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 11:43	53-70-3	
Fluoranthene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 11:43	206-44-0	
Fluorene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 11:43	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/L	0.10	1	11/24/14 12:20	11/25/14 11:43	193-39-5	
1-Methylnaphthalene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 11:43	90-12-0	
2-Methylnaphthalene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 11:43	91-57-6	
Naphthalene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 11:43	91-20-3	
Phenanthrene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 11:43	85-01-8	
Pyrene	ND	ug/L	1.0	1	11/24/14 12:20	11/25/14 11:43	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	72 %.		21-114	1	11/24/14 12:20	11/25/14 11:43	321-60-8	
p-Terphenyl-d14 (S)	65 %.		25-131	1	11/24/14 12:20	11/25/14 11:43	1718-51-0	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-10D		Lab ID: 50107512009	Collected: 11/20/14 16:00	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Benzyl alcohol	ND ug/L		20.4	1	11/24/14 12:20	11/25/14 19:13	100-51-6	
4-Bromophenylphenyl ether	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	101-55-3	
Butylbenzylphthalate	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	85-68-7	
4-Chloro-3-methylphenol	ND ug/L		20.4	1	11/24/14 12:20	11/25/14 19:13	59-50-7	
4-Chloroaniline	ND ug/L		20.4	1	11/24/14 12:20	11/25/14 19:13	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	111-91-1	
bis(2-Chloroethyl) ether	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	111-44-4	
bis(2-Chloroisopropyl) ether	ND ug/L		5.1	1	11/24/14 12:20	11/25/14 19:13	108-60-1	
bis(2chloro1methylethyl) ether	ND ug/L		5.1	1	11/24/14 12:20	11/25/14 19:13	108-60-1	
2-Chloronaphthalene	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	91-58-7	
2-Chlorophenol	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	95-57-8	
4-Chlorophenylphenyl ether	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	7005-72-3	
Dibenzofuran	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	132-64-9	
3,3'-Dichlorobenzidine	ND ug/L		20.4	1	11/24/14 12:20	11/25/14 19:13	91-94-1	
2,4-Dichlorophenol	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	120-83-2	
Diethylphthalate	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	84-66-2	
2,4-Dimethylphenol	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	105-67-9	
Dimethylphthalate	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	131-11-3	
Di-n-butylphthalate	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/L		51.0	1	11/24/14 12:20	11/25/14 19:13	534-52-1	
2,4-Dinitrophenol	ND ug/L		51.0	1	11/24/14 12:20	11/25/14 19:13	51-28-5	
2,4-Dinitrotoluene	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	121-14-2	
2,6-Dinitrotoluene	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	606-20-2	
Di-n-octylphthalate	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/L		5.1	1	11/24/14 12:20	11/25/14 19:13	117-81-7	
Hexachloro-1,3-butadiene	ND ug/L		5.1	1	11/24/14 12:20	11/25/14 19:13	87-68-3	
Hexachlorobenzene	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	118-74-1	
Hexachlorocyclopentadiene	ND ug/L		20.4	1	11/24/14 12:20	11/25/14 19:13	77-47-4	
Hexachloroethane	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	67-72-1	
Isophorone	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/L		20.4	1	11/24/14 12:20	11/25/14 19:13		
2-Nitroaniline	ND ug/L		51.0	1	11/24/14 12:20	11/25/14 19:13	88-74-4	
3-Nitroaniline	ND ug/L		51.0	1	11/24/14 12:20	11/25/14 19:13	99-09-2	
4-Nitroaniline	ND ug/L		51.0	1	11/24/14 12:20	11/25/14 19:13	100-01-6	
Nitrobenzene	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	98-95-3	
2-Nitrophenol	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	88-75-5	
4-Nitrophenol	ND ug/L		51.0	1	11/24/14 12:20	11/25/14 19:13	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	621-64-7	
N-Nitrosodiphenylamine	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	86-30-6	
Pentachlorophenol	ND ug/L		51.0	1	11/24/14 12:20	11/25/14 19:13	87-86-5	
Phenol	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	108-95-2	
2,4,5-Trichlorophenol	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	95-95-4	
2,4,6-Trichlorophenol	ND ug/L		10.2	1	11/24/14 12:20	11/25/14 19:13	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	87 %.		29-126	1	11/24/14 12:20	11/25/14 19:13	4165-60-0	
Phenol-d5 (S)	14 %.		10-47	1	11/24/14 12:20	11/25/14 19:13	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: MW-10D		Lab ID: 50107512009	Collected: 11/20/14 16:00	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
<b>Surrogates</b>								
2-Fluorophenol (S)	25 %.		10-67	1	11/24/14 12:20	11/25/14 19:13	367-12-4	
2,4,6-Tribromophenol (S)	83 %.		31-161	1	11/24/14 12:20	11/25/14 19:13	118-79-6	
<b>2320B Alkalinity</b>		Analytical Method: SM 2320B						
Alkalinity, Total as CaCO <sub>3</sub>	236 mg/L		2.0	1		12/02/14 12:31		
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	276 mg/L		10.0	1		11/26/14 07:05		
<b>4500FC Fluoride</b>		Analytical Method: SM 4500F/C						
Fluoride	0.50 mg/L		0.10	1		12/02/14 10:08	16984-48-8	
<b>4500S2D Sulfide Water</b>		Analytical Method: SM 4500-S2-D						
Sulfide	ND mg/L		0.10	1		11/21/14 16:47		
<b>335.4 Cyanide, Total</b>		Analytical Method: EPA 335.4 Preparation Method: EPA 335.4						
Cyanide	ND mg/L		0.010	1	11/25/14 15:19	11/29/14 13:37	57-12-5	
<b>350.1 Ammonia</b>		Analytical Method: EPA 350.1 Preparation Method: EPA 350.1						
Nitrogen, Ammonia	0.17 mg/L		0.10	1	11/25/14 11:27	11/25/14 16:33	7664-41-7	
<b>353.2 Nitrogen, NO<sub>2</sub>/NO<sub>3</sub> unpres</b>		Analytical Method: EPA 353.2						
Nitrogen, Nitrate	ND mg/L		0.10	1		11/22/14 08:42		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: Trip Blank		Lab ID: 50107512010		Collected: 11/20/14 08:00		Received: 11/21/14 12:00		Matrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual	
8260 MSV Indiana		Analytical Method: EPA 8260							
Acetone	ND	ug/L	100	1		12/03/14 17:07	67-64-1		
Acrolein	ND	ug/L	50.0	1		12/03/14 17:07	107-02-8		
Acrylonitrile	ND	ug/L	100	1		12/03/14 17:07	107-13-1		
Benzene	ND	ug/L	5.0	1		12/03/14 17:07	71-43-2		
Bromobenzene	ND	ug/L	5.0	1		12/03/14 17:07	108-86-1		
Bromochloromethane	ND	ug/L	5.0	1		12/03/14 17:07	74-97-5		
Bromodichloromethane	ND	ug/L	5.0	1		12/03/14 17:07	75-27-4		
Bromoform	ND	ug/L	5.0	1		12/03/14 17:07	75-25-2		
Bromomethane	ND	ug/L	5.0	1		12/03/14 17:07	74-83-9		
2-Butanone (MEK)	ND	ug/L	25.0	1		12/03/14 17:07	78-93-3		
n-Butylbenzene	ND	ug/L	5.0	1		12/03/14 17:07	104-51-8		
sec-Butylbenzene	ND	ug/L	5.0	1		12/03/14 17:07	135-98-8		
tert-Butylbenzene	ND	ug/L	5.0	1		12/03/14 17:07	98-06-6		
Carbon disulfide	ND	ug/L	10.0	1		12/03/14 17:07	75-15-0		
Carbon tetrachloride	ND	ug/L	5.0	1		12/03/14 17:07	56-23-5		
Chlorobenzene	ND	ug/L	5.0	1		12/03/14 17:07	108-90-7		
Chloroethane	ND	ug/L	5.0	1		12/03/14 17:07	75-00-3		
Chloroform	ND	ug/L	5.0	1		12/03/14 17:07	67-66-3		
Chloromethane	ND	ug/L	5.0	1		12/03/14 17:07	74-87-3		
2-Chlorotoluene	ND	ug/L	5.0	1		12/03/14 17:07	95-49-8		
4-Chlorotoluene	ND	ug/L	5.0	1		12/03/14 17:07	106-43-4		
Dibromochloromethane	ND	ug/L	5.0	1		12/03/14 17:07	124-48-1		
1,2-Dibromoethane (EDB)	ND	ug/L	5.0	1		12/03/14 17:07	106-93-4		
Dibromomethane	ND	ug/L	5.0	1		12/03/14 17:07	74-95-3		
1,2-Dichlorobenzene	ND	ug/L	5.0	1		12/03/14 17:07	95-50-1		
1,3-Dichlorobenzene	ND	ug/L	5.0	1		12/03/14 17:07	541-73-1		
1,4-Dichlorobenzene	ND	ug/L	5.0	1		12/03/14 17:07	106-46-7		
trans-1,4-Dichloro-2-butene	ND	ug/L	100	1		12/03/14 17:07	110-57-6		
Dichlorodifluoromethane	ND	ug/L	5.0	1		12/03/14 17:07	75-71-8		
1,1-Dichloroethane	ND	ug/L	5.0	1		12/03/14 17:07	75-34-3		
1,2-Dichloroethane	ND	ug/L	5.0	1		12/03/14 17:07	107-06-2		
1,1-Dichloroethene	ND	ug/L	5.0	1		12/03/14 17:07	75-35-4		
cis-1,2-Dichloroethene	ND	ug/L	5.0	1		12/03/14 17:07	156-59-2		
trans-1,2-Dichloroethene	ND	ug/L	5.0	1		12/03/14 17:07	156-60-5		
1,2-Dichloropropane	ND	ug/L	5.0	1		12/03/14 17:07	78-87-5		
1,3-Dichloropropane	ND	ug/L	5.0	1		12/03/14 17:07	142-28-9		
2,2-Dichloropropane	ND	ug/L	5.0	1		12/03/14 17:07	594-20-7		
1,1-Dichloropropene	ND	ug/L	5.0	1		12/03/14 17:07	563-58-6		
cis-1,3-Dichloropropene	ND	ug/L	5.0	1		12/03/14 17:07	10061-01-5		
trans-1,3-Dichloropropene	ND	ug/L	5.0	1		12/03/14 17:07	10061-02-6		
Ethylbenzene	ND	ug/L	5.0	1		12/03/14 17:07	100-41-4		
Ethyl methacrylate	ND	ug/L	100	1		12/03/14 17:07	97-63-2		
Hexachloro-1,3-butadiene	ND	ug/L	5.0	1		12/03/14 17:07	87-68-3		
n-Hexane	ND	ug/L	5.0	1		12/03/14 17:07	110-54-3		
2-Hexanone	ND	ug/L	25.0	1		12/03/14 17:07	591-78-6		
Iodomethane	ND	ug/L	10.0	1		12/03/14 17:07	74-88-4		
Isopropylbenzene (Cumene)	ND	ug/L	5.0	1		12/03/14 17:07	98-82-8		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Sample: Trip Blank		Lab ID: 50107512010	Collected: 11/20/14 08:00	Received: 11/21/14 12:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV Indiana</b>		Analytical Method: EPA 8260						
p-Isopropyltoluene	ND ug/L		5.0	1		12/03/14 17:07	99-87-6	
Methylene Chloride	ND ug/L		5.0	1		12/03/14 17:07	75-09-2	
1-Methylnaphthalene	ND ug/L		5.0	1		12/03/14 17:07	90-12-0	N2
2-Methylnaphthalene	ND ug/L		10.0	1		12/03/14 17:07	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND ug/L		25.0	1		12/03/14 17:07	108-10-1	
Methyl-tert-butyl ether	ND ug/L		4.0	1		12/03/14 17:07	1634-04-4	
Naphthalene	ND ug/L		1.4	1		12/03/14 17:07	91-20-3	
n-Propylbenzene	ND ug/L		5.0	1		12/03/14 17:07	103-65-1	
Styrene	ND ug/L		5.0	1		12/03/14 17:07	100-42-5	
1,1,1,2-Tetrachloroethane	ND ug/L		5.0	1		12/03/14 17:07	630-20-6	
1,1,2,2-Tetrachloroethane	ND ug/L		5.0	1		12/03/14 17:07	79-34-5	
Tetrachloroethene	ND ug/L		5.0	1		12/03/14 17:07	127-18-4	
Toluene	ND ug/L		5.0	1		12/03/14 17:07	108-88-3	
1,2,3-Trichlorobenzene	ND ug/L		5.0	1		12/03/14 17:07	87-61-6	
1,2,4-Trichlorobenzene	ND ug/L		5.0	1		12/03/14 17:07	120-82-1	
1,1,1-Trichloroethane	ND ug/L		5.0	1		12/03/14 17:07	71-55-6	
1,1,2-Trichloroethane	ND ug/L		5.0	1		12/03/14 17:07	79-00-5	
Trichloroethene	ND ug/L		5.0	1		12/03/14 17:07	79-01-6	
Trichlorofluoromethane	ND ug/L		5.0	1		12/03/14 17:07	75-69-4	
1,2,3-Trichloropropane	ND ug/L		5.0	1		12/03/14 17:07	96-18-4	
1,2,4-Trimethylbenzene	ND ug/L		5.0	1		12/03/14 17:07	95-63-6	
1,3,5-Trimethylbenzene	ND ug/L		5.0	1		12/03/14 17:07	108-67-8	
Vinyl acetate	ND ug/L		50.0	1		12/03/14 17:07	108-05-4	
Vinyl chloride	ND ug/L		2.0	1		12/03/14 17:07	75-01-4	
Xylene (Total)	ND ug/L		10.0	1		12/03/14 17:07	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	99 %.		79-116	1		12/03/14 17:07	1868-53-7	
4-Bromofluorobenzene (S)	91 %.		80-114	1		12/03/14 17:07	460-00-4	
Toluene-d8 (S)	95 %.		81-110	1		12/03/14 17:07	2037-26-5	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

QC Batch:	MERP/5863	Analysis Method:	EPA 7470
QC Batch Method:	EPA 7470	Analysis Description:	7470 Mercury
Associated Lab Samples:	50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009		

METHOD BLANK:	1194266	Matrix:	Water
Associated Lab Samples:	50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009		

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	ND	2.0	11/26/14 10:58	

LABORATORY CONTROL SAMPLE: 1194267						
Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	4.8	97	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1194268 1194269												
Parameter	Units	50107327009 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	ND	5	5	4.3	4.1	86	82	75-125	5	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1194270 1194271												
Parameter	Units	50107512005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	ND	5	5	5.0	5.0	101	100	75-125	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

QC Batch:	MPRP/14664	Analysis Method:	EPA 6010
QC Batch Method:	EPA 3010	Analysis Description:	6010 MET
Associated Lab Samples:	50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009		

METHOD BLANK: 1194200

Matrix: Water

Associated Lab Samples: 50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	ug/L	ND	6.0	11/26/14 08:04	
Arsenic	ug/L	ND	10.0	11/26/14 08:04	
Barium	ug/L	ND	10.0	11/26/14 08:04	
Beryllium	ug/L	ND	4.0	11/26/14 08:04	
Cadmium	ug/L	ND	2.0	11/26/14 08:04	
Calcium	ug/L	ND	1000	11/26/14 08:04	
Chromium	ug/L	ND	10.0	11/26/14 08:04	
Cobalt	ug/L	ND	10.0	11/26/14 08:04	
Copper	ug/L	ND	10.0	11/26/14 08:04	
Iron	ug/L	ND	100	11/26/14 08:04	
Lead	ug/L	ND	10.0	11/26/14 08:04	
Magnesium	ug/L	ND	1000	11/26/14 08:04	
Manganese	ug/L	ND	10.0	11/26/14 08:04	
Nickel	ug/L	ND	10.0	11/26/14 08:04	
Potassium	ug/L	ND	1000	11/26/14 08:04	
Selenium	ug/L	ND	10.0	11/26/14 08:04	
Silver	ug/L	ND	10.0	11/26/14 08:04	
Thallium	ug/L	ND	10.0	11/26/14 08:04	
Vanadium	ug/L	ND	10.0	11/26/14 08:04	
Zinc	ug/L	ND	20.0	11/26/14 08:04	

LABORATORY CONTROL SAMPLE: 1194201

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	1000	1070	107	80-120	
Arsenic	ug/L	1000	1060	106	80-120	
Barium	ug/L	1000	1010	101	80-120	
Beryllium	ug/L	1000	1040	104	80-120	
Cadmium	ug/L	1000	1040	104	80-120	
Calcium	ug/L	10000	10200	102	80-120	
Chromium	ug/L	1000	1030	103	80-120	
Cobalt	ug/L	1000	1020	102	80-120	
Copper	ug/L	1000	1000	100	80-120	
Iron	ug/L	10000	10300	103	80-120	
Lead	ug/L	1000	1030	103	80-120	
Magnesium	ug/L	10000	10400	104	80-120	
Manganese	ug/L	1000	1020	102	80-120	
Nickel	ug/L	1000	1040	104	80-120	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

LABORATORY CONTROL SAMPLE: 1194201

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Potassium	ug/L	10000	10200	102	80-120	
Selenium	ug/L	1000	1060	106	80-120	
Silver	ug/L	500	488	98	80-120	
Thallium	ug/L	1000	1010	101	80-120	
Vanadium	ug/L	1000	1040	104	80-120	
Zinc	ug/L	1000	1020	102	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1194202 1194203

Parameter	Units	50107512005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	ug/L	ND	1000	1000	1080	1080	108	108	75-125	0	20	
Arsenic	ug/L	ND	1000	1000	1090	1090	109	109	75-125	0	20	
Barium	ug/L	10.7	1000	1000	1040	1030	102	102	75-125	0	20	
Beryllium	ug/L	ND	1000	1000	1060	1050	106	105	75-125	1	20	
Cadmium	ug/L	ND	1000	1000	1070	1060	107	106	75-125	0	20	
Calcium	ug/L	103000	10000	10000	116000	115000	132	124	75-125	1	20	P6
Chromium	ug/L	ND	1000	1000	1020	1020	102	102	75-125	1	20	
Cobalt	ug/L	ND	1000	1000	1010	1010	101	101	75-125	0	20	
Copper	ug/L	ND	1000	1000	1000	1000	100	100	75-125	0	20	
Iron	ug/L	841	10000	10000	11000	11000	101	101	75-125	0	20	
Lead	ug/L	ND	1000	1000	1020	1020	102	102	75-125	0	20	
Magnesium	ug/L	55000	10000	10000	67900	67300	129	123	75-125	1	20	P6
Manganese	ug/L	34.7	1000	1000	1030	1040	100	100	75-125	0	20	
Nickel	ug/L	ND	1000	1000	1020	1020	102	102	75-125	0	20	
Potassium	ug/L	8640	10000	10000	19500	19200	108	105	75-125	2	20	
Selenium	ug/L	ND	1000	1000	1080	1080	108	108	75-125	0	20	
Silver	ug/L	ND	500	500	489	484	98	97	75-125	1	20	
Thallium	ug/L	ND	1000	1000	1010	1010	100	101	75-125	0	20	
Vanadium	ug/L	ND	1000	1000	1060	1060	106	105	75-125	0	20	
Zinc	ug/L	ND	1000	1000	1010	1000	101	100	75-125	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

QC Batch: MSV/71427

Analysis Method: EPA 8260

QC Batch Method: EPA 8260

Analysis Description: 8260 MSV

Associated Lab Samples: 50107512001, 50107512010

METHOD BLANK: 1198725

Matrix: Water

Associated Lab Samples: 50107512001, 50107512010

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	ND	5.0	12/03/14 14:11	
1,1,1-Trichloroethane	ug/L	ND	5.0	12/03/14 14:11	
1,1,2,2-Tetrachloroethane	ug/L	ND	5.0	12/03/14 14:11	
1,1,2-Trichloroethane	ug/L	ND	5.0	12/03/14 14:11	
1,1-Dichloroethane	ug/L	ND	5.0	12/03/14 14:11	
1,1-Dichloroethene	ug/L	ND	5.0	12/03/14 14:11	
1,1-Dichloropropene	ug/L	ND	5.0	12/03/14 14:11	
1,2,3-Trichlorobenzene	ug/L	ND	5.0	12/03/14 14:11	
1,2,3-Trichloropropane	ug/L	ND	5.0	12/03/14 14:11	
1,2,4-Trichlorobenzene	ug/L	ND	5.0	12/03/14 14:11	
1,2,4-Trimethylbenzene	ug/L	ND	5.0	12/03/14 14:11	
1,2-Dibromoethane (EDB)	ug/L	ND	5.0	12/03/14 14:11	
1,2-Dichlorobenzene	ug/L	ND	5.0	12/03/14 14:11	
1,2-Dichloroethane	ug/L	ND	5.0	12/03/14 14:11	
1,2-Dichloropropane	ug/L	ND	5.0	12/03/14 14:11	
1,3,5-Trimethylbenzene	ug/L	ND	5.0	12/03/14 14:11	
1,3-Dichlorobenzene	ug/L	ND	5.0	12/03/14 14:11	
1,3-Dichloropropane	ug/L	ND	5.0	12/03/14 14:11	
1,4-Dichlorobenzene	ug/L	ND	5.0	12/03/14 14:11	
1-Methylnaphthalene	ug/L	ND	5.0	12/03/14 14:11	N2
2,2-Dichloropropane	ug/L	ND	5.0	12/03/14 14:11	
2-Butanone (MEK)	ug/L	ND	25.0	12/03/14 14:11	
2-Chlorotoluene	ug/L	ND	5.0	12/03/14 14:11	
2-Hexanone	ug/L	ND	25.0	12/03/14 14:11	
2-Methylnaphthalene	ug/L	ND	10.0	12/03/14 14:11	
4-Chlorotoluene	ug/L	ND	5.0	12/03/14 14:11	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	25.0	12/03/14 14:11	
Acetone	ug/L	ND	100	12/03/14 14:11	
Acrolein	ug/L	ND	50.0	12/03/14 14:11	
Acrylonitrile	ug/L	ND	100	12/03/14 14:11	
Benzene	ug/L	ND	5.0	12/03/14 14:11	
Bromobenzene	ug/L	ND	5.0	12/03/14 14:11	
Bromochloromethane	ug/L	ND	5.0	12/03/14 14:11	
Bromodichloromethane	ug/L	ND	5.0	12/03/14 14:11	
Bromoform	ug/L	ND	5.0	12/03/14 14:11	
Bromomethane	ug/L	ND	5.0	12/03/14 14:11	
Carbon disulfide	ug/L	ND	10.0	12/03/14 14:11	
Carbon tetrachloride	ug/L	ND	5.0	12/03/14 14:11	
Chlorobenzene	ug/L	ND	5.0	12/03/14 14:11	
Chloroethane	ug/L	ND	5.0	12/03/14 14:11	
Chloroform	ug/L	ND	5.0	12/03/14 14:11	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

METHOD BLANK: 1198725

Matrix: Water

Associated Lab Samples: 50107512001, 50107512010

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloromethane	ug/L	ND	5.0	12/03/14 14:11	
cis-1,2-Dichloroethene	ug/L	ND	5.0	12/03/14 14:11	
cis-1,3-Dichloropropene	ug/L	ND	5.0	12/03/14 14:11	
Dibromochloromethane	ug/L	ND	5.0	12/03/14 14:11	
Dibromomethane	ug/L	ND	5.0	12/03/14 14:11	
Dichlorodifluoromethane	ug/L	ND	5.0	12/03/14 14:11	
Ethyl methacrylate	ug/L	ND	100	12/03/14 14:11	
Ethylbenzene	ug/L	ND	5.0	12/03/14 14:11	
Hexachloro-1,3-butadiene	ug/L	ND	5.0	12/03/14 14:11	
Iodomethane	ug/L	ND	10.0	12/03/14 14:11	
Isopropylbenzene (Cumene)	ug/L	ND	5.0	12/03/14 14:11	
Methyl-tert-butyl ether	ug/L	ND	4.0	12/03/14 14:11	
Methylene Chloride	ug/L	ND	5.0	12/03/14 14:11	
n-Butylbenzene	ug/L	ND	5.0	12/03/14 14:11	
n-Hexane	ug/L	ND	5.0	12/03/14 14:11	
n-Propylbenzene	ug/L	ND	5.0	12/03/14 14:11	
Naphthalene	ug/L	ND	1.4	12/03/14 14:11	
p-Isopropyltoluene	ug/L	ND	5.0	12/03/14 14:11	
sec-Butylbenzene	ug/L	ND	5.0	12/03/14 14:11	
Styrene	ug/L	ND	5.0	12/03/14 14:11	
tert-Butylbenzene	ug/L	ND	5.0	12/03/14 14:11	
Tetrachloroethene	ug/L	ND	5.0	12/03/14 14:11	
Toluene	ug/L	ND	5.0	12/03/14 14:11	
trans-1,2-Dichloroethene	ug/L	ND	5.0	12/03/14 14:11	
trans-1,3-Dichloropropene	ug/L	ND	5.0	12/03/14 14:11	
trans-1,4-Dichloro-2-butene	ug/L	ND	100	12/03/14 14:11	
Trichloroethene	ug/L	ND	5.0	12/03/14 14:11	
Trichlorofluoromethane	ug/L	ND	5.0	12/03/14 14:11	
Vinyl acetate	ug/L	ND	50.0	12/03/14 14:11	
Vinyl chloride	ug/L	ND	2.0	12/03/14 14:11	
Xylene (Total)	ug/L	ND	10.0	12/03/14 14:11	
4-Bromofluorobenzene (S)	%	93	80-114	12/03/14 14:11	
Dibromofluoromethane (S)	%	101	79-116	12/03/14 14:11	
Toluene-d8 (S)	%	96	81-110	12/03/14 14:11	

LABORATORY CONTROL SAMPLE: 1198726

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	50	46.2	92	61-135	
1,1,1-Trichloroethane	ug/L	50	55.6	111	71-129	
1,1,2,2-Tetrachloroethane	ug/L	50	52.9	106	66-126	
1,1,2-Trichloroethane	ug/L	50	52.0	104	77-130	
1,1-Dichloroethane	ug/L	50	50.4	101	75-130	
1,1-Dichloroethene	ug/L	50	49.7	99	68-127	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

LABORATORY CONTROL SAMPLE: 1198726

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1-Dichloropropene	ug/L	50	51.0	102	78-130	
1,2,3-Trichlorobenzene	ug/L	50	49.8	100	70-130	
1,2,3-Trichloropropane	ug/L	50	51.8	104	58-142	
1,2,4-Trichlorobenzene	ug/L	50	49.4	99	68-131	
1,2,4-Trimethylbenzene	ug/L	50	52.5	105	69-127	
1,2-Dibromoethane (EDB)	ug/L	50	52.1	104	76-125	
1,2-Dichlorobenzene	ug/L	50	51.0	102	75-123	
1,2-Dichloroethane	ug/L	50	52.2	104	75-128	
1,2-Dichloropropane	ug/L	50	53.6	107	74-121	
1,3,5-Trimethylbenzene	ug/L	50	53.3	107	70-126	
1,3-Dichlorobenzene	ug/L	50	50.7	101	74-122	
1,3-Dichloropropane	ug/L	50	50.2	100	74-123	
1,4-Dichlorobenzene	ug/L	50	50.5	101	76-120	
1-Methylnaphthalene	ug/L	50	51.7	103	39-141	N2
2,2-Dichloropropane	ug/L	50	46.5	93	50-137	
2-Butanone (MEK)	ug/L	250	268	107	58-139	
2-Chlorotoluene	ug/L	50	50.9	102	74-122	
2-Hexanone	ug/L	250	294	118	54-140	
2-Methylnaphthalene	ug/L	50	50.7	101	54-151	
4-Chlorotoluene	ug/L	50	52.4	105	77-123	
4-Methyl-2-pentanone (MIBK)	ug/L	250	282	113	58-138	
Acetone	ug/L	250	280	112	49-150	
Acrolein	ug/L	1000	1730	173	41-200	
Acrylonitrile	ug/L	1000	1070	107	63-137	
Benzene	ug/L	50	51.5	103	74-122	
Bromobenzene	ug/L	50	50.8	102	72-127	
Bromochloromethane	ug/L	50	50.6	101	63-132	
Bromodichloromethane	ug/L	50	56.9	114	62-136	
Bromoform	ug/L	50	49.0	98	44-134	
Bromomethane	ug/L	50	38.4	77	22-181	
Carbon disulfide	ug/L	100	110	110	59-132	
Carbon tetrachloride	ug/L	50	51.9	104	56-137	
Chlorobenzene	ug/L	50	50.8	102	78-123	
Chloroethane	ug/L	50	46.3	93	60-144	
Chloroform	ug/L	50	51.6	103	78-126	
Chloromethane	ug/L	50	44.0	88	42-134	
cis-1,2-Dichloroethene	ug/L	50	54.0	108	75-122	
cis-1,3-Dichloropropene	ug/L	50	43.8	88	64-126	
Dibromochloromethane	ug/L	50	46.9	94	58-128	
Dibromomethane	ug/L	50	53.2	106	73-125	
Dichlorodifluoromethane	ug/L	50	49.6	99	35-181	
Ethyl methacrylate	ug/L	200	195	97	69-133	
Ethylbenzene	ug/L	50	52.8	106	66-133	
Hexachloro-1,3-butadiene	ug/L	50	50.2	100	59-145	
Iodomethane	ug/L	100	107	107	21-170	
Isopropylbenzene (Cumene)	ug/L	50	55.2	110	69-124	
Methyl-tert-butyl ether	ug/L	100	109	109	69-122	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

LABORATORY CONTROL SAMPLE: 1198726

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Methylene Chloride	ug/L	50	43.1	86	68-132	
n-Butylbenzene	ug/L	50	53.8	108	70-126	
n-Hexane	ug/L	50	54.0	108	51-125	
n-Propylbenzene	ug/L	50	52.2	104	71-122	
Naphthalene	ug/L	50	52.8	106	68-127	
p-Isopropyltoluene	ug/L	50	53.7	107	72-132	
sec-Butylbenzene	ug/L	50	53.3	107	70-128	
Styrene	ug/L	50	55.1	110	74-126	
tert-Butylbenzene	ug/L	50	44.0	88	51-118	
Tetrachloroethene	ug/L	50	49.4	99	69-130	
Toluene	ug/L	50	49.5	99	72-122	
trans-1,2-Dichloroethene	ug/L	50	53.0	106	72-124	
trans-1,3-Dichloropropene	ug/L	50	42.8	86	64-121	
trans-1,4-Dichloro-2-butene	ug/L	200	189	94	56-133	
Trichloroethene	ug/L	50	52.2	104	76-126	
Trichlorofluoromethane	ug/L	50	60.8	122	76-149	
Vinyl acetate	ug/L	200	174	87	45-151	
Vinyl chloride	ug/L	50	41.8	84	59-126	
Xylene (Total)	ug/L	150	159	106	70-124	
4-Bromofluorobenzene (S)	%			100	80-114	
Dibromofluoromethane (S)	%			101	79-116	
Toluene-d8 (S)	%			97	81-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1198727 1198728

Parameter	Units	50107463003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,1,1,2-Tetrachloroethane	ug/L	ND	50	50	37.2	42.7	74	85	50-132	14	20	
1,1,1-Trichloroethane	ug/L	ND	50	50	48.2	57.9	96	116	60-138	18	20	
1,1,2,2-Tetrachloroethane	ug/L	ND	50	50	46.4	56.7	93	113	55-128	20	20	
1,1,2-Trichloroethane	ug/L	ND	50	50	47.2	56.0	94	112	61-139	17	20	
1,1-Dichloroethane	ug/L	ND	50	50	46.2	54.0	92	108	57-147	16	20	
1,1-Dichloroethene	ug/L	ND	50	50	45.9	54.3	92	109	55-145	17	20	
1,1-Dichloropropene	ug/L	ND	50	50	41.3	49.0	83	98	55-147	17	20	
1,2,3-Trichlorobenzene	ug/L	ND	50	50	29.6	32.3	59	65	31-141	9	20	
1,2,3-Trichloropropane	ug/L	ND	50	50	48.0	57.6	96	115	58-133	18	20	
1,2,4-Trichlorobenzene	ug/L	ND	50	50	26.1	27.4	52	55	25-143	5	20	
1,2,4-Trimethylbenzene	ug/L	ND	50	50	26.4	28.2	53	56	18-149	7	20	
1,2-Dibromoethane (EDB)	ug/L	ND	50	50	47.0	55.3	94	111	63-129	16	20	
1,2-Dichlorobenzene	ug/L	ND	50	50	31.3	34.1	63	68	38-136	9	20	
1,2-Dichloroethane	ug/L	ND	50	50	47.6	56.4	95	113	62-138	17	20	
1,2-Dichloropropane	ug/L	ND	50	50	47.8	55.3	96	111	59-130	14	20	
1,3,5-Trimethylbenzene	ug/L	ND	50	50	26.9	28.9	54	58	20-147	7	20	
1,3-Dichlorobenzene	ug/L	ND	50	50	27.9	29.5	56	59	28-141	5	20	
1,3-Dichloropropane	ug/L	ND	50	50	44.7	52.5	89	105	62-127	16	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1198727 1198728											
Parameter	Units	50107463003		MS	MSD	MS		MSD	% Rec		Max
		Result	Conc.	Spike	Spike	Result	Result	% Rec	% Rec	Limits	RPD
1,4-Dichlorobenzene	ug/L	ND	50	50	50	27.2	29.4	54	59	30-139	8
1-Methylnaphthalene	ug/L	ND	50	50	50	38.8	47.9	78	96	23-143	21
2,2-Dichloropropane	ug/L	ND	50	50	50	39.4	48.2	79	96	37-139	20
2-Butanone (MEK)	ug/L	ND	250	250	250	253	315	101	126	37-156	22
2-Chlorotoluene	ug/L	ND	50	50	50	28.4	31.1	57	62	27-142	9
2-Hexanone	ug/L	ND	250	250	250	278	350	111	140	44-143	23
2-Methylnaphthalene	ug/L	ND	50	50	50	36.3	43.6	73	87	24-151	18
4-Chlorotoluene	ug/L	ND	50	50	50	27.3	29.4	55	59	27-144	7
4-Methyl-2-pentanone (MIBK)	ug/L	ND	250	250	250	272	343	109	137	46-144	23
Acetone	ug/L	ND	250	250	250	244	305	98	122	39-156	22
Acrolein	ug/L	ND	1000	1000	1000	1400	1730	140	173	33-200	21
Acrylonitrile	ug/L	ND	1000	1000	1000	1050	1280	105	128	48-149	20
Benzene	ug/L	ND	50	50	50	44.3	51.5	89	103	62-129	15
Bromobenzene	ug/L	ND	50	50	50	34.1	37.2	68	74	39-140	9
Bromochloromethane	ug/L	ND	50	50	50	47.8	52.6	96	105	49-142	10
Bromodichloromethane	ug/L	ND	50	50	50	49.5	57.6	99	115	50-142	15
Bromoform	ug/L	ND	50	50	50	42.9	51.3	86	103	36-125	18
Bromomethane	ug/L	ND	50	50	50	41.0	46.8	82	94	13-179	13
Carbon disulfide	ug/L	ND	100	100	100	95.1	111	95	111	45-142	16
Carbon tetrachloride	ug/L	ND	50	50	50	43.5	52.0	87	104	46-142	18
Chlorobenzene	ug/L	ND	50	50	50	35.2	39.1	70	78	49-136	10
Chloroethane	ug/L	ND	50	50	50	44.9	52.0	90	104	47-160	15
Chloroform	ug/L	ND	50	50	50	46.1	53.7	92	107	54-150	15
Chloromethane	ug/L	ND	50	50	50	45.6	52.6	91	105	30-148	14
cis-1,2-Dichloroethene	ug/L	ND	50	50	50	48.8	56.5	98	113	60-135	15
cis-1,3-Dichloropropene	ug/L	ND	50	50	50	36.6	42.3	73	85	52-123	15
Dibromochloromethane	ug/L	ND	50	50	50	40.6	47.9	81	96	48-125	17
Dibromomethane	ug/L	ND	50	50	50	48.0	57.0	96	114	59-134	17
Dichlorodifluoromethane	ug/L	ND	50	50	50	55.4	65.3	111	131	24-197	16
Ethyl methacrylate	ug/L	ND	200	200	200	180	220	90	110	55-139	20
Ethylbenzene	ug/L	ND	50	50	50	32.6	36.1	65	72	28-153	10
Hexachloro-1,3-butadiene	ug/L	ND	50	50	50	14.8	14.5	30	29	10-176	2
Iodomethane	ug/L	ND	100	100	100	108	125	108	125	17-157	15
Isopropylbenzene (Cumene)	ug/L	ND	50	50	50	29.8	32.9	60	66	18-152	10
Methyl-tert-butyl ether	ug/L	ND	100	100	100	107	132	107	132	63-130	21
Methylene Chloride	ug/L	ND	50	50	50	42.9	49.1	84	97	45-156	13
n-Butylbenzene	ug/L	ND	50	50	50	17.8	18.2	36	36	10-161	3
n-Hexane	ug/L	ND	50	50	50	48.2	57.8	96	116	33-144	18
n-Propylbenzene	ug/L	ND	50	50	50	24.8	26.9	50	54	16-150	8
Naphthalene	ug/L	ND	50	50	50	41.2	48.3	82	97	39-140	16
p-Isopropyltoluene	ug/L	ND	50	50	50	21.1	22.2	42	44	10-163	5
sec-Butylbenzene	ug/L	ND	50	50	50	22.9	24.5	46	49	10-160	7
Styrene	ug/L	ND	50	50	50	35.2	38.4	70	77	36-139	9
tert-Butylbenzene	ug/L	ND	50	50	50	22.1	24.1	44	48	12-134	8
Tetrachloroethene	ug/L	ND	50	50	50	32.0	36.5	64	73	33-151	13

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1198727 1198728											
Parameter	Units	50107463003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	Qual
Toluene	ug/L	ND	50	50	37.0	42.2	74	84	50-132	13	20
trans-1,2-Dichloroethene	ug/L	ND	50	50	46.6	53.7	93	107	40-153	14	20
trans-1,3-Dichloropropene	ug/L	ND	50	50	36.2	42.2	72	84	48-122	15	20
trans-1,4-Dichloro-2-butene	ug/L	ND	200	200	148	183	74	92	32-139	21	20 R1
Trichloroethene	ug/L	ND	50	50	40.3	46.8	81	94	50-143	15	20
Trichlorofluoromethane	ug/L	ND	50	50	57.1	66.8	114	134	60-175	16	20
Vinyl acetate	ug/L	ND	200	200	129	159	64	79	17-142	21	20 R1
Vinyl chloride	ug/L	ND	50	50	41.4	48.9	83	98	44-145	16	20
Xylene (Total)	ug/L	ND	150	150	95.7	106	64	71	29-145	10	20
4-Bromofluorobenzene (S)	%.						99	101	80-114		
Dibromofluoromethane (S)	%.						100	99	79-116		
Toluene-d8 (S)	%.						97	95	81-110		

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

QC Batch:	OEXT/3518	Analysis Method:	EPA 8081
QC Batch Method:	EPA 3535	Analysis Description:	8081A GCS Pesticides
Associated Lab Samples:	50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009		

METHOD BLANK: 74615

Matrix: Water

Associated Lab Samples: 50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
4,4'-DDD	ug/L	ND	0.10	12/05/14 20:24	
4,4'-DDE	ug/L	ND	0.10	12/05/14 20:24	
4,4'-DDT	ug/L	ND	0.10	12/05/14 20:24	
Aldrin	ug/L	ND	0.050	12/05/14 20:24	
alpha-BHC	ug/L	ND	0.050	12/05/14 20:24	
alpha-Chlordane	ug/L	ND	0.050	12/05/14 20:24	
beta-BHC	ug/L	ND	0.050	12/05/14 20:24	
delta-BHC	ug/L	ND	0.050	12/05/14 20:24	
Dieldrin	ug/L	ND	0.10	12/05/14 20:24	
Endosulfan I	ug/L	ND	0.050	12/05/14 20:24	
Endosulfan II	ug/L	ND	0.10	12/05/14 20:24	
Endosulfan sulfate	ug/L	ND	0.10	12/05/14 20:24	
Endrin	ug/L	ND	0.10	12/05/14 20:24	
Endrin aldehyde	ug/L	ND	0.10	12/05/14 20:24	
Endrin ketone	ug/L	ND	0.10	12/05/14 20:24	
gamma-BHC (Lindane)	ug/L	ND	0.050	12/05/14 20:24	
gamma-Chlordane	ug/L	ND	0.050	12/05/14 20:24	
Heptachlor	ug/L	ND	0.050	12/05/14 20:24	
Heptachlor epoxide	ug/L	ND	0.050	12/05/14 20:24	
Methoxychlor	ug/L	ND	0.50	12/05/14 20:24	
Toxaphene	ug/L	ND	2.0	12/05/14 20:24	
Decachlorobiphenyl (S)	%	75	14-126	12/05/14 20:24	
Decachlorobiphenyl (S)	%	77	14-126	12/05/14 20:24	
Tetrachloro-m-xylene (S)	%	56	10-119	12/05/14 20:24	
Tetrachloro-m-xylene (S)	%	61	10-119	12/05/14 20:24	

LABORATORY CONTROL SAMPLE: 74616

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
4,4'-DDD	ug/L	.5	0.34	67	29-130	
4,4'-DDE	ug/L	.5	0.27	54	15-115	
4,4'-DDT	ug/L	.5	0.30	61	24-115	
Aldrin	ug/L	.5	0.14	28	10-115	
alpha-BHC	ug/L	.5	0.36	72	27-124	
alpha-Chlordane	ug/L	.5	0.31	62	21-116	
beta-BHC	ug/L	.5	0.35	70	32-131	
delta-BHC	ug/L	.5	0.36	73	28-134	
Dieldrin	ug/L	.5	0.35	71	31-121	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

LABORATORY CONTROL SAMPLE: 74616

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Endosulfan I	ug/L	.5	0.25	51	13-115	
Endosulfan II	ug/L	.5	0.29	58	14-115	
Endosulfan sulfate	ug/L	.5	0.31	62	33-133	
Endrin	ug/L	.5	0.36	72	20-153	
Endrin aldehyde	ug/L	.5	0.36	73	27-129	
Endrin ketone	ug/L	.5	0.38	76	34-129	
gamma-BHC (Lindane)	ug/L	.5	0.38	75	28-128	
gamma-Chlordane	ug/L	.5	0.31	61	16-116	
Heptachlor	ug/L	.5	0.26	52	10-115	
Heptachlor epoxide	ug/L	.5	0.37	74	30-119	
Methoxychlor	ug/L	.5	.3J	59	21-150	
Decachlorobiphenyl (S)	%			59	14-126	
Decachlorobiphenyl (S)	%			58	14-126	
Tetrachloro-m-xylene (S)	%			47	10-119	
Tetrachloro-m-xylene (S)	%			52	10-119	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 74617 74618

Parameter	Units	50107512005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
4,4'-DDD	ug/L	ND	.5	.5	0.35	0.37	70	74	22-141	6	20	
4,4'-DDE	ug/L	ND	.5	.5	0.27	0.29	53	58	11-125	8	20	
4,4'-DDT	ug/L	ND	.5	.5	0.30	0.32	60	64	16-133	8	20	
Aldrin	ug/L	ND	.5	.5	0.20	0.22	41	44	10-115	7	20	
alpha-BHC	ug/L	ND	.5	.5	0.36	0.40	72	79	14-145	9	20	
alpha-Chlordane	ug/L	ND	.5	.5	0.33	0.35	66	71	16-135	7	20	
beta-BHC	ug/L	ND	.5	.5	0.36	0.39	70	77	18-155	9	20	
delta-BHC	ug/L	ND	.5	.5	0.39	0.42	76	82	16-153	8	20	
Dieldrin	ug/L	ND	.5	.5	0.37	0.39	74	78	14-148	4	20	
Endosulfan I	ug/L	ND	.5	.5	0.30	0.31	59	62	10-126	5	20	
Endosulfan II	ug/L	ND	.5	.5	0.32	0.34	65	67	10-133	4	20	
Endosulfan sulfate	ug/L	ND	.5	.5	0.34	0.35	67	70	24-149	5	20	
Endrin	ug/L	ND	.5	.5	0.39	0.41	78	82	22-160	5	20	
Endrin aldehyde	ug/L	ND	.5	.5	0.37	0.39	74	79	12-139	6	20	
Endrin ketone	ug/L	ND	.5	.5	0.39	0.42	77	82	20-153	6	20	
gamma-BHC (Lindane)	ug/L	ND	.5	.5	0.39	0.42	77	83	17-149	8	20	
gamma-Chlordane	ug/L	ND	.5	.5	0.32	0.34	62	67	13-136	8	20	
Heptachlor	ug/L	ND	.5	.5	0.25	0.28	50	56	10-134	10	20	
Heptachlor epoxide	ug/L	ND	.5	.5	0.39	0.41	78	82	13-147	5	20	
Methoxychlor	ug/L	ND	.5	.5	.33J	.34J	63	66	17-166		20	
Decachlorobiphenyl (S)	%						62	72	14-126			
Decachlorobiphenyl (S)	%						62	71	14-126			
Tetrachloro-m-xylene (S)	%						57	66	10-119			
Tetrachloro-m-xylene (S)	%						52	62	10-119			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

QC Batch:	OEXT/37547	Analysis Method:	EPA 8082
QC Batch Method:	EPA 3510	Analysis Description:	8082 GCS PCB Mod
Associated Lab Samples:	50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009		

METHOD BLANK:	1194431	Matrix:	Water
Associated Lab Samples:	50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009		

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
PCB-1016 (Aroclor 1016)	ug/L	ND	0.50	12/02/14 01:40	
PCB-1221 (Aroclor 1221)	ug/L	ND	0.50	12/02/14 01:40	
PCB-1232 (Aroclor 1232)	ug/L	ND	0.50	12/02/14 01:40	
PCB-1242 (Aroclor 1242)	ug/L	ND	0.50	12/02/14 01:40	
PCB-1248 (Aroclor 1248)	ug/L	ND	0.50	12/02/14 01:40	
PCB-1254 (Aroclor 1254)	ug/L	ND	0.50	12/02/14 01:40	
PCB-1260 (Aroclor 1260)	ug/L	ND	0.50	12/02/14 01:40	
Tetrachloro-m-xylene (S)	%.	67	32-115	12/02/14 01:40	

LABORATORY CONTROL SAMPLE: 1194432

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
PCB-1016 (Aroclor 1016)	ug/L	5	4.6	93	50-114	
PCB-1260 (Aroclor 1260)	ug/L	5	4.5	90	44-120	
Tetrachloro-m-xylene (S)	%.			74	32-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1194433 1194434

Parameter	Units	50107512005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	Qual
PCB-1016 (Aroclor 1016)	ug/L	ND	10.2	10.2	10.2	9.2	100	90	41-124	10	20
PCB-1260 (Aroclor 1260)	ug/L	ND	10.2	10.2	9.6	8.7	94	85	34-127	10	20
Tetrachloro-m-xylene (S)	%.						90	81	32-115		

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

QC Batch:	OEXT/3533	Analysis Method:	EPA 8151
QC Batch Method:	EPA 3535A	Analysis Description:	8151A GCS Herbicides
Associated Lab Samples:	50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009		

METHOD BLANK:	75149	Matrix:	Water
Associated Lab Samples:	50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009		

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
2,4,5-T	ug/L	ND	2.0	12/03/14 19:47	
2,4,5-TP (Silvex)	ug/L	ND	2.0	12/03/14 19:47	
2,4-D	ug/L	ND	2.0	12/03/14 19:47	
2,4-DCAA (S)	%.	66	10-166	12/03/14 19:47	
2,4-DCAA (S)	%.	67	10-166	12/03/14 19:47	

LABORATORY CONTROL SAMPLE: 75150

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
2,4,5-T	ug/L	2	1.6J	81	10-169	
2,4,5-TP (Silvex)	ug/L	2	1.8J	90	22-158	
2,4-D	ug/L	20	17.6	88	10-151	
2,4-DCAA (S)	%.			106	10-166	
2,4-DCAA (S)	%.			104	10-166	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 75151 75152

Parameter	Units	50107512005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
2,4,5-T	ug/L	ND	2	2	1.4J	1.4J	72	69	10-168		20	
2,4,5-TP (Silvex)	ug/L	ND	2	2	1.6J	1.5J	79	74	16-164		20	
2,4-D	ug/L	ND	20	20	16.3	15.4	82	77	10-160	6	20	
2,4-DCAA (S)	%.						90	85	10-166			
2,4-DCAA (S)	%.						87	80	10-166			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

QC Batch:	OEXT/37545	Analysis Method:	EPA 8270 by SIM
QC Batch Method:	EPA 3510	Analysis Description:	8270 Water PAH
Associated Lab Samples:	50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009		

METHOD BLANK: 1194186

Matrix: Water

Associated Lab Samples: 50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1-Methylnaphthalene	ug/L	ND	1.0	11/25/14 08:07	
2-Methylnaphthalene	ug/L	ND	1.0	11/25/14 08:07	
Acenaphthene	ug/L	ND	1.0	11/25/14 08:07	
Acenaphthylene	ug/L	ND	1.0	11/25/14 08:07	
Anthracene	ug/L	ND	0.10	11/25/14 08:07	
Benzo(a)anthracene	ug/L	ND	0.10	11/25/14 08:07	
Benzo(a)pyrene	ug/L	ND	0.10	11/25/14 08:07	
Benzo(b)fluoranthene	ug/L	ND	0.10	11/25/14 08:07	
Benzo(g,h,i)perylene	ug/L	ND	0.10	11/25/14 08:07	
Benzo(k)fluoranthene	ug/L	ND	0.10	11/25/14 08:07	
Chrysene	ug/L	ND	0.50	11/25/14 08:07	
Dibenz(a,h)anthracene	ug/L	ND	0.10	11/25/14 08:07	
Fluoranthene	ug/L	ND	1.0	11/25/14 08:07	
Fluorene	ug/L	ND	1.0	11/25/14 08:07	
Indeno(1,2,3-cd)pyrene	ug/L	ND	0.10	11/25/14 08:07	
Naphthalene	ug/L	ND	1.0	11/25/14 08:07	
Phenanthrene	ug/L	ND	1.0	11/25/14 08:07	
Pyrene	ug/L	ND	1.0	11/25/14 08:07	
2-Fluorobiphenyl (S)	%	80	21-114	11/25/14 08:07	
p-Terphenyl-d14 (S)	%	92	25-131	11/25/14 08:07	

LABORATORY CONTROL SAMPLE: 1194187

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1-Methylnaphthalene	ug/L	10	7.3	73	29-112	
2-Methylnaphthalene	ug/L	10	6.6	66	29-110	
Acenaphthene	ug/L	10	7.4	74	39-117	
Acenaphthylene	ug/L	10	7.4	74	40-120	
Anthracene	ug/L	10	7.6	76	48-126	
Benzo(a)anthracene	ug/L	10	7.0	70	51-134	
Benzo(a)pyrene	ug/L	10	5.7	57	48-141	
Benzo(b)fluoranthene	ug/L	10	6.2	62	49-139	
Benzo(g,h,i)perylene	ug/L	10	4.8	48	44-134	
Benzo(k)fluoranthene	ug/L	10	5.6	56	48-140	
Chrysene	ug/L	10	7.0	70	53-136	
Dibenz(a,h)anthracene	ug/L	10	4.6	46	44-132	
Fluoranthene	ug/L	10	7.8	78	50-135	
Fluorene	ug/L	10	7.3	73	44-124	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

LABORATORY CONTROL SAMPLE: 1194187

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Indeno(1,2,3-cd)pyrene	ug/L	10	4.7	47	45-132	
Naphthalene	ug/L	10	7.0	70	30-112	
Phenanthrene	ug/L	10	7.5	75	47-128	
Pyrene	ug/L	10	7.4	74	50-134	
2-Fluorobiphenyl (S)	%			65	21-114	
p-Terphenyl-d14 (S)	%			66	25-131	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1194188 1194189

Parameter	Units	50107512005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	Qual
1-Methylnaphthalene	ug/L	ND	21.7	21.7	17.3	16.0	80	74	10-135	8	20
2-Methylnaphthalene	ug/L	ND	21.7	21.7	16.1	14.8	74	68	16-116	8	20
Acenaphthene	ug/L	ND	21.7	21.7	17.2	15.9	79	73	28-116	8	20
Acenaphthylene	ug/L	ND	21.7	21.7	17.6	16.0	81	74	34-115	9	20
Anthracene	ug/L	ND	21.7	21.7	17.5	16.9	81	78	39-121	4	20
Benzo(a)anthracene	ug/L	ND	21.7	21.7	14.9	14.0	69	64	31-127	7	20
Benzo(a)pyrene	ug/L	ND	21.7	21.7	12.2	11.4	56	52	10-121	7	20
Benzo(b)fluoranthene	ug/L	ND	21.7	21.7	13.1	12.3	60	57	10-119	6	20
Benzo(g,h,i)perylene	ug/L	ND	21.7	21.7	11.2	10.5	52	48	10-108	7	20
Benzo(k)fluoranthene	ug/L	ND	21.7	21.7	12.8	12.1	59	55	10-118	6	20
Chrysene	ug/L	ND	21.7	21.7	15.1	14.3	70	66	32-127	5	20
Dibenz(a,h)anthracene	ug/L	ND	21.7	21.7	10.7	10	49	46	10-104	7	20
Fluoranthene	ug/L	ND	21.7	21.7	18.2	17.4	84	80	38-131	4	20
Fluorene	ug/L	ND	21.7	21.7	17.8	16.1	82	74	33-121	10	20
Indeno(1,2,3-cd)pyrene	ug/L	ND	21.7	21.7	10.8	10.0	50	46	10-108	7	20
Naphthalene	ug/L	ND	21.7	21.7	17.4	15.8	80	72	16-119	10	20
Phenanthrene	ug/L	ND	21.7	21.7	17.7	16.9	81	78	32-130	4	20
Pyrene	ug/L	ND	21.7	21.7	17.2	16.2	79	74	39-131	6	20
2-Fluorobiphenyl (S)	%						75	68	21-114		
p-Terphenyl-d14 (S)	%						69	64	25-131		

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

QC Batch:	OEXT/37544	Analysis Method:	EPA 8270
QC Batch Method:	EPA 3510	Analysis Description:	8270 Water Scan
Associated Lab Samples:	50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009		

METHOD BLANK: 1194178

Matrix: Water

Associated Lab Samples: 50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
2,4,5-Trichlorophenol	ug/L	ND	10.0	11/25/14 14:43	
2,4,6-Trichlorophenol	ug/L	ND	10.0	11/25/14 14:43	
2,4-Dichlorophenol	ug/L	ND	10.0	11/25/14 14:43	
2,4-Dimethylphenol	ug/L	ND	10.0	11/25/14 14:43	
2,4-Dinitrophenol	ug/L	ND	50.0	11/25/14 14:43	
2,4-Dinitrotoluene	ug/L	ND	10.0	11/25/14 14:43	
2,6-Dinitrotoluene	ug/L	ND	10.0	11/25/14 14:43	
2-Chloronaphthalene	ug/L	ND	10.0	11/25/14 14:43	
2-Chlorophenol	ug/L	ND	10.0	11/25/14 14:43	
2-Methylphenol(o-Cresol)	ug/L	ND	10.0	11/25/14 14:43	
2-Nitroaniline	ug/L	ND	50.0	11/25/14 14:43	
2-Nitrophenol	ug/L	ND	10.0	11/25/14 14:43	
3&4-Methylphenol(m&p Cresol)	ug/L	ND	20.0	11/25/14 14:43	
3,3'-Dichlorobenzidine	ug/L	ND	20.0	11/25/14 14:43	
3-Nitroaniline	ug/L	ND	50.0	11/25/14 14:43	
4,6-Dinitro-2-methylphenol	ug/L	ND	50.0	11/25/14 14:43	
4-Bromophenylphenyl ether	ug/L	ND	10.0	11/25/14 14:43	
4-Chloro-3-methylphenol	ug/L	ND	20.0	11/25/14 14:43	
4-Chloroaniline	ug/L	ND	20.0	11/25/14 14:43	
4-Chlorophenylphenyl ether	ug/L	ND	10.0	11/25/14 14:43	
4-Nitroaniline	ug/L	ND	50.0	11/25/14 14:43	
4-Nitrophenol	ug/L	ND	50.0	11/25/14 14:43	
Benzyl alcohol	ug/L	ND	20.0	11/25/14 14:43	
bis(2-Chloroethoxy)methane	ug/L	ND	10.0	11/25/14 14:43	
bis(2-Chloroethyl) ether	ug/L	ND	10.0	11/25/14 14:43	
bis(2-Chloroisopropyl) ether	ug/L	ND	5.0	11/25/14 14:43	
bis(2-Ethylhexyl)phthalate	ug/L	ND	5.0	11/25/14 14:43	
bis(2chloro1methylethyl) ether	ug/L	ND	5.0	11/25/14 14:43	
Butylbenzylphthalate	ug/L	ND	10.0	11/25/14 14:43	
Di-n-butylphthalate	ug/L	ND	10.0	11/25/14 14:43	
Di-n-octylphthalate	ug/L	ND	10.0	11/25/14 14:43	
Dibenzofuran	ug/L	ND	10.0	11/25/14 14:43	
Diethylphthalate	ug/L	ND	10.0	11/25/14 14:43	
Dimethylphthalate	ug/L	ND	10.0	11/25/14 14:43	
Hexachloro-1,3-butadiene	ug/L	ND	5.0	11/25/14 14:43	
Hexachlorobenzene	ug/L	ND	10.0	11/25/14 14:43	
Hexachlorocyclopentadiene	ug/L	ND	20.0	11/25/14 14:43	
Hexachloroethane	ug/L	ND	10.0	11/25/14 14:43	
Isophorone	ug/L	ND	10.0	11/25/14 14:43	
N-Nitroso-di-n-propylamine	ug/L	ND	10.0	11/25/14 14:43	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

METHOD BLANK: 1194178

Matrix: Water

Associated Lab Samples: 50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
N-Nitrosodiphenylamine	ug/L	ND	10.0	11/25/14 14:43	
Nitrobenzene	ug/L	ND	10.0	11/25/14 14:43	
Pentachlorophenol	ug/L	ND	50.0	11/25/14 14:43	
Phenol	ug/L	ND	10.0	11/25/14 14:43	
2,4,6-Tribromophenol (S)	%	90	31-161	11/25/14 14:43	
2-Fluorophenol (S)	%	29	10-67	11/25/14 14:43	
Nitrobenzene-d5 (S)	%	84	29-126	11/25/14 14:43	
Phenol-d5 (S)	%	17	10-47	11/25/14 14:43	

LABORATORY CONTROL SAMPLE: 1194179

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
2,4-Dinitrotoluene	ug/L	100	81.1	81	36-126	
2-Chlorophenol	ug/L	100	55.2	55	40-98	
4-Chloro-3-methylphenol	ug/L	100	71.5	71	43-113	
4-Nitrophenol	ug/L	100	ND	12	10-42	
N-Nitroso-di-n-propylamine	ug/L	100	92.5	93	43-120	
Pentachlorophenol	ug/L	100	67.5	68	31-125	
Phenol	ug/L	100	14.8	15	10-37	
2,4,6-Tribromophenol (S)	%			84	31-161	
2-Fluorophenol (S)	%			25	10-67	
Nitrobenzene-d5 (S)	%			76	29-126	
Phenol-d5 (S)	%			15	10-47	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1194180

1194181

Parameter	Units	50107512005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
2,4-Dinitrotoluene	ug/L	ND	217	217	212	183	98	84	34-124	15	20	
2-Chlorophenol	ug/L	ND	217	217	178	149	82	69	34-106	18	20	
4-Chloro-3-methylphenol	ug/L	ND	217	217	201	180	92	83	41-116	11	20	
4-Nitrophenol	ug/L	ND	217	217	ND	ND	37	33	10-78		20	
N-Nitroso-di-n-propylamine	ug/L	ND	217	217	241	206	111	95	40-115	16	20	
Pentachlorophenol	ug/L	ND	217	217	194	172	89	79	30-128	12	20	
Phenol	ug/L	ND	217	217	71.7	64.7	33	30	10-65	10	20	
2,4,6-Tribromophenol (S)	%						102	89	31-161			
2-Fluorophenol (S)	%						50	43	10-67			
Nitrobenzene-d5 (S)	%						95	78	29-126			
Phenol-d5 (S)	%						33	30	10-47			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

QC Batch:	WET/18574	Analysis Method:	SM 2320B
QC Batch Method:	SM 2320B	Analysis Description:	2320B Alkalinity
Associated Lab Samples:	50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009		

METHOD BLANK:	1197693	Matrix:	Water
Associated Lab Samples:	50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009		

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity, Total as CaCO <sub>3</sub>	mg/L	ND	2.0	12/02/14 12:31	

LABORATORY CONTROL SAMPLE:	1197694					
Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO <sub>3</sub>	mg/L	50	48.5	97	90-110	

SAMPLE DUPLICATE:	1197695					
Parameter	Units	50107512005 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO <sub>3</sub>	mg/L	287	284	1	20	

SAMPLE DUPLICATE:	1197696					
Parameter	Units	50107512009 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO <sub>3</sub>	mg/L	236	238	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

QC Batch:	WET/18498	Analysis Method:	SM 2540C
QC Batch Method:	SM 2540C	Analysis Description:	2540C Total Dissolved Solids
Associated Lab Samples:	50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009		

METHOD BLANK:	1195473	Matrix:	Water
Associated Lab Samples:	50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009		

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	ND	10.0	11/26/14 06:58	

LABORATORY CONTROL SAMPLE: 1195474						
Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	300	298	99	80-120	

SAMPLE DUPLICATE: 1195475						
Parameter	Units	50107258049 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	471	491	4	10	

SAMPLE DUPLICATE: 1195476						
Parameter	Units	50107512005 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	1020	1030	1	10	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

QC Batch:	WET/18583	Analysis Method:	SM 4500F/C
QC Batch Method:	SM 4500F/C	Analysis Description:	SM4500FC Fluoride Water
Associated Lab Samples:	50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009		

METHOD BLANK:	1197771	Matrix:	Water
Associated Lab Samples:	50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009		

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Fluoride	mg/L	ND	0.10	12/02/14 09:33	

LABORATORY CONTROL SAMPLE: 1197772

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Fluoride	mg/L	1	1.1	108	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1197773 1197774

Parameter	Units	50107512005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Fluoride	mg/L	0.64	1	1	1.7	1.7	104	105	90-110	1	20	

MATRIX SPIKE SAMPLE: 1197775

Parameter	Units	50107623001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Fluoride	mg/L	0.19	1	1.2	106	90-110	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

QC Batch:	WET/18432	Analysis Method:	SM 4500-S2-D
QC Batch Method:	SM 4500-S2-D	Analysis Description:	4500S2D Sulfide Water
Associated Lab Samples:	50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009		

METHOD BLANK:	1193348	Matrix:	Water
Associated Lab Samples:	50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009		

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfide	mg/L	ND	0.10	11/21/14 16:33	

LABORATORY CONTROL SAMPLE: 1193349

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfide	mg/L	.5	0.50	100	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1193350 1193351

Parameter	Units	50107512005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Sulfide	mg/L	ND	.5	.5	0.31	0.28	61	57	90-110	8	20	M3

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

QC Batch:	WETA/13813	Analysis Method:	EPA 335.4
QC Batch Method:	EPA 335.4	Analysis Description:	335.4 Cyanide, Total
Associated Lab Samples:	50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009		

METHOD BLANK:	1194965	Matrix:	Water
Associated Lab Samples:	50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009		

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Cyanide	mg/L	ND	0.010	11/29/14 13:20	

LABORATORY CONTROL SAMPLE:		1194966				
Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cyanide	mg/L	.2	0.21	107	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE:		1194967		1194968								
Parameter	Units	50107512005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cyanide	mg/L	ND	.2	.2	0.19	0.22	97	108	90-110	10	20	

MATRIX SPIKE SAMPLE:		1194969					
		50107525004	Spike	MS	MS	% Rec	
Parameter	Units	Result	Conc.	Result	% Rec	Limits	Qualifiers
Cyanide	mg/L	0.029	.2	0.24	104	90-110	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

QC Batch:	WETA/13803	Analysis Method:	EPA 350.1
QC Batch Method:	EPA 350.1	Analysis Description:	350.1 Ammonia
Associated Lab Samples:	50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009		

METHOD BLANK:	1194644	Matrix:	Water
Associated Lab Samples:	50107512001, 50107512002, 50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009		

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Ammonia	mg/L	ND	0.10	11/25/14 16:10	

LABORATORY CONTROL SAMPLE: 1194645						
Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Ammonia	mg/L	1.7	1.8	110	90-110	

MATRIX SPIKE SAMPLE:		1194646					
		10288636016	Spike	MS	MS	% Rec	
Parameter	Units	Result	Conc.	Result	% Rec	Limits	Qualifiers
Nitrogen, Ammonia	mg/L	ND	1.7	1.9	110	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1194647													1194648			
Parameter	Units	50107512005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual				
Nitrogen, Ammonia	mg/L	0.67	1.7	1.7	2.5	2.6	111	114	90-110	3	20	M3				

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

QC Batch: WETA/13788

Analysis Method: EPA 353.2

QC Batch Method: EPA 353.2

Analysis Description: 353.2 Nitrate + Nitrite, Unpres.

Associated Lab Samples: 50107512001, 50107512002

METHOD BLANK: 1193562

Matrix: Water

Associated Lab Samples: 50107512001, 50107512002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Nitrate	mg/L	ND	0.10	11/22/14 07:55	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

QC Batch:	WETA/13789	Analysis Method:	EPA 353.2
QC Batch Method:	EPA 353.2	Analysis Description:	353.2 Nitrate + Nitrite, Unpres.
Associated Lab Samples:	50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009		

METHOD BLANK:	1193567	Matrix:	Water
Associated Lab Samples:	50107512003, 50107512004, 50107512005, 50107512006, 50107512007, 50107512008, 50107512009		

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Nitrate	mg/L	ND	0.10	11/22/14 08:25	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALIFIERS

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

### DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

### LABORATORIES

PASI-I Pace Analytical Services - Indianapolis

PASI-N Pace Analytical Services - New Orleans

### ANALYTE QUALIFIERS

1d Surrogate recovery outside laboratory control limits due to matrix interferences; confirmed by similar results from analysis of an in-hold re-extract sample on 12/03/14 at 15:55 on 50MSS9. TBP 12/04/14

2d Surrogate recovery outside laboratory control limits due to matrix interferences; confirmed by similar results from analysis of an in-hold re-extract sample on 12/03/14 at 15:55 on 50MSS9. TBP 12/04/14

M3 Matrix spike recovery was outside laboratory control limits due to matrix interferences.

N2 The lab does not hold TNI accreditation for this parameter.

P6 Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

R1 RPD value was outside control limits.

S3 Surrogate recovery exceeded laboratory control limits. Analyte presence below reporting limits in associated samples. Results unaffected by high bias.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
50107512001	MW-4S	EPA 3535	OEXT/3518	EPA 8081	GCSV/2974
50107512002	MW-5S	EPA 3535	OEXT/3518	EPA 8081	GCSV/2974
50107512003	MW-9S	EPA 3535	OEXT/3518	EPA 8081	GCSV/2974
50107512004	MW-8S	EPA 3535	OEXT/3518	EPA 8081	GCSV/2974
50107512005	MW-6D	EPA 3535	OEXT/3518	EPA 8081	GCSV/2974
50107512006	MW-6S	EPA 3535	OEXT/3518	EPA 8081	GCSV/2974
50107512007	MW-7S	EPA 3535	OEXT/3518	EPA 8081	GCSV/2974
50107512008	MW-10S	EPA 3535	OEXT/3518	EPA 8081	GCSV/2974
50107512009	MW-10D	EPA 3535	OEXT/3518	EPA 8081	GCSV/2974
50107512001	MW-4S	EPA 3510	OEXT/37547	EPA 8082	GCSV/13590
50107512002	MW-5S	EPA 3510	OEXT/37547	EPA 8082	GCSV/13590
50107512003	MW-9S	EPA 3510	OEXT/37547	EPA 8082	GCSV/13590
50107512004	MW-8S	EPA 3510	OEXT/37547	EPA 8082	GCSV/13590
50107512005	MW-6D	EPA 3510	OEXT/37547	EPA 8082	GCSV/13590
50107512006	MW-6S	EPA 3510	OEXT/37547	EPA 8082	GCSV/13590
50107512007	MW-7S	EPA 3510	OEXT/37547	EPA 8082	GCSV/13590
50107512008	MW-10S	EPA 3510	OEXT/37547	EPA 8082	GCSV/13590
50107512009	MW-10D	EPA 3510	OEXT/37547	EPA 8082	GCSV/13590
50107512001	MW-4S	EPA 3535A	OEXT/3533	EPA 8151	GCSV/2918
50107512002	MW-5S	EPA 3535A	OEXT/3533	EPA 8151	GCSV/2918
50107512003	MW-9S	EPA 3535A	OEXT/3533	EPA 8151	GCSV/2918
50107512004	MW-8S	EPA 3535A	OEXT/3533	EPA 8151	GCSV/2918
50107512005	MW-6D	EPA 3535A	OEXT/3533	EPA 8151	GCSV/2918
50107512006	MW-6S	EPA 3535A	OEXT/3533	EPA 8151	GCSV/2918
50107512007	MW-7S	EPA 3535A	OEXT/3533	EPA 8151	GCSV/2918
50107512008	MW-10S	EPA 3535A	OEXT/3533	EPA 8151	GCSV/2918
50107512009	MW-10D	EPA 3535A	OEXT/3533	EPA 8151	GCSV/2918
50107512001	MW-4S	EPA 3010	MPRP/14664	EPA 6010	ICP/17557
50107512002	MW-5S	EPA 3010	MPRP/14664	EPA 6010	ICP/17557
50107512003	MW-9S	EPA 3010	MPRP/14664	EPA 6010	ICP/17557
50107512004	MW-8S	EPA 3010	MPRP/14664	EPA 6010	ICP/17557
50107512005	MW-6D	EPA 3010	MPRP/14664	EPA 6010	ICP/17557
50107512006	MW-6S	EPA 3010	MPRP/14664	EPA 6010	ICP/17557
50107512007	MW-7S	EPA 3010	MPRP/14664	EPA 6010	ICP/17557
50107512008	MW-10S	EPA 3010	MPRP/14664	EPA 6010	ICP/17557
50107512009	MW-10D	EPA 3010	MPRP/14664	EPA 6010	ICP/17557
50107512001	MW-4S	EPA 7470	MERP/5863	EPA 7470	MERC/6536
50107512002	MW-5S	EPA 7470	MERP/5863	EPA 7470	MERC/6536
50107512003	MW-9S	EPA 7470	MERP/5863	EPA 7470	MERC/6536
50107512004	MW-8S	EPA 7470	MERP/5863	EPA 7470	MERC/6536
50107512005	MW-6D	EPA 7470	MERP/5863	EPA 7470	MERC/6536
50107512006	MW-6S	EPA 7470	MERP/5863	EPA 7470	MERC/6536
50107512007	MW-7S	EPA 7470	MERP/5863	EPA 7470	MERC/6536
50107512008	MW-10S	EPA 7470	MERP/5863	EPA 7470	MERC/6536
50107512009	MW-10D	EPA 7470	MERP/5863	EPA 7470	MERC/6536
50107512001	MW-4S	EPA 3510	OEXT/37545	EPA 8270 by SIM	MSSV/16617

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
50107512002	MW-5S	EPA 3510	OEXT/37545	EPA 8270 by SIM	MSSV/16617
50107512003	MW-9S	EPA 3510	OEXT/37545	EPA 8270 by SIM	MSSV/16617
50107512004	MW-8S	EPA 3510	OEXT/37545	EPA 8270 by SIM	MSSV/16617
50107512005	MW-6D	EPA 3510	OEXT/37545	EPA 8270 by SIM	MSSV/16617
50107512006	MW-6S	EPA 3510	OEXT/37545	EPA 8270 by SIM	MSSV/16617
50107512007	MW-7S	EPA 3510	OEXT/37545	EPA 8270 by SIM	MSSV/16617
50107512008	MW-10S	EPA 3510	OEXT/37545	EPA 8270 by SIM	MSSV/16617
50107512009	MW-10D	EPA 3510	OEXT/37545	EPA 8270 by SIM	MSSV/16617
50107512001	MW-4S	EPA 3510	OEXT/37544	EPA 8270	MSSV/16622
50107512002	MW-5S	EPA 3510	OEXT/37544	EPA 8270	MSSV/16622
50107512003	MW-9S	EPA 3510	OEXT/37544	EPA 8270	MSSV/16622
50107512004	MW-8S	EPA 3510	OEXT/37544	EPA 8270	MSSV/16622
50107512005	MW-6D	EPA 3510	OEXT/37544	EPA 8270	MSSV/16622
50107512006	MW-6S	EPA 3510	OEXT/37544	EPA 8270	MSSV/16622
50107512007	MW-7S	EPA 3510	OEXT/37544	EPA 8270	MSSV/16622
50107512008	MW-10S	EPA 3510	OEXT/37544	EPA 8270	MSSV/16622
50107512009	MW-10D	EPA 3510	OEXT/37544	EPA 8270	MSSV/16622
50107512001	MW-4S	EPA 8260	MSV/71427		
50107512010	Trip Blank	EPA 8260	MSV/71427		
50107512001	MW-4S	SM 2320B	WET/18574		
50107512002	MW-5S	SM 2320B	WET/18574		
50107512003	MW-9S	SM 2320B	WET/18574		
50107512004	MW-8S	SM 2320B	WET/18574		
50107512005	MW-6D	SM 2320B	WET/18574		
50107512006	MW-6S	SM 2320B	WET/18574		
50107512007	MW-7S	SM 2320B	WET/18574		
50107512008	MW-10S	SM 2320B	WET/18574		
50107512009	MW-10D	SM 2320B	WET/18574		
50107512001	MW-4S	SM 2540C	WET/18498		
50107512002	MW-5S	SM 2540C	WET/18498		
50107512003	MW-9S	SM 2540C	WET/18498		
50107512004	MW-8S	SM 2540C	WET/18498		
50107512005	MW-6D	SM 2540C	WET/18498		
50107512006	MW-6S	SM 2540C	WET/18498		
50107512007	MW-7S	SM 2540C	WET/18498		
50107512008	MW-10S	SM 2540C	WET/18498		
50107512009	MW-10D	SM 2540C	WET/18498		
50107512001	MW-4S	SM 4500F/C	WET/18583		
50107512002	MW-5S	SM 4500F/C	WET/18583		
50107512003	MW-9S	SM 4500F/C	WET/18583		
50107512004	MW-8S	SM 4500F/C	WET/18583		
50107512005	MW-6D	SM 4500F/C	WET/18583		
50107512006	MW-6S	SM 4500F/C	WET/18583		
50107512007	MW-7S	SM 4500F/C	WET/18583		
50107512008	MW-10S	SM 4500F/C	WET/18583		
50107512009	MW-10D	SM 4500F/C	WET/18583		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Karwick Road Nature Park GW

Pace Project No.: 50107512

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
50107512001	MW-4S	SM 4500-S2-D	WET/18432		
50107512002	MW-5S	SM 4500-S2-D	WET/18432		
50107512003	MW-9S	SM 4500-S2-D	WET/18432		
50107512004	MW-8S	SM 4500-S2-D	WET/18432		
50107512005	MW-6D	SM 4500-S2-D	WET/18432		
50107512006	MW-6S	SM 4500-S2-D	WET/18432		
50107512007	MW-7S	SM 4500-S2-D	WET/18432		
50107512008	MW-10S	SM 4500-S2-D	WET/18432		
50107512009	MW-10D	SM 4500-S2-D	WET/18432		
50107512001	MW-4S	EPA 335.4	WETA/13813	EPA 335.4	WETA/13846
50107512002	MW-5S	EPA 335.4	WETA/13813	EPA 335.4	WETA/13846
50107512003	MW-9S	EPA 335.4	WETA/13813	EPA 335.4	WETA/13846
50107512004	MW-8S	EPA 335.4	WETA/13813	EPA 335.4	WETA/13846
50107512005	MW-6D	EPA 335.4	WETA/13813	EPA 335.4	WETA/13846
50107512006	MW-6S	EPA 335.4	WETA/13813	EPA 335.4	WETA/13846
50107512007	MW-7S	EPA 335.4	WETA/13813	EPA 335.4	WETA/13846
50107512008	MW-10S	EPA 335.4	WETA/13813	EPA 335.4	WETA/13846
50107512009	MW-10D	EPA 335.4	WETA/13813	EPA 335.4	WETA/13846
50107512001	MW-4S	EPA 350.1	WETA/13803	EPA 350.1	WETA/13817
50107512002	MW-5S	EPA 350.1	WETA/13803	EPA 350.1	WETA/13817
50107512003	MW-9S	EPA 350.1	WETA/13803	EPA 350.1	WETA/13817
50107512004	MW-8S	EPA 350.1	WETA/13803	EPA 350.1	WETA/13817
50107512005	MW-6D	EPA 350.1	WETA/13803	EPA 350.1	WETA/13817
50107512006	MW-6S	EPA 350.1	WETA/13803	EPA 350.1	WETA/13817
50107512007	MW-7S	EPA 350.1	WETA/13803	EPA 350.1	WETA/13817
50107512008	MW-10S	EPA 350.1	WETA/13803	EPA 350.1	WETA/13817
50107512009	MW-10D	EPA 350.1	WETA/13803	EPA 350.1	WETA/13817
50107512001	MW-4S	EPA 353.2	WETA/13788		
50107512002	MW-5S	EPA 353.2	WETA/13788		
50107512003	MW-9S	EPA 353.2	WETA/13789		
50107512004	MW-8S	EPA 353.2	WETA/13789		
50107512005	MW-6D	EPA 353.2	WETA/13789		
50107512006	MW-6S	EPA 353.2	WETA/13789		
50107512007	MW-7S	EPA 353.2	WETA/13789		
50107512008	MW-10S	EPA 353.2	WETA/13789		
50107512009	MW-10D	EPA 353.2	WETA/13789		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..





CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A  
Required Client Information:

Company: Weaver Boos Consulting  
Address: 7121 Grape Rd  
Grange, IN 46530  
Email To: ss@weaverboos.com  
Phone: 574-271-3477  
Requested Due Date/TAT:

Section B  
Required Project Information:

Report To: Steve Semfor  
Copy To: ahuang@weaverboos.com  
Purchase Order No.:   
Project Name: Palwick Nature Park GW  
Project Number: 1873-356-04-00

Section C  
Invoice Information:

Attention: Lyle Cable  
Company Name: Pace Analytical  
Address: 7226 Moller Rd.  
Pace Quote Reference:   
Pace Project Manager:   
Pace Profile #:

Section D  
Required Client Information:

Matrix Codes  
Drinking Water DW  
Waste Water WW  
Water Product P  
Soil/Solid SL  
Oil OL  
Wipe WI  
Air AR  
Tissue TS  
Other OT

Sample ID  
(A-Z, 0-9, /, -)  
Sample IDs MUST BE UNIQUE

ITEM #	Matrix Codes	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	SAMPLE TEMP AT COLLECTION		# OF CONTAINERS	Preservatives		Analysis Test	Requested Analysis Filtered (Y/N)												Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
		COMPOSITE START	COMPOSITE END/GRAB			DATE	TIME		H <sub>2</sub> SO <sub>4</sub>	HNO <sub>3</sub>	HCl	NaOH	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	Methanol	Other										
1	MW-4S				WT	11/20	9:00	16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	50107512
2	MW-5S				WT	11/20	10:30	13	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	50107512
3	MW-9S				WT	11/20	11:30	13	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	50107512
4	MW-8S				WT	11/20	12:30	13	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	50107512
5	MW-6D				WT	11/20	13:10	13	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	50107512
6	MW-6S				WT	11/20	14:00	13	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	50107512
7	MW-7S				WT	11/20	14:40	13	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	50107512
8	MW-10S				WT	11/20	15:20	13	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	50107512
9	MW-10D				WT	11/20	16:00	13	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	50107512
10	60 MS/MSD				WT	11/20	13:10	13	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	50107512
11	Trap Blank				WT	—	—	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	50107512
12																									

ADDITIONAL COMMENTS

please refer to bottle  
order for complete analyte  
1154 only MW-4S  
has vials / vials.

RELINQUISHED BY / AFFILIATION

Alex Huang/Weaver Boos

DATE

11/20

TIME

20:00

ACCEPTED BY / AFFILIATION

Marcia Bennett/Pace

DATE

11/20/14

TIME

12:00

SAMPLE CONDITIONS

Y

Temp in °C

300 below

Received on

Y

Custody

Y

Sealed Cooler

Y

Samples Intact

Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Alex Huang

SIGNATURE OF SAMPLER: Alex Huang

DATE Signed (MM/DD/YY): 11/20/14

ORIGINAL

0.5°C, 0.0°C, 1.9°C, 0.3°C  
1.7°C, 0.7°C, 1.4°C, 0.1°C  
Fedorov, 7801 5448 3095, 7801 5448 3062  
8066 0864 3864 7801 5448 3073, 7801 5448 3040  
7801 5448 3030, 7801 5448 3084, 7801 5448 3051

F-ALL-Q-020rev.07, 15-May-2007



# Sample Condition Upon Receipt

Face Analytical

Client Name: Weaver Boos

Project # 501075R

Courier: ☒ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other

Tracking #: 9066 0864 2864, 78015448 3073, 78015448 3095, 78015448 3040  
78015448 3030, 78015448 3084, 78015448 3062, 78015448 3051

Custody Seal on Cooler/Box Present: ☒ yes ☐ no Seals intact: ☒ yes ☐ no

Date/Time 5036A kits placed in freezer

Packing Material: ☒ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other

Thermometer 1 2 3 4 5 6 A B C D E F

Type of Ice: Wet Blue None

☒ Samples on ice, cooling process has begun

Cooler Temperature 0.5°C 0.0°C 1.9°C 0.3°C

Ice Visible in Sample Containers:

☐ yes ☒ no

(Corrected, if applicable) 1.7°C 0.7°C 1.4°C 0.1°C  
Temp should be above freezing to 6°C

Comments:

Date and Initials of person examining contents: MB 11/21/14

Chain of Custody Present: ☒ Yes ☐ No ☐ N/A  
Chain of Custody Filled Out: ☒ Yes ☐ No ☐ N/A  
Chain of Custody Relinquished: ☒ Yes ☐ No ☐ N/A  
Sampler Name & Signature on COC: ☒ Yes ☐ No ☐ N/A  
Short Hold Time Analysis (<72hr): ☐ Yes ☐ No ☒ N/A  
Rush Turn Around Time Requested: ☐ Yes ☐ No ☒ N/A  
Containers Intact: ☐ Yes ☒ No ☐ N/A  
Sample Labels match COC: ☒ Yes ☐ No ☐ N/A  
-Includes date/time/ID/Analysis  
All containers needing acid/base pres. have been checked? ☒ Yes ☐ No ☐ N/A  
exceptions: VOA, coliform, TOC, O&G  
All containers needing preservation are found to be in compliance with EPA recommendation (<2, >9, >12) unless otherwise noted.  
Headspace in VOA Vials (>6mm): ☐ Yes ☒ No ☐ N/A  
Trip Blank Present: ☒ Yes ☐ No ☐ N/A  
Trip Blank Custody Seals Present: ☒ Yes ☐ No ☐ N/A

1.   
2.   
3.   
4.   
5.   
6.   
7. 1AGIV Gr MW-9S recw broken MB  
8.   
9. (Circles) HNO3 H2SO4 NaOH NaOH/zinc Acetate  
BP3C for MW-10D = pH12 MB  
10.   
11.   
12.   
13.   
14.

## Project Manager Review

Samples Arrived within Hold Time: ☒ Yes ☐ No ☐ N/A  
Sufficient Volume: ☒ Yes ☐ No ☐ N/A  
Correct Containers Used: ☒ Yes ☐ No ☐ N/A

Client Notification/ Resolution:

Field Data Required?

Y / N

Person Contacted: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Comments/ Resolution: \_\_\_\_\_

Project Manager Review:

Date: \_\_\_\_\_



# Sample Container Count



CLIENT: Weaver Boos

COC PAGE 1 of 1

COC ID# 1880219

Project # 50107512

Sample Line Item	DG9H	AG1U	WG1U	AG0U	R	4/6	BP2N	BP2U	BP2S	BP3N	BP3U	BP3S	AG3S	AG1H	BP3C	BP3Z	SPST	pH < 2	pH > 12	Comments
1	3	8						1												
2		8						1												
3		8						1												8 AG1U new but 1 reed broken per 4/21/14
4		8						1												
5		16					2			2										
6		8					1													
7		8					1													
8		8					1													
9		8					1													
10																				
11	1																			
12																				

see line 5 MB 11/21/14

Container Codes	DG9H	40mL HCL	amber vial	AG0U	100mL	unpreserved	amber glass	BP1N	1 liter	HNO3	plastic	DG9P	40mL	TSP	amber vial
AG1U		1 liter	unpreserved	amber glass	AG1H	1 liter	HCL	BP1S	1 liter	H2SO4	plastic	DG9S	40mL	H2SO4	amber vial
WG1U		4oz	clear soil jar	AG1S	1 liter	H2SO4	amber glass	BP1U	1 liter	unpreserved	plastic	DG9T	40mL	Na Thio	amber vial
R		terra core kit	AG1T	1 liter	Na Thiosulfate	amber glass	BP1Z	1 liter	NaOH, Zn, Ac			DG9U	40mL	unpreserved	amber vial
BP2N		500mL	HNO3 plastic	AG2N	500mL	HNO3	amber glass	BP2A	500mL	NaOH, Asc Acid	plastic		Wipe/Swab		
BP2U		500mL	unpreserved plastic	AG2S	500mL	H2SO4	amber glass	BP2O	500mL	NaOH plastic		JG1U	4oz	unpreserved	amber wide
BP2S		500mL	H2SO4 plastic	AG2U	500mL	unpreserved	amber glass	BP2Z	500mL	NaOH, Zn Ac		U	Summa Can		
BP3N		250mL	HNO3 plastic	AG3U	250mL	unpreserved	amber glass	AF	Air Filter			VG9H	40mL	HCL	clear vial
BP3U		250mL	unpreserved plastic	BG1H	1 liter	HCL	clear glass	BP3C	250mL	NaOH plastic		VG9T	40mL	Na Thio	clear vial
BP3S		250mL	H2SO4 plastic	BG1S	1 liter	H2SO4	clear glass	BP3Z	250mL	NaOH, Zn Ac	plastic	VG9U	40mL	unpreserved	clear vial
AG3S		250mL	H2SO4 glass	BG1T	1 liter	Na Thiosulfate	clear glass	C	Air Cassettes			VSG	Headspace	septa vial & HCL	
AG1S		1 liter	H2SO4	BG1U	1 liter	unpreserved	glass	DG9B	40mL	Na Bisulfate	amber vial	WGFX	4oz	wide jar w/hexane	wipe
BP1U		1 liter	unpreserved plastic	BP1A	1 liter	NaOH, Asc Acid	plastic	DG9M	40mL	MeOH	clear vial	ZPLC	Ziploc	Bag	





24-Nov-2014

Steve Stanford  
Weaver Boos Consultants  
7121 Grape Road  
Granger, IN 46530

Re: **Karwick IDW (1873-356-04-00)**

Work Order: **1411698**

Dear Steve,

ALS Environmental received 1 sample on 12-Nov-2014 04:30 PM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

Sample results are compliant with NELAP standard requirements and QC results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 29.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

*Chad Whelton*

Electronically approved by: Chad Whelton

Chad Whelton  
Project Manager



Certificate No: MN 532786

### Report of Laboratory Analysis

ADDRESS 3352 128th Avenue Holland, Michigan 49424-9263 | PHONE (616) 399-6070 | FAX (616) 399-6185

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Environmental 

[www.alsglobal.com](http://www.alsglobal.com)

RIGHT SOLUTIONS RIGHT PARTNER



---

**Client:** Weaver Boos Consultants  
**Project:** Karwick IDW (1873-356-04-00)  
**Work Order:** 1411698

**Work Order Sample Summary**

---

<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
1411698-01	DW-1	Water		11/10/2014 14:20	11/12/2014 16:30	<input type="checkbox"/>



---

**Client:** Weaver Boos Consultants  
**Project:** Karwick IDW (1873-356-04-00)  
**Work Order:** 1411698

---

**Case Narrative**

Batch 65095, Sample 1411698-01B: 2,3,7,8-TCDD was not present in the TIC scan.



**Client:** Weaver Boos Consultants  
**Project:** Karwick IDW (1873-356-04-00)  
**WorkOrder:** 1411698

## **QUALIFIERS, ACRONYMS, UNITS**

<b><u>Qualifier</u></b>	<b><u>Description</u></b>
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

<b><u>Acronym</u></b>	<b><u>Description</u></b>
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

<b><u>Units Reported</u></b>	<b><u>Description</u></b>
µg/L	Micrograms per Liter
as noted	
mg/L	Milligrams per Liter



# ALS Group USA, Corp

Date: 24-Nov-14

Client: Weaver Boos Consultants

Project: Karwick IDW (1873-356-04-00)

Sample ID: DW-1

Collection Date: 11/10/2014 02:20 PM

Work Order: 1411698

Lab ID: 1411698-01

Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>PCBS</b>						
			<b>E608</b>		Prep: E608 / 11/18/14	Analyst: <b>BLM</b>
Aroclor 1016	ND		0.20	µg/L	1	11/18/2014 07:13 PM
Aroclor 1221	ND		0.20	µg/L	1	11/18/2014 07:13 PM
Aroclor 1232	ND		0.20	µg/L	1	11/18/2014 07:13 PM
Aroclor 1242	ND		0.20	µg/L	1	11/18/2014 07:13 PM
Aroclor 1248	ND		0.20	µg/L	1	11/18/2014 07:13 PM
Aroclor 1254	ND		0.20	µg/L	1	11/18/2014 07:13 PM
Aroclor 1260	ND		0.20	µg/L	1	11/18/2014 07:13 PM
Surr: Decachlorobiphenyl	78.0		40-110	%REC	1	11/18/2014 07:13 PM
<b>PRIORITY POLLUTANT PESTICIDES</b>						
			<b>E608</b>			Analyst: <b>BLM</b>
4,4'-DDD	ND		0.020	µg/L	1	11/15/2014 02:15 AM
4,4'-DDE	ND		0.020	µg/L	1	11/15/2014 02:15 AM
4,4'-DDT	ND		0.020	µg/L	1	11/15/2014 02:15 AM
Aldrin	ND		0.020	µg/L	1	11/15/2014 02:15 AM
alpha-BHC	ND		0.020	µg/L	1	11/15/2014 02:15 AM
beta-BHC	ND		0.020	µg/L	1	11/15/2014 02:15 AM
Chlordane, Technical	ND		1.0	µg/L	1	11/15/2014 02:15 AM
delta-BHC	ND		0.020	µg/L	1	11/15/2014 02:15 AM
Dieldrin	ND		0.020	µg/L	1	11/15/2014 02:15 AM
Endosulfan I	ND		0.020	µg/L	1	11/15/2014 02:15 AM
Endosulfan II	ND		0.020	µg/L	1	11/15/2014 02:15 AM
Endosulfan sulfate	ND		0.020	µg/L	1	11/15/2014 02:15 AM
Endrin	ND		0.020	µg/L	1	11/15/2014 02:15 AM
Endrin aldehyde	ND		0.020	µg/L	1	11/15/2014 02:15 AM
gamma-BHC (Lindane)	ND		0.020	µg/L	1	11/15/2014 02:15 AM
Heptachlor	ND		0.020	µg/L	1	11/15/2014 02:15 AM
Heptachlor epoxide	ND		0.020	µg/L	1	11/15/2014 02:15 AM
Toxaphene	ND		4.0	µg/L	1	11/15/2014 02:15 AM
Surr: Decachlorobiphenyl	77.0		33-93	%REC	1	11/15/2014 02:15 AM
Surr: Tetrachloro-m-xylene	56.0		27-93	%REC	1	11/15/2014 02:15 AM
<b>MERCURY BY CVAA</b>						
			<b>E245.1</b>		Prep: E245.1 / 11/17/14	Analyst: <b>LR</b>
Mercury	0.0017		0.00033	mg/L	1	11/17/2014 05:41 PM
<b>METALS BY ICP-MS</b>						
			<b>E200.8</b>		Prep: E200.8 / 11/15/14	Analyst: <b>ML</b>
Antimony	ND		0.0050	mg/L	1	11/17/2014 05:13 AM
Arsenic	0.14		0.0050	mg/L	1	11/17/2014 05:13 AM
Beryllium	ND		0.020	mg/L	10	11/17/2014 07:57 PM
Cadmium	0.0068		0.00020	mg/L	1	11/17/2014 05:13 AM
Chromium	0.29		0.0050	mg/L	1	11/17/2014 05:13 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.



# ALS Group USA, Corp

Date: 24-Nov-14

Client: Weaver Boos Consultants

Project: Karwick IDW (1873-356-04-00)

Sample ID: DW-1

Collection Date: 11/10/2014 02:20 PM

Work Order: 1411698

Lab ID: 1411698-01

Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Copper	0.43		0.0050	mg/L	1	11/17/2014 05:13 AM
Lead	0.84		0.0050	mg/L	1	11/17/2014 05:13 AM
Nickel	0.23		0.0050	mg/L	1	11/17/2014 05:13 AM
Selenium	0.025		0.0050	mg/L	1	11/17/2014 05:13 AM
Silver	ND		0.0050	mg/L	1	11/17/2014 05:13 AM
Thallium	ND		0.0050	mg/L	1	11/17/2014 05:13 AM
Zinc	1.8		0.010	mg/L	1	11/17/2014 05:13 AM
<b>PRIORITY POLLUTANT SEMI-VOLATILES</b>			<b>E625</b>		Prep: SW3510 / 11/17/14	Analyst: <b>JG</b>
1,2,4-Trichlorobenzene	ND		5.1	µg/L	1	11/18/2014 02:30 AM
1,2-Diphenylhydrazine	ND		5.1	µg/L	1	11/18/2014 02:30 AM
2,4,6-Trichlorophenol	ND		5.1	µg/L	1	11/18/2014 02:30 AM
2,4-Dichlorophenol	ND		10	µg/L	1	11/18/2014 02:30 AM
2,4-Dimethylphenol	ND		5.1	µg/L	1	11/18/2014 02:30 AM
2,4-Dinitrophenol	ND		21	µg/L	1	11/18/2014 02:30 AM
2,4-Dinitrotoluene	ND		5.1	µg/L	1	11/18/2014 02:30 AM
2,6-Dinitrotoluene	ND		5.1	µg/L	1	11/18/2014 02:30 AM
2-Chloronaphthalene	ND		5.1	µg/L	1	11/18/2014 02:30 AM
2-Chlorophenol	ND		5.1	µg/L	1	11/18/2014 02:30 AM
2-Nitrophenol	ND		5.1	µg/L	1	11/18/2014 02:30 AM
3,3'-Dichlorobenzidine	ND		21	µg/L	1	11/18/2014 02:30 AM
4,6-Dinitro-2-methylphenol	ND		21	µg/L	1	11/18/2014 02:30 AM
4-Bromophenyl phenyl ether	ND		5.1	µg/L	1	11/18/2014 02:30 AM
4-Chloro-3-methylphenol	ND		5.1	µg/L	1	11/18/2014 02:30 AM
4-Chlorophenyl phenyl ether	ND		5.1	µg/L	1	11/18/2014 02:30 AM
4-Nitrophenol	ND		21	µg/L	1	11/18/2014 02:30 AM
Acenaphthene	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Acenaphthylene	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Anthracene	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Benzidine	ND		51	µg/L	1	11/18/2014 02:30 AM
Benzo(a)anthracene	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Benzo(a)pyrene	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Benzo(b)fluoranthene	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Benzo(g,h,i)perylene	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Benzo(k)fluoranthene	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Bis(2-chloroethoxy)methane	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Bis(2-chloroethyl)ether	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Bis(2-chloroisopropyl)ether	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Bis(2-ethylhexyl)phthalate	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Butyl benzyl phthalate	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Chrysene	ND		5.1	µg/L	1	11/18/2014 02:30 AM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.



# ALS Group USA, Corp

Date: 24-Nov-14

Client: Weaver Boos Consultants

Project: Karwick IDW (1873-356-04-00)

Sample ID: DW-1

Collection Date: 11/10/2014 02:20 PM

Work Order: 1411698

Lab ID: 1411698-01

Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Dibenzo(a,h)anthracene	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Diethyl phthalate	ND		21	µg/L	1	11/18/2014 02:30 AM
Dimethyl phthalate	ND		21	µg/L	1	11/18/2014 02:30 AM
Di-n-butyl phthalate	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Di-n-octyl phthalate	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Fluoranthene	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Fluorene	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Hexachlorobenzene	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Hexachlorobutadiene	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Hexachlorocyclopentadiene	ND		21	µg/L	1	11/18/2014 02:30 AM
Hexachloroethane	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Indeno(1,2,3-cd)pyrene	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Isophorone	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Naphthalene	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Nitrobenzene	ND		5.1	µg/L	1	11/18/2014 02:30 AM
N-Nitrosodimethylamine	ND		5.1	µg/L	1	11/18/2014 02:30 AM
N-Nitrosodi-n-propylamine	ND		5.1	µg/L	1	11/18/2014 02:30 AM
N-Nitrosodiphenylamine	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Pentachlorophenol	ND		21	µg/L	1	11/18/2014 02:30 AM
Phenanthrene	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Phenol	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Pyrene	ND		5.1	µg/L	1	11/18/2014 02:30 AM
Surr: 2,4,6-Tribromophenol	74.0		38-115	%REC	1	11/18/2014 02:30 AM
Surr: 2-Fluorobiphenyl	68.5		32-100	%REC	1	11/18/2014 02:30 AM
Surr: 2-Fluorophenol	41.5		22-59	%REC	1	11/18/2014 02:30 AM
Surr: 4-Terphenyl-d14	78.8		23-112	%REC	1	11/18/2014 02:30 AM
Surr: Nitrobenzene-d5	57.7		31-93	%REC	1	11/18/2014 02:30 AM
Surr: Phenol-d6	27.0		13-36	%REC	1	11/18/2014 02:30 AM
<b>SCAN FOR SEMI-VOLATILE ORGANICS</b>			<b>E625</b>		Prep: SW3510 / 11/17/14	Analyst: <b>JG</b>
Scan for Semi-Volatile Organics	no TICs found			as noted	1	11/18/2014 02:30 AM
<b>PRIORITY POLLUTANT VOLATILES</b>			<b>E624</b>			Analyst: <b>JDW</b>
1,1,1-Trichloroethane	ND		1.0	µg/L	1	11/17/2014 10:51 PM
1,1,2,2-Tetrachloroethane	ND		1.0	µg/L	1	11/17/2014 10:51 PM
1,1,2-Trichloroethane	ND		1.0	µg/L	1	11/17/2014 10:51 PM
1,1-Dichloroethane	ND		1.0	µg/L	1	11/17/2014 10:51 PM
1,1-Dichloroethene	ND		1.0	µg/L	1	11/17/2014 10:51 PM
1,2-Dichlorobenzene	ND		1.0	µg/L	1	11/17/2014 10:51 PM
1,2-Dichloroethane	ND		1.0	µg/L	1	11/17/2014 10:51 PM
1,2-Dichloropropane	ND		1.0	µg/L	1	11/17/2014 10:51 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.



# ALS Group USA, Corp

Date: 24-Nov-14

Client: Weaver Boos Consultants

Project: Karwick IDW (1873-356-04-00)

Sample ID: DW-1

Collection Date: 11/10/2014 02:20 PM

Work Order: 1411698

Lab ID: 1411698-01

Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
1,3-Dichlorobenzene	ND		1.0	µg/L	1	11/17/2014 10:51 PM
1,4-Dichlorobenzene	ND		1.0	µg/L	1	11/17/2014 10:51 PM
2-Chloroethyl vinyl ether	ND		10	µg/L	1	11/17/2014 10:51 PM
Acrolein	ND		5.0	µg/L	1	11/17/2014 10:51 PM
Acrylonitrile	ND		1.0	µg/L	1	11/17/2014 10:51 PM
Benzene	ND		1.0	µg/L	1	11/17/2014 10:51 PM
Bromodichloromethane	ND		1.0	µg/L	1	11/17/2014 10:51 PM
Bromoform	ND		1.0	µg/L	1	11/17/2014 10:51 PM
Bromomethane	ND		1.0	µg/L	1	11/17/2014 10:51 PM
Carbon tetrachloride	ND		1.0	µg/L	1	11/17/2014 10:51 PM
<b>Chlorobenzene</b>	<b>14</b>		<b>1.0</b>	<b>µg/L</b>	1	11/17/2014 10:51 PM
Chloroethane	ND		1.0	µg/L	1	11/17/2014 10:51 PM
<b>Chloroform</b>	<b>1.7</b>		<b>1.0</b>	<b>µg/L</b>	1	11/17/2014 10:51 PM
Chloromethane	ND		1.0	µg/L	1	11/17/2014 10:51 PM
cis-1,3-Dichloropropene	ND		1.0	µg/L	1	11/17/2014 10:51 PM
Dibromochloromethane	ND		1.0	µg/L	1	11/17/2014 10:51 PM
Ethylbenzene	ND		1.0	µg/L	1	11/17/2014 10:51 PM
Methylene chloride	ND		5.0	µg/L	1	11/17/2014 10:51 PM
Tetrachloroethene	ND		1.0	µg/L	1	11/17/2014 10:51 PM
Toluene	ND		1.0	µg/L	1	11/17/2014 10:51 PM
trans-1,2-Dichloroethene	ND		1.0	µg/L	1	11/17/2014 10:51 PM
trans-1,3-Dichloropropene	ND		1.0	µg/L	1	11/17/2014 10:51 PM
Trichloroethene	ND		1.0	µg/L	1	11/17/2014 10:51 PM
Vinyl chloride	ND		1.0	µg/L	1	11/17/2014 10:51 PM
Surr: 1,2-Dichloroethane-d4	100		75-120	%REC	1	11/17/2014 10:51 PM
Surr: 4-Bromofluorobenzene	96.8		80-110	%REC	1	11/17/2014 10:51 PM
Surr: Dibromofluoromethane	94.8		85-115	%REC	1	11/17/2014 10:51 PM
Surr: Toluene-d8	100		85-110	%REC	1	11/17/2014 10:51 PM
<b>CYANIDE, TOTAL</b>			<b>E335.4 R1.0</b>		Prep: SW9012A / 11/15/14	Analyst: <b>JB</b>
<b>Cyanide, Total</b>	<b>0.015</b>		<b>0.0050</b>	<b>mg/L</b>	1	11/17/2014 10:21 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.



# ALS Group USA, Corp

Date: 24-Nov-14

**Client:** Weaver Boos Consultants  
**Work Order:** 1411698  
**Project:** Karwick IDW (1873-356-04-00)

## QC BATCH REPORT

Batch ID: **65013A** Instrument ID **GC12** Method: **E608**

MBLK				Sample ID: PBLKW1-65013-65013A			Units: µg/L		Analysis Date: 11/14/2014 09:50 PM		
Client ID:			Run ID: GC12_141114A			SeqNo: 3040892		Prep Date: 11/14/2014		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
4,4´-DDD	ND	0.020									
4,4´-DDE	ND	0.020									
4,4´-DDT	ND	0.020									
Aldrin	ND	0.020									
alpha-BHC	ND	0.020									
beta-BHC	ND	0.020									
Chlordane, Technical	ND	1.0									
delta-BHC	ND	0.020									
Dieldrin	ND	0.020									
Endosulfan I	ND	0.020									
Endosulfan II	ND	0.020									
Endosulfan sulfate	ND	0.020									
Endrin	ND	0.020									
Endrin aldehyde	ND	0.020									
gamma-BHC (Lindane)	ND	0.020									
Heptachlor	ND	0.020									
Heptachlor epoxide	ND	0.020									
Toxaphene	ND	4.0									
Surr: Decachlorobiphenyl	0.068	0	0.1	0	68	33-93		0			
Surr: Tetrachloro-m-xylene	0.064	0	0.1	0	64	27-93		0			

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



**Client:** Weaver Boos Consultants  
**Work Order:** 1411698  
**Project:** Karwick IDW (1873-356-04-00)

# QC BATCH REPORT

Batch ID: **65013A** Instrument ID **GC12** Method: **E608**

LCS				Sample ID: <b>PLCSW1-65013-65013A</b>			Units: <b>µg/L</b>		Analysis Date: <b>11/14/2014 10:05 PM</b>	
Client ID:				Run ID: <b>GC12_141114A</b>			SeqNo: <b>3040893</b>		Prep Date: <b>11/14/2014</b>	
									DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4'-DDD	0.072	0.020	0.1	0	72	33-126	0			
4,4'-DDE	0.068	0.020	0.1	0	68	34-112	0			
4,4'-DDT	0.071	0.020	0.1	0	71	41-122	0			
Aldrin	0.06	0.020	0.1	0	60	18-110	0			
alpha-BHC	0.063	0.020	0.1	0	63	31-109	0			
beta-BHC	0.07	0.020	0.1	0	70	38-108	0			
delta-BHC	0.069	0.020	0.1	0	69	36-114	0			
Dieldrin	0.067	0.020	0.1	0	67	35-114	0			
Endosulfan I	0.067	0.020	0.1	0	67	32-114	0			
Endosulfan II	0.074	0.020	0.1	0	74	40-119	0			
Endosulfan sulfate	0.075	0.020	0.1	0	75	42-120	0			
Endrin	0.073	0.020	0.1	0	73	39-123	0			
Endrin aldehyde	0.07	0.020	0.1	0	70	29-116	0			
gamma-BHC (Lindane)	0.064	0.020	0.1	0	64	32-114	0			
Heptachlor	0.065	0.020	0.1	0	65	34-112	0			
Heptachlor epoxide	0.067	0.020	0.1	0	67	36-109	0			
Surr: Decachlorobiphenyl	0.063	0	0.1	0	63	33-93	0			
Surr: Tetrachloro-m-xylene	0.058	0	0.1	0	58	27-93	0			

MS				Sample ID: <b>1411682-01B MS</b>			Units: <b>µg/L</b>		Analysis Date: <b>11/14/2014 10:21 PM</b>	
Client ID:				Run ID: <b>GC12_141114A</b>			SeqNo: <b>3040894</b>		Prep Date: <b>11/14/2014</b>	
									DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4'-DDD	0.75	0.20	1	0	75	33-126	0			
4,4'-DDE	0.71	0.20	1	0	71	34-112	0			
4,4'-DDT	0.75	0.20	1	0	75	41-122	0			
Aldrin	0.64	0.20	1	0	64	18-110	0			
alpha-BHC	0.66	0.20	1	0	66	31-109	0			
beta-BHC	0.73	0.20	1	0	73	38-108	0			
delta-BHC	0.71	0.20	1	0	71	36-114	0			
Dieldrin	0.7	0.20	1	0	70	35-114	0			
Endosulfan I	0.7	0.20	1	0	70	32-114	0			
Endosulfan II	0.75	0.20	1	0	75	40-119	0			
Endosulfan sulfate	0.77	0.20	1	0	77	42-120	0			
Endrin	0.76	0.20	1	0	76	39-123	0			
Endrin aldehyde	0.71	0.20	1	0	71	29-116	0			
gamma-BHC (Lindane)	0.67	0.20	1	0	67	32-114	0			
Heptachlor	0.68	0.20	1	0	68	34-112	0			
Heptachlor epoxide	0.69	0.20	1	0	69	36-109	0			
Surr: Decachlorobiphenyl	0.66	0	1	0	66	33-93	0			
Surr: Tetrachloro-m-xylene	0.61	0	1	0	61	27-93	0			

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



**Client:** Weaver Boos Consultants  
**Work Order:** 1411698  
**Project:** Karwick IDW (1873-356-04-00)

## QC BATCH REPORT

Batch ID: **65013A**      Instrument ID **GC12**      Method: **E608**

MSD		Sample ID: <b>1411682-01B MSD</b>				Units: <b>µg/L</b>		Analysis Date: <b>11/14/2014 10:37 PM</b>		
Client ID:		Run ID: <b>GC12_141114A</b>				SeqNo: <b>3040895</b>		Prep Date: <b>11/14/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4'-DDD	0.72	0.20	1	0	72	33-126	0.75	4.08	35	
4,4'-DDE	0.68	0.20	1	0	68	34-112	0.71	4.32	35	
4,4'-DDT	0.71	0.20	1	0	71	41-122	0.75	5.48	35	
Aldrin	0.58	0.20	1	0	58	18-110	0.64	9.84	35	
alpha-BHC	0.62	0.20	1	0	62	31-109	0.66	6.25	35	
beta-BHC	0.71	0.20	1	0	71	38-108	0.73	2.78	35	
delta-BHC	0.69	0.20	1	0	69	36-114	0.71	2.86	35	
Dieldrin	0.67	0.20	1	0	67	35-114	0.7	4.38	35	
Endosulfan I	0.67	0.20	1	0	67	32-114	0.7	4.38	35	
Endosulfan II	0.73	0.20	1	0	73	40-119	0.75	2.7	35	
Endosulfan sulfate	0.75	0.20	1	0	75	42-120	0.77	2.63	35	
Endrin	0.73	0.20	1	0	73	39-123	0.76	4.03	35	
Endrin aldehyde	0.69	0.20	1	0	69	29-116	0.71	2.86	35	
gamma-BHC (Lindane)	0.64	0.20	1	0	64	32-114	0.67	4.58	35	
Heptachlor	0.63	0.20	1	0	63	34-112	0.68	7.63	35	
Heptachlor epoxide	0.66	0.20	1	0	66	36-109	0.69	4.44	35	
<i>Surr: Decachlorobiphenyl</i>	0.67	0	1	0	67	33-93	0.66	1.5	35	
<i>Surr: Tetrachloro-m-xylene</i>	0.57	0	1	0	57	27-93	0.61	6.78	35	

The following samples were analyzed in this batch:

1411698-01B

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



**Client:** Weaver Boos Consultants  
**Work Order:** 1411698  
**Project:** Karwick IDW (1873-356-04-00)

## QC BATCH REPORT

Batch ID: **65155**      Instrument ID **GC14**      Method: **E608**

<b>MBLK</b>		Sample ID: <b>PBLKW1-65155-65155</b>				Units: <b>µg/L</b>		Analysis Date: <b>11/18/2014 05:19 PM</b>		
Client ID:		Run ID: <b>GC14_141118A</b>				SeqNo: <b>3042139</b>		Prep Date: <b>11/18/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	ND	0.20								
Aroclor 1221	ND	0.20								
Aroclor 1232	ND	0.20								
Aroclor 1242	ND	0.20								
Aroclor 1248	ND	0.20								
Aroclor 1254	ND	0.20								
Aroclor 1260	ND	0.20								
<i>Surr: Decachlorobiphenyl</i>	<i>0.066</i>	<i>0</i>	<i>0.1</i>	<i>0</i>	<i>66</i>	<i>40-110</i>	<i>0</i>			

<b>LCS</b>		Sample ID: <b>PLCSW1-65155-65155</b>				Units: <b>µg/L</b>		Analysis Date: <b>11/18/2014 05:36 PM</b>		
Client ID:		Run ID: <b>GC14_141118A</b>				SeqNo: <b>3042140</b>		Prep Date: <b>11/18/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	1.867	0.20	2.5	0	74.7	50-130	0			
Aroclor 1260	1.87	0.20	2.5	0	74.8	50-130	0			
<i>Surr: Decachlorobiphenyl</i>	<i>0.072</i>	<i>0</i>	<i>0.1</i>	<i>0</i>	<i>72</i>	<i>40-110</i>	<i>0</i>			

<b>MS</b>		Sample ID: <b>1411696-03A MS</b>				Units: <b>µg/L</b>		Analysis Date: <b>11/18/2014 06:08 PM</b>		
Client ID:		Run ID: <b>GC14_141118A</b>				SeqNo: <b>3042143</b>		Prep Date: <b>11/18/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	19.2	2.0	25	0	76.8	40-140	0			
Aroclor 1260	19.49	2.0	25	0	78	40-140	0			
<i>Surr: Decachlorobiphenyl</i>	<i>0.75</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>75</i>	<i>40-110</i>	<i>0</i>			

<b>MSD</b>		Sample ID: <b>1411696-03A MSD</b>				Units: <b>µg/L</b>		Analysis Date: <b>11/18/2014 06:24 PM</b>		
Client ID:		Run ID: <b>GC14_141118A</b>				SeqNo: <b>3042144</b>		Prep Date: <b>11/18/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	19.29	2.0	25	0	77.2	40-140	19.2	0.468	50	
Aroclor 1260	20.19	2.0	25	0	80.8	40-140	19.49	3.53	50	
<i>Surr: Decachlorobiphenyl</i>	<i>0.76</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>76</i>	<i>40-110</i>	<i>0.75</i>	<i>1.32</i>	<i>50</i>	

The following samples were analyzed in this batch:

1411698-01B

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



**Client:** Weaver Boos Consultants  
**Work Order:** 1411698  
**Project:** Karwick IDW (1873-356-04-00)

# QC BATCH REPORT

Batch ID: **65138**      Instrument ID **HG1**      Method: **E245.1**

<b>MBLK</b>		Sample ID: <b>MBLK-65138-65138</b>				Units: <b>mg/L</b>		Analysis Date: <b>11/17/2014 05:25 PM</b>		
Client ID:		Run ID: <b>HG1_141117A</b>				SeqNo: <b>3038922</b>		Prep Date: <b>11/17/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury      ND      0.00020

<b>LCS</b>		Sample ID: <b>LCS-65138-65138</b>				Units: <b>mg/L</b>		Analysis Date: <b>11/17/2014 05:27 PM</b>		
Client ID:		Run ID: <b>HG1_141117A</b>				SeqNo: <b>3038923</b>		Prep Date: <b>11/17/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury      0.001876      0.00020      0.002      0      93.8      85-115      0

<b>MS</b>		Sample ID: <b>1411696-03DMS</b>				Units: <b>mg/L</b>		Analysis Date: <b>11/17/2014 05:37 PM</b>		
Client ID:		Run ID: <b>HG1_141117A</b>				SeqNo: <b>3038927</b>		Prep Date: <b>11/17/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury      0.001956      0.00020      0.002      -0.000013      98.4      80-120      0

<b>MS</b>		Sample ID: <b>1411733-01BMS</b>				Units: <b>mg/L</b>		Analysis Date: <b>11/17/2014 06:15 PM</b>		
Client ID:		Run ID: <b>HG1_141117A</b>				SeqNo: <b>3038944</b>		Prep Date: <b>11/17/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury      0.001893      0.00020      0.002      0.000021      93.6      80-120      0

<b>MSD</b>		Sample ID: <b>1411696-03DMSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>11/17/2014 05:39 PM</b>		
Client ID:		Run ID: <b>HG1_141117A</b>				SeqNo: <b>3038928</b>		Prep Date: <b>11/17/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury      0.001957      0.00020      0.002      -0.000013      98.5      80-120      0.001956      0.0511      20

<b>MSD</b>		Sample ID: <b>1411733-01BMSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>11/17/2014 06:25 PM</b>		
Client ID:		Run ID: <b>HG1_141117A</b>				SeqNo: <b>3038948</b>		Prep Date: <b>11/17/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury      0.001824      0.00020      0.002      0.000021      90.2      80-120      0.001893      3.71      20

<b>DUP</b>		Sample ID: <b>1411729-01ADUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>11/17/2014 06:09 PM</b>		
Client ID:		Run ID: <b>HG1_141117A</b>				SeqNo: <b>3038941</b>		Prep Date: <b>11/17/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury      ND      0.00020      0      0      0      0-0      -0.00001      0      20

The following samples were analyzed in this batch: 1411698-01C

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



**Client:** Weaver Boos Consultants  
**Work Order:** 1411698  
**Project:** Karwick IDW (1873-356-04-00)

## QC BATCH REPORT

Batch ID: **65054**      Instrument ID **ICPMS1**      Method: **E200.8**

<b>MBLK</b>		Sample ID: <b>MBLK-65054-65054</b>				Units: <b>mg/L</b>		Analysis Date: <b>11/17/2014 02:37 A</b>		
Client ID:		Run ID: <b>ICPMS1_141115A</b>				SeqNo: <b>3037542</b>		Prep Date: <b>11/15/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	ND	0.0050								
Arsenic	ND	0.0050								
Beryllium	ND	0.0020								
Cadmium	ND	0.00020								
Chromium	ND	0.0050								
Copper	ND	0.0050								
Lead	ND	0.0050								
Nickel	ND	0.0050								
Selenium	ND	0.0050								
Silver	ND	0.0050								
Thallium	ND	0.0050								
Zinc	0.00341	0.010								J

<b>LCS</b>		Sample ID: <b>LCS-65054-65054</b>				Units: <b>mg/L</b>		Analysis Date: <b>11/17/2014 03:03 A</b>		
Client ID:		Run ID: <b>ICPMS1_141115A</b>				SeqNo: <b>3037546</b>		Prep Date: <b>11/15/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.1004	0.0050	0.1	0	100	85-115	0			
Arsenic	0.09698	0.0050	0.1	0	97	85-115	0			
Beryllium	0.09871	0.0020	0.1	0	98.7	85-115	0			
Cadmium	0.09843	0.00020	0.1	0	98.4	85-115	0			
Chromium	0.09474	0.0050	0.1	0	94.7	85-115	0			
Copper	0.09728	0.0050	0.1	0	97.3	85-115	0			
Lead	0.09659	0.0050	0.1	0	96.6	85-115	0			
Nickel	0.09237	0.0050	0.1	0	92.4	85-115	0			
Selenium	0.09613	0.0050	0.1	0	96.1	85-115	0			
Silver	0.1017	0.0050	0.1	0	102	85-115	0			
Thallium	0.09322	0.0050	0.1	0	93.2	85-115	0			
Zinc	0.1032	0.010	0.1	0	103	85-115	0			

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



**Client:** Weaver Boos Consultants  
**Work Order:** 1411698  
**Project:** Karwick IDW (1873-356-04-00)

## QC BATCH REPORT

Batch ID: **65054** Instrument ID **ICPMS1** Method: **E200.8**

MS		Sample ID: <b>1411614-01AMS</b>				Units: <b>mg/L</b>		Analysis Date: <b>11/17/2014 03:47 A</b>		
Client ID:		Run ID: <b>ICPMS1_141115A</b>				SeqNo: <b>3037553</b>		Prep Date: <b>11/15/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.1012	0.0050	0.1	0.002598	98.6	70-130	0			
Arsenic	0.1015	0.0050	0.1	0.004663	96.8	70-130	0			
Beryllium	0.09366	0.0020	0.1	-3.472E-05	93.7	70-130	0			
Cadmium	0.09488	0.00020	0.1	0.0003372	94.5	70-130	0			
Chromium	0.1083	0.0050	0.1	0.01675	91.6	70-130	0			
Copper	0.1435	0.0050	0.1	0.05267	90.8	70-130	0			
Lead	0.09373	0.0050	0.1	0.0001232	93.6	70-130	0			
Nickel	0.1158	0.0050	0.1	0.02562	90.2	70-130	0			
Selenium	0.09522	0.0050	0.1	0.0003292	94.9	70-130	0			
Silver	0.09831	0.0050	0.1	0.001622	96.7	70-130	0			
Thallium	0.09113	0.0050	0.1	-9.327E-07	91.1	70-130	0			
Zinc	0.2161	0.010	0.1	0.1237	92.4	70-130	0			

MS		Sample ID: <b>1411696-03DMS</b>				Units: <b>mg/L</b>		Analysis Date: <b>11/17/2014 05:01 A</b>		
Client ID:		Run ID: <b>ICPMS1_141115A</b>				SeqNo: <b>3037573</b>		Prep Date: <b>11/15/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.0964	0.0050	0.1	0.0002002	96.2	70-130	0			
Arsenic	0.0971	0.0050	0.1	0.001862	95.2	70-130	0			
Beryllium	0.093	0.0020	0.1	-1.833E-05	93	70-130	0			
Cadmium	0.09379	0.00020	0.1	0.00009021	93.7	70-130	0			
Chromium	0.0931	0.0050	0.1	8.594E-06	93.1	70-130	0			
Copper	0.09245	0.0050	0.1	0.002483	90	70-130	0			
Lead	0.09431	0.0050	0.1	0.0005294	93.8	70-130	0			
Nickel	0.09184	0.0050	0.1	0.00278	89.1	70-130	0			
Selenium	0.09134	0.0050	0.1	0.0004872	90.9	70-130	0			
Silver	0.09515	0.0050	0.1	-4.953E-06	95.2	70-130	0			
Thallium	0.0901	0.0050	0.1	-0.0000146	90.1	70-130	0			
Zinc	0.1032	0.010	0.1	0.009596	93.6	70-130	0			

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



**Client:** Weaver Boos Consultants  
**Work Order:** 1411698  
**Project:** Karwick IDW (1873-356-04-00)

## QC BATCH REPORT

Batch ID: **65054** Instrument ID **ICPMS1** Method: **E200.8**

MSD				Sample ID: 1411614-01AMSD				Units: mg/L		Analysis Date: 11/17/2014 03:54 A	
Client ID:			Run ID: ICPMS1_141115A			SeqNo: 3037554		Prep Date: 11/15/2014		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.1008	0.0050	0.1	0.002598	98.2	70-130	0.1012	0.396	20		
Arsenic	0.1004	0.0050	0.1	0.004663	95.7	70-130	0.1015	1.09	20		
Beryllium	0.09369	0.0020	0.1	-3.472E-05	93.7	70-130	0.09366	0.032	20		
Cadmium	0.09481	0.00020	0.1	0.0003372	94.5	70-130	0.09488	0.0738	20		
Chromium	0.1095	0.0050	0.1	0.01675	92.8	70-130	0.1083	1.1	20		
Copper	0.1456	0.0050	0.1	0.05267	92.9	70-130	0.1435	1.45	20		
Lead	0.0941	0.0050	0.1	0.0001232	94	70-130	0.09373	0.394	20		
Nickel	0.1199	0.0050	0.1	0.02562	94.3	70-130	0.1158	3.48	20		
Selenium	0.09281	0.0050	0.1	0.0003292	92.5	70-130	0.09522	2.56	20		
Silver	0.09913	0.0050	0.1	0.001622	97.5	70-130	0.09831	0.831	20		
Thallium	0.09155	0.0050	0.1	-9.327E-07	91.6	70-130	0.09113	0.46	20		
Zinc	0.2204	0.010	0.1	0.1237	96.7	70-130	0.2161	1.97	20		

MSD				Sample ID: 1411696-03DMSD			Units: mg/L		Analysis Date: 11/17/2014 05:07 A		
Client ID:			Run ID: ICPMS1_141115A			SeqNo: 3037574		Prep Date: 11/15/2014		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.09403	0.0050	0.1	0.0002002	93.8	70-130	0.0964	2.49	20		
Arsenic	0.09423	0.0050	0.1	0.001862	92.4	70-130	0.0971	3	20		
Beryllium	0.09077	0.0020	0.1	-1.833E-05	90.8	70-130	0.093	2.43	20		
Cadmium	0.0926	0.00020	0.1	0.00009021	92.5	70-130	0.09379	1.28	20		
Chromium	0.09175	0.0050	0.1	8.594E-06	91.7	70-130	0.0931	1.46	20		
Copper	0.09205	0.0050	0.1	0.002483	89.6	70-130	0.09245	0.434	20		
Lead	0.09203	0.0050	0.1	0.0005294	91.5	70-130	0.09431	2.45	20		
Nickel	0.09071	0.0050	0.1	0.00278	87.9	70-130	0.09184	1.24	20		
Selenium	0.09265	0.0050	0.1	0.0004872	92.2	70-130	0.09134	1.42	20		
Silver	0.09313	0.0050	0.1	-4.953E-06	93.1	70-130	0.09515	2.15	20		
Thallium	0.08884	0.0050	0.1	-0.0000146	88.9	70-130	0.0901	1.41	20		
Zinc	0.1033	0.010	0.1	0.009596	93.7	70-130	0.1032	0.0969	20		

The following samples were analyzed in this batch: 1411698-01C

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



**Client:** Weaver Boos Consultants  
**Work Order:** 1411698  
**Project:** Karwick IDW (1873-356-04-00)

## QC BATCH REPORT

Batch ID: **65095**      Instrument ID **SVMS8**      Method: **E625**

MBLK		Sample ID: <b>SBLKW1-65095-65095</b>				Units: <b>µg/L</b>		Analysis Date: <b>11/17/2014 05:14 PM</b>		
Client ID:		Run ID: <b>SVMS8_141117A</b>				SeqNo: <b>3039833</b>		Prep Date: <b>11/17/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,2,4-Trichlorobenzene	ND	5.0								
1,2-Diphenylhydrazine	ND	5.0								
2,4,6-Trichlorophenol	ND	5.0								
2,4-Dichlorophenol	ND	10								
2,4-Dimethylphenol	ND	5.0								
2,4-Dinitrophenol	ND	20								
2,4-Dinitrotoluene	ND	5.0								
2,6-Dinitrotoluene	ND	5.0								
2-Chloronaphthalene	ND	5.0								
2-Chlorophenol	ND	5.0								
2-Nitrophenol	ND	5.0								
3,3'-Dichlorobenzidine	ND	20								
4,6-Dinitro-2-methylphenol	ND	20								
4-Bromophenyl phenyl ether	ND	5.0								
4-Chloro-3-methylphenol	ND	5.0								
4-Chlorophenyl phenyl ether	ND	5.0								
4-Nitrophenol	ND	20								
Acenaphthene	ND	5.0								
Acenaphthylene	ND	5.0								
Anthracene	ND	5.0								
Benzidine	ND	50								
Benzo(a)anthracene	ND	5.0								
Benzo(a)pyrene	ND	5.0								
Benzo(b)fluoranthene	ND	5.0								
Benzo(g,h,i)perylene	ND	5.0								
Benzo(k)fluoranthene	ND	5.0								
Bis(2-chloroethoxy)methane	ND	5.0								
Bis(2-chloroethyl)ether	ND	5.0								
Bis(2-chloroisopropyl)ether	ND	5.0								
Bis(2-ethylhexyl)phthalate	2.5	5.0								J
Butyl benzyl phthalate	ND	5.0								
Chrysene	ND	5.0								
Dibenzo(a,h)anthracene	ND	5.0								
Diethyl phthalate	ND	20								
Dimethyl phthalate	ND	20								
Di-n-butyl phthalate	ND	5.0								
Di-n-octyl phthalate	ND	5.0								
Fluoranthene	ND	5.0								
Fluorene	ND	5.0								
Hexachlorobenzene	ND	5.0								
Hexachlorobutadiene	ND	5.0								
Hexachlorocyclopentadiene	ND	20								

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



**Client:** Weaver Boos Consultants  
**Work Order:** 1411698  
**Project:** Karwick IDW (1873-356-04-00)

## QC BATCH REPORT

Batch ID: <b>65095</b>	Instrument ID <b>SVMS8</b>	Method: <b>E625</b>					
Hexachloroethane	ND	5.0					
Indeno(1,2,3-cd)pyrene	ND	5.0					
Isophorone	ND	5.0					
Naphthalene	ND	5.0					
Nitrobenzene	ND	5.0					
N-Nitrosodimethylamine	ND	5.0					
N-Nitrosodi-n-propylamine	ND	5.0					
N-Nitrosodiphenylamine	ND	5.0					
Pentachlorophenol	ND	20					
Phenanthrene	ND	5.0					
Phenol	ND	5.0					
Pyrene	ND	5.0					
<i>Surr: 2,4,6-Tribromophenol</i>	33.99	0	50	0	68	21-125	0
<i>Surr: 2-Fluorobiphenyl</i>	33.83	0	50	0	67.7	36-94	0
<i>Surr: 2-Fluorophenol</i>	19.15	0	50	0	38.3	10-75	0
<i>Surr: 4-Terphenyl-d14</i>	40.67	0	50	0	81.3	26-119	0
<i>Surr: Nitrobenzene-d5</i>	28.62	0	50	0	57.2	41-104	0
<i>Surr: Phenol-d6</i>	12.18	0	50	0	24.4	11-50	0

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



**Client:** Weaver Boos Consultants  
**Work Order:** 1411698  
**Project:** Karwick IDW (1873-356-04-00)

## QC BATCH REPORT

Batch ID: **65095**      Instrument ID **SVMS8**      Method: **E625**

LCS		Sample ID: <b>SLCSW1-65095-65095</b>				Units: <b>µg/L</b>		Analysis Date: <b>11/17/2014 05:35 PM</b>		
Client ID:		Run ID: <b>SVMS8_141117A</b>				SeqNo: <b>3039836</b>		Prep Date: <b>11/17/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,2,4-Trichlorobenzene	14.46	5.0	20	0	72.3	35-105	0			
2,4-Dinitrotoluene	21.16	5.0	20	0	106	50-120	0			
2-Chlorophenol	14.01	5.0	20	0	70	35-105	0			
4-Chloro-3-methylphenol	15.3	5.0	20	0	76.5	45-110	0			
4-Nitrophenol	5.3	20	20	0	26.5	1-58	0			J
Acenaphthene	16.81	5.0	20	0	84	45-110	0			
Acenaphthylene	16.5	5.0	20	0	82.5	50-105	0			
Anthracene	18.14	5.0	20	0	90.7	55-110	0			
Benzo(a)anthracene	18.01	5.0	20	0	90	55-110	0			
Benzo(a)pyrene	20.56	5.0	20	0	103	55-110	0			
Benzo(b)fluoranthene	20.12	5.0	20	0	101	45-120	0			
Benzo(g,h,i)perylene	16.92	5.0	20	0	84.6	40-125	0			
Benzo(k)fluoranthene	20.07	5.0	20	0	100	45-125	0			
Butyl benzyl phthalate	18.98	5.0	20	0	94.9	45-115	0			
Chrysene	18.86	5.0	20	0	94.3	55-110	0			
Dibenzo(a,h)anthracene	18.01	5.0	20	0	90	40-125	0			
Diethyl phthalate	18.94	20	20	0	94.7	40-120	0			J
Dimethyl phthalate	17.53	20	20	0	87.6	25-125	0			J
Fluoranthene	19.94	5.0	20	0	99.7	55-115	0			
Fluorene	17.47	5.0	20	0	87.4	50-110	0			
Indeno(1,2,3-cd)pyrene	18.26	5.0	20	0	91.3	45-125	0			
Naphthalene	15.52	5.0	20	0	77.6	40-100	0			
N-Nitrosodi-n-propylamine	15.6	5.0	20	0	78	35-130	0			
Pentachlorophenol	13.82	20	20	0	69.1	40-115	0			J
Phenanthrene	17.25	5.0	20	0	86.2	50-115	0			
Phenol	5.32	5.0	20	0	26.6	12-43	0			
Pyrene	16.68	5.0	20	0	83.4	50-130	0			
Surr: 2,4,6-Tribromophenol	39.82	0	50	0	79.6	38-115	0			
Surr: 2-Fluorobiphenyl	36.91	0	50	0	73.8	32-100	0			
Surr: 2-Fluorophenol	20.84	0	50	0	41.7	22-59	0			
Surr: 4-Terphenyl-d14	40.05	0	50	0	80.1	23-112	0			
Surr: Nitrobenzene-d5	34.47	0	50	0	68.9	31-93	0			
Surr: Phenol-d6	13.85	0	50	0	27.7	13-36	0			

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



**Client:** Weaver Boos Consultants  
**Work Order:** 1411698  
**Project:** Karwick IDW (1873-356-04-00)

## QC BATCH REPORT

Batch ID: **65095**      Instrument ID **SVMS8**      Method: **E625**

MS				Sample ID: 1411543-01B MS			Units: µg/L		Analysis Date: 11/17/2014 05:56 PM		
Client ID:		Run ID: SVMS8_141117A			SeqNo: 3039838		Prep Date: 11/17/2014		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
1,2,4-Trichlorobenzene	138	50	200	0	69	35-105	0				
2,4-Dinitrotoluene	185.5	50	200	0	92.8	50-120	0				
2-Chlorophenol	119.7	50	200	0	59.8	35-105	0				
4-Chloro-3-methylphenol	129.2	50	200	0	64.6	45-110	0				
4-Nitrophenol	43.7	200	200	0	21.8	1-58	0			J	
Acenaphthene	156.5	50	200	0	78.2	45-110	0				
Acenaphthylene	159.4	50	200	0	79.7	50-105	0				
Anthracene	177.8	50	200	0	88.9	55-110	0				
Benzo(a)anthracene	175.4	50	200	0	87.7	55-110	0				
Benzo(a)pyrene	200.8	50	200	0	100	55-110	0				
Benzo(b)fluoranthene	191.1	50	200	0	95.6	45-120	0				
Benzo(g,h,i)perylene	191.6	50	200	0	95.8	40-125	0				
Benzo(k)fluoranthene	196.1	50	200	0	98	45-125	0				
Butyl benzyl phthalate	192.5	50	200	0	96.2	45-115	0				
Chrysene	185.3	50	200	0	92.6	55-110	0				
Dibenzo(a,h)anthracene	204.7	50	200	0	102	40-125	0				
Diethyl phthalate	175	200	200	0	87.5	40-120	0			J	
Dimethyl phthalate	164.5	200	200	0	82.2	25-125	0			J	
Fluoranthene	183.3	50	200	0	91.6	55-115	0				
Fluorene	167	50	200	0	83.5	50-110	0				
Indeno(1,2,3-cd)pyrene	207	50	200	0	104	45-125	0				
Naphthalene	142.8	50	200	0	71.4	40-110	0				
N-Nitrosodi-n-propylamine	131.8	50	200	0	65.9	35-130	0				
Pentachlorophenol	122.3	200	200	0	61.2	40-115	0			J	
Phenanthrene	168.3	50	200	0	84.2	50-115	0				
Phenol	44	50	200	0	22	12-43	0			J	
Pyrene	172.7	50	200	0	86.4	50-130	0				
Surr: 2,4,6-Tribromophenol	398.5	0	500	0	79.7	38-115	0				
Surr: 2-Fluorobiphenyl	376	0	500	0	75.2	32-100	0				
Surr: 2-Fluorophenol	181.8	0	500	0	36.4	22-59	0				
Surr: 4-Terphenyl-d14	380.6	0	500	0	76.1	23-112	0				
Surr: Nitrobenzene-d5	328.5	0	500	0	65.7	31-93	0				
Surr: Phenol-d6	111	0	500	0	22.2	13-36	0				

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



**Client:** Weaver Boos Consultants  
**Work Order:** 1411698  
**Project:** Karwick IDW (1873-356-04-00)

# QC BATCH REPORT

Batch ID: **65095**      Instrument ID **SVMS8**      Method: **E625**

MSD				Sample ID: 1411543-01B MSD			Units: µg/L		Analysis Date: 11/17/2014 06:16 PM		
Client ID:		Run ID: SVMS8_141117A			SeqNo: 3039839		Prep Date: 11/17/2014		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
1,2,4-Trichlorobenzene	130.5	50	200	0	65.2	35-105	138	5.59	30		
2,4-Dinitrotoluene	193	50	200	0	96.5	50-120	185.5	3.96	35		
2-Chlorophenol	122.9	50	200	0	61.4	35-105	119.7	2.64	32		
4-Chloro-3-methylphenol	133.2	50	200	0	66.6	45-110	129.2	3.05	31		
4-Nitrophenol	48.6	200	200	0	24.3	1-58	43.7	0	43	J	
Acenaphthene	155.3	50	200	0	77.6	45-110	156.5	0.77	44		
Acenaphthylene	160	50	200	0	80	50-105	159.4	0.376	26		
Anthracene	171.4	50	200	0	85.7	55-110	177.8	3.67	21		
Benzo(a)anthracene	168.9	50	200	0	84.4	55-110	175.4	3.78	30		
Benzo(a)pyrene	195.5	50	200	0	97.8	55-110	200.8	2.67	32		
Benzo(b)fluoranthene	192.8	50	200	0	96.4	45-120	191.1	0.886	34		
Benzo(g,h,i)perylene	156.7	50	200	0	78.4	40-125	191.6	20	27		
Benzo(k)fluoranthene	188.5	50	200	0	94.2	45-125	196.1	3.95	27		
Butyl benzyl phthalate	181.6	50	200	0	90.8	45-115	192.5	5.83	30		
Chrysene	175.7	50	200	0	87.8	55-110	185.3	5.32	33		
Dibenzo(a,h)anthracene	165.6	50	200	0	82.8	40-125	204.7	21.1	35		
Diethyl phthalate	175.5	200	200	0	87.8	40-120	175	0	30	J	
Dimethyl phthalate	165.2	200	200	0	82.6	25-125	164.5	0	30	J	
Fluoranthene	187.7	50	200	0	93.8	55-115	183.3	2.37	29		
Fluorene	162.9	50	200	0	81.4	50-110	167	2.49	25		
Indeno(1,2,3-cd)pyrene	165.8	50	200	0	82.9	45-125	207	22.1	34		
Naphthalene	139.6	50	200	0	69.8	40-100	142.8	2.27	40		
N-Nitrosodi-n-propylamine	141.9	50	200	0	71	35-130	131.8	7.38	36		
Pentachlorophenol	132.1	200	200	0	66	40-115	122.3	0	34	J	
Phenanthrene	161.5	50	200	0	80.8	50-115	168.3	4.12	22		
Phenol	47.7	50	200	0	23.8	12-43	44	0	34	J	
Pyrene	155.7	50	200	0	77.8	50-130	172.7	10.4	22		
Surr: 2,4,6-Tribromophenol	369.9	0	500	0	74	38-115	398.5	7.44	40		
Surr: 2-Fluorobiphenyl	349.1	0	500	0	69.8	32-100	376	7.42	40		
Surr: 2-Fluorophenol	185	0	500	0	37	22-59	181.8	1.74	40		
Surr: 4-Terphenyl-d14	372.2	0	500	0	74.4	23-112	380.6	2.23	40		
Surr: Nitrobenzene-d5	311.2	0	500	0	62.2	31-93	328.5	5.41	40		
Surr: Phenol-d6	123.6	0	500	0	24.7	13-36	111	10.7	40		

The following samples were analyzed in this batch:

1411698-01B

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



**Client:** Weaver Boos Consultants  
**Work Order:** 1411698  
**Project:** Karwick IDW (1873-356-04-00)

# QC BATCH REPORT

Batch ID: **R152606b**      Instrument ID **VMS9**      Method: **E624**

MBLK		Sample ID: <b>VBKWW2-141117-R152606b</b>				Units: <b>µg/L</b>		Analysis Date: <b>11/17/2014 05:48 PM</b>		
Client ID:		Run ID: <b>VMS9_141117A</b>				SeqNo: <b>3039269</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	ND	1.0								
1,1,2,2-Tetrachloroethane	ND	1.0								
1,1,2-Trichloroethane	ND	1.0								
1,1-Dichloroethane	ND	1.0								
1,1-Dichloroethene	ND	1.0								
1,2-Dichlorobenzene	ND	1.0								
1,2-Dichloroethane	ND	1.0								
1,2-Dichloropropane	ND	1.0								
1,3-Dichlorobenzene	ND	1.0								
1,4-Dichlorobenzene	ND	1.0								
2-Chloroethyl vinyl ether	ND	10								
Acrolein	ND	5.0								
Acrylonitrile	ND	1.0								
Benzene	ND	1.0								
Bromodichloromethane	ND	1.0								
Bromoform	ND	1.0								
Bromomethane	ND	1.0								
Carbon tetrachloride	ND	1.0								
Chlorobenzene	ND	1.0								
Chloroethane	ND	1.0								
Chloroform	ND	1.0								
Chloromethane	ND	1.0								
cis-1,3-Dichloropropene	ND	1.0								
Dibromochloromethane	ND	1.0								
Ethylbenzene	ND	1.0								
Methylene chloride	ND	5.0								
Tetrachloroethene	ND	1.0								
Toluene	ND	1.0								
trans-1,2-Dichloroethene	ND	1.0								
trans-1,3-Dichloropropene	ND	1.0								
Trichloroethene	ND	1.0								
Vinyl chloride	ND	1.0								
<i>Surr: 1,2-Dichloroethane-d4</i>	<i>20.41</i>	<i>0</i>	<i>20</i>	<i>0</i>	<i>102</i>	<i>75-120</i>	<i>0</i>			
<i>Surr: 4-Bromofluorobenzene</i>	<i>19.35</i>	<i>0</i>	<i>20</i>	<i>0</i>	<i>96.8</i>	<i>80-110</i>	<i>0</i>			
<i>Surr: Dibromofluoromethane</i>	<i>19.82</i>	<i>0</i>	<i>20</i>	<i>0</i>	<i>99.1</i>	<i>85-115</i>	<i>0</i>			
<i>Surr: Toluene-d8</i>	<i>19.59</i>	<i>0</i>	<i>20</i>	<i>0</i>	<i>98</i>	<i>85-110</i>	<i>0</i>			

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



**Client:** Weaver Boos Consultants  
**Work Order:** 1411698  
**Project:** Karwick IDW (1873-356-04-00)

# QC BATCH REPORT

Batch ID: **R152606b**      Instrument ID **VMS9**      Method: **E624**

LCS		Sample ID: <b>VLCSW2-141117-R152606b</b>				Units: <b>µg/L</b>		Analysis Date: <b>11/17/2014 04:06 PM</b>		
Client ID:		Run ID: <b>VMS9_141117A</b>				SeqNo: <b>3039268</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	21.79	1.0	20	0	109	75-130	0			
1,1,2,2-Tetrachloroethane	21.56	1.0	20	0	108	75-130	0			
1,1,2-Trichloroethane	23.99	1.0	20	0	120	75-125	0			
1,1-Dichloroethane	23.76	1.0	20	0	119	75-133	0			
1,1-Dichloroethene	24.65	1.0	20	0	123	70-145	0			
1,2-Dichlorobenzene	22.63	1.0	20	0	113	70-130	0			
1,2-Dichloroethane	23.77	1.0	20	0	119	78-125	0			
1,2-Dichloropropane	22.73	1.0	20	0	114	75-125	0			
1,3-Dichlorobenzene	23.53	1.0	20	0	118	75-130	0			
1,4-Dichlorobenzene	22.88	1.0	20	0	114	75-125	0			
Acrylonitrile	23.54	1.0	20	0	118	60-140	0			
Benzene	23.31	1.0	20	0	117	85-125	0			
Bromodichloromethane	21.26	1.0	20	0	106	75-125	0			
Bromoform	18.78	1.0	20	0	93.9	60-125	0			
Bromomethane	8.75	1.0	20	0	43.8	30-185	0			
Carbon tetrachloride	19.43	1.0	20	0	97.2	65-140	0			
Chlorobenzene	23.38	1.0	20	0	117	80-120	0			
Chloroethane	20.57	1.0	20	0	103	50-140	0			
Chloroform	24.06	1.0	20	0	120	80-130	0			
Chloromethane	18.33	1.0	20	0	91.6	50-130	0			
cis-1,3-Dichloropropene	21.55	1.0	20	0	108	70-130	0			
Dibromochloromethane	18.63	1.0	20	0	93.2	60-115	0			
Ethylbenzene	23.51	1.0	20	0	118	85-125	0			
Methylene chloride	22.1	5.0	20	0	110	75-140	0			
Tetrachloroethene	22.58	1.0	20	0	113	77-138	0			
Toluene	22.87	1.0	20	0	114	85-125	0			
trans-1,2-Dichloroethene	25.2	1.0	20	0	126	80-140	0			
trans-1,3-Dichloropropene	20.83	1.0	20	0	104	81-123	0			
Trichloroethene	22.8	1.0	20	0	114	84-130	0			
Vinyl chloride	23.08	1.0	20	0	115	50-136	0			
Surr: 1,2-Dichloroethane-d4	19.76	0	20	0	98.8	75-120	0			
Surr: 4-Bromofluorobenzene	20.98	0	20	0	105	80-110	0			
Surr: Dibromofluoromethane	20	0	20	0	100	85-115	0			
Surr: Toluene-d8	20.17	0	20	0	101	85-110	0			

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



**Client:** Weaver Boos Consultants  
**Work Order:** 1411698  
**Project:** Karwick IDW (1873-356-04-00)

# QC BATCH REPORT

Batch ID: **R152606b**      Instrument ID **VMS9**      Method: **E624**

MS				Sample ID: <b>1411696-01B MS</b>			Units: <b>µg/L</b>		Analysis Date: <b>11/18/2014 02:38 A</b>	
Client ID:				Run ID: <b>VMS9_141117A</b>			SeqNo: <b>3039273</b>		Prep Date:	
									DF: <b>5</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	98.75	5.0	100	0	98.8	75-130	0			
1,1,2,2-Tetrachloroethane	91.7	5.0	100	0	91.7	75-130	0			
1,1,2-Trichloroethane	103.2	5.0	100	0	103	75-125	0			
1,1-Dichloroethane	111	5.0	100	0	111	75-133	0			
1,1-Dichloroethene	109.5	5.0	100	0	110	70-145	0			
1,2-Dichlorobenzene	100.6	5.0	100	0	101	70-130	0			
1,2-Dichloroethane	104.5	5.0	100	0	104	78-125	0			
1,2-Dichloropropane	99.5	5.0	100	0	99.5	75-125	0			
1,3-Dichlorobenzene	102.2	5.0	100	0	102	75-130	0			
1,4-Dichlorobenzene	99.7	5.0	100	0	99.7	75-125	0			
Acrylonitrile	113.8	5.0	100	0	114	60-140	0			
Benzene	104.8	5.0	100	0	105	85-125	0			
Bromodichloromethane	83.2	5.0	100	0	83.2	75-125	0			
Bromoform	68.4	5.0	100	0	68.4	60-125	0			
Bromomethane	89	5.0	100	0	89	30-185	0			
Carbon tetrachloride	81.4	5.0	100	0	81.4	65-140	0			
Chlorobenzene	102.8	5.0	100	0	103	80-120	0			
Chloroethane	88.2	5.0	100	0	88.2	50-140	0			
Chloroform	106.2	5.0	100	0	106	80-130	0			
Chloromethane	73.75	5.0	100	0	73.8	50-130	0			
cis-1,3-Dichloropropene	82.8	5.0	100	0	82.8	70-130	0			
Dibromochloromethane	71.6	5.0	100	0	71.6	60-115	0			
Ethylbenzene	108.8	5.0	100	0	109	85-125	0			
Methylene chloride	96.6	25	100	0	96.6	75-140	0			
Tetrachloroethene	103.8	5.0	100	0	104	77-138	0			
Toluene	104	5.0	100	0	104	85-125	0			
trans-1,2-Dichloroethene	113.2	5.0	100	0	113	80-140	0			
trans-1,3-Dichloropropene	75.8	5.0	100	0	75.8	81-123	0			S
Trichloroethene	100.4	5.0	100	0	100	84-130	0			
Vinyl chloride	153.4	5.0	100	57.2	96.2	50-136	0			
Surr: 1,2-Dichloroethane-d4	97.95	0	100	0	98	75-120	0			
Surr: 4-Bromofluorobenzene	100.8	0	100	0	101	80-110	0			
Surr: Dibromofluoromethane	96.45	0	100	0	96.4	85-115	0			
Surr: Toluene-d8	101.1	0	100	0	101	85-110	0			

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



Client: Weaver Boos Consultants  
 Work Order: 1411698  
 Project: Karwick IDW (1873-356-04-00)

# QC BATCH REPORT

Batch ID: **R152606b** Instrument ID **VMS9** Method: **E624**

MSD				Sample ID: 1411696-01B MSD				Units: µg/L		Analysis Date: 11/18/2014 03:04 A	
Client ID:			Run ID: VMS9_141117A			SeqNo: 3039274		Prep Date:		DF: 5	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
1,1,1-Trichloroethane	94.95	5.0	100	0	95	75-130	98.75	3.92	30		
1,1,2,2-Tetrachloroethane	91.7	5.0	100	0	91.7	75-130	91.7	0	30		
1,1,2-Trichloroethane	103.4	5.0	100	0	103	75-125	103.2	0.145	30		
1,1-Dichloroethane	109	5.0	100	0	109	75-133	111	1.73	30		
1,1-Dichloroethene	106.8	5.0	100	0	107	70-145	109.5	2.5	30		
1,2-Dichlorobenzene	99.7	5.0	100	0	99.7	70-130	100.6	0.899	30		
1,2-Dichloroethane	101.8	5.0	100	0	102	78-125	104.5	2.57	30		
1,2-Dichloropropane	99.2	5.0	100	0	99.2	75-125	99.5	0.302	30		
1,3-Dichlorobenzene	101.2	5.0	100	0	101	75-130	102.2	0.885	30		
1,4-Dichlorobenzene	98.6	5.0	100	0	98.6	75-125	99.7	1.11	30		
Acrylonitrile	110.2	5.0	100	0	110	60-140	113.8	3.26	30		
Benzene	102.7	5.0	100	0	103	85-125	104.8	2.02	30		
Bromodichloromethane	83.9	5.0	100	0	83.9	75-125	83.2	0.838	30		
Bromoform	67.95	5.0	100	0	68	60-125	68.4	0.66	30		
Bromomethane	88.8	5.0	100	0	88.8	30-185	89	0.225	30		
Carbon tetrachloride	83.9	5.0	100	0	83.9	65-140	81.4	3.02	30		
Chlorobenzene	101.2	5.0	100	0	101	80-120	102.8	1.57	30		
Chloroethane	89.55	5.0	100	0	89.6	50-140	88.2	1.52	30		
Chloroform	103.8	5.0	100	0	104	80-130	106.2	2.19	30		
Chloromethane	74.15	5.0	100	0	74.2	50-130	73.75	0.541	30		
cis-1,3-Dichloropropene	83.15	5.0	100	0	83.2	70-130	82.8	0.422	30		
Dibromochloromethane	69.85	5.0	100	0	69.8	60-115	71.6	2.47	30		
Ethylbenzene	104.8	5.0	100	0	105	85-125	108.8	3.65	30		
Methylene chloride	96.5	25	100	0	96.5	75-140	96.6	0.104	30		
Tetrachloroethene	102.8	5.0	100	0	103	77-138	103.8	1.02	30		
Toluene	102.2	5.0	100	0	102	85-125	104	1.75	30		
trans-1,2-Dichloroethene	110.8	5.0	100	0	111	80-140	113.2	2.14	30		
trans-1,3-Dichloropropene	76.8	5.0	100	0	76.8	81-123	75.8	1.31	30	S	
Trichloroethene	98.55	5.0	100	0	98.6	84-130	100.4	1.86	30		
Vinyl chloride	150.6	5.0	100	57.2	93.4	50-136	153.4	1.87	30		
Surr: 1,2-Dichloroethane-d4	95.8	0	100	0	95.8	75-120	97.95	2.22	30		
Surr: 4-Bromofluorobenzene	101.4	0	100	0	101	80-110	100.8	0.495	30		
Surr: Dibromofluoromethane	97.9	0	100	0	97.9	85-115	96.45	1.49	30		
Surr: Toluene-d8	101.7	0	100	0	102	85-110	101.1	0.592	30		

The following samples were analyzed in this batch:

1411698-01A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.



**Client:** Weaver Boos Consultants  
**Work Order:** 1411698  
**Project:** Karwick IDW (1873-356-04-00)

# QC BATCH REPORT

Batch ID: **65072** Instrument ID **LACHAT** Method: **E335.4 R1.0**

<b>MBLK</b>		Sample ID: <b>MBLK-65072-65072</b>				Units: <b>mg/L</b>		Analysis Date: <b>11/17/2014 10:21 A</b>		
Client ID:		Run ID: <b>LACHAT_141117C</b>				SeqNo: <b>3037988</b>		Prep Date: <b>11/15/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Cyanide, Total ND 0.0050

<b>MBLK</b>		Sample ID: <b>MBLK-65072-65072</b>				Units: <b>mg/L</b>		Analysis Date: <b>11/17/2014 10:21 A</b>		
Client ID:		Run ID: <b>LACHAT_141117C</b>				SeqNo: <b>3038032</b>		Prep Date: <b>11/15/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Cyanide, Total ND 0.0050

<b>LCS</b>		Sample ID: <b>LCS-65072-65072</b>				Units: <b>mg/L</b>		Analysis Date: <b>11/17/2014 10:21 A</b>		
Client ID:		Run ID: <b>LACHAT_141117C</b>				SeqNo: <b>3037989</b>		Prep Date: <b>11/15/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Cyanide, Total 0.2555 0.0050 0.25 0 102 90-110 0

<b>LCS</b>		Sample ID: <b>LCS-65072-65072</b>				Units: <b>mg/L</b>		Analysis Date: <b>11/17/2014 10:21 A</b>		
Client ID:		Run ID: <b>LACHAT_141117C</b>				SeqNo: <b>3038033</b>		Prep Date: <b>11/15/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Cyanide, Total 0.2555 0.0050 0.25 0 102 90-110 0

<b>MS</b>		Sample ID: <b>1411698-01D MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>11/17/2014 10:21 A</b>		
Client ID: <b>DW-1</b>		Run ID: <b>LACHAT_141117C</b>				SeqNo: <b>3037992</b>		Prep Date: <b>11/15/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Cyanide, Total 0.248 0.0050 0.25 0.01539 93 90-110 0

<b>MS</b>		Sample ID: <b>1411782-03C MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>11/17/2014 10:21 A</b>		
Client ID:		Run ID: <b>LACHAT_141117C</b>				SeqNo: <b>3038010</b>		Prep Date: <b>11/15/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Cyanide, Total 0.2635 0.0050 0.25 0.000549 105 90-110 0

<b>MSD</b>		Sample ID: <b>1411698-01D MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>11/17/2014 10:21 A</b>		
Client ID: <b>DW-1</b>		Run ID: <b>LACHAT_141117C</b>				SeqNo: <b>3037993</b>		Prep Date: <b>11/15/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Cyanide, Total 0.2502 0.0050 0.25 0.01539 93.9 90-110 0.248 0.883 20

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



**Client:** Weaver Boos Consultants  
**Work Order:** 1411698  
**Project:** Karwick IDW (1873-356-04-00)

## QC BATCH REPORT

Batch ID: **65072** Instrument ID **LACHAT** Method: **E335.4 R1.0**

<b>MSD</b>		Sample ID: <b>1411782-03C MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>11/17/2014 10:21 A</b>		
Client ID:		Run ID: <b>LACHAT_141117C</b>				SeqNo: <b>3038011</b>		Prep Date: <b>11/15/2014</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Cyanide, Total	0.2573	0.0050	0.25	0.000549	103	90-110	0.2635	2.38	20	

The following samples were analyzed in this batch:

1411698-01D

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



# CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: 1 of 1

**WEAVER**  
**BOOS**  
**CONSULTANTS**

## Section A

Required Client Information:

Company: **WEAVER BOOS**  
Address: **7121 GRAPERD**  
**GRANGER IN 46530**  
Email To: **SStanford@Weaverboos.com**  
Phone: **571-271-3447** Fax:  
Requested Due Date/TAT:

## Section B

Required Project Information:

Report To: **STEVEN STANFORD**  
Copy To: **---**  
Purchase Order No.:  
Project Name: **KARWICK IDW**  
Project Number: **1873-356-04-00**

## Section C

Invoice Information:

Attention: **STEVEN STANFORD**  
Company Name:  
Address: **SANUK**  
Quote Reference:  
Project Manager:  
Profile #:

## REGULATORY AGENCY

☒ NPDES ☐ GROUND WATER ☐ DRINKING WATER  
☐ UST ☐ RCRA ☐ Other

## SITE LOCATION

☐ GA ☐ IL ☒ IN ☐ MI ☐ MN ☐ NC  
☐ OH ☐ SC ☐ WI ☐ OTHER

ITEM #	Section D Required Client Information										MATRIX CODE	SAMPLE TYPE G=GRAB C=COMP	COLLECTED				SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives								Residual Chlorine (1/2)	Lab ID																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
	SAMPLE ID  One Character per box. (A-Z, 0-9 / -) Samples IDs MUST BE UNIQUE												COMPOSITE START		COMPOSITE END/GRAB				Unpreserved	H <sub>2</sub> SO <sub>4</sub>	HNO <sub>3</sub>	HCl	NaOH	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	Methanol	Other																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
													COMPOSITE END/GRAB																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
													DATE	TIME	DATE	TIME																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
1	D	W	-	I							WT	C	11-10-14	1420	11-10-14	1445	100	15	9	1	4	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											

Additional Comments:

WELL DEVELOPMENT WATER AND  
AUGER DRILL WATER. RUN  
DIOXIN AS "TIC" ON 8270 RUN.  
FULL PRIORITY POLLUTANTS OTHERWISE.

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITION			
<i>[Signature]</i>	11-10-14	1603	<i>[Signature]</i>	11-10-14	1605		YN	YN	YN
<i>[Signature]</i>	11-11-14	1230	<i>[Signature]</i>	11-12-14	1630		YN	YN	YN
	11-12-14	1630	<i>[Signature]</i>				YN	YN	YN

## SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER:

**STEVEN STANFORD**

SIGNATURE OF SAMPLER:

*[Signature]*

11-10-14

DATE Signed (MM/DD/YY)

Temp in °C

Received on Ice

Coolbox

Sealed Cooler

Batteries Intact

4.0



Sample Receipt Checklist

Client Name: **WEAVERBOOS - SOUTH BEND**

Date/Time Received: **12-Nov-14 16:30**

Work Order: **1411698**

Received by: **DS**

Checklist completed by Diane Shaw 13-Nov-14  
eSignature Date

Reviewed by: Chad Whelton 13-Nov-14  
eSignature Date

Matrices: **Water**

Carrier name: **ALSHN**

Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on shipping container/cooler?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Custody seals intact on sample bottles?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Chain of custody present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody signed when relinquished and received?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody agrees with sample labels?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Samples in proper container/bottle?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample containers intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sufficient sample volume for indicated test?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
All samples received within holding time?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Container/Temp Blank temperature in compliance?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample(s) received on ice?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Temperature(s)/Thermometer(s):	<u>4.0 c</u>		
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	<u>11/13/2014 2:57:08 PM</u>		
Water - VOA vials have zero headspace?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	No VOA vials submitted <input type="checkbox"/>
Water - pH acceptable upon receipt?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>
pH adjusted?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	N/A <input type="checkbox"/>
pH adjusted by:	<u>-</u>		

Login Notes:

-----

Client Contacted:

Date Contacted:

Person Contacted:

Contacted By:

Regarding:

Comments:

CorrectiveAction:



## **APPENDIX H**

Streambed Sediment and Surface Water Sample Results  
(Combined by the Laboratory into a Single Report)



## SURFACE WATER AND SEDIMENT SAMPLING FIELD SHEET

Site: Karwick Rd. Nature Park County: La Porte

Name of Person(s) Sampling: Alex Huang/Jodi Slough Title: Environmental Specialists

Sample Location: SW-1 and SD-1

Date: 9/30/2014

Weather Conditions: Skies: Mostly cloudy Temp: 60 deg F Wind: SSW 3  
Precipitation: Occasional drizzle

Monitoring Equipment: Oakton pHTestr 30, Oakton ECTestr High

Sampling Equipment: Dip sampler (surface water), hand auger (sediment)

Calibration Notes: Three-Point Calibration (pH) calibrated on 9/29/2014 @ 17:30

Sample Appearance: See notes.

Water Sample pH: 8.55 (SW-1) Standard Units Sample Time 10:30

Water Sample Temperature: 15.5 (SW-1) Degree C Sample Date 9/30/14

Water Sample Spec.  
Conductivity: 640 (SW-1)  $\mu$ S

Notes / Observations: The surface water sample (SW-1) was collected from a wide and shallow section of the creek with a dip sampler from the top 0.5 feet of water. The water sample was mostly colorless with minor turbidity from suspended solids, and no detectable odors.

The sediment sample (SD-1) was collected from a depth of 0 to 0.5 ft below the creek bottom. It was dark gray with a greenish tint, consisting mostly of fines with significant amounts of sand and trace amounts of plant debris.



## SURFACE WATER AND SEDIMENT SAMPLING FIELD SHEET

Site: Karwick Rd. Nature Park County: La Porte

Name of Person(s) Sampling: Alex Huang/Jodi Slough Title: Environmental Specialists

Sample Location: SW-2 and SD-2

Date: 9/30/2014

Weather Conditions: Skies: Overcast Temp: 60 deg F Wind: SSW 3

Precipitation: Occasional drizzle

Monitoring Equipment: Oakton pHTestr 30, Oakton ECTestr High

Sampling Equipment: Disposable bailer (surface water), hand auger (sediment)

Calibration Notes: Three-Point Calibration (pH) calibrated on 9/29/2014 @ 17:30

Sample Appearance: See notes.

Water Sample pH: 8.53 (SW-2) Standard Units Sample Time 11:40

Water Sample Temperature: 16.1 (SW-2) Degree C Sample Date 9/30/14

Water Sample Spec.  
Conductivity: 630 (SW-2)  $\mu$ S

Notes / Observations: The surface water sample (SW-2) was collected from a deep section of the creek with a disposable bailer, representing the uppermost 3 feet of water from the surface. The water sample was mostly colorless with minor turbidity from suspended solids, and no detectable odors.

The sediment sample (SD-2) was collected from a depth of 0 to 0.5 ft below the creek bottom. It was dark gray with a greenish tint, consisting mostly of fines with small amounts of sand and trace amounts of plant debris.



## SURFACE WATER AND SEDIMENT SAMPLING FIELD SHEET

Site: Karwick Rd. Nature Park County: La Porte

Name of Person(s) Sampling: Alex Huang/Jodi Slough Title: Environmental Specialists

Sample Location: SW-3 and SD-3

Date: 9/30/2014

Weather Conditions: Skies: Overcast Temp: 60 deg F Wind: SSW 3

Precipitation: None

Monitoring Equipment: Oakton pHTestr 30, Oakton ECTestr High

Sampling Equipment: Dip sampler (surface water), hand auger (sediment)

Calibration Notes: Three-Point Calibration (pH) calibrated on 9/29/2014 @ 17:30

Sample Appearance: See notes.

Water Sample pH: 6.90 (SW-3) Standard Units Sample Time 13:00

Water Sample Temperature: 15.6 (SW-3) Degree C Sample Date 9/30/14

Water Sample Spec.  
Conductivity: 1060 (SW-3)  $\mu$ S

Notes / Observations: The water sample (SW-3) was collected from the corrugated metal pipe located above the  
waterline near monitoring well #4. The water was collected from the outfall with a dip sampler and containerized  
before it entered Trail Creek. The water had a light orange color, even after field filtering with a 0.45 micron filter. The  
water had a mild, vaguely metallic odor. A surface water field duplicate, labeled "F.D.," was collected alongside SW-3.

The sediment sample (SD-3) was collected from a depth of 0 to 0.5 ft below the creek bottom. It was dark gray with  
a greenish tint, consisting mostly of fines with small amounts of sand and trace amounts of plant debris. A sediment  
field duplicate, labeled "Field Dup," was collected alongside SD-3.



## SURFACE WATER AND SEDIMENT SAMPLING FIELD SHEET

Site: Karwick Rd. Nature Park County: La Porte

Name of Person(s) Sampling: Alex Huang/Jodi Slough Title: Environmental Specialists

Sample Location: SW-4 and SD-4

Date: 9/30/2014

Weather Conditions: Skies: Overcast Temp: 60 deg F Wind: SSW 3

Precipitation: None

Monitoring Equipment: Oakton pHTestr 30, Oakton ECTestr High

Sampling Equipment: Disposable bailer (surface water), hand auger (sediment)

Calibration Notes: Three-Point Calibration (pH) calibrated on 9/29/2014 @ 17:30

Sample Appearance: See notes.

Water Sample pH: 8.52 (SW-4) Standard Units Sample Time 14:40

Water Sample Temperature: 16.8 (SW-4) Degree C Sample Date 9/30/14

Water Sample Spec.  
Conductivity: 660 (SW-4)  $\mu$ S

Notes / Observations: The surface water sample (SW-4) was collected from a deep section of the creek with a disposable bailer, representing the uppermost 3 feet of water from the surface. The water sample was mostly colorless with minor turbidity from suspended solids, and no detectable odors.

The sediment sample (SD-4) was collected from a depth of 0 to 0.5 ft below the creek bottom. It was dark gray with a greenish tint, consisting mostly of fines with small amounts of sand and trace amounts of plant debris.



## SURFACE WATER AND SEDIMENT SAMPLING FIELD SHEET

Site: Karwick Rd. Nature Park County: La Porte

Name of Person(s) Sampling: Alex Huang/Jodi Slough Title: Environmental Specialists

Sample Location: SW-5 and SD-5

Date: 9/30/2014

Weather Conditions: Skies: Overcast Temp: 60 deg F Wind: SSW 3

Precipitation: None

Monitoring Equipment: Oakton pHTestr 30, Oakton ECTestr High

Sampling Equipment: Dip sampler (surface water), hand auger (sediment)

Calibration Notes: Three-Point Calibration (pH) calibrated on 9/29/2014 @ 17:30

Sample Appearance: See notes.

Water Sample pH: 8.57 (SW-5) Standard Units Sample Time 13:35

Water Sample Temperature: 15.6 (SW-5) Degree C Sample Date 9/30/14

Water Sample Spec.  
Conductivity: 670 (SW-5)  $\mu$ S

Notes / Observations: The surface water sample (SW-5) was collected from a straight section of the creek with a dip sampler, representing the uppermost one foot of water. The water sample was mostly colorless with minor turbidity from suspended solids, and no detectable odors. A surface water matrix spike/matrix spike duplicate, labeled "MS/MSD," was collected alongside SW-5.

The sediment sample (SD-5) was collected from a depth of 0 to 0.5 ft below the creek bottom. It was dark gray with a greenish tint, consisting mostly of fines with significant amounts of sand and trace amounts of plant debris.

A sediment matrix spike/matrix spike duplicate, labeled "MS/MSD," was collected alongside SD-5.



October 24, 2014

Mr. Steve Stanford  
Weaver Boos & Gordon  
7121 Grape Road  
Granger, IN 46530

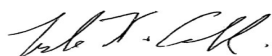
RE: Project: Karwick Rd. Nature Park  
Pace Project No.: 50104622

Dear Mr. Stanford:

Enclosed are the analytical results for sample(s) received by the laboratory between October 01, 2014 and October 02, 2014. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Lyle Cable  
lyle.cable@pacelabs.com  
Project Manager

Enclosures

cc: Mr. Alex Huang, Weaver Boos



## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## CERTIFICATIONS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

---

### New Orleans Certification IDs

California Env. Lab Accreditation Program Branch:  
11277CA

Florida Department of Health (NELAC): E87595

Illinois Environmental Protection Agency: 0025721

Kansas Department of Health and Environment (NELAC):  
E-10266

Louisiana Dept. of Environmental Quality (NELAC/LELAP):  
02006

Oklahoma Department of Environmental Quality: 2010-  
139

Oregon Environmental Laboratory Accreditation:  
LA200001

Pennsylvania Dept. of Env Protection (NELAC): 68-04202

Texas Commission on Env. Quality (NELAC):

T104704405-09-TX

U.S. Dept. of Agriculture Foreign Soil Import: P330-10-  
00119

Washington Department of Ecology: C2078

---

### Indiana Certification IDs

7726 Moller Road, Indianapolis, IN 46268

Illinois Certification #: 200074

Indiana Certification #: C-49-06

Kansas Certification #: E-10247

Kentucky UST Certification #: 0042

Louisiana/NELAP Certification #: 04076

Ohio VAP Certification #: CL-0065

West Virginia Certification #: 330

---

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## SAMPLE SUMMARY

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Lab ID	Sample ID	Matrix	Date Collected	Date Received
50104622001	SW-1	Water	09/30/14 10:30	10/01/14 09:41
50104622002	SW-2	Water	09/30/14 11:40	10/01/14 09:41
50104622003	SW-3	Water	09/30/14 13:00	10/01/14 09:41
50104622004	SW-4	Water	09/30/14 14:40	10/01/14 09:41
50104622005	SW-5	Water	09/30/14 15:35	10/01/14 09:41
50104622006	F.D.	Water	09/30/14 08:00	10/01/14 09:41
50104622007	SD-1	Solid	09/30/14 10:30	10/01/14 09:41
50104622008	SD-2	Solid	09/30/14 11:40	10/01/14 09:41
50104622009	SD-3	Solid	09/30/14 13:00	10/01/14 09:41
50104622010	SD-4	Solid	09/30/14 14:40	10/01/14 09:41
50104622011	SD-5	Solid	09/30/14 15:35	10/01/14 09:41
50104622012	F.D.	Solid	09/30/14 08:00	10/01/14 09:41
50104622013	Trip Blank	Water	09/30/14 08:00	10/01/14 09:41
50104622014	Trip Blank (water)	Water	09/30/14 08:00	10/02/14 09:10
50104622015	SW-1 Dis	Water	09/30/14 10:30	10/02/14 09:10
50104622016	SW-2 Dis	Water	09/30/14 11:40	10/02/14 09:10
50104622017	SW-3 Dis	Water	09/30/14 13:00	10/02/14 09:10
50104622018	SW-4 Dis	Water	09/30/14 14:40	10/02/14 09:10
50104622019	SW-5 Dis	Water	09/30/14 15:35	10/02/14 09:10
50104622020	Field Dup Dis	Water	09/30/14 08:00	10/02/14 09:10

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## SAMPLE ANALYTE COUNT

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
50104622001	SW-1	EPA 8081	SPP1	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SPP1	4	PASI-N
		EPA 6010	LLB	20	PASI-I
		EPA 7470	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	48	PASI-I
		EPA 8260	JLZ	75	PASI-I
		SM 2320B	MLS	1	PASI-I
		SM 2540C	MLS	1	PASI-I
		SM 4500F/C	TPD	1	PASI-I
		SM 4500-S2-D	TPD	1	PASI-I
		EPA 335.4	ILP	1	PASI-I
		EPA 350.1	ILP	1	PASI-I
		EPA 353.2	ILP	1	PASI-I
50104622002	SW-2	EPA 8081	SPP1	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SPP1	4	PASI-N
		EPA 6010	LLB	20	PASI-I
		EPA 7470	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	48	PASI-I
		EPA 8260	JLZ	75	PASI-I
		SM 2320B	MLS	1	PASI-I
		SM 2540C	MLS	1	PASI-I
		SM 4500F/C	TPD	1	PASI-I
		SM 4500-S2-D	TPD	1	PASI-I
		EPA 335.4	ILP	1	PASI-I
		EPA 350.1	ILP	1	PASI-I
		EPA 353.2	ILP	1	PASI-I
50104622003	SW-3	EPA 8081	SPP1	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SPP1	4	PASI-N
		EPA 6010	LLB	20	PASI-I
		EPA 7470	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	48	PASI-I

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## SAMPLE ANALYTE COUNT

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
50104622004	SW-4	EPA 8260	JLZ	75	PASI-I
		SM 2320B	MLS	1	PASI-I
		SM 2540C	MLS	1	PASI-I
		SM 4500F/C	TPD	1	PASI-I
		SM 4500-S2-D	TPD	1	PASI-I
		EPA 335.4	ILP	1	PASI-I
		EPA 350.1	ILP	1	PASI-I
		EPA 353.2	ILP	1	PASI-I
		EPA 8081	SPP1	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SPP1	4	PASI-N
		EPA 6010	LLB	20	PASI-I
		EPA 7470	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	48	PASI-I
		EPA 8260	JLZ	75	PASI-I
		SM 2320B	MLS	1	PASI-I
		SM 2540C	MLS	1	PASI-I
		SM 4500F/C	TPD	1	PASI-I
		SM 4500-S2-D	TPD	1	PASI-I
50104622005	SW-5	EPA 335.4	ILP	1	PASI-I
		EPA 350.1	ILP	1	PASI-I
		EPA 353.2	ILP	1	PASI-I
		EPA 8081	SPP1	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SPP1	4	PASI-N
		EPA 6010	LLB	20	PASI-I
		EPA 7470	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	48	PASI-I
		EPA 8260	JLZ	75	PASI-I
		SM 2320B	MLS	1	PASI-I
		SM 2540C	MLS	1	PASI-I
		SM 4500F/C	TPD	1	PASI-I
		SM 4500-S2-D	TPD	1	PASI-I
		EPA 335.4	ILP	1	PASI-I
		EPA 350.1	ILP	1	PASI-I

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## SAMPLE ANALYTE COUNT

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
50104622006	F.D.	EPA 353.2	ILP	1	PASI-I
		EPA 8081	SPP1	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SPP1	4	PASI-N
		EPA 6010	LLB	20	PASI-I
		EPA 7470	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	48	PASI-I
		EPA 8260	JLZ	75	PASI-I
		SM 2320B	MLS	1	PASI-I
		SM 2540C	MLS	1	PASI-I
		SM 4500F/C	TPD	1	PASI-I
		SM 4500-S2-D	TPD	1	PASI-I
		EPA 335.4	ILP	1	PASI-I
		EPA 350.1	ILP	1	PASI-I
50104622007	SD-1	EPA 353.2	ILP	1	PASI-I
		EPA 8081	SPP1	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SPP1	4	PASI-N
		EPA 6010	FRW	15	PASI-I
		EPA 7471	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	49	PASI-I
		EPA 8260	JLZ	75	PASI-I
		ASTM D2974-87	MLS	1	PASI-I
		EPA 9012	ILP	1	PASI-I
50104622008	SD-2	EPA 8081	SPP1	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SPP1	4	PASI-N
		EPA 6010	FRW	15	PASI-I
		EPA 7471	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	49	PASI-I
		EPA 8260	JLZ	75	PASI-I
		ASTM D2974-87	MLS	1	PASI-I
		EPA 9012	ILP	1	PASI-I
50104622009	SD-3	EPA 8081	SPP1	23	PASI-N

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## SAMPLE ANALYTE COUNT

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
50104622010	SD-4	EPA 8082	DMT	8	PASI-I
		EPA 8151	SPP1	4	PASI-N
		EPA 6010	FRW	15	PASI-I
		EPA 7471	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	49	PASI-I
		EPA 8260	JLZ	75	PASI-I
		ASTM D2974-87	MLS	1	PASI-I
		EPA 9012	ILP	1	PASI-I
		EPA 8081	SPP1	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SPP1	4	PASI-N
		EPA 6010	FRW	15	PASI-I
		EPA 7471	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	49	PASI-I
50104622011	SD-5	EPA 8260	JLZ	75	PASI-I
		ASTM D2974-87	MLS	1	PASI-I
		EPA 9012	ILP	1	PASI-I
		EPA 8081	SPP1	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SPP1	4	PASI-N
		EPA 6010	FRW	15	PASI-I
		EPA 7471	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	49	PASI-I
		EPA 8260	JLZ	75	PASI-I
		ASTM D2974-87	MLS	1	PASI-I
		EPA 9012	ILP	1	PASI-I
		EPA 8081	SPP1	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SPP1	4	PASI-N
50104622012	F.D.	EPA 6010	FRW	15	PASI-I
		EPA 7471	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	49	PASI-I
		EPA 8260	JLZ	75	PASI-I
		EPA 8081	SPP1	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SPP1	4	PASI-N
		EPA 6010	FRW	15	PASI-I
		EPA 7471	LLB	1	PASI-I
		EPA 8270 by SIM	CEM	20	PASI-I
		EPA 8270	CEM	49	PASI-I
		EPA 8260	JLZ	75	PASI-I
		EPA 8081	SPP1	23	PASI-N
		EPA 8082	DMT	8	PASI-I
		EPA 8151	SPP1	4	PASI-N

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## SAMPLE ANALYTE COUNT

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
		ASTM D2974-87	MLS	1	PASI-I
		EPA 9012	ILP	1	PASI-I
50104622013	Trip Blank	EPA 8260	JLZ	75	PASI-I
50104622014	Trip Blank (water)	EPA 8260	JLZ	75	PASI-I

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-1		Lab ID: 50104622001	Collected: 09/30/14 10:30	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b>		Analytical Method: EPA 8081 Preparation Method: EPA 3535						
Aldrin	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 19:59	309-00-2	H2
alpha-BHC	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 19:59	319-84-6	H2
beta-BHC	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 19:59	319-85-7	H2
delta-BHC	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 19:59	319-86-8	H2
gamma-BHC (Lindane)	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 19:59	58-89-9	H2
alpha-Chlordane	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 19:59	5103-71-9	H2
gamma-Chlordane	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 19:59	5103-74-2	H2
4,4'-DDD	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 19:59	72-54-8	H2
4,4'-DDE	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 19:59	72-55-9	H2
4,4'-DDT	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 19:59	50-29-3	H2
Dieldrin	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 19:59	60-57-1	H2
Endosulfan I	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 19:59	959-98-8	H2
Endosulfan II	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 19:59	33213-65-9	H2
Endosulfan sulfate	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 19:59	1031-07-8	H2
Endrin	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 19:59	72-20-8	H2
Endrin aldehyde	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 19:59	7421-93-4	H2
Endrin ketone	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 19:59	53494-70-5	H2
Heptachlor	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 19:59	76-44-8	H2
Heptachlor epoxide	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 19:59	1024-57-3	H2
Methoxychlor	ND ug/L		0.50	1	10/08/14 13:13	10/18/14 19:59	72-43-5	H2
Toxaphene	ND ug/L		2.0	1	10/08/14 13:13	10/18/14 19:59	8001-35-2	H2
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	68 %.		10-119	1	10/08/14 13:13	10/18/14 19:59	877-09-8	
Tetrachloro-m-xylene (S)	66 %.		10-119	1	10/08/14 13:13	10/18/14 19:59	877-09-8	
Decachlorobiphenyl (S)	70 %.		14-126	1	10/08/14 13:13	10/18/14 19:59	2051-24-3	
Decachlorobiphenyl (S)	78 %.		14-126	1	10/08/14 13:13	10/18/14 19:59	2051-24-3	
<b>8082 GCS PCB</b>		Analytical Method: EPA 8082 Preparation Method: EPA 3510						
PCB-1016 (Aroclor 1016)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 14:59	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 14:59	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 14:59	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 14:59	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 14:59	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 14:59	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 14:59	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	52 %.		32-115	1	10/03/14 14:03	10/06/14 14:59	877-09-8	
<b>8151 Chlorinated Herbicides</b>		Analytical Method: EPA 8151 Preparation Method: EPA 3535A						
2,4-D	ND ug/L		2.0	1	10/08/14 15:29	10/09/14 16:00	94-75-7	H2
2,4,5-T	ND ug/L		2.0	1	10/08/14 15:29	10/09/14 16:00	93-76-5	H2
2,4,5-TP (Silvex)	ND ug/L		2.0	1	10/08/14 15:29	10/09/14 16:00	93-72-1	H2
<b>Surrogates</b>								
2,4-DCAA (S)	63 %.		10-166	1	10/08/14 15:29	10/09/14 16:00	19719-28-9	
2,4-DCAA (S)	58 %.		10-166	1	10/08/14 15:29	10/09/14 16:00	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-1		Lab ID: 50104622001	Collected: 09/30/14 10:30	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b>		Analytical Method: EPA 6010 Preparation Method: EPA 3010						
Antimony	ND ug/L		6.0	1	10/04/14 12:32	10/07/14 13:48	7440-36-0	
Arsenic	ND ug/L		10.0	1	10/04/14 12:32	10/07/14 13:48	7440-38-2	
Barium	71.1 ug/L		10.0	1	10/04/14 12:32	10/07/14 13:48	7440-39-3	
Beryllium	ND ug/L		4.0	1	10/04/14 12:32	10/07/14 13:48	7440-41-7	
Cadmium	ND ug/L		2.0	1	10/04/14 12:32	10/07/14 13:48	7440-43-9	
Calcium	78400 ug/L		1000	1	10/04/14 12:32	10/07/14 13:48	7440-70-2	
Chromium	ND ug/L		10.0	1	10/04/14 12:32	10/07/14 13:48	7440-47-3	
Cobalt	ND ug/L		10.0	1	10/04/14 12:32	10/07/14 13:48	7440-48-4	
Copper	ND ug/L		10.0	1	10/04/14 12:32	10/07/14 13:48	7440-50-8	
Iron	648 ug/L		100	1	10/04/14 12:32	10/07/14 13:48	7439-89-6	
Lead	ND ug/L		10.0	1	10/04/14 12:32	10/07/14 13:48	7439-92-1	
Magnesium	26400 ug/L		1000	1	10/04/14 12:32	10/07/14 13:48	7439-95-4	
Manganese	61.6 ug/L		10.0	1	10/04/14 12:32	10/07/14 13:48	7439-96-5	
Nickel	ND ug/L		10.0	1	10/04/14 12:32	10/07/14 13:48	7440-02-0	
Potassium	2530 ug/L		1000	1	10/04/14 12:32	10/07/14 13:48	7440-09-7	
Selenium	ND ug/L		10.0	1	10/04/14 12:32	10/07/14 13:48	7782-49-2	
Silver	ND ug/L		10.0	1	10/04/14 12:32	10/07/14 13:48	7440-22-4	
Thallium	ND ug/L		2.0	1	10/11/14 16:05	10/13/14 10:26	7440-28-0	
Vanadium	14.6 ug/L		10.0	1	10/04/14 12:32	10/07/14 13:48	7440-62-2	
Zinc	ND ug/L		20.0	1	10/04/14 12:32	10/07/14 13:48	7440-66-6	
<b>7470 Mercury</b>		Analytical Method: EPA 7470 Preparation Method: EPA 7470						
Mercury	ND ug/L		2.0	1	10/08/14 10:42	10/09/14 11:29	7439-97-6	
<b>8270 MSSV PAH</b>		Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3510						
Acenaphthene	ND ug/L		1.0	1	10/03/14 10:52	10/03/14 23:25	83-32-9	
Acenaphthylene	ND ug/L		1.0	1	10/03/14 10:52	10/03/14 23:25	208-96-8	
Anthracene	ND ug/L		0.10	1	10/03/14 10:52	10/03/14 23:25	120-12-7	
Benzo(a)anthracene	ND ug/L		0.10	1	10/03/14 10:52	10/03/14 23:25	56-55-3	
Benzo(a)pyrene	ND ug/L		0.10	1	10/03/14 10:52	10/03/14 23:25	50-32-8	
Benzo(b)fluoranthene	ND ug/L		0.10	1	10/03/14 10:52	10/03/14 23:25	205-99-2	
Benzo(g,h,i)perylene	ND ug/L		0.10	1	10/03/14 10:52	10/03/14 23:25	191-24-2	
Benzo(k)fluoranthene	ND ug/L		0.10	1	10/03/14 10:52	10/03/14 23:25	207-08-9	
Chrysene	ND ug/L		0.51	1	10/03/14 10:52	10/03/14 23:25	218-01-9	
Dibenz(a,h)anthracene	ND ug/L		0.10	1	10/03/14 10:52	10/03/14 23:25	53-70-3	
Fluoranthene	ND ug/L		1.0	1	10/03/14 10:52	10/03/14 23:25	206-44-0	
Fluorene	ND ug/L		1.0	1	10/03/14 10:52	10/03/14 23:25	86-73-7	
Indeno(1,2,3-cd)pyrene	ND ug/L		0.10	1	10/03/14 10:52	10/03/14 23:25	193-39-5	
1-Methylnaphthalene	ND ug/L		1.0	1	10/03/14 10:52	10/03/14 23:25	90-12-0	
2-Methylnaphthalene	ND ug/L		1.0	1	10/03/14 10:52	10/03/14 23:25	91-57-6	
Naphthalene	ND ug/L		1.0	1	10/03/14 10:52	10/03/14 23:25	91-20-3	
Phenanthrene	ND ug/L		1.0	1	10/03/14 10:52	10/03/14 23:25	85-01-8	
Pyrene	ND ug/L		1.0	1	10/03/14 10:52	10/03/14 23:25	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	79 %.		21-114	1	10/03/14 10:52	10/03/14 23:25	321-60-8	
p-Terphenyl-d14 (S)	71 %.		25-131	1	10/03/14 10:52	10/03/14 23:25	1718-51-0	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-1		Lab ID: 50104622001	Collected: 09/30/14 10:30	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Benzyl alcohol	ND ug/L		20.4	1	10/03/14 10:52	10/04/14 19:53	100-51-6	
4-Bromophenylphenyl ether	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	101-55-3	
Butylbenzylphthalate	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	85-68-7	
4-Chloro-3-methylphenol	ND ug/L		20.4	1	10/03/14 10:52	10/04/14 19:53	59-50-7	
4-Chloroaniline	ND ug/L		20.4	1	10/03/14 10:52	10/04/14 19:53	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	111-91-1	
bis(2-Chloroethyl) ether	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	111-44-4	
bis(2-Chloroisopropyl) ether	ND ug/L		5.1	1	10/03/14 10:52	10/04/14 19:53	108-60-1	
bis(2chloro1methylethyl) ether	ND ug/L		5.1	1	10/03/14 10:52	10/04/14 19:53	108-60-1	
2-Chloronaphthalene	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	91-58-7	
2-Chlorophenol	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	95-57-8	
4-Chlorophenylphenyl ether	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	7005-72-3	
Dibenzofuran	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	132-64-9	
3,3'-Dichlorobenzidine	ND ug/L		20.4	1	10/03/14 10:52	10/04/14 19:53	91-94-1	
2,4-Dichlorophenol	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	120-83-2	
Diethylphthalate	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	84-66-2	
2,4-Dimethylphenol	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	105-67-9	
Dimethylphthalate	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	131-11-3	
Di-n-butylphthalate	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/L		51.0	1	10/03/14 10:52	10/04/14 19:53	534-52-1	
2,4-Dinitrophenol	ND ug/L		51.0	1	10/03/14 10:52	10/04/14 19:53	51-28-5	
2,4-Dinitrotoluene	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	121-14-2	
2,6-Dinitrotoluene	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	606-20-2	
Di-n-octylphthalate	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/L		5.1	1	10/03/14 10:52	10/04/14 19:53	117-81-7	
Hexachloro-1,3-butadiene	ND ug/L		5.1	1	10/03/14 10:52	10/04/14 19:53	87-68-3	
Hexachlorobenzene	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	118-74-1	
Hexachlorocyclopentadiene	ND ug/L		20.4	1	10/03/14 10:52	10/04/14 19:53	77-47-4	
Hexachloroethane	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	67-72-1	
Isophorone	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/L		20.4	1	10/03/14 10:52	10/04/14 19:53		
2-Nitroaniline	ND ug/L		51.0	1	10/03/14 10:52	10/04/14 19:53	88-74-4	
3-Nitroaniline	ND ug/L		51.0	1	10/03/14 10:52	10/04/14 19:53	99-09-2	
4-Nitroaniline	ND ug/L		51.0	1	10/03/14 10:52	10/04/14 19:53	100-01-6	
Nitrobenzene	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	98-95-3	
2-Nitrophenol	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	88-75-5	
4-Nitrophenol	ND ug/L		51.0	1	10/03/14 10:52	10/04/14 19:53	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	621-64-7	
N-Nitrosodiphenylamine	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	86-30-6	
Pentachlorophenol	ND ug/L		51.0	1	10/03/14 10:52	10/04/14 19:53	87-86-5	
Phenol	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	108-95-2	
2,4,5-Trichlorophenol	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	95-95-4	
2,4,6-Trichlorophenol	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 19:53	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	88 %.		29-126	1	10/03/14 10:52	10/04/14 19:53	4165-60-0	
Phenol-d5 (S)	17 %.		10-47	1	10/03/14 10:52	10/04/14 19:53	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-1		Lab ID: 50104622001	Collected: 09/30/14 10:30	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV SCAN		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Surrogates								
2-Fluorophenol (S)	30 %.		10-67	1	10/03/14 10:52	10/04/14 19:53	367-12-4	
2,4,6-Tribromophenol (S)	100 %.		31-161	1	10/03/14 10:52	10/04/14 19:53	118-79-6	
8260 MSV Indiana		Analytical Method: EPA 8260						
Acetone	ND ug/L		100	1		10/12/14 02:00	67-64-1	
Acrolein	ND ug/L		50.0	1		10/12/14 02:00	107-02-8	
Acrylonitrile	ND ug/L		100	1		10/12/14 02:00	107-13-1	
Benzene	ND ug/L		5.0	1		10/12/14 02:00	71-43-2	
Bromobenzene	ND ug/L		5.0	1		10/12/14 02:00	108-86-1	
Bromochloromethane	ND ug/L		5.0	1		10/12/14 02:00	74-97-5	
Bromodichloromethane	ND ug/L		5.0	1		10/12/14 02:00	75-27-4	
Bromoform	ND ug/L		5.0	1		10/12/14 02:00	75-25-2	
Bromomethane	ND ug/L		5.0	1		10/12/14 02:00	74-83-9	
2-Butanone (MEK)	ND ug/L		25.0	1		10/12/14 02:00	78-93-3	
n-Butylbenzene	ND ug/L		5.0	1		10/12/14 02:00	104-51-8	
sec-Butylbenzene	ND ug/L		5.0	1		10/12/14 02:00	135-98-8	
tert-Butylbenzene	ND ug/L		5.0	1		10/12/14 02:00	98-06-6	
Carbon disulfide	ND ug/L		10.0	1		10/12/14 02:00	75-15-0	
Carbon tetrachloride	ND ug/L		5.0	1		10/12/14 02:00	56-23-5	
Chlorobenzene	ND ug/L		5.0	1		10/12/14 02:00	108-90-7	
Chloroethane	ND ug/L		5.0	1		10/12/14 02:00	75-00-3	
Chloroform	ND ug/L		5.0	1		10/12/14 02:00	67-66-3	
Chloromethane	ND ug/L		5.0	1		10/12/14 02:00	74-87-3	
2-Chlorotoluene	ND ug/L		5.0	1		10/12/14 02:00	95-49-8	
4-Chlorotoluene	ND ug/L		5.0	1		10/12/14 02:00	106-43-4	
Dibromochloromethane	ND ug/L		5.0	1		10/12/14 02:00	124-48-1	
1,2-Dibromoethane (EDB)	ND ug/L		5.0	1		10/12/14 02:00	106-93-4	
Dibromomethane	ND ug/L		5.0	1		10/12/14 02:00	74-95-3	
1,2-Dichlorobenzene	ND ug/L		5.0	1		10/12/14 02:00	95-50-1	
1,3-Dichlorobenzene	ND ug/L		5.0	1		10/12/14 02:00	541-73-1	
1,4-Dichlorobenzene	ND ug/L		5.0	1		10/12/14 02:00	106-46-7	
trans-1,4-Dichloro-2-butene	ND ug/L		100	1		10/12/14 02:00	110-57-6	
Dichlorodifluoromethane	ND ug/L		5.0	1		10/12/14 02:00	75-71-8	
1,1-Dichloroethane	ND ug/L		5.0	1		10/12/14 02:00	75-34-3	
1,2-Dichloroethane	ND ug/L		5.0	1		10/12/14 02:00	107-06-2	
1,1-Dichloroethene	ND ug/L		5.0	1		10/12/14 02:00	75-35-4	
cis-1,2-Dichloroethene	ND ug/L		5.0	1		10/12/14 02:00	156-59-2	
trans-1,2-Dichloroethene	ND ug/L		5.0	1		10/12/14 02:00	156-60-5	
1,2-Dichloropropane	ND ug/L		5.0	1		10/12/14 02:00	78-87-5	
1,3-Dichloropropane	ND ug/L		5.0	1		10/12/14 02:00	142-28-9	
2,2-Dichloropropane	ND ug/L		5.0	1		10/12/14 02:00	594-20-7	
1,1-Dichloropropene	ND ug/L		5.0	1		10/12/14 02:00	563-58-6	
cis-1,3-Dichloropropene	ND ug/L		5.0	1		10/12/14 02:00	10061-01-5	
trans-1,3-Dichloropropene	ND ug/L		5.0	1		10/12/14 02:00	10061-02-6	
Ethylbenzene	ND ug/L		5.0	1		10/12/14 02:00	100-41-4	
Ethyl methacrylate	ND ug/L		100	1		10/12/14 02:00	97-63-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-1		Lab ID: 50104622001	Collected: 09/30/14 10:30	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV Indiana</b>		Analytical Method: EPA 8260						
Hexachloro-1,3-butadiene	ND ug/L		5.0	1		10/12/14 02:00	87-68-3	
n-Hexane	ND ug/L		5.0	1		10/12/14 02:00	110-54-3	
2-Hexanone	ND ug/L		25.0	1		10/12/14 02:00	591-78-6	
Iodomethane	ND ug/L		10.0	1		10/12/14 02:00	74-88-4	
Isopropylbenzene (Cumene)	ND ug/L		5.0	1		10/12/14 02:00	98-82-8	
p-Isopropyltoluene	ND ug/L		5.0	1		10/12/14 02:00	99-87-6	
Methylene Chloride	ND ug/L		5.0	1		10/12/14 02:00	75-09-2	
1-Methylnaphthalene	ND ug/L		5.0	1		10/12/14 02:00	90-12-0	N2
2-Methylnaphthalene	ND ug/L		10.0	1		10/12/14 02:00	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND ug/L		25.0	1		10/12/14 02:00	108-10-1	
Methyl-tert-butyl ether	ND ug/L		4.0	1		10/12/14 02:00	1634-04-4	
Naphthalene	ND ug/L		1.4	1		10/12/14 02:00	91-20-3	
n-Propylbenzene	ND ug/L		5.0	1		10/12/14 02:00	103-65-1	
Styrene	ND ug/L		5.0	1		10/12/14 02:00	100-42-5	
1,1,1,2-Tetrachloroethane	ND ug/L		5.0	1		10/12/14 02:00	630-20-6	
1,1,2,2-Tetrachloroethane	ND ug/L		5.0	1		10/12/14 02:00	79-34-5	
Tetrachloroethene	ND ug/L		5.0	1		10/12/14 02:00	127-18-4	
Toluene	ND ug/L		5.0	1		10/12/14 02:00	108-88-3	
1,2,3-Trichlorobenzene	ND ug/L		5.0	1		10/12/14 02:00	87-61-6	
1,2,4-Trichlorobenzene	ND ug/L		5.0	1		10/12/14 02:00	120-82-1	
1,1,1-Trichloroethane	ND ug/L		5.0	1		10/12/14 02:00	71-55-6	
1,1,2-Trichloroethane	ND ug/L		5.0	1		10/12/14 02:00	79-00-5	
Trichloroethene	ND ug/L		5.0	1		10/12/14 02:00	79-01-6	
Trichlorofluoromethane	ND ug/L		5.0	1		10/12/14 02:00	75-69-4	
1,2,3-Trichloropropane	ND ug/L		5.0	1		10/12/14 02:00	96-18-4	
1,2,4-Trimethylbenzene	ND ug/L		5.0	1		10/12/14 02:00	95-63-6	
1,3,5-Trimethylbenzene	ND ug/L		5.0	1		10/12/14 02:00	108-67-8	
Vinyl acetate	ND ug/L		50.0	1		10/12/14 02:00	108-05-4	
Vinyl chloride	ND ug/L		2.0	1		10/12/14 02:00	75-01-4	
Xylene (Total)	ND ug/L		10.0	1		10/12/14 02:00	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	99 %.		79-116	1		10/12/14 02:00	1868-53-7	
4-Bromofluorobenzene (S)	93 %.		80-114	1		10/12/14 02:00	460-00-4	
Toluene-d8 (S)	87 %.		81-110	1		10/12/14 02:00	2037-26-5	
<b>2320B Alkalinity</b>		Analytical Method: SM 2320B						
Alkalinity, Total as CaCO3	239 mg/L		2.0	1		10/09/14 13:36		
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	417 mg/L		10.0	1		10/02/14 06:42		
<b>4500FC Fluoride</b>		Analytical Method: SM 4500F/C						
Fluoride	0.12 mg/L		0.10	1		10/08/14 12:51	16984-48-8	
<b>4500S2D Sulfide Water</b>		Analytical Method: SM 4500-S2-D						
Sulfide	ND mg/L		0.10	1		10/06/14 09:52		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-1		Lab ID: 50104622001	Collected: 09/30/14 10:30	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>335.4 Cyanide, Total</b>	Analytical Method: EPA 335.4 Preparation Method: EPA 335.4							
Cyanide	ND	mg/L	0.010	1	10/06/14 13:05	10/08/14 14:22	57-12-5	
<b>350.1 Ammonia</b>	Analytical Method: EPA 350.1 Preparation Method: EPA 350.1							
Nitrogen, Ammonia	ND	mg/L	0.10	1	10/07/14 10:40	10/09/14 10:19	7664-41-7	
<b>353.2 Nitrogen, NO2/NO3 unpres</b>	Analytical Method: EPA 353.2							
Nitrogen, Nitrate	<b>0.19</b>	mg/L	0.10	1		10/01/14 14:11		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-2		Lab ID: 50104622002	Collected: 09/30/14 11:40	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b>		Analytical Method: EPA 8081 Preparation Method: EPA 3535						
Aldrin	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:11	309-00-2	H2
alpha-BHC	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:11	319-84-6	H2
beta-BHC	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:11	319-85-7	H2
delta-BHC	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:11	319-86-8	H2
gamma-BHC (Lindane)	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:11	58-89-9	H2
alpha-Chlordane	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:11	5103-71-9	H2
gamma-Chlordane	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:11	5103-74-2	H2
4,4'-DDD	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:11	72-54-8	H2
4,4'-DDE	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:11	72-55-9	H2
4,4'-DDT	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:11	50-29-3	H2
Dieldrin	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:11	60-57-1	H2
Endosulfan I	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:11	959-98-8	H2
Endosulfan II	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:11	33213-65-9	H2
Endosulfan sulfate	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:11	1031-07-8	H2
Endrin	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:11	72-20-8	H2
Endrin aldehyde	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:11	7421-93-4	H2
Endrin ketone	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:11	53494-70-5	H2
Heptachlor	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:11	76-44-8	H2
Heptachlor epoxide	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:11	1024-57-3	H2
Methoxychlor	ND ug/L		0.50	1	10/08/14 13:13	10/18/14 20:11	72-43-5	H2
Toxaphene	ND ug/L		2.0	1	10/08/14 13:13	10/18/14 20:11	8001-35-2	H2
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	67 %.		10-119	1	10/08/14 13:13	10/18/14 20:11	877-09-8	
Tetrachloro-m-xylene (S)	64 %.		10-119	1	10/08/14 13:13	10/18/14 20:11	877-09-8	
Decachlorobiphenyl (S)	76 %.		14-126	1	10/08/14 13:13	10/18/14 20:11	2051-24-3	
Decachlorobiphenyl (S)	68 %.		14-126	1	10/08/14 13:13	10/18/14 20:11	2051-24-3	
<b>8082 GCS PCB</b>		Analytical Method: EPA 8082 Preparation Method: EPA 3510						
PCB-1016 (Aroclor 1016)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 15:05	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 15:05	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 15:05	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 15:05	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 15:05	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 15:05	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 15:05	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	78 %.		32-115	1	10/03/14 14:03	10/06/14 15:05	877-09-8	
<b>8151 Chlorinated Herbicides</b>		Analytical Method: EPA 8151 Preparation Method: EPA 3535A						
2,4-D	ND ug/L		2.0	1	10/08/14 15:29	10/09/14 16:16	94-75-7	H2
2,4,5-T	ND ug/L		2.0	1	10/08/14 15:29	10/09/14 16:16	93-76-5	H2
2,4,5-TP (Silvex)	ND ug/L		2.0	1	10/08/14 15:29	10/09/14 16:16	93-72-1	H2
<b>Surrogates</b>								
2,4-DCAA (S)	49 %.		10-166	1	10/08/14 15:29	10/09/14 16:16	19719-28-9	
2,4-DCAA (S)	44 %.		10-166	1	10/08/14 15:29	10/09/14 16:16	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-2		Lab ID: 50104622002	Collected: 09/30/14 11:40	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b>		Analytical Method: EPA 6010 Preparation Method: EPA 3010						
Antimony	ND	ug/L	6.0	1	10/04/14 12:32	10/07/14 13:51	7440-36-0	
Arsenic	ND	ug/L	10.0	1	10/04/14 12:32	10/07/14 13:51	7440-38-2	
Barium	68.9	ug/L	10.0	1	10/04/14 12:32	10/07/14 13:51	7440-39-3	
Beryllium	ND	ug/L	4.0	1	10/04/14 12:32	10/07/14 13:51	7440-41-7	
Cadmium	ND	ug/L	2.0	1	10/04/14 12:32	10/07/14 13:51	7440-43-9	
Calcium	78000	ug/L	1000	1	10/04/14 12:32	10/07/14 13:51	7440-70-2	
Chromium	ND	ug/L	10.0	1	10/04/14 12:32	10/07/14 13:51	7440-47-3	
Cobalt	ND	ug/L	10.0	1	10/04/14 12:32	10/07/14 13:51	7440-48-4	
Copper	ND	ug/L	10.0	1	10/04/14 12:32	10/07/14 13:51	7440-50-8	
Iron	587	ug/L	100	1	10/04/14 12:32	10/07/14 13:51	7439-89-6	
Lead	ND	ug/L	10.0	1	10/04/14 12:32	10/07/14 13:51	7439-92-1	
Magnesium	26200	ug/L	1000	1	10/04/14 12:32	10/07/14 13:51	7439-95-4	
Manganese	57.4	ug/L	10.0	1	10/04/14 12:32	10/07/14 13:51	7439-96-5	
Nickel	ND	ug/L	10.0	1	10/04/14 12:32	10/07/14 13:51	7440-02-0	
Potassium	2460	ug/L	1000	1	10/04/14 12:32	10/07/14 13:51	7440-09-7	
Selenium	ND	ug/L	10.0	1	10/04/14 12:32	10/07/14 13:51	7782-49-2	
Silver	ND	ug/L	10.0	1	10/04/14 12:32	10/07/14 13:51	7440-22-4	
Thallium	ND	ug/L	2.0	1	10/11/14 16:05	10/13/14 10:29	7440-28-0	
Vanadium	13.7	ug/L	10.0	1	10/04/14 12:32	10/07/14 13:51	7440-62-2	
Zinc	ND	ug/L	20.0	1	10/04/14 12:32	10/07/14 13:51	7440-66-6	
<b>7470 Mercury</b>		Analytical Method: EPA 7470 Preparation Method: EPA 7470						
Mercury	ND	ug/L	2.0	1	10/08/14 10:42	10/09/14 11:31	7439-97-6	
<b>8270 MSSV PAH</b>		Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3510						
Acenaphthene	ND	ug/L	1.0	1	10/03/14 10:52	10/03/14 23:43	83-32-9	
Acenaphthylene	ND	ug/L	1.0	1	10/03/14 10:52	10/03/14 23:43	208-96-8	
Anthracene	ND	ug/L	0.10	1	10/03/14 10:52	10/03/14 23:43	120-12-7	
Benzo(a)anthracene	ND	ug/L	0.10	1	10/03/14 10:52	10/03/14 23:43	56-55-3	
Benzo(a)pyrene	ND	ug/L	0.10	1	10/03/14 10:52	10/03/14 23:43	50-32-8	
Benzo(b)fluoranthene	ND	ug/L	0.10	1	10/03/14 10:52	10/03/14 23:43	205-99-2	
Benzo(g,h,i)perylene	ND	ug/L	0.10	1	10/03/14 10:52	10/03/14 23:43	191-24-2	
Benzo(k)fluoranthene	ND	ug/L	0.10	1	10/03/14 10:52	10/03/14 23:43	207-08-9	
Chrysene	ND	ug/L	0.51	1	10/03/14 10:52	10/03/14 23:43	218-01-9	
Dibenz(a,h)anthracene	ND	ug/L	0.10	1	10/03/14 10:52	10/03/14 23:43	53-70-3	
Fluoranthene	ND	ug/L	1.0	1	10/03/14 10:52	10/03/14 23:43	206-44-0	
Fluorene	ND	ug/L	1.0	1	10/03/14 10:52	10/03/14 23:43	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/L	0.10	1	10/03/14 10:52	10/03/14 23:43	193-39-5	
1-Methylnaphthalene	ND	ug/L	1.0	1	10/03/14 10:52	10/03/14 23:43	90-12-0	
2-Methylnaphthalene	ND	ug/L	1.0	1	10/03/14 10:52	10/03/14 23:43	91-57-6	
Naphthalene	ND	ug/L	1.0	1	10/03/14 10:52	10/03/14 23:43	91-20-3	
Phenanthrene	ND	ug/L	1.0	1	10/03/14 10:52	10/03/14 23:43	85-01-8	
Pyrene	ND	ug/L	1.0	1	10/03/14 10:52	10/03/14 23:43	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	78 %		21-114	1	10/03/14 10:52	10/03/14 23:43	321-60-8	
p-Terphenyl-d14 (S)	70 %		25-131	1	10/03/14 10:52	10/03/14 23:43	1718-51-0	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-2		Lab ID: 50104622002	Collected: 09/30/14 11:40	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Benzyl alcohol	ND	ug/L	20.4	1	10/03/14 10:52	10/04/14 20:15	100-51-6	
4-Bromophenylphenyl ether	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	101-55-3	
Butylbenzylphthalate	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	85-68-7	
4-Chloro-3-methylphenol	ND	ug/L	20.4	1	10/03/14 10:52	10/04/14 20:15	59-50-7	
4-Chloroaniline	ND	ug/L	20.4	1	10/03/14 10:52	10/04/14 20:15	106-47-8	
bis(2-Chloroethoxy)methane	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	111-91-1	
bis(2-Chloroethyl) ether	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	111-44-4	
bis(2-Chloroisopropyl) ether	ND	ug/L	5.1	1	10/03/14 10:52	10/04/14 20:15	108-60-1	
bis(2chloro1methylethyl) ether	ND	ug/L	5.1	1	10/03/14 10:52	10/04/14 20:15	108-60-1	
2-Chloronaphthalene	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	91-58-7	
2-Chlorophenol	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	95-57-8	
4-Chlorophenylphenyl ether	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	7005-72-3	
Dibenzofuran	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	132-64-9	
3,3'-Dichlorobenzidine	ND	ug/L	20.4	1	10/03/14 10:52	10/04/14 20:15	91-94-1	
2,4-Dichlorophenol	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	120-83-2	
Diethylphthalate	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	84-66-2	
2,4-Dimethylphenol	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	105-67-9	
Dimethylphthalate	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	131-11-3	
Di-n-butylphthalate	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	84-74-2	
4,6-Dinitro-2-methylphenol	ND	ug/L	51.0	1	10/03/14 10:52	10/04/14 20:15	534-52-1	
2,4-Dinitrophenol	ND	ug/L	51.0	1	10/03/14 10:52	10/04/14 20:15	51-28-5	
2,4-Dinitrotoluene	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	121-14-2	
2,6-Dinitrotoluene	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	606-20-2	
Di-n-octylphthalate	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	117-84-0	
bis(2-Ethylhexyl)phthalate	ND	ug/L	5.1	1	10/03/14 10:52	10/04/14 20:15	117-81-7	
Hexachloro-1,3-butadiene	ND	ug/L	5.1	1	10/03/14 10:52	10/04/14 20:15	87-68-3	
Hexachlorobenzene	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	118-74-1	
Hexachlorocyclopentadiene	ND	ug/L	20.4	1	10/03/14 10:52	10/04/14 20:15	77-47-4	
Hexachloroethane	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	67-72-1	
Isophorone	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	78-59-1	
2-Methylphenol(o-Cresol)	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND	ug/L	20.4	1	10/03/14 10:52	10/04/14 20:15		
2-Nitroaniline	ND	ug/L	51.0	1	10/03/14 10:52	10/04/14 20:15	88-74-4	
3-Nitroaniline	ND	ug/L	51.0	1	10/03/14 10:52	10/04/14 20:15	99-09-2	
4-Nitroaniline	ND	ug/L	51.0	1	10/03/14 10:52	10/04/14 20:15	100-01-6	
Nitrobenzene	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	98-95-3	
2-Nitrophenol	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	88-75-5	
4-Nitrophenol	ND	ug/L	51.0	1	10/03/14 10:52	10/04/14 20:15	100-02-7	
N-Nitroso-di-n-propylamine	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	621-64-7	
N-Nitrosodiphenylamine	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	86-30-6	
Pentachlorophenol	ND	ug/L	51.0	1	10/03/14 10:52	10/04/14 20:15	87-86-5	
Phenol	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	108-95-2	
2,4,5-Trichlorophenol	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	95-95-4	
2,4,6-Trichlorophenol	ND	ug/L	10.2	1	10/03/14 10:52	10/04/14 20:15	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	88 %.		29-126	1	10/03/14 10:52	10/04/14 20:15	4165-60-0	
Phenol-d5 (S)	15 %.		10-47	1	10/03/14 10:52	10/04/14 20:15	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-2		Lab ID: 50104622002		Collected: 09/30/14 11:40		Received: 10/01/14 09:41		Matrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual	
8270 MSSV SCAN		Analytical Method: EPA 8270 Preparation Method: EPA 3510							
Surrogates									
2-Fluorophenol (S)	27 %.		10-67	1	10/03/14 10:52	10/04/14 20:15	367-12-4		
2,4,6-Tribromophenol (S)	101 %.		31-161	1	10/03/14 10:52	10/04/14 20:15	118-79-6		
8260 MSV Indiana		Analytical Method: EPA 8260							
Acetone	ND ug/L		100	1		10/12/14 02:32	67-64-1		
Acrolein	ND ug/L		50.0	1		10/12/14 02:32	107-02-8		
Acrylonitrile	ND ug/L		100	1		10/12/14 02:32	107-13-1		
Benzene	ND ug/L		5.0	1		10/12/14 02:32	71-43-2		
Bromobenzene	ND ug/L		5.0	1		10/12/14 02:32	108-86-1		
Bromochloromethane	ND ug/L		5.0	1		10/12/14 02:32	74-97-5		
Bromodichloromethane	ND ug/L		5.0	1		10/12/14 02:32	75-27-4		
Bromoform	ND ug/L		5.0	1		10/12/14 02:32	75-25-2		
Bromomethane	ND ug/L		5.0	1		10/12/14 02:32	74-83-9		
2-Butanone (MEK)	ND ug/L		25.0	1		10/12/14 02:32	78-93-3		
n-Butylbenzene	ND ug/L		5.0	1		10/12/14 02:32	104-51-8		
sec-Butylbenzene	ND ug/L		5.0	1		10/12/14 02:32	135-98-8		
tert-Butylbenzene	ND ug/L		5.0	1		10/12/14 02:32	98-06-6		
Carbon disulfide	ND ug/L		10.0	1		10/12/14 02:32	75-15-0		
Carbon tetrachloride	ND ug/L		5.0	1		10/12/14 02:32	56-23-5		
Chlorobenzene	ND ug/L		5.0	1		10/12/14 02:32	108-90-7		
Chloroethane	ND ug/L		5.0	1		10/12/14 02:32	75-00-3		
Chloroform	ND ug/L		5.0	1		10/12/14 02:32	67-66-3		
Chloromethane	ND ug/L		5.0	1		10/12/14 02:32	74-87-3		
2-Chlorotoluene	ND ug/L		5.0	1		10/12/14 02:32	95-49-8		
4-Chlorotoluene	ND ug/L		5.0	1		10/12/14 02:32	106-43-4		
Dibromochloromethane	ND ug/L		5.0	1		10/12/14 02:32	124-48-1		
1,2-Dibromoethane (EDB)	ND ug/L		5.0	1		10/12/14 02:32	106-93-4		
Dibromomethane	ND ug/L		5.0	1		10/12/14 02:32	74-95-3		
1,2-Dichlorobenzene	ND ug/L		5.0	1		10/12/14 02:32	95-50-1		
1,3-Dichlorobenzene	ND ug/L		5.0	1		10/12/14 02:32	541-73-1		
1,4-Dichlorobenzene	ND ug/L		5.0	1		10/12/14 02:32	106-46-7		
trans-1,4-Dichloro-2-butene	ND ug/L		100	1		10/12/14 02:32	110-57-6		
Dichlorodifluoromethane	ND ug/L		5.0	1		10/12/14 02:32	75-71-8		
1,1-Dichloroethane	ND ug/L		5.0	1		10/12/14 02:32	75-34-3		
1,2-Dichloroethane	ND ug/L		5.0	1		10/12/14 02:32	107-06-2		
1,1-Dichloroethene	ND ug/L		5.0	1		10/12/14 02:32	75-35-4		
cis-1,2-Dichloroethene	ND ug/L		5.0	1		10/12/14 02:32	156-59-2		
trans-1,2-Dichloroethene	ND ug/L		5.0	1		10/12/14 02:32	156-60-5		
1,2-Dichloropropane	ND ug/L		5.0	1		10/12/14 02:32	78-87-5		
1,3-Dichloropropane	ND ug/L		5.0	1		10/12/14 02:32	142-28-9		
2,2-Dichloropropane	ND ug/L		5.0	1		10/12/14 02:32	594-20-7		
1,1-Dichloropropene	ND ug/L		5.0	1		10/12/14 02:32	563-58-6		
cis-1,3-Dichloropropene	ND ug/L		5.0	1		10/12/14 02:32	10061-01-5		
trans-1,3-Dichloropropene	ND ug/L		5.0	1		10/12/14 02:32	10061-02-6		
Ethylbenzene	ND ug/L		5.0	1		10/12/14 02:32	100-41-4		
Ethyl methacrylate	ND ug/L		100	1		10/12/14 02:32	97-63-2		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-2		Lab ID: 50104622002	Collected: 09/30/14 11:40	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV Indiana</b>		Analytical Method: EPA 8260						
Hexachloro-1,3-butadiene	ND ug/L		5.0	1		10/12/14 02:32	87-68-3	
n-Hexane	ND ug/L		5.0	1		10/12/14 02:32	110-54-3	
2-Hexanone	ND ug/L		25.0	1		10/12/14 02:32	591-78-6	
Iodomethane	ND ug/L		10.0	1		10/12/14 02:32	74-88-4	
Isopropylbenzene (Cumene)	ND ug/L		5.0	1		10/12/14 02:32	98-82-8	
p-Isopropyltoluene	ND ug/L		5.0	1		10/12/14 02:32	99-87-6	
Methylene Chloride	ND ug/L		5.0	1		10/12/14 02:32	75-09-2	
1-Methylnaphthalene	ND ug/L		5.0	1		10/12/14 02:32	90-12-0	N2
2-Methylnaphthalene	ND ug/L		10.0	1		10/12/14 02:32	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND ug/L		25.0	1		10/12/14 02:32	108-10-1	
Methyl-tert-butyl ether	ND ug/L		4.0	1		10/12/14 02:32	1634-04-4	
Naphthalene	ND ug/L		1.4	1		10/12/14 02:32	91-20-3	
n-Propylbenzene	ND ug/L		5.0	1		10/12/14 02:32	103-65-1	
Styrene	ND ug/L		5.0	1		10/12/14 02:32	100-42-5	
1,1,1,2-Tetrachloroethane	ND ug/L		5.0	1		10/12/14 02:32	630-20-6	
1,1,2,2-Tetrachloroethane	ND ug/L		5.0	1		10/12/14 02:32	79-34-5	
Tetrachloroethene	ND ug/L		5.0	1		10/12/14 02:32	127-18-4	
Toluene	ND ug/L		5.0	1		10/12/14 02:32	108-88-3	
1,2,3-Trichlorobenzene	ND ug/L		5.0	1		10/12/14 02:32	87-61-6	
1,2,4-Trichlorobenzene	ND ug/L		5.0	1		10/12/14 02:32	120-82-1	
1,1,1-Trichloroethane	ND ug/L		5.0	1		10/12/14 02:32	71-55-6	
1,1,2-Trichloroethane	ND ug/L		5.0	1		10/12/14 02:32	79-00-5	
Trichloroethene	ND ug/L		5.0	1		10/12/14 02:32	79-01-6	
Trichlorofluoromethane	ND ug/L		5.0	1		10/12/14 02:32	75-69-4	
1,2,3-Trichloropropane	ND ug/L		5.0	1		10/12/14 02:32	96-18-4	
1,2,4-Trimethylbenzene	ND ug/L		5.0	1		10/12/14 02:32	95-63-6	
1,3,5-Trimethylbenzene	ND ug/L		5.0	1		10/12/14 02:32	108-67-8	
Vinyl acetate	ND ug/L		50.0	1		10/12/14 02:32	108-05-4	
Vinyl chloride	ND ug/L		2.0	1		10/12/14 02:32	75-01-4	
Xylene (Total)	ND ug/L		10.0	1		10/12/14 02:32	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	97 %.		79-116	1		10/12/14 02:32	1868-53-7	
4-Bromofluorobenzene (S)	91 %.		80-114	1		10/12/14 02:32	460-00-4	
Toluene-d8 (S)	87 %.		81-110	1		10/12/14 02:32	2037-26-5	
<b>2320B Alkalinity</b>		Analytical Method: SM 2320B						
Alkalinity, Total as CaCO3	236 mg/L		2.0	1		10/09/14 13:36		
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	410 mg/L		10.0	1		10/02/14 06:42		
<b>4500FC Fluoride</b>		Analytical Method: SM 4500F/C						
Fluoride	0.12 mg/L		0.10	1		10/08/14 12:53	16984-48-8	
<b>4500S2D Sulfide Water</b>		Analytical Method: SM 4500-S2-D						
Sulfide	ND mg/L		0.10	1		10/06/14 09:52		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-2		Lab ID: 50104622002	Collected: 09/30/14 11:40	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>335.4 Cyanide, Total</b>	Analytical Method: EPA 335.4 Preparation Method: EPA 335.4							
Cyanide	ND	mg/L	0.010	1	10/06/14 13:05	10/08/14 14:23	57-12-5	
<b>350.1 Ammonia</b>	Analytical Method: EPA 350.1 Preparation Method: EPA 350.1							
Nitrogen, Ammonia	ND	mg/L	0.10	1	10/07/14 10:40	10/09/14 10:20	7664-41-7	
<b>353.2 Nitrogen, NO2/NO3 unpres</b>	Analytical Method: EPA 353.2							
Nitrogen, Nitrate	<b>0.20</b>	mg/L	0.10	1		10/01/14 14:13		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-3		Lab ID: 50104622003	Collected: 09/30/14 13:00	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b> Analytical Method: EPA 8081 Preparation Method: EPA 3535								
Aldrin	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:24	309-00-2	H2
alpha-BHC	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:24	319-84-6	H2
beta-BHC	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:24	319-85-7	H2
delta-BHC	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:24	319-86-8	H2
gamma-BHC (Lindane)	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:24	58-89-9	H2
alpha-Chlordane	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:24	5103-71-9	H2
gamma-Chlordane	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:24	5103-74-2	H2
4,4'-DDD	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:24	72-54-8	H2
4,4'-DDE	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:24	72-55-9	H2
4,4'-DDT	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:24	50-29-3	H2
Dieldrin	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:24	60-57-1	H2
Endosulfan I	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:24	959-98-8	H2
Endosulfan II	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:24	33213-65-9	H2
Endosulfan sulfate	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:24	1031-07-8	H2
Endrin	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:24	72-20-8	H2
Endrin aldehyde	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:24	7421-93-4	H2
Endrin ketone	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:24	53494-70-5	H2
Heptachlor	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:24	76-44-8	H2
Heptachlor epoxide	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:24	1024-57-3	H2
Methoxychlor	ND ug/L		0.50	1	10/08/14 13:13	10/18/14 20:24	72-43-5	H2
Toxaphene	ND ug/L		2.0	1	10/08/14 13:13	10/18/14 20:24	8001-35-2	H2
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	56 %.		10-119	1	10/08/14 13:13	10/18/14 20:24	877-09-8	
Tetrachloro-m-xylene (S)	58 %.		10-119	1	10/08/14 13:13	10/18/14 20:24	877-09-8	
Decachlorobiphenyl (S)	75 %.		14-126	1	10/08/14 13:13	10/18/14 20:24	2051-24-3	
Decachlorobiphenyl (S)	77 %.		14-126	1	10/08/14 13:13	10/18/14 20:24	2051-24-3	
<b>8082 GCS PCB</b> Analytical Method: EPA 8082 Preparation Method: EPA 3510								
PCB-1016 (Aroclor 1016)	ND ug/L		0.52	1	10/03/14 14:03	10/06/14 15:11	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/L		0.52	1	10/03/14 14:03	10/06/14 15:11	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/L		0.52	1	10/03/14 14:03	10/06/14 15:11	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/L		0.52	1	10/03/14 14:03	10/06/14 15:11	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/L		0.52	1	10/03/14 14:03	10/06/14 15:11	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/L		0.52	1	10/03/14 14:03	10/06/14 15:11	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/L		0.52	1	10/03/14 14:03	10/06/14 15:11	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	71 %.		32-115	1	10/03/14 14:03	10/06/14 15:11	877-09-8	
<b>8151 Chlorinated Herbicides</b> Analytical Method: EPA 8151 Preparation Method: EPA 3535A								
2,4-D	ND ug/L		2.0	1	10/08/14 15:29	10/09/14 16:32	94-75-7	H2
2,4,5-T	ND ug/L		2.0	1	10/08/14 15:29	10/09/14 16:32	93-76-5	H2
2,4,5-TP (Silvex)	ND ug/L		2.0	1	10/08/14 15:29	10/09/14 16:32	93-72-1	H2
<b>Surrogates</b>								
2,4-DCAA (S)	59 %.		10-166	1	10/08/14 15:29	10/09/14 16:32	19719-28-9	
2,4-DCAA (S)	64 %.		10-166	1	10/08/14 15:29	10/09/14 16:32	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-3		Lab ID: 50104622003	Collected: 09/30/14 13:00	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b>		Analytical Method: EPA 6010 Preparation Method: EPA 3010						
Antimony	ND	ug/L	6.0	1	10/04/14 12:32	10/07/14 14:03	7440-36-0	
Arsenic	ND	ug/L	10.0	1	10/04/14 12:32	10/07/14 14:03	7440-38-2	
Barium	108	ug/L	10.0	1	10/04/14 12:32	10/07/14 14:03	7440-39-3	
Beryllium	ND	ug/L	4.0	1	10/04/14 12:32	10/07/14 14:03	7440-41-7	
Cadmium	ND	ug/L	2.0	1	10/04/14 12:32	10/07/14 14:03	7440-43-9	
Calcium	74500	ug/L	1000	1	10/04/14 12:32	10/07/14 14:03	7440-70-2	
Chromium	ND	ug/L	10.0	1	10/04/14 12:32	10/07/14 14:03	7440-47-3	
Cobalt	ND	ug/L	10.0	1	10/04/14 12:32	10/07/14 14:03	7440-48-4	
Copper	ND	ug/L	10.0	1	10/04/14 12:32	10/07/14 14:03	7440-50-8	
Iron	28600	ug/L	100	1	10/04/14 12:32	10/07/14 14:03	7439-89-6	
Lead	ND	ug/L	10.0	1	10/04/14 12:32	10/07/14 14:03	7439-92-1	
Magnesium	22800	ug/L	1000	1	10/04/14 12:32	10/07/14 14:03	7439-95-4	
Manganese	296	ug/L	10.0	1	10/04/14 12:32	10/07/14 14:03	7439-96-5	
Nickel	ND	ug/L	10.0	1	10/04/14 12:32	10/07/14 14:03	7440-02-0	
Potassium	5710	ug/L	1000	1	10/04/14 12:32	10/07/14 14:03	7440-09-7	
Selenium	ND	ug/L	10.0	1	10/04/14 12:32	10/07/14 14:03	7782-49-2	CU
Silver	ND	ug/L	10.0	1	10/04/14 12:32	10/07/14 14:03	7440-22-4	
Thallium	ND	ug/L	2.0	1	10/11/14 16:05	10/13/14 10:32	7440-28-0	
Vanadium	13.1	ug/L	10.0	1	10/04/14 12:32	10/07/14 14:03	7440-62-2	
Zinc	ND	ug/L	20.0	1	10/04/14 12:32	10/07/14 14:03	7440-66-6	
<b>7470 Mercury</b>		Analytical Method: EPA 7470 Preparation Method: EPA 7470						
Mercury	ND	ug/L	2.0	1	10/08/14 10:42	10/09/14 11:33	7439-97-6	
<b>8270 MSSV PAH</b>		Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3510						
Acenaphthene	ND	ug/L	1.0	1	10/03/14 10:52	10/04/14 00:01	83-32-9	
Acenaphthylene	ND	ug/L	1.0	1	10/03/14 10:52	10/04/14 00:01	208-96-8	
Anthracene	ND	ug/L	0.10	1	10/03/14 10:52	10/04/14 00:01	120-12-7	
Benzo(a)anthracene	ND	ug/L	0.10	1	10/03/14 10:52	10/04/14 00:01	56-55-3	
Benzo(a)pyrene	ND	ug/L	0.10	1	10/03/14 10:52	10/04/14 00:01	50-32-8	
Benzo(b)fluoranthene	ND	ug/L	0.10	1	10/03/14 10:52	10/04/14 00:01	205-99-2	
Benzo(g,h,i)perylene	ND	ug/L	0.10	1	10/03/14 10:52	10/04/14 00:01	191-24-2	
Benzo(k)fluoranthene	ND	ug/L	0.10	1	10/03/14 10:52	10/04/14 00:01	207-08-9	
Chrysene	ND	ug/L	0.51	1	10/03/14 10:52	10/04/14 00:01	218-01-9	
Dibenz(a,h)anthracene	ND	ug/L	0.10	1	10/03/14 10:52	10/04/14 00:01	53-70-3	
Fluoranthene	ND	ug/L	1.0	1	10/03/14 10:52	10/04/14 00:01	206-44-0	
Fluorene	ND	ug/L	1.0	1	10/03/14 10:52	10/04/14 00:01	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/L	0.10	1	10/03/14 10:52	10/04/14 00:01	193-39-5	
1-Methylnaphthalene	ND	ug/L	1.0	1	10/03/14 10:52	10/04/14 00:01	90-12-0	
2-Methylnaphthalene	ND	ug/L	1.0	1	10/03/14 10:52	10/04/14 00:01	91-57-6	
Naphthalene	ND	ug/L	1.0	1	10/03/14 10:52	10/04/14 00:01	91-20-3	
Phenanthrene	ND	ug/L	1.0	1	10/03/14 10:52	10/04/14 00:01	85-01-8	
Pyrene	ND	ug/L	1.0	1	10/03/14 10:52	10/04/14 00:01	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	72 %.		21-114	1	10/03/14 10:52	10/04/14 00:01	321-60-8	
p-Terphenyl-d14 (S)	69 %.		25-131	1	10/03/14 10:52	10/04/14 00:01	1718-51-0	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-3		Lab ID: 50104622003	Collected: 09/30/14 13:00	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Benzyl alcohol	ND ug/L		20.4	1	10/03/14 10:52	10/04/14 20:38	100-51-6	
4-Bromophenylphenyl ether	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	101-55-3	
Butylbenzylphthalate	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	85-68-7	
4-Chloro-3-methylphenol	ND ug/L		20.4	1	10/03/14 10:52	10/04/14 20:38	59-50-7	
4-Chloroaniline	ND ug/L		20.4	1	10/03/14 10:52	10/04/14 20:38	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	111-91-1	
bis(2-Chloroethyl) ether	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	111-44-4	
bis(2-Chloroisopropyl) ether	ND ug/L		5.1	1	10/03/14 10:52	10/04/14 20:38	108-60-1	
bis(2chloro1methylethyl) ether	ND ug/L		5.1	1	10/03/14 10:52	10/04/14 20:38	108-60-1	
2-Chloronaphthalene	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	91-58-7	
2-Chlorophenol	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	95-57-8	
4-Chlorophenylphenyl ether	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	7005-72-3	
Dibenzofuran	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	132-64-9	
3,3'-Dichlorobenzidine	ND ug/L		20.4	1	10/03/14 10:52	10/04/14 20:38	91-94-1	
2,4-Dichlorophenol	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	120-83-2	
Diethylphthalate	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	84-66-2	
2,4-Dimethylphenol	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	105-67-9	
Dimethylphthalate	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	131-11-3	
Di-n-butylphthalate	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/L		51.0	1	10/03/14 10:52	10/04/14 20:38	534-52-1	
2,4-Dinitrophenol	ND ug/L		51.0	1	10/03/14 10:52	10/04/14 20:38	51-28-5	
2,4-Dinitrotoluene	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	121-14-2	
2,6-Dinitrotoluene	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	606-20-2	
Di-n-octylphthalate	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/L		5.1	1	10/03/14 10:52	10/04/14 20:38	117-81-7	
Hexachloro-1,3-butadiene	ND ug/L		5.1	1	10/03/14 10:52	10/04/14 20:38	87-68-3	
Hexachlorobenzene	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	118-74-1	
Hexachlorocyclopentadiene	ND ug/L		20.4	1	10/03/14 10:52	10/04/14 20:38	77-47-4	
Hexachloroethane	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	67-72-1	
Isophorone	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/L		20.4	1	10/03/14 10:52	10/04/14 20:38		
2-Nitroaniline	ND ug/L		51.0	1	10/03/14 10:52	10/04/14 20:38	88-74-4	
3-Nitroaniline	ND ug/L		51.0	1	10/03/14 10:52	10/04/14 20:38	99-09-2	
4-Nitroaniline	ND ug/L		51.0	1	10/03/14 10:52	10/04/14 20:38	100-01-6	
Nitrobenzene	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	98-95-3	
2-Nitrophenol	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	88-75-5	
4-Nitrophenol	ND ug/L		51.0	1	10/03/14 10:52	10/04/14 20:38	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	621-64-7	
N-Nitrosodiphenylamine	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	86-30-6	
Pentachlorophenol	ND ug/L		51.0	1	10/03/14 10:52	10/04/14 20:38	87-86-5	
Phenol	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	108-95-2	
2,4,5-Trichlorophenol	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	95-95-4	
2,4,6-Trichlorophenol	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 20:38	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	86 %.		29-126	1	10/03/14 10:52	10/04/14 20:38	4165-60-0	
Phenol-d5 (S)	15 %.		10-47	1	10/03/14 10:52	10/04/14 20:38	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-3		Lab ID: 50104622003		Collected: 09/30/14 13:00		Received: 10/01/14 09:41		Matrix: Water	
Parameters		Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV SCAN		Analytical Method: EPA 8270 Preparation Method: EPA 3510							
Surrogates									
2-Fluorophenol (S)	26 %.		10-67	1	10/03/14 10:52	10/04/14 20:38	367-12-4		
2,4,6-Tribromophenol (S)	107 %.		31-161	1	10/03/14 10:52	10/04/14 20:38	118-79-6		
8260 MSV Indiana		Analytical Method: EPA 8260							
Acetone	ND ug/L		100	1		10/12/14 03:03	67-64-1		
Acrolein	ND ug/L		50.0	1		10/12/14 03:03	107-02-8		
Acrylonitrile	ND ug/L		100	1		10/12/14 03:03	107-13-1		
Benzene	ND ug/L		5.0	1		10/12/14 03:03	71-43-2		
Bromobenzene	ND ug/L		5.0	1		10/12/14 03:03	108-86-1		
Bromochloromethane	ND ug/L		5.0	1		10/12/14 03:03	74-97-5		
Bromodichloromethane	ND ug/L		5.0	1		10/12/14 03:03	75-27-4		
Bromoform	ND ug/L		5.0	1		10/12/14 03:03	75-25-2		
Bromomethane	ND ug/L		5.0	1		10/12/14 03:03	74-83-9		
2-Butanone (MEK)	ND ug/L		25.0	1		10/12/14 03:03	78-93-3		
n-Butylbenzene	ND ug/L		5.0	1		10/12/14 03:03	104-51-8		
sec-Butylbenzene	ND ug/L		5.0	1		10/12/14 03:03	135-98-8		
tert-Butylbenzene	ND ug/L		5.0	1		10/12/14 03:03	98-06-6		
Carbon disulfide	ND ug/L		10.0	1		10/12/14 03:03	75-15-0		
Carbon tetrachloride	ND ug/L		5.0	1		10/12/14 03:03	56-23-5		
Chlorobenzene	7.2 ug/L		5.0	1		10/12/14 03:03	108-90-7		
Chloroethane	ND ug/L		5.0	1		10/12/14 03:03	75-00-3		
Chloroform	ND ug/L		5.0	1		10/12/14 03:03	67-66-3		
Chloromethane	ND ug/L		5.0	1		10/12/14 03:03	74-87-3		
2-Chlorotoluene	ND ug/L		5.0	1		10/12/14 03:03	95-49-8		
4-Chlorotoluene	ND ug/L		5.0	1		10/12/14 03:03	106-43-4		
Dibromochloromethane	ND ug/L		5.0	1		10/12/14 03:03	124-48-1		
1,2-Dibromoethane (EDB)	ND ug/L		5.0	1		10/12/14 03:03	106-93-4		
Dibromomethane	ND ug/L		5.0	1		10/12/14 03:03	74-95-3		
1,2-Dichlorobenzene	ND ug/L		5.0	1		10/12/14 03:03	95-50-1		
1,3-Dichlorobenzene	ND ug/L		5.0	1		10/12/14 03:03	541-73-1		
1,4-Dichlorobenzene	ND ug/L		5.0	1		10/12/14 03:03	106-46-7		
trans-1,4-Dichloro-2-butene	ND ug/L		100	1		10/12/14 03:03	110-57-6		
Dichlorodifluoromethane	ND ug/L		5.0	1		10/12/14 03:03	75-71-8		
1,1-Dichloroethane	ND ug/L		5.0	1		10/12/14 03:03	75-34-3		
1,2-Dichloroethane	ND ug/L		5.0	1		10/12/14 03:03	107-06-2		
1,1-Dichloroethene	ND ug/L		5.0	1		10/12/14 03:03	75-35-4		
cis-1,2-Dichloroethene	ND ug/L		5.0	1		10/12/14 03:03	156-59-2		
trans-1,2-Dichloroethene	ND ug/L		5.0	1		10/12/14 03:03	156-60-5		
1,2-Dichloropropane	ND ug/L		5.0	1		10/12/14 03:03	78-87-5		
1,3-Dichloropropane	ND ug/L		5.0	1		10/12/14 03:03	142-28-9		
2,2-Dichloropropane	ND ug/L		5.0	1		10/12/14 03:03	594-20-7		
1,1-Dichloropropene	ND ug/L		5.0	1		10/12/14 03:03	563-58-6		
cis-1,3-Dichloropropene	ND ug/L		5.0	1		10/12/14 03:03	10061-01-5		
trans-1,3-Dichloropropene	ND ug/L		5.0	1		10/12/14 03:03	10061-02-6		
Ethylbenzene	ND ug/L		5.0	1		10/12/14 03:03	100-41-4		
Ethyl methacrylate	ND ug/L		100	1		10/12/14 03:03	97-63-2		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-3		Lab ID: 50104622003	Collected: 09/30/14 13:00	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV Indiana</b>		Analytical Method: EPA 8260						
Hexachloro-1,3-butadiene	ND ug/L		5.0	1		10/12/14 03:03	87-68-3	
n-Hexane	ND ug/L		5.0	1		10/12/14 03:03	110-54-3	
2-Hexanone	ND ug/L		25.0	1		10/12/14 03:03	591-78-6	
Iodomethane	ND ug/L		10.0	1		10/12/14 03:03	74-88-4	
Isopropylbenzene (Cumene)	ND ug/L		5.0	1		10/12/14 03:03	98-82-8	
p-Isopropyltoluene	ND ug/L		5.0	1		10/12/14 03:03	99-87-6	
Methylene Chloride	ND ug/L		5.0	1		10/12/14 03:03	75-09-2	
1-Methylnaphthalene	ND ug/L		5.0	1		10/12/14 03:03	90-12-0	N2
2-Methylnaphthalene	ND ug/L		10.0	1		10/12/14 03:03	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND ug/L		25.0	1		10/12/14 03:03	108-10-1	
Methyl-tert-butyl ether	ND ug/L		4.0	1		10/12/14 03:03	1634-04-4	
Naphthalene	ND ug/L		1.4	1		10/12/14 03:03	91-20-3	
n-Propylbenzene	ND ug/L		5.0	1		10/12/14 03:03	103-65-1	
Styrene	ND ug/L		5.0	1		10/12/14 03:03	100-42-5	
1,1,1,2-Tetrachloroethane	ND ug/L		5.0	1		10/12/14 03:03	630-20-6	
1,1,2,2-Tetrachloroethane	ND ug/L		5.0	1		10/12/14 03:03	79-34-5	
Tetrachloroethene	ND ug/L		5.0	1		10/12/14 03:03	127-18-4	
Toluene	ND ug/L		5.0	1		10/12/14 03:03	108-88-3	
1,2,3-Trichlorobenzene	ND ug/L		5.0	1		10/12/14 03:03	87-61-6	
1,2,4-Trichlorobenzene	ND ug/L		5.0	1		10/12/14 03:03	120-82-1	
1,1,1-Trichloroethane	ND ug/L		5.0	1		10/12/14 03:03	71-55-6	
1,1,2-Trichloroethane	ND ug/L		5.0	1		10/12/14 03:03	79-00-5	
Trichloroethene	ND ug/L		5.0	1		10/12/14 03:03	79-01-6	
Trichlorofluoromethane	ND ug/L		5.0	1		10/12/14 03:03	75-69-4	
1,2,3-Trichloropropane	ND ug/L		5.0	1		10/12/14 03:03	96-18-4	
1,2,4-Trimethylbenzene	ND ug/L		5.0	1		10/12/14 03:03	95-63-6	
1,3,5-Trimethylbenzene	ND ug/L		5.0	1		10/12/14 03:03	108-67-8	
Vinyl acetate	ND ug/L		50.0	1		10/12/14 03:03	108-05-4	
Vinyl chloride	ND ug/L		2.0	1		10/12/14 03:03	75-01-4	
Xylene (Total)	ND ug/L		10.0	1		10/12/14 03:03	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	99 %.		79-116	1		10/12/14 03:03	1868-53-7	
4-Bromofluorobenzene (S)	91 %.		80-114	1		10/12/14 03:03	460-00-4	
Toluene-d8 (S)	86 %.		81-110	1		10/12/14 03:03	2037-26-5	
<b>2320B Alkalinity</b>		Analytical Method: SM 2320B						
Alkalinity, Total as CaCO3	309 mg/L		2.0	1		10/09/14 13:36		
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	525 mg/L		10.0	1		10/02/14 06:43		
<b>4500FC Fluoride</b>		Analytical Method: SM 4500F/C						
Fluoride	0.11 mg/L		0.10	1		10/08/14 12:54	16984-48-8	
<b>4500S2D Sulfide Water</b>		Analytical Method: SM 4500-S2-D						
Sulfide	ND mg/L		0.10	1		10/06/14 09:52		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-3		Lab ID: 50104622003		Collected: 09/30/14 13:00		Received: 10/01/14 09:41		Matrix: Water	
Parameters		Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
335.4 Cyanide, Total		Analytical Method: EPA 335.4 Preparation Method: EPA 335.4							
Cyanide	ND	mg/L	0.010	1	10/06/14 13:05	10/08/14 14:23	57-12-5		
350.1 Ammonia		Analytical Method: EPA 350.1 Preparation Method: EPA 350.1							
Nitrogen, Ammonia	12.3	mg/L	0.40	4	10/07/14 10:40	10/09/14 11:14	7664-41-7		
353.2 Nitrogen, NO2/NO3 unpres		Analytical Method: EPA 353.2							
Nitrogen, Nitrate	ND	mg/L	0.10	1		10/01/14 14:19			

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-4		Lab ID: 50104622004	Collected: 09/30/14 14:40	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b>		Analytical Method: EPA 8081 Preparation Method: EPA 3535						
Aldrin	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:37	309-00-2	H2
alpha-BHC	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:37	319-84-6	H2
beta-BHC	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:37	319-85-7	H2
delta-BHC	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:37	319-86-8	H2
gamma-BHC (Lindane)	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:37	58-89-9	H2
alpha-Chlordane	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:37	5103-71-9	H2
gamma-Chlordane	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:37	5103-74-2	H2
4,4'-DDD	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:37	72-54-8	H2
4,4'-DDE	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:37	72-55-9	H2
4,4'-DDT	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:37	50-29-3	H2
Dieldrin	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:37	60-57-1	H2
Endosulfan I	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:37	959-98-8	H2
Endosulfan II	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:37	33213-65-9	H2
Endosulfan sulfate	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:37	1031-07-8	H2
Endrin	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:37	72-20-8	H2
Endrin aldehyde	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:37	7421-93-4	H2
Endrin ketone	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:37	53494-70-5	H2
Heptachlor	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:37	76-44-8	H2
Heptachlor epoxide	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:37	1024-57-3	H2
Methoxychlor	ND ug/L		0.50	1	10/08/14 13:13	10/18/14 20:37	72-43-5	H2
Toxaphene	ND ug/L		2.0	1	10/08/14 13:13	10/18/14 20:37	8001-35-2	H2
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	58 %.		10-119	1	10/08/14 13:13	10/18/14 20:37	877-09-8	
Tetrachloro-m-xylene (S)	58 %.		10-119	1	10/08/14 13:13	10/18/14 20:37	877-09-8	
Decachlorobiphenyl (S)	74 %.		14-126	1	10/08/14 13:13	10/18/14 20:37	2051-24-3	
Decachlorobiphenyl (S)	78 %.		14-126	1	10/08/14 13:13	10/18/14 20:37	2051-24-3	
<b>8082 GCS PCB</b>		Analytical Method: EPA 8082 Preparation Method: EPA 3510						
PCB-1016 (Aroclor 1016)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 15:16	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 15:16	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 15:16	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 15:16	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 15:16	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 15:16	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 15:16	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	53 %.		32-115	1	10/03/14 14:03	10/06/14 15:16	877-09-8	
<b>8151 Chlorinated Herbicides</b>		Analytical Method: EPA 8151 Preparation Method: EPA 3535A						
2,4-D	ND ug/L		2.0	1	10/08/14 15:29	10/09/14 16:48	94-75-7	H2
2,4,5-T	ND ug/L		2.0	1	10/08/14 15:29	10/09/14 16:48	93-76-5	H2
2,4,5-TP (Silvex)	ND ug/L		2.0	1	10/08/14 15:29	10/09/14 16:48	93-72-1	H2
<b>Surrogates</b>								
2,4-DCAA (S)	68 %.		10-166	1	10/08/14 15:29	10/09/14 16:48	19719-28-9	
2,4-DCAA (S)	64 %.		10-166	1	10/08/14 15:29	10/09/14 16:48	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-4		Lab ID: 50104622004	Collected: 09/30/14 14:40	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b>		Analytical Method: EPA 6010 Preparation Method: EPA 3010						
Antimony	ND ug/L		6.0	1	10/04/14 12:32	10/07/14 14:06	7440-36-0	
Arsenic	ND ug/L		10.0	1	10/04/14 12:32	10/07/14 14:06	7440-38-2	
Barium	71.0 ug/L		10.0	1	10/04/14 12:32	10/07/14 14:06	7440-39-3	
Beryllium	ND ug/L		4.0	1	10/04/14 12:32	10/07/14 14:06	7440-41-7	
Cadmium	ND ug/L		2.0	1	10/04/14 12:32	10/07/14 14:06	7440-43-9	
Calcium	79900 ug/L		1000	1	10/04/14 12:32	10/07/14 14:06	7440-70-2	
Chromium	ND ug/L		10.0	1	10/04/14 12:32	10/07/14 14:06	7440-47-3	
Cobalt	ND ug/L		10.0	1	10/04/14 12:32	10/07/14 14:06	7440-48-4	
Copper	ND ug/L		10.0	1	10/04/14 12:32	10/07/14 14:06	7440-50-8	
Iron	651 ug/L		100	1	10/04/14 12:32	10/07/14 14:06	7439-89-6	
Lead	ND ug/L		10.0	1	10/04/14 12:32	10/07/14 14:06	7439-92-1	
Magnesium	26800 ug/L		1000	1	10/04/14 12:32	10/07/14 14:06	7439-95-4	
Manganese	58.6 ug/L		10.0	1	10/04/14 12:32	10/07/14 14:06	7439-96-5	
Nickel	ND ug/L		10.0	1	10/04/14 12:32	10/07/14 14:06	7440-02-0	
Potassium	2590 ug/L		1000	1	10/04/14 12:32	10/07/14 14:06	7440-09-7	
Selenium	ND ug/L		10.0	1	10/04/14 12:32	10/07/14 14:06	7782-49-2	CU
Silver	ND ug/L		10.0	1	10/04/14 12:32	10/07/14 14:06	7440-22-4	
Thallium	ND ug/L		2.0	1	10/11/14 16:05	10/13/14 10:35	7440-28-0	
Vanadium	14.9 ug/L		10.0	1	10/04/14 12:32	10/07/14 14:06	7440-62-2	
Zinc	ND ug/L		20.0	1	10/04/14 12:32	10/07/14 14:06	7440-66-6	
<b>7470 Mercury</b>		Analytical Method: EPA 7470 Preparation Method: EPA 7470						
Mercury	ND ug/L		2.0	1	10/08/14 10:42	10/09/14 11:42	7439-97-6	
<b>8270 MSSV PAH</b>		Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3510						
Acenaphthene	ND ug/L		1.0	1	10/03/14 10:52	10/04/14 00:19	83-32-9	
Acenaphthylene	ND ug/L		1.0	1	10/03/14 10:52	10/04/14 00:19	208-96-8	
Anthracene	ND ug/L		0.10	1	10/03/14 10:52	10/04/14 00:19	120-12-7	
Benzo(a)anthracene	ND ug/L		0.10	1	10/03/14 10:52	10/04/14 00:19	56-55-3	
Benzo(a)pyrene	ND ug/L		0.10	1	10/03/14 10:52	10/04/14 00:19	50-32-8	
Benzo(b)fluoranthene	ND ug/L		0.10	1	10/03/14 10:52	10/04/14 00:19	205-99-2	
Benzo(g,h,i)perylene	ND ug/L		0.10	1	10/03/14 10:52	10/04/14 00:19	191-24-2	
Benzo(k)fluoranthene	ND ug/L		0.10	1	10/03/14 10:52	10/04/14 00:19	207-08-9	
Chrysene	ND ug/L		0.51	1	10/03/14 10:52	10/04/14 00:19	218-01-9	
Dibenz(a,h)anthracene	ND ug/L		0.10	1	10/03/14 10:52	10/04/14 00:19	53-70-3	
Fluoranthene	ND ug/L		1.0	1	10/03/14 10:52	10/04/14 00:19	206-44-0	
Fluorene	ND ug/L		1.0	1	10/03/14 10:52	10/04/14 00:19	86-73-7	
Indeno(1,2,3-cd)pyrene	ND ug/L		0.10	1	10/03/14 10:52	10/04/14 00:19	193-39-5	
1-Methylnaphthalene	ND ug/L		1.0	1	10/03/14 10:52	10/04/14 00:19	90-12-0	
2-Methylnaphthalene	ND ug/L		1.0	1	10/03/14 10:52	10/04/14 00:19	91-57-6	
Naphthalene	ND ug/L		1.0	1	10/03/14 10:52	10/04/14 00:19	91-20-3	
Phenanthrene	ND ug/L		1.0	1	10/03/14 10:52	10/04/14 00:19	85-01-8	
Pyrene	ND ug/L		1.0	1	10/03/14 10:52	10/04/14 00:19	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	78 %.		21-114	1	10/03/14 10:52	10/04/14 00:19	321-60-8	
p-Terphenyl-d14 (S)	75 %.		25-131	1	10/03/14 10:52	10/04/14 00:19	1718-51-0	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-4		Lab ID: 50104622004	Collected: 09/30/14 14:40	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Benzyl alcohol	ND ug/L		20.4	1	10/03/14 10:52	10/04/14 21:00	100-51-6	
4-Bromophenylphenyl ether	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	101-55-3	
Butylbenzylphthalate	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	85-68-7	
4-Chloro-3-methylphenol	ND ug/L		20.4	1	10/03/14 10:52	10/04/14 21:00	59-50-7	
4-Chloroaniline	ND ug/L		20.4	1	10/03/14 10:52	10/04/14 21:00	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	111-91-1	
bis(2-Chloroethyl) ether	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	111-44-4	
bis(2-Chloroisopropyl) ether	ND ug/L		5.1	1	10/03/14 10:52	10/04/14 21:00	108-60-1	
bis(2chloro1methylethyl) ether	ND ug/L		5.1	1	10/03/14 10:52	10/04/14 21:00	108-60-1	
2-Chloronaphthalene	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	91-58-7	
2-Chlorophenol	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	95-57-8	
4-Chlorophenylphenyl ether	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	7005-72-3	
Dibenzofuran	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	132-64-9	
3,3'-Dichlorobenzidine	ND ug/L		20.4	1	10/03/14 10:52	10/04/14 21:00	91-94-1	
2,4-Dichlorophenol	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	120-83-2	
Diethylphthalate	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	84-66-2	
2,4-Dimethylphenol	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	105-67-9	
Dimethylphthalate	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	131-11-3	
Di-n-butylphthalate	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/L		51.0	1	10/03/14 10:52	10/04/14 21:00	534-52-1	
2,4-Dinitrophenol	ND ug/L		51.0	1	10/03/14 10:52	10/04/14 21:00	51-28-5	
2,4-Dinitrotoluene	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	121-14-2	
2,6-Dinitrotoluene	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	606-20-2	
Di-n-octylphthalate	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/L		5.1	1	10/03/14 10:52	10/04/14 21:00	117-81-7	
Hexachloro-1,3-butadiene	ND ug/L		5.1	1	10/03/14 10:52	10/04/14 21:00	87-68-3	
Hexachlorobenzene	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	118-74-1	
Hexachlorocyclopentadiene	ND ug/L		20.4	1	10/03/14 10:52	10/04/14 21:00	77-47-4	
Hexachloroethane	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	67-72-1	
Isophorone	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/L		20.4	1	10/03/14 10:52	10/04/14 21:00		
2-Nitroaniline	ND ug/L		51.0	1	10/03/14 10:52	10/04/14 21:00	88-74-4	
3-Nitroaniline	ND ug/L		51.0	1	10/03/14 10:52	10/04/14 21:00	99-09-2	
4-Nitroaniline	ND ug/L		51.0	1	10/03/14 10:52	10/04/14 21:00	100-01-6	
Nitrobenzene	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	98-95-3	
2-Nitrophenol	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	88-75-5	
4-Nitrophenol	ND ug/L		51.0	1	10/03/14 10:52	10/04/14 21:00	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	621-64-7	
N-Nitrosodiphenylamine	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	86-30-6	
Pentachlorophenol	ND ug/L		51.0	1	10/03/14 10:52	10/04/14 21:00	87-86-5	
Phenol	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	108-95-2	
2,4,5-Trichlorophenol	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	95-95-4	
2,4,6-Trichlorophenol	ND ug/L		10.2	1	10/03/14 10:52	10/04/14 21:00	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	95 %.		29-126	1	10/03/14 10:52	10/04/14 21:00	4165-60-0	
Phenol-d5 (S)	17 %.		10-47	1	10/03/14 10:52	10/04/14 21:00	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-4		Lab ID: 50104622004	Collected: 09/30/14 14:40	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV SCAN		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Surrogates								
2-Fluorophenol (S)	31 %.		10-67	1	10/03/14 10:52	10/04/14 21:00	367-12-4	
2,4,6-Tribromophenol (S)	99 %.		31-161	1	10/03/14 10:52	10/04/14 21:00	118-79-6	
8260 MSV Indiana		Analytical Method: EPA 8260						
Acetone	ND ug/L		100	1		10/12/14 03:35	67-64-1	
Acrolein	ND ug/L		50.0	1		10/12/14 03:35	107-02-8	
Acrylonitrile	ND ug/L		100	1		10/12/14 03:35	107-13-1	
Benzene	ND ug/L		5.0	1		10/12/14 03:35	71-43-2	
Bromobenzene	ND ug/L		5.0	1		10/12/14 03:35	108-86-1	
Bromochloromethane	ND ug/L		5.0	1		10/12/14 03:35	74-97-5	
Bromodichloromethane	ND ug/L		5.0	1		10/12/14 03:35	75-27-4	
Bromoform	ND ug/L		5.0	1		10/12/14 03:35	75-25-2	
Bromomethane	ND ug/L		5.0	1		10/12/14 03:35	74-83-9	
2-Butanone (MEK)	ND ug/L		25.0	1		10/12/14 03:35	78-93-3	
n-Butylbenzene	ND ug/L		5.0	1		10/12/14 03:35	104-51-8	
sec-Butylbenzene	ND ug/L		5.0	1		10/12/14 03:35	135-98-8	
tert-Butylbenzene	ND ug/L		5.0	1		10/12/14 03:35	98-06-6	
Carbon disulfide	ND ug/L		10.0	1		10/12/14 03:35	75-15-0	
Carbon tetrachloride	ND ug/L		5.0	1		10/12/14 03:35	56-23-5	
Chlorobenzene	ND ug/L		5.0	1		10/12/14 03:35	108-90-7	
Chloroethane	ND ug/L		5.0	1		10/12/14 03:35	75-00-3	
Chloroform	ND ug/L		5.0	1		10/12/14 03:35	67-66-3	
Chloromethane	ND ug/L		5.0	1		10/12/14 03:35	74-87-3	
2-Chlorotoluene	ND ug/L		5.0	1		10/12/14 03:35	95-49-8	
4-Chlorotoluene	ND ug/L		5.0	1		10/12/14 03:35	106-43-4	
Dibromochloromethane	ND ug/L		5.0	1		10/12/14 03:35	124-48-1	
1,2-Dibromoethane (EDB)	ND ug/L		5.0	1		10/12/14 03:35	106-93-4	
Dibromomethane	ND ug/L		5.0	1		10/12/14 03:35	74-95-3	
1,2-Dichlorobenzene	ND ug/L		5.0	1		10/12/14 03:35	95-50-1	
1,3-Dichlorobenzene	ND ug/L		5.0	1		10/12/14 03:35	541-73-1	
1,4-Dichlorobenzene	ND ug/L		5.0	1		10/12/14 03:35	106-46-7	
trans-1,4-Dichloro-2-butene	ND ug/L		100	1		10/12/14 03:35	110-57-6	
Dichlorodifluoromethane	ND ug/L		5.0	1		10/12/14 03:35	75-71-8	
1,1-Dichloroethane	ND ug/L		5.0	1		10/12/14 03:35	75-34-3	
1,2-Dichloroethane	ND ug/L		5.0	1		10/12/14 03:35	107-06-2	
1,1-Dichloroethene	ND ug/L		5.0	1		10/12/14 03:35	75-35-4	
cis-1,2-Dichloroethene	ND ug/L		5.0	1		10/12/14 03:35	156-59-2	
trans-1,2-Dichloroethene	ND ug/L		5.0	1		10/12/14 03:35	156-60-5	
1,2-Dichloropropane	ND ug/L		5.0	1		10/12/14 03:35	78-87-5	
1,3-Dichloropropane	ND ug/L		5.0	1		10/12/14 03:35	142-28-9	
2,2-Dichloropropane	ND ug/L		5.0	1		10/12/14 03:35	594-20-7	
1,1-Dichloropropene	ND ug/L		5.0	1		10/12/14 03:35	563-58-6	
cis-1,3-Dichloropropene	ND ug/L		5.0	1		10/12/14 03:35	10061-01-5	
trans-1,3-Dichloropropene	ND ug/L		5.0	1		10/12/14 03:35	10061-02-6	
Ethylbenzene	ND ug/L		5.0	1		10/12/14 03:35	100-41-4	
Ethyl methacrylate	ND ug/L		100	1		10/12/14 03:35	97-63-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-4		Lab ID: 50104622004		Collected: 09/30/14 14:40		Received: 10/01/14 09:41		Matrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual	
8260 MSV Indiana		Analytical Method: EPA 8260							
Hexachloro-1,3-butadiene	ND ug/L		5.0	1		10/12/14 03:35	87-68-3		
n-Hexane	ND ug/L		5.0	1		10/12/14 03:35	110-54-3		
2-Hexanone	ND ug/L		25.0	1		10/12/14 03:35	591-78-6		
Iodomethane	ND ug/L		10.0	1		10/12/14 03:35	74-88-4		
Isopropylbenzene (Cumene)	ND ug/L		5.0	1		10/12/14 03:35	98-82-8		
p-Isopropyltoluene	ND ug/L		5.0	1		10/12/14 03:35	99-87-6		
Methylene Chloride	ND ug/L		5.0	1		10/12/14 03:35	75-09-2		
1-Methylnaphthalene	ND ug/L		5.0	1		10/12/14 03:35	90-12-0	N2	
2-Methylnaphthalene	ND ug/L		10.0	1		10/12/14 03:35	91-57-6		
4-Methyl-2-pentanone (MIBK)	ND ug/L		25.0	1		10/12/14 03:35	108-10-1		
Methyl-tert-butyl ether	ND ug/L		4.0	1		10/12/14 03:35	1634-04-4		
Naphthalene	ND ug/L		1.4	1		10/12/14 03:35	91-20-3		
n-Propylbenzene	ND ug/L		5.0	1		10/12/14 03:35	103-65-1		
Styrene	ND ug/L		5.0	1		10/12/14 03:35	100-42-5		
1,1,1,2-Tetrachloroethane	ND ug/L		5.0	1		10/12/14 03:35	630-20-6		
1,1,2,2-Tetrachloroethane	ND ug/L		5.0	1		10/12/14 03:35	79-34-5		
Tetrachloroethene	ND ug/L		5.0	1		10/12/14 03:35	127-18-4		
Toluene	ND ug/L		5.0	1		10/12/14 03:35	108-88-3		
1,2,3-Trichlorobenzene	ND ug/L		5.0	1		10/12/14 03:35	87-61-6		
1,2,4-Trichlorobenzene	ND ug/L		5.0	1		10/12/14 03:35	120-82-1		
1,1,1-Trichloroethane	ND ug/L		5.0	1		10/12/14 03:35	71-55-6		
1,1,2-Trichloroethane	ND ug/L		5.0	1		10/12/14 03:35	79-00-5		
Trichloroethene	ND ug/L		5.0	1		10/12/14 03:35	79-01-6		
Trichlorofluoromethane	ND ug/L		5.0	1		10/12/14 03:35	75-69-4		
1,2,3-Trichloropropane	ND ug/L		5.0	1		10/12/14 03:35	96-18-4		
1,2,4-Trimethylbenzene	ND ug/L		5.0	1		10/12/14 03:35	95-63-6		
1,3,5-Trimethylbenzene	ND ug/L		5.0	1		10/12/14 03:35	108-67-8		
Vinyl acetate	ND ug/L		50.0	1		10/12/14 03:35	108-05-4		
Vinyl chloride	ND ug/L		2.0	1		10/12/14 03:35	75-01-4		
Xylene (Total)	ND ug/L		10.0	1		10/12/14 03:35	1330-20-7		
Surrogates									
Dibromofluoromethane (S)	99 %.		79-116	1		10/12/14 03:35	1868-53-7		
4-Bromofluorobenzene (S)	91 %.		80-114	1		10/12/14 03:35	460-00-4		
Toluene-d8 (S)	86 %.		81-110	1		10/12/14 03:35	2037-26-5		
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	237 mg/L		2.0	1		10/09/14 13:36			
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	502 mg/L		20.0	1		10/02/14 06:43			
4500FC Fluoride		Analytical Method: SM 4500F/C							
Fluoride	0.13 mg/L		0.10	1		10/08/14 12:56	16984-48-8		
4500S2D Sulfide Water		Analytical Method: SM 4500-S2-D							
Sulfide	ND mg/L		0.10	1		10/06/14 09:52			

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: <b>SW-4</b>		Lab ID: <b>50104622004</b>	Collected: 09/30/14 14:40	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>335.4 Cyanide, Total</b>	Analytical Method: EPA 335.4 Preparation Method: EPA 335.4							
Cyanide	ND	mg/L	0.010	1	10/06/14 13:05	10/08/14 14:24	57-12-5	
<b>350.1 Ammonia</b>	Analytical Method: EPA 350.1 Preparation Method: EPA 350.1							
Nitrogen, Ammonia	<b>0.14</b>	mg/L	0.10	1	10/07/14 10:40	10/09/14 10:23	7664-41-7	
<b>353.2 Nitrogen, NO2/NO3 unpres</b>	Analytical Method: EPA 353.2							
Nitrogen, Nitrate	<b>0.24</b>	mg/L	0.10	1		10/01/14 14:20		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-5		Lab ID: 50104622005	Collected: 09/30/14 15:35	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b>		Analytical Method: EPA 8081 Preparation Method: EPA 3535						
Aldrin	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:49	309-00-2	
alpha-BHC	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:49	319-84-6	
beta-BHC	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:49	319-85-7	
delta-BHC	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:49	319-86-8	
gamma-BHC (Lindane)	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:49	58-89-9	
alpha-Chlordane	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:49	5103-71-9	
gamma-Chlordane	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:49	5103-74-2	
4,4'-DDD	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:49	72-54-8	
4,4'-DDE	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:49	72-55-9	
4,4'-DDT	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:49	50-29-3	
Dieldrin	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:49	60-57-1	
Endosulfan I	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:49	959-98-8	
Endosulfan II	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:49	33213-65-9	
Endosulfan sulfate	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:49	1031-07-8	
Endrin	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:49	72-20-8	
Endrin aldehyde	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:49	7421-93-4	
Endrin ketone	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 20:49	53494-70-5	
Heptachlor	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:49	76-44-8	
Heptachlor epoxide	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 20:49	1024-57-3	
Methoxychlor	ND ug/L		0.50	1	10/08/14 13:13	10/18/14 20:49	72-43-5	
Toxaphene	ND ug/L		2.0	1	10/08/14 13:13	10/18/14 20:49	8001-35-2	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	57 %.		10-119	1	10/08/14 13:13	10/18/14 20:49	877-09-8	
Tetrachloro-m-xylene (S)	61 %.		10-119	1	10/08/14 13:13	10/18/14 20:49	877-09-8	
Decachlorobiphenyl (S)	80 %.		14-126	1	10/08/14 13:13	10/18/14 20:49	2051-24-3	
Decachlorobiphenyl (S)	89 %.		14-126	1	10/08/14 13:13	10/18/14 20:49	2051-24-3	
<b>8082 GCS PCB</b>		Analytical Method: EPA 8082 Preparation Method: EPA 3510						
PCB-1016 (Aroclor 1016)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 15:22	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 15:22	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 15:22	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 15:22	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 15:22	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 15:22	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/L		0.51	1	10/03/14 14:03	10/06/14 15:22	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	67 %.		32-115	1	10/03/14 14:03	10/06/14 15:22	877-09-8	
<b>8151 Chlorinated Herbicides</b>		Analytical Method: EPA 8151 Preparation Method: EPA 3535A						
2,4-D	ND ug/L		2.0	1	10/08/14 15:29	10/09/14 17:04	94-75-7	
2,4,5-T	ND ug/L		2.0	1	10/08/14 15:29	10/09/14 17:04	93-76-5	
2,4,5-TP (Silvex)	ND ug/L		2.0	1	10/08/14 15:29	10/09/14 17:04	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	70 %.		10-166	1	10/08/14 15:29	10/09/14 17:04	19719-28-9	
2,4-DCAA (S)	75 %.		10-166	1	10/08/14 15:29	10/09/14 17:04	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-5		Lab ID: 50104622005	Collected: 09/30/14 15:35	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b>		Analytical Method: EPA 6010 Preparation Method: EPA 3010						
Antimony	ND	ug/L	6.0	1	10/04/14 12:32	10/07/14 14:09	7440-36-0	
Arsenic	ND	ug/L	10.0	1	10/04/14 12:32	10/07/14 14:09	7440-38-2	
Barium	73.4	ug/L	10.0	1	10/04/14 12:32	10/07/14 14:09	7440-39-3	
Beryllium	ND	ug/L	4.0	1	10/04/14 12:32	10/07/14 14:09	7440-41-7	
Cadmium	ND	ug/L	2.0	1	10/04/14 12:32	10/07/14 14:09	7440-43-9	
Calcium	81800	ug/L	1000	1	10/04/14 12:32	10/07/14 14:09	7440-70-2	
Chromium	ND	ug/L	10.0	1	10/04/14 12:32	10/07/14 14:09	7440-47-3	
Cobalt	ND	ug/L	10.0	1	10/04/14 12:32	10/07/14 14:09	7440-48-4	
Copper	ND	ug/L	10.0	1	10/04/14 12:32	10/07/14 14:09	7440-50-8	
Iron	607	ug/L	100	1	10/04/14 12:32	10/07/14 14:09	7439-89-6	
Lead	ND	ug/L	10.0	1	10/04/14 12:32	10/07/14 14:09	7439-92-1	
Magnesium	27500	ug/L	1000	1	10/04/14 12:32	10/07/14 14:09	7439-95-4	
Manganese	65.1	ug/L	10.0	1	10/04/14 12:32	10/07/14 14:09	7439-96-5	
Nickel	ND	ug/L	10.0	1	10/04/14 12:32	10/07/14 14:09	7440-02-0	
Potassium	2670	ug/L	1000	1	10/04/14 12:32	10/07/14 14:09	7440-09-7	
Selenium	ND	ug/L	10.0	1	10/04/14 12:32	10/07/14 14:09	7782-49-2	CU
Silver	ND	ug/L	10.0	1	10/04/14 12:32	10/07/14 14:09	7440-22-4	
Thallium	ND	ug/L	2.0	1	10/11/14 16:05	10/13/14 10:38	7440-28-0	
Vanadium	15.1	ug/L	10.0	1	10/04/14 12:32	10/07/14 14:09	7440-62-2	
Zinc	ND	ug/L	20.0	1	10/04/14 12:32	10/07/14 14:09	7440-66-6	
<b>7470 Mercury</b>		Analytical Method: EPA 7470 Preparation Method: EPA 7470						
Mercury	ND	ug/L	2.0	1	10/08/14 10:42	10/09/14 11:44	7439-97-6	
<b>8270 MSSV PAH</b>		Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3510						
Acenaphthene	ND	ug/L	1.0	1	10/03/14 10:52	10/04/14 00:37	83-32-9	
Acenaphthylene	ND	ug/L	1.0	1	10/03/14 10:52	10/04/14 00:37	208-96-8	
Anthracene	ND	ug/L	0.10	1	10/03/14 10:52	10/04/14 00:37	120-12-7	
Benzo(a)anthracene	ND	ug/L	0.10	1	10/03/14 10:52	10/04/14 00:37	56-55-3	
Benzo(a)pyrene	ND	ug/L	0.10	1	10/03/14 10:52	10/04/14 00:37	50-32-8	
Benzo(b)fluoranthene	ND	ug/L	0.10	1	10/03/14 10:52	10/04/14 00:37	205-99-2	
Benzo(g,h,i)perylene	ND	ug/L	0.10	1	10/03/14 10:52	10/04/14 00:37	191-24-2	
Benzo(k)fluoranthene	ND	ug/L	0.10	1	10/03/14 10:52	10/04/14 00:37	207-08-9	
Chrysene	ND	ug/L	0.52	1	10/03/14 10:52	10/04/14 00:37	218-01-9	
Dibenz(a,h)anthracene	ND	ug/L	0.10	1	10/03/14 10:52	10/04/14 00:37	53-70-3	
Fluoranthene	ND	ug/L	1.0	1	10/03/14 10:52	10/04/14 00:37	206-44-0	
Fluorene	ND	ug/L	1.0	1	10/03/14 10:52	10/04/14 00:37	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/L	0.10	1	10/03/14 10:52	10/04/14 00:37	193-39-5	
1-Methylnaphthalene	ND	ug/L	1.0	1	10/03/14 10:52	10/04/14 00:37	90-12-0	
2-Methylnaphthalene	ND	ug/L	1.0	1	10/03/14 10:52	10/04/14 00:37	91-57-6	
Naphthalene	ND	ug/L	1.0	1	10/03/14 10:52	10/04/14 00:37	91-20-3	
Phenanthrene	ND	ug/L	1.0	1	10/03/14 10:52	10/04/14 00:37	85-01-8	
Pyrene	ND	ug/L	1.0	1	10/03/14 10:52	10/04/14 00:37	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	73 %		21-114	1	10/03/14 10:52	10/04/14 00:37	321-60-8	
p-Terphenyl-d14 (S)	75 %		25-131	1	10/03/14 10:52	10/04/14 00:37	1718-51-0	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-5		Lab ID: 50104622005	Collected: 09/30/14 15:35	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Benzyl alcohol	ND ug/L		20.8	1	10/03/14 10:52	10/04/14 21:23	100-51-6	
4-Bromophenylphenyl ether	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	101-55-3	
Butylbenzylphthalate	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	85-68-7	
4-Chloro-3-methylphenol	ND ug/L		20.8	1	10/03/14 10:52	10/04/14 21:23	59-50-7	
4-Chloroaniline	ND ug/L		20.8	1	10/03/14 10:52	10/04/14 21:23	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	111-91-1	
bis(2-Chloroethyl) ether	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	111-44-4	
bis(2-Chloroisopropyl) ether	ND ug/L		5.2	1	10/03/14 10:52	10/04/14 21:23	108-60-1	
bis(2chloro1methylethyl) ether	ND ug/L		5.2	1	10/03/14 10:52	10/04/14 21:23	108-60-1	
2-Chloronaphthalene	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	91-58-7	
2-Chlorophenol	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	95-57-8	
4-Chlorophenylphenyl ether	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	7005-72-3	
Dibenzofuran	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	132-64-9	
3,3'-Dichlorobenzidine	ND ug/L		20.8	1	10/03/14 10:52	10/04/14 21:23	91-94-1	
2,4-Dichlorophenol	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	120-83-2	
Diethylphthalate	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	84-66-2	
2,4-Dimethylphenol	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	105-67-9	
Dimethylphthalate	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	131-11-3	
Di-n-butylphthalate	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/L		52.1	1	10/03/14 10:52	10/04/14 21:23	534-52-1	
2,4-Dinitrophenol	ND ug/L		52.1	1	10/03/14 10:52	10/04/14 21:23	51-28-5	
2,4-Dinitrotoluene	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	121-14-2	
2,6-Dinitrotoluene	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	606-20-2	
Di-n-octylphthalate	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/L		5.2	1	10/03/14 10:52	10/04/14 21:23	117-81-7	
Hexachloro-1,3-butadiene	ND ug/L		5.2	1	10/03/14 10:52	10/04/14 21:23	87-68-3	
Hexachlorobenzene	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	118-74-1	
Hexachlorocyclopentadiene	ND ug/L		20.8	1	10/03/14 10:52	10/04/14 21:23	77-47-4	
Hexachloroethane	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	67-72-1	
Isophorone	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/L		20.8	1	10/03/14 10:52	10/04/14 21:23		
2-Nitroaniline	ND ug/L		52.1	1	10/03/14 10:52	10/04/14 21:23	88-74-4	
3-Nitroaniline	ND ug/L		52.1	1	10/03/14 10:52	10/04/14 21:23	99-09-2	
4-Nitroaniline	ND ug/L		52.1	1	10/03/14 10:52	10/04/14 21:23	100-01-6	
Nitrobenzene	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	98-95-3	
2-Nitrophenol	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	88-75-5	
4-Nitrophenol	ND ug/L		52.1	1	10/03/14 10:52	10/04/14 21:23	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	621-64-7	
N-Nitrosodiphenylamine	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	86-30-6	
Pentachlorophenol	ND ug/L		52.1	1	10/03/14 10:52	10/04/14 21:23	87-86-5	
Phenol	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	108-95-2	
2,4,5-Trichlorophenol	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	95-95-4	
2,4,6-Trichlorophenol	ND ug/L		10.4	1	10/03/14 10:52	10/04/14 21:23	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	89 %.		29-126	1	10/03/14 10:52	10/04/14 21:23	4165-60-0	
Phenol-d5 (S)	18 %.		10-47	1	10/03/14 10:52	10/04/14 21:23	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-5		Lab ID: 50104622005		Collected: 09/30/14 15:35		Received: 10/01/14 09:41		Matrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual	
8270 MSSV SCAN		Analytical Method: EPA 8270 Preparation Method: EPA 3510							
Surrogates									
2-Fluorophenol (S)	31 %.		10-67	1	10/03/14 10:52	10/04/14 21:23	367-12-4		
2,4,6-Tribromophenol (S)	100 %.		31-161	1	10/03/14 10:52	10/04/14 21:23	118-79-6		
8260 MSV Indiana		Analytical Method: EPA 8260							
Acetone	ND ug/L		100	1		10/12/14 05:41	67-64-1		
Acrolein	ND ug/L		50.0	1		10/12/14 05:41	107-02-8		
Acrylonitrile	ND ug/L		100	1		10/12/14 05:41	107-13-1		
Benzene	ND ug/L		5.0	1		10/12/14 05:41	71-43-2		
Bromobenzene	ND ug/L		5.0	1		10/12/14 05:41	108-86-1		
Bromochloromethane	ND ug/L		5.0	1		10/12/14 05:41	74-97-5		
Bromodichloromethane	ND ug/L		5.0	1		10/12/14 05:41	75-27-4		
Bromoform	ND ug/L		5.0	1		10/12/14 05:41	75-25-2		
Bromomethane	ND ug/L		5.0	1		10/12/14 05:41	74-83-9		
2-Butanone (MEK)	ND ug/L		25.0	1		10/12/14 05:41	78-93-3		
n-Butylbenzene	ND ug/L		5.0	1		10/12/14 05:41	104-51-8		
sec-Butylbenzene	ND ug/L		5.0	1		10/12/14 05:41	135-98-8		
tert-Butylbenzene	ND ug/L		5.0	1		10/12/14 05:41	98-06-6		
Carbon disulfide	ND ug/L		10.0	1		10/12/14 05:41	75-15-0		
Carbon tetrachloride	ND ug/L		5.0	1		10/12/14 05:41	56-23-5		
Chlorobenzene	ND ug/L		5.0	1		10/12/14 05:41	108-90-7		
Chloroethane	ND ug/L		5.0	1		10/12/14 05:41	75-00-3		
Chloroform	ND ug/L		5.0	1		10/12/14 05:41	67-66-3		
Chloromethane	ND ug/L		5.0	1		10/12/14 05:41	74-87-3		
2-Chlorotoluene	ND ug/L		5.0	1		10/12/14 05:41	95-49-8		
4-Chlorotoluene	ND ug/L		5.0	1		10/12/14 05:41	106-43-4		
Dibromochloromethane	ND ug/L		5.0	1		10/12/14 05:41	124-48-1		
1,2-Dibromoethane (EDB)	ND ug/L		5.0	1		10/12/14 05:41	106-93-4		
Dibromomethane	ND ug/L		5.0	1		10/12/14 05:41	74-95-3		
1,2-Dichlorobenzene	ND ug/L		5.0	1		10/12/14 05:41	95-50-1		
1,3-Dichlorobenzene	ND ug/L		5.0	1		10/12/14 05:41	541-73-1		
1,4-Dichlorobenzene	ND ug/L		5.0	1		10/12/14 05:41	106-46-7		
trans-1,4-Dichloro-2-butene	ND ug/L		100	1		10/12/14 05:41	110-57-6		
Dichlorodifluoromethane	ND ug/L		5.0	1		10/12/14 05:41	75-71-8		
1,1-Dichloroethane	ND ug/L		5.0	1		10/12/14 05:41	75-34-3		
1,2-Dichloroethane	ND ug/L		5.0	1		10/12/14 05:41	107-06-2		
1,1-Dichloroethene	ND ug/L		5.0	1		10/12/14 05:41	75-35-4		
cis-1,2-Dichloroethene	ND ug/L		5.0	1		10/12/14 05:41	156-59-2		
trans-1,2-Dichloroethene	ND ug/L		5.0	1		10/12/14 05:41	156-60-5		
1,2-Dichloropropane	ND ug/L		5.0	1		10/12/14 05:41	78-87-5		
1,3-Dichloropropane	ND ug/L		5.0	1		10/12/14 05:41	142-28-9		
2,2-Dichloropropane	ND ug/L		5.0	1		10/12/14 05:41	594-20-7		
1,1-Dichloropropene	ND ug/L		5.0	1		10/12/14 05:41	563-58-6		
cis-1,3-Dichloropropene	ND ug/L		5.0	1		10/12/14 05:41	10061-01-5		
trans-1,3-Dichloropropene	ND ug/L		5.0	1		10/12/14 05:41	10061-02-6		
Ethylbenzene	ND ug/L		5.0	1		10/12/14 05:41	100-41-4		
Ethyl methacrylate	ND ug/L		100	1		10/12/14 05:41	97-63-2		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-5		Lab ID: 50104622005	Collected: 09/30/14 15:35	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV Indiana</b>		Analytical Method: EPA 8260						
Hexachloro-1,3-butadiene	ND ug/L		5.0	1		10/12/14 05:41	87-68-3	
n-Hexane	ND ug/L		5.0	1		10/12/14 05:41	110-54-3	
2-Hexanone	ND ug/L		25.0	1		10/12/14 05:41	591-78-6	
Iodomethane	ND ug/L		10.0	1		10/12/14 05:41	74-88-4	
Isopropylbenzene (Cumene)	ND ug/L		5.0	1		10/12/14 05:41	98-82-8	
p-Isopropyltoluene	ND ug/L		5.0	1		10/12/14 05:41	99-87-6	
Methylene Chloride	ND ug/L		5.0	1		10/12/14 05:41	75-09-2	
1-Methylnaphthalene	ND ug/L		5.0	1		10/12/14 05:41	90-12-0	N2
2-Methylnaphthalene	ND ug/L		10.0	1		10/12/14 05:41	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND ug/L		25.0	1		10/12/14 05:41	108-10-1	
Methyl-tert-butyl ether	ND ug/L		4.0	1		10/12/14 05:41	1634-04-4	
Naphthalene	ND ug/L		1.4	1		10/12/14 05:41	91-20-3	
n-Propylbenzene	ND ug/L		5.0	1		10/12/14 05:41	103-65-1	
Styrene	ND ug/L		5.0	1		10/12/14 05:41	100-42-5	
1,1,1,2-Tetrachloroethane	ND ug/L		5.0	1		10/12/14 05:41	630-20-6	
1,1,2,2-Tetrachloroethane	ND ug/L		5.0	1		10/12/14 05:41	79-34-5	
Tetrachloroethene	ND ug/L		5.0	1		10/12/14 05:41	127-18-4	
Toluene	ND ug/L		5.0	1		10/12/14 05:41	108-88-3	
1,2,3-Trichlorobenzene	ND ug/L		5.0	1		10/12/14 05:41	87-61-6	
1,2,4-Trichlorobenzene	ND ug/L		5.0	1		10/12/14 05:41	120-82-1	
1,1,1-Trichloroethane	ND ug/L		5.0	1		10/12/14 05:41	71-55-6	
1,1,2-Trichloroethane	ND ug/L		5.0	1		10/12/14 05:41	79-00-5	
Trichloroethene	ND ug/L		5.0	1		10/12/14 05:41	79-01-6	
Trichlorofluoromethane	ND ug/L		5.0	1		10/12/14 05:41	75-69-4	
1,2,3-Trichloropropane	ND ug/L		5.0	1		10/12/14 05:41	96-18-4	
1,2,4-Trimethylbenzene	ND ug/L		5.0	1		10/12/14 05:41	95-63-6	
1,3,5-Trimethylbenzene	ND ug/L		5.0	1		10/12/14 05:41	108-67-8	
Vinyl acetate	ND ug/L		50.0	1		10/12/14 05:41	108-05-4	
Vinyl chloride	ND ug/L		2.0	1		10/12/14 05:41	75-01-4	
Xylene (Total)	ND ug/L		10.0	1		10/12/14 05:41	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	93 %.		79-116	1		10/12/14 05:41	1868-53-7	
4-Bromofluorobenzene (S)	93 %.		80-114	1		10/12/14 05:41	460-00-4	
Toluene-d8 (S)	86 %.		81-110	1		10/12/14 05:41	2037-26-5	
<b>2320B Alkalinity</b>		Analytical Method: SM 2320B						
Alkalinity, Total as CaCO3	241 mg/L		2.0	1		10/09/14 13:36		
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	426 mg/L		10.0	1		10/02/14 06:44		
<b>4500FC Fluoride</b>		Analytical Method: SM 4500F/C						
Fluoride	0.13 mg/L		0.10	1		10/08/14 12:58	16984-48-8	
<b>4500S2D Sulfide Water</b>		Analytical Method: SM 4500-S2-D						
Sulfide	ND mg/L		0.10	1		10/06/14 09:53		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SW-5		Lab ID: 50104622005	Collected: 09/30/14 15:35	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>335.4 Cyanide, Total</b>	Analytical Method: EPA 335.4 Preparation Method: EPA 335.4							
Cyanide	ND	mg/L	0.010	1	10/06/14 13:05	10/08/14 14:25	57-12-5	
<b>350.1 Ammonia</b>	Analytical Method: EPA 350.1 Preparation Method: EPA 350.1							
Nitrogen, Ammonia	ND	mg/L	0.10	1	10/07/14 10:40	10/09/14 10:24	7664-41-7	
<b>353.2 Nitrogen, NO2/NO3 unpres</b>	Analytical Method: EPA 353.2							
Nitrogen, Nitrate	0.23	mg/L	0.10	1		10/01/14 14:22		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: F.D.		Lab ID: 50104622006	Collected: 09/30/14 08:00	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b>		Analytical Method: EPA 8081 Preparation Method: EPA 3535						
Aldrin	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 21:28	309-00-2	H2
alpha-BHC	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 21:28	319-84-6	H2
beta-BHC	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 21:28	319-85-7	H2
delta-BHC	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 21:28	319-86-8	H2
gamma-BHC (Lindane)	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 21:28	58-89-9	H2
alpha-Chlordane	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 21:28	5103-71-9	H2
gamma-Chlordane	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 21:28	5103-74-2	H2
4,4'-DDD	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 21:28	72-54-8	H2
4,4'-DDE	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 21:28	72-55-9	H2
4,4'-DDT	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 21:28	50-29-3	H2
Dieldrin	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 21:28	60-57-1	H2
Endosulfan I	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 21:28	959-98-8	H2
Endosulfan II	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 21:28	33213-65-9	H2
Endosulfan sulfate	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 21:28	1031-07-8	H2
Endrin	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 21:28	72-20-8	H2
Endrin aldehyde	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 21:28	7421-93-4	H2
Endrin ketone	ND ug/L		0.10	1	10/08/14 13:13	10/18/14 21:28	53494-70-5	H2
Heptachlor	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 21:28	76-44-8	H2
Heptachlor epoxide	ND ug/L		0.050	1	10/08/14 13:13	10/18/14 21:28	1024-57-3	H2
Methoxychlor	ND ug/L		0.50	1	10/08/14 13:13	10/18/14 21:28	72-43-5	H2
Toxaphene	ND ug/L		2.0	1	10/08/14 13:13	10/18/14 21:28	8001-35-2	H2
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	44 %.		10-119	1	10/08/14 13:13	10/18/14 21:28	877-09-8	
Tetrachloro-m-xylene (S)	49 %.		10-119	1	10/08/14 13:13	10/18/14 21:28	877-09-8	
Decachlorobiphenyl (S)	69 %.		14-126	1	10/08/14 13:13	10/18/14 21:28	2051-24-3	
Decachlorobiphenyl (S)	74 %.		14-126	1	10/08/14 13:13	10/18/14 21:28	2051-24-3	
<b>8082 GCS PCB</b>		Analytical Method: EPA 8082 Preparation Method: EPA 3510						
PCB-1016 (Aroclor 1016)	ND ug/L		0.52	1	10/03/14 14:03	10/06/14 15:39	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/L		0.52	1	10/03/14 14:03	10/06/14 15:39	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/L		0.52	1	10/03/14 14:03	10/06/14 15:39	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/L		0.52	1	10/03/14 14:03	10/06/14 15:39	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/L		0.52	1	10/03/14 14:03	10/06/14 15:39	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/L		0.52	1	10/03/14 14:03	10/06/14 15:39	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/L		0.52	1	10/03/14 14:03	10/06/14 15:39	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	71 %.		32-115	1	10/03/14 14:03	10/06/14 15:39	877-09-8	
<b>8151 Chlorinated Herbicides</b>		Analytical Method: EPA 8151 Preparation Method: EPA 3535A						
2,4-D	ND ug/L		2.0	1	10/08/14 15:29	10/09/14 17:53	94-75-7	H2
2,4,5-T	ND ug/L		2.0	1	10/08/14 15:29	10/09/14 17:53	93-76-5	H2
2,4,5-TP (Silvex)	ND ug/L		2.0	1	10/08/14 15:29	10/09/14 17:53	93-72-1	H2
<b>Surrogates</b>								
2,4-DCAA (S)	72 %.		10-166	1	10/08/14 15:29	10/09/14 17:53	19719-28-9	
2,4-DCAA (S)	66 %.		10-166	1	10/08/14 15:29	10/09/14 17:53	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: F.D.		Lab ID: 50104622006	Collected: 09/30/14 08:00	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b>		Analytical Method: EPA 6010 Preparation Method: EPA 3010						
Antimony	ND ug/L		6.0	1	10/04/14 12:32	10/07/14 17:31	7440-36-0	
Arsenic	ND ug/L		10.0	1	10/04/14 12:32	10/07/14 17:31	7440-38-2	
Barium	106 ug/L		10.0	1	10/04/14 12:32	10/07/14 17:31	7440-39-3	
Beryllium	ND ug/L		4.0	1	10/04/14 12:32	10/07/14 17:31	7440-41-7	
Cadmium	ND ug/L		2.0	1	10/04/14 12:32	10/07/14 17:31	7440-43-9	
Calcium	74400 ug/L		1000	1	10/04/14 12:32	10/07/14 17:31	7440-70-2	
Chromium	ND ug/L		10.0	1	10/04/14 12:32	10/07/14 17:31	7440-47-3	
Cobalt	ND ug/L		10.0	1	10/04/14 12:32	10/07/14 17:31	7440-48-4	
Copper	ND ug/L		10.0	1	10/04/14 12:32	10/07/14 17:31	7440-50-8	
Iron	27600 ug/L		100	1	10/04/14 12:32	10/07/14 17:31	7439-89-6	
Lead	ND ug/L		10.0	1	10/04/14 12:32	10/07/14 17:31	7439-92-1	
Magnesium	22500 ug/L		1000	1	10/04/14 12:32	10/07/14 17:31	7439-95-4	
Manganese	292 ug/L		10.0	1	10/04/14 12:32	10/07/14 17:31	7439-96-5	
Nickel	ND ug/L		10.0	1	10/04/14 12:32	10/07/14 17:31	7440-02-0	
Potassium	5570 ug/L		1000	1	10/04/14 12:32	10/07/14 17:31	7440-09-7	
Selenium	ND ug/L		10.0	1	10/04/14 12:32	10/07/14 17:31	7782-49-2	
Silver	ND ug/L		10.0	1	10/04/14 12:32	10/07/14 17:31	7440-22-4	
Thallium	ND ug/L		2.0	1	10/11/14 16:05	10/13/14 10:46	7440-28-0	
Vanadium	13.3 ug/L		10.0	1	10/04/14 12:32	10/07/14 12:15	7440-62-2	
Zinc	ND ug/L		20.0	1	10/04/14 12:32	10/07/14 17:31	7440-66-6	
<b>7470 Mercury</b>		Analytical Method: EPA 7470 Preparation Method: EPA 7470						
Mercury	ND ug/L		2.0	1	10/08/14 10:42	10/09/14 11:50	7439-97-6	
<b>8270 MSSV PAH</b>		Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3510						
Acenaphthene	ND ug/L		1.1	1	10/03/14 10:52	10/04/14 01:31	83-32-9	
Acenaphthylene	ND ug/L		1.1	1	10/03/14 10:52	10/04/14 01:31	208-96-8	
Anthracene	ND ug/L		0.11	1	10/03/14 10:52	10/04/14 01:31	120-12-7	
Benzo(a)anthracene	ND ug/L		0.11	1	10/03/14 10:52	10/04/14 01:31	56-55-3	
Benzo(a)pyrene	ND ug/L		0.11	1	10/03/14 10:52	10/04/14 01:31	50-32-8	
Benzo(b)fluoranthene	ND ug/L		0.11	1	10/03/14 10:52	10/04/14 01:31	205-99-2	
Benzo(g,h,i)perylene	ND ug/L		0.11	1	10/03/14 10:52	10/04/14 01:31	191-24-2	
Benzo(k)fluoranthene	ND ug/L		0.11	1	10/03/14 10:52	10/04/14 01:31	207-08-9	
Chrysene	ND ug/L		0.53	1	10/03/14 10:52	10/04/14 01:31	218-01-9	
Dibenz(a,h)anthracene	ND ug/L		0.11	1	10/03/14 10:52	10/04/14 01:31	53-70-3	
Fluoranthene	ND ug/L		1.1	1	10/03/14 10:52	10/04/14 01:31	206-44-0	
Fluorene	ND ug/L		1.1	1	10/03/14 10:52	10/04/14 01:31	86-73-7	
Indeno(1,2,3-cd)pyrene	ND ug/L		0.11	1	10/03/14 10:52	10/04/14 01:31	193-39-5	
1-Methylnaphthalene	ND ug/L		1.1	1	10/03/14 10:52	10/04/14 01:31	90-12-0	
2-Methylnaphthalene	ND ug/L		1.1	1	10/03/14 10:52	10/04/14 01:31	91-57-6	
Naphthalene	ND ug/L		1.1	1	10/03/14 10:52	10/04/14 01:31	91-20-3	
Phenanthrene	ND ug/L		1.1	1	10/03/14 10:52	10/04/14 01:31	85-01-8	
Pyrene	ND ug/L		1.1	1	10/03/14 10:52	10/04/14 01:31	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	74 %.		21-114	1	10/03/14 10:52	10/04/14 01:31	321-60-8	
p-Terphenyl-d14 (S)	73 %.		25-131	1	10/03/14 10:52	10/04/14 01:31	1718-51-0	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: F.D.		Lab ID: 50104622006	Collected: 09/30/14 08:00	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SCAN</b>		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Benzyl alcohol	ND ug/L		21.1	1	10/03/14 10:52	10/04/14 22:31	100-51-6	
4-Bromophenylphenyl ether	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	101-55-3	
Butylbenzylphthalate	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	85-68-7	
4-Chloro-3-methylphenol	ND ug/L		21.1	1	10/03/14 10:52	10/04/14 22:31	59-50-7	
4-Chloroaniline	ND ug/L		21.1	1	10/03/14 10:52	10/04/14 22:31	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	111-91-1	
bis(2-Chloroethyl) ether	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	111-44-4	
bis(2-Chloroisopropyl) ether	ND ug/L		5.3	1	10/03/14 10:52	10/04/14 22:31	108-60-1	
bis(2chloro1methylethyl) ether	ND ug/L		5.3	1	10/03/14 10:52	10/04/14 22:31	108-60-1	
2-Chloronaphthalene	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	91-58-7	
2-Chlorophenol	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	95-57-8	
4-Chlorophenylphenyl ether	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	7005-72-3	
Dibenzofuran	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	132-64-9	
3,3'-Dichlorobenzidine	ND ug/L		21.1	1	10/03/14 10:52	10/04/14 22:31	91-94-1	
2,4-Dichlorophenol	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	120-83-2	
Diethylphthalate	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	84-66-2	
2,4-Dimethylphenol	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	105-67-9	
Dimethylphthalate	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	131-11-3	
Di-n-butylphthalate	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/L		52.6	1	10/03/14 10:52	10/04/14 22:31	534-52-1	
2,4-Dinitrophenol	ND ug/L		52.6	1	10/03/14 10:52	10/04/14 22:31	51-28-5	
2,4-Dinitrotoluene	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	121-14-2	
2,6-Dinitrotoluene	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	606-20-2	
Di-n-octylphthalate	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/L		5.3	1	10/03/14 10:52	10/04/14 22:31	117-81-7	
Hexachloro-1,3-butadiene	ND ug/L		5.3	1	10/03/14 10:52	10/04/14 22:31	87-68-3	
Hexachlorobenzene	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	118-74-1	
Hexachlorocyclopentadiene	ND ug/L		21.1	1	10/03/14 10:52	10/04/14 22:31	77-47-4	
Hexachloroethane	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	67-72-1	
Isophorone	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/L		21.1	1	10/03/14 10:52	10/04/14 22:31		
2-Nitroaniline	ND ug/L		52.6	1	10/03/14 10:52	10/04/14 22:31	88-74-4	
3-Nitroaniline	ND ug/L		52.6	1	10/03/14 10:52	10/04/14 22:31	99-09-2	
4-Nitroaniline	ND ug/L		52.6	1	10/03/14 10:52	10/04/14 22:31	100-01-6	
Nitrobenzene	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	98-95-3	
2-Nitrophenol	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	88-75-5	
4-Nitrophenol	ND ug/L		52.6	1	10/03/14 10:52	10/04/14 22:31	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	621-64-7	
N-Nitrosodiphenylamine	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	86-30-6	
Pentachlorophenol	ND ug/L		52.6	1	10/03/14 10:52	10/04/14 22:31	87-86-5	
Phenol	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	108-95-2	
2,4,5-Trichlorophenol	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	95-95-4	
2,4,6-Trichlorophenol	ND ug/L		10.5	1	10/03/14 10:52	10/04/14 22:31	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	100 %.		29-126	1	10/03/14 10:52	10/04/14 22:31	4165-60-0	
Phenol-d5 (S)	19 %.		10-47	1	10/03/14 10:52	10/04/14 22:31	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: F.D.		Lab ID: 50104622006	Collected: 09/30/14 08:00	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV SCAN		Analytical Method: EPA 8270 Preparation Method: EPA 3510						
Surrogates								
2-Fluorophenol (S)	33 %.		10-67	1	10/03/14 10:52	10/04/14 22:31	367-12-4	
2,4,6-Tribromophenol (S)	114 %.		31-161	1	10/03/14 10:52	10/04/14 22:31	118-79-6	
8260 MSV Indiana		Analytical Method: EPA 8260						
Acetone	ND ug/L		100	1		10/12/14 04:07	67-64-1	
Acrolein	ND ug/L		50.0	1		10/12/14 04:07	107-02-8	
Acrylonitrile	ND ug/L		100	1		10/12/14 04:07	107-13-1	
Benzene	ND ug/L		5.0	1		10/12/14 04:07	71-43-2	
Bromobenzene	ND ug/L		5.0	1		10/12/14 04:07	108-86-1	
Bromochloromethane	ND ug/L		5.0	1		10/12/14 04:07	74-97-5	
Bromodichloromethane	ND ug/L		5.0	1		10/12/14 04:07	75-27-4	
Bromoform	ND ug/L		5.0	1		10/12/14 04:07	75-25-2	
Bromomethane	ND ug/L		5.0	1		10/12/14 04:07	74-83-9	
2-Butanone (MEK)	ND ug/L		25.0	1		10/12/14 04:07	78-93-3	
n-Butylbenzene	ND ug/L		5.0	1		10/12/14 04:07	104-51-8	
sec-Butylbenzene	ND ug/L		5.0	1		10/12/14 04:07	135-98-8	
tert-Butylbenzene	ND ug/L		5.0	1		10/12/14 04:07	98-06-6	
Carbon disulfide	ND ug/L		10.0	1		10/12/14 04:07	75-15-0	
Carbon tetrachloride	ND ug/L		5.0	1		10/12/14 04:07	56-23-5	
Chlorobenzene	7.2 ug/L		5.0	1		10/12/14 04:07	108-90-7	
Chloroethane	ND ug/L		5.0	1		10/12/14 04:07	75-00-3	
Chloroform	ND ug/L		5.0	1		10/12/14 04:07	67-66-3	
Chloromethane	ND ug/L		5.0	1		10/12/14 04:07	74-87-3	
2-Chlorotoluene	ND ug/L		5.0	1		10/12/14 04:07	95-49-8	
4-Chlorotoluene	ND ug/L		5.0	1		10/12/14 04:07	106-43-4	
Dibromochloromethane	ND ug/L		5.0	1		10/12/14 04:07	124-48-1	
1,2-Dibromoethane (EDB)	ND ug/L		5.0	1		10/12/14 04:07	106-93-4	
Dibromomethane	ND ug/L		5.0	1		10/12/14 04:07	74-95-3	
1,2-Dichlorobenzene	ND ug/L		5.0	1		10/12/14 04:07	95-50-1	
1,3-Dichlorobenzene	ND ug/L		5.0	1		10/12/14 04:07	541-73-1	
1,4-Dichlorobenzene	ND ug/L		5.0	1		10/12/14 04:07	106-46-7	
trans-1,4-Dichloro-2-butene	ND ug/L		100	1		10/12/14 04:07	110-57-6	
Dichlorodifluoromethane	ND ug/L		5.0	1		10/12/14 04:07	75-71-8	
1,1-Dichloroethane	ND ug/L		5.0	1		10/12/14 04:07	75-34-3	
1,2-Dichloroethane	ND ug/L		5.0	1		10/12/14 04:07	107-06-2	
1,1-Dichloroethene	ND ug/L		5.0	1		10/12/14 04:07	75-35-4	
cis-1,2-Dichloroethene	ND ug/L		5.0	1		10/12/14 04:07	156-59-2	
trans-1,2-Dichloroethene	ND ug/L		5.0	1		10/12/14 04:07	156-60-5	
1,2-Dichloropropane	ND ug/L		5.0	1		10/12/14 04:07	78-87-5	
1,3-Dichloropropane	ND ug/L		5.0	1		10/12/14 04:07	142-28-9	
2,2-Dichloropropane	ND ug/L		5.0	1		10/12/14 04:07	594-20-7	
1,1-Dichloropropene	ND ug/L		5.0	1		10/12/14 04:07	563-58-6	
cis-1,3-Dichloropropene	ND ug/L		5.0	1		10/12/14 04:07	10061-01-5	
trans-1,3-Dichloropropene	ND ug/L		5.0	1		10/12/14 04:07	10061-02-6	
Ethylbenzene	ND ug/L		5.0	1		10/12/14 04:07	100-41-4	
Ethyl methacrylate	ND ug/L		100	1		10/12/14 04:07	97-63-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: F.D.		Lab ID: 50104622006	Collected: 09/30/14 08:00	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV Indiana</b>		Analytical Method: EPA 8260						
Hexachloro-1,3-butadiene	ND ug/L		5.0	1		10/12/14 04:07	87-68-3	
n-Hexane	ND ug/L		5.0	1		10/12/14 04:07	110-54-3	
2-Hexanone	ND ug/L		25.0	1		10/12/14 04:07	591-78-6	
Iodomethane	ND ug/L		10.0	1		10/12/14 04:07	74-88-4	
Isopropylbenzene (Cumene)	ND ug/L		5.0	1		10/12/14 04:07	98-82-8	
p-Isopropyltoluene	ND ug/L		5.0	1		10/12/14 04:07	99-87-6	
Methylene Chloride	ND ug/L		5.0	1		10/12/14 04:07	75-09-2	
1-Methylnaphthalene	ND ug/L		5.0	1		10/12/14 04:07	90-12-0	N2
2-Methylnaphthalene	ND ug/L		10.0	1		10/12/14 04:07	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND ug/L		25.0	1		10/12/14 04:07	108-10-1	
Methyl-tert-butyl ether	ND ug/L		4.0	1		10/12/14 04:07	1634-04-4	
Naphthalene	ND ug/L		1.4	1		10/12/14 04:07	91-20-3	
n-Propylbenzene	ND ug/L		5.0	1		10/12/14 04:07	103-65-1	
Styrene	ND ug/L		5.0	1		10/12/14 04:07	100-42-5	
1,1,1,2-Tetrachloroethane	ND ug/L		5.0	1		10/12/14 04:07	630-20-6	
1,1,2,2-Tetrachloroethane	ND ug/L		5.0	1		10/12/14 04:07	79-34-5	
Tetrachloroethene	ND ug/L		5.0	1		10/12/14 04:07	127-18-4	
Toluene	ND ug/L		5.0	1		10/12/14 04:07	108-88-3	
1,2,3-Trichlorobenzene	ND ug/L		5.0	1		10/12/14 04:07	87-61-6	
1,2,4-Trichlorobenzene	ND ug/L		5.0	1		10/12/14 04:07	120-82-1	
1,1,1-Trichloroethane	ND ug/L		5.0	1		10/12/14 04:07	71-55-6	
1,1,2-Trichloroethane	ND ug/L		5.0	1		10/12/14 04:07	79-00-5	
Trichloroethene	ND ug/L		5.0	1		10/12/14 04:07	79-01-6	
Trichlorofluoromethane	ND ug/L		5.0	1		10/12/14 04:07	75-69-4	
1,2,3-Trichloropropane	ND ug/L		5.0	1		10/12/14 04:07	96-18-4	
1,2,4-Trimethylbenzene	ND ug/L		5.0	1		10/12/14 04:07	95-63-6	
1,3,5-Trimethylbenzene	ND ug/L		5.0	1		10/12/14 04:07	108-67-8	
Vinyl acetate	ND ug/L		50.0	1		10/12/14 04:07	108-05-4	
Vinyl chloride	ND ug/L		2.0	1		10/12/14 04:07	75-01-4	
Xylene (Total)	ND ug/L		10.0	1		10/12/14 04:07	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	97 %.		79-116	1		10/12/14 04:07	1868-53-7	
4-Bromofluorobenzene (S)	91 %.		80-114	1		10/12/14 04:07	460-00-4	
Toluene-d8 (S)	86 %.		81-110	1		10/12/14 04:07	2037-26-5	
<b>2320B Alkalinity</b>		Analytical Method: SM 2320B						
Alkalinity, Total as CaCO3	310 mg/L		2.0	1		10/09/14 13:36		
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	512 mg/L		10.0	1		10/02/14 06:48		
<b>4500FC Fluoride</b>		Analytical Method: SM 4500F/C						
Fluoride	0.11 mg/L		0.10	1		10/08/14 13:01	16984-48-8	
<b>4500S2D Sulfide Water</b>		Analytical Method: SM 4500-S2-D						
Sulfide	ND mg/L		0.10	1		10/06/14 09:53		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: F.D.		Lab ID: 50104622006	Collected: 09/30/14 08:00	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>335.4 Cyanide, Total</b>	Analytical Method: EPA 335.4 Preparation Method: EPA 335.4							
Cyanide	<b>0.012</b>	mg/L	0.010	1	10/06/14 13:05	10/08/14 14:28	57-12-5	
<b>350.1 Ammonia</b>	Analytical Method: EPA 350.1 Preparation Method: EPA 350.1							
Nitrogen, Ammonia	<b>12.1</b>	mg/L	0.40	4	10/07/14 10:40	10/09/14 11:14	7664-41-7	
<b>353.2 Nitrogen, NO2/NO3 unpres</b>	Analytical Method: EPA 353.2							
Nitrogen, Nitrate	ND	mg/L	0.10	1		10/01/14 14:09		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-1 Lab ID: 50104622007 Collected: 09/30/14 10:30 Received: 10/01/14 09:41 Matrix: Solid

### Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual	
8081 GCS Pesticides	Analytical Method: EPA 8081 Preparation Method: EPA 3546								
Aldrin	ND ug/kg		1.6	1	10/11/14 11:02	10/16/14 20:58	309-00-2	3d	
alpha-BHC	ND ug/kg		1.6	1	10/11/14 11:02	10/16/14 20:58	319-84-6		
beta-BHC	ND ug/kg		1.6	1	10/11/14 11:02	10/16/14 20:58	319-85-7		
delta-BHC	ND ug/kg		1.6	1	10/11/14 11:02	10/16/14 20:58	319-86-8		
gamma-BHC (Lindane)	ND ug/kg		1.6	1	10/11/14 11:02	10/16/14 20:58	58-89-9		
alpha-Chlordane	ND ug/kg		1.6	1	10/11/14 11:02	10/16/14 20:58	5103-71-9		
gamma-Chlordane	ND ug/kg		1.6	1	10/11/14 11:02	10/16/14 20:58	5103-74-2		
4,4'-DDD	ND ug/kg		3.1	1	10/11/14 11:02	10/16/14 20:58	72-54-8		
4,4'-DDE	ND ug/kg		3.1	1	10/11/14 11:02	10/16/14 20:58	72-55-9		
4,4'-DDT	ND ug/kg		3.1	1	10/11/14 11:02	10/16/14 20:58	50-29-3		
Dieldrin	ND ug/kg		3.1	1	10/11/14 11:02	10/16/14 20:58	60-57-1		
Endosulfan I	ND ug/kg		1.6	1	10/11/14 11:02	10/16/14 20:58	959-98-8		
Endosulfan II	ND ug/kg		3.1	1	10/11/14 11:02	10/16/14 20:58	33213-65-9		
Endosulfan sulfate	ND ug/kg		3.1	1	10/11/14 11:02	10/16/14 20:58	1031-07-8		
Endrin	ND ug/kg		3.1	1	10/11/14 11:02	10/16/14 20:58	72-20-8		
Endrin aldehyde	ND ug/kg		3.1	1	10/11/14 11:02	10/16/14 20:58	7421-93-4		
Endrin ketone	ND ug/kg		3.1	1	10/11/14 11:02	10/16/14 20:58	53494-70-5		
Heptachlor	ND ug/kg		1.6	1	10/11/14 11:02	10/16/14 20:58	76-44-8		
Heptachlor epoxide	ND ug/kg		1.6	1	10/11/14 11:02	10/16/14 20:58	1024-57-3		
Methoxychlor	ND ug/kg		15.8	1	10/11/14 11:02	10/16/14 20:58	72-43-5		
Toxaphene	ND ug/kg		63.1	1	10/11/14 11:02	10/16/14 20:58	8001-35-2		
Surrogates									
Tetrachloro-m-xylene (S)	59 %.		10-178	1	10/11/14 11:02	10/16/14 20:58	877-09-8		
Tetrachloro-m-xylene (S)	37 %.		10-178	1	10/11/14 11:02	10/16/14 20:58	877-09-8		
Decachlorobiphenyl (S)	23 %.		15-177	1	10/11/14 11:02	10/16/14 20:58	2051-24-3		
Decachlorobiphenyl (S)	28 %.		15-177	1	10/11/14 11:02	10/16/14 20:58	2051-24-3		

### 8082 GCS PCB

Analytical Method: EPA 8082 Preparation Method: EPA 3546

PCB-1016 (Aroclor 1016)	ND ug/kg		122	1	10/03/14 11:35	10/13/14 03:12	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/kg		122	1	10/03/14 11:35	10/13/14 03:12	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/kg		122	1	10/03/14 11:35	10/13/14 03:12	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/kg		122	1	10/03/14 11:35	10/13/14 03:12	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/kg		122	1	10/03/14 11:35	10/13/14 03:12	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/kg		122	1	10/03/14 11:35	10/13/14 03:12	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/kg		122	1	10/03/14 11:35	10/13/14 03:12	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	54 %.		30-106	1	10/03/14 11:35	10/13/14 03:12	877-09-8	

### 8151 Chlorinated Herbicides MW

Analytical Method: EPA 8151 Preparation Method: EPA 3546

2,4-D	ND ug/kg		64.6	1	10/10/14 12:18	10/15/14 12:59	94-75-7	
2,4,5-T	ND ug/kg		64.6	1	10/10/14 12:18	10/15/14 12:59	93-76-5	
2,4,5-TP (Silvex)	ND ug/kg		64.6	1	10/10/14 12:18	10/15/14 12:59	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	84 %.		10-161	1	10/10/14 12:18	10/15/14 12:59	19719-28-9	
2,4-DCAA (S)	85 %.		10-161	1	10/10/14 12:18	10/15/14 12:59	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-1 Lab ID: 50104622007 Collected: 09/30/14 10:30 Received: 10/01/14 09:41 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050								
Antimony	ND	mg/kg	1.2	1	10/03/14 11:17	10/07/14 08:55	7440-36-0	
Arsenic	2.1	mg/kg	1.2	1	10/03/14 11:17	10/07/14 08:55	7440-38-2	
Barium	18.5	mg/kg	1.2	1	10/03/14 11:17	10/07/14 08:55	7440-39-3	
Beryllium	ND	mg/kg	0.59	1	10/03/14 11:17	10/07/14 08:55	7440-41-7	
Cadmium	ND	mg/kg	0.59	1	10/03/14 11:17	10/07/14 08:55	7440-43-9	
Chromium	3.1	mg/kg	1.2	1	10/03/14 11:17	10/07/14 08:55	7440-47-3	
Cobalt	1.5	mg/kg	1.2	1	10/03/14 11:17	10/07/14 08:55	7440-48-4	
Copper	1.9	mg/kg	1.2	1	10/03/14 11:17	10/07/14 08:55	7440-50-8	
Lead	2.8	mg/kg	1.2	1	10/03/14 11:17	10/07/14 08:55	7439-92-1	
Nickel	3.0	mg/kg	1.2	1	10/03/14 11:17	10/07/14 08:55	7440-02-0	
Selenium	ND	mg/kg	1.2	1	10/03/14 11:17	10/07/14 08:55	7782-49-2	
Silver	ND	mg/kg	0.59	1	10/03/14 11:17	10/07/14 08:55	7440-22-4	
Thallium	ND	mg/kg	1.2	1	10/03/14 11:17	10/07/14 08:55	7440-28-0	
Vanadium	4.6	mg/kg	1.2	1	10/03/14 11:17	10/07/14 08:55	7440-62-2	
Zinc	16.7	mg/kg	1.2	1	10/03/14 11:17	10/07/14 08:55	7440-66-6	

### 7471 Mercury

Analytical Method: EPA 7471 Preparation Method: EPA 7471

Mercury	ND	mg/kg	0.23	1	10/07/14 13:07	10/08/14 13:04	7439-97-6	
---------	----	-------	------	---	----------------	----------------	-----------	--

### 8270 MSSV PAH by SIM

Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546

Acenaphthene	ND	ug/kg	6.1	1	10/03/14 12:05	10/04/14 12:20	83-32-9	
Acenaphthylene	ND	ug/kg	6.1	1	10/03/14 12:05	10/04/14 12:20	208-96-8	
Anthracene	ND	ug/kg	6.1	1	10/03/14 12:05	10/04/14 12:20	120-12-7	
Benzo(a)anthracene	ND	ug/kg	6.1	1	10/03/14 12:05	10/04/14 12:20	56-55-3	
Benzo(a)pyrene	ND	ug/kg	6.1	1	10/03/14 12:05	10/04/14 12:20	50-32-8	
Benzo(b)fluoranthene	ND	ug/kg	6.1	1	10/03/14 12:05	10/04/14 12:20	205-99-2	
Benzo(g,h,i)perylene	ND	ug/kg	6.1	1	10/03/14 12:05	10/04/14 12:20	191-24-2	
Benzo(k)fluoranthene	ND	ug/kg	6.1	1	10/03/14 12:05	10/04/14 12:20	207-08-9	
Chrysene	ND	ug/kg	6.1	1	10/03/14 12:05	10/04/14 12:20	218-01-9	
Dibenz(a,h)anthracene	ND	ug/kg	6.1	1	10/03/14 12:05	10/04/14 12:20	53-70-3	
Fluoranthene	6.5	ug/kg	6.1	1	10/03/14 12:05	10/04/14 12:20	206-44-0	
Fluorene	ND	ug/kg	6.1	1	10/03/14 12:05	10/04/14 12:20	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/kg	6.1	1	10/03/14 12:05	10/04/14 12:20	193-39-5	
1-Methylnaphthalene	ND	ug/kg	6.1	1	10/03/14 12:05	10/04/14 12:20	90-12-0	
2-Methylnaphthalene	ND	ug/kg	6.1	1	10/03/14 12:05	10/04/14 12:20	91-57-6	
Naphthalene	ND	ug/kg	6.1	1	10/03/14 12:05	10/04/14 12:20	91-20-3	
Phenanthrene	ND	ug/kg	6.1	1	10/03/14 12:05	10/04/14 12:20	85-01-8	
Pyrene	ND	ug/kg	6.1	1	10/03/14 12:05	10/04/14 12:20	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	53	%	38-110	1	10/03/14 12:05	10/04/14 12:20	321-60-8	
p-Terphenyl-d14 (S)	40	%	32-111	1	10/03/14 12:05	10/04/14 12:20	1718-51-0	

### 8270 MSSV SHORT LIST MICROWAVE

Analytical Method: EPA 8270 Preparation Method: EPA 3546

Benzyl alcohol	ND	ug/kg	803	1	10/06/14 12:20	10/07/14 01:06	100-51-6	
4-Bromophenylphenyl ether	ND	ug/kg	401	1	10/06/14 12:20	10/07/14 01:06	101-55-3	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-1 Lab ID: 50104622007 Collected: 09/30/14 10:30 Received: 10/01/14 09:41 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SHORT LIST MICROWAVE</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546								
Butylbenzylphthalate	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	85-68-7	
4-Chloro-3-methylphenol	ND ug/kg		803	1	10/06/14 12:20	10/07/14 01:06	59-50-7	
4-Chloroaniline	ND ug/kg		803	1	10/06/14 12:20	10/07/14 01:06	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	111-91-1	
bis(2-Chloroethyl) ether	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	111-44-4	
bis(2chloro1methylethyl) ether	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	108-60-1	
2-Chloronaphthalene	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	91-58-7	
2-Chlorophenol	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	95-57-8	
4-Chlorophenylphenyl ether	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	7005-72-3	
Dibenzofuran	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	132-64-9	
3,3'-Dichlorobenzidine	ND ug/kg		803	1	10/06/14 12:20	10/07/14 01:06	91-94-1	
2,4-Dichlorophenol	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	120-83-2	
Diethylphthalate	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	84-66-2	
2,4-Dimethylphenol	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	105-67-9	
Dimethylphthalate	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	131-11-3	
Di-n-butylphthalate	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/kg		1950	1	10/06/14 12:20	10/07/14 01:06	534-52-1	
2,4-Dinitrophenol	ND ug/kg		1950	1	10/06/14 12:20	10/07/14 01:06	51-28-5	
2,4-Dinitrotoluene	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	121-14-2	
2,6-Dinitrotoluene	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	606-20-2	
Di-n-octylphthalate	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	117-81-7	
Hexachloro-1,3-butadiene	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	87-68-3	
Hexachlorobenzene	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	118-74-1	
Hexachlorocyclopentadiene	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	77-47-4	
Hexachloroethane	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	67-72-1	
Isophorone	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/kg		803	1	10/06/14 12:20	10/07/14 01:06		
2-Nitroaniline	ND ug/kg		1950	1	10/06/14 12:20	10/07/14 01:06	88-74-4	
3-Nitroaniline	ND ug/kg		1950	1	10/06/14 12:20	10/07/14 01:06	99-09-2	
4-Nitroaniline	ND ug/kg		1950	1	10/06/14 12:20	10/07/14 01:06	100-01-6	
Nitrobenzene	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	98-95-3	
2-Nitrophenol	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	88-75-5	
4-Nitrophenol	ND ug/kg		1950	1	10/06/14 12:20	10/07/14 01:06	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	621-64-7	
N-Nitrosodiphenylamine	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	86-30-6	
Pentachlorophenol	ND ug/kg		1950	1	10/06/14 12:20	10/07/14 01:06	87-86-5	
Phenol	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	108-95-2	
2,4,5-Trichlorophenol	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	95-95-4	
2,4,6-Trichlorophenol	ND ug/kg		401	1	10/06/14 12:20	10/07/14 01:06	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	64 %.		28-101	1	10/06/14 12:20	10/07/14 01:06	4165-60-0	
2-Fluorobiphenyl (S)	63 %.		31-94	1	10/06/14 12:20	10/07/14 01:06	321-60-8	
p-Terphenyl-d14 (S)	57 %.		26-110	1	10/06/14 12:20	10/07/14 01:06	1718-51-0	
Phenol-d5 (S)	70 %.		28-101	1	10/06/14 12:20	10/07/14 01:06	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-1 Lab ID: 50104622007 Collected: 09/30/14 10:30 Received: 10/01/14 09:41 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
------------	---------	-------	--------------	----	----------	----------	---------	------

**8270 MSSV SHORT LIST MICROWAVE** Analytical Method: EPA 8270 Preparation Method: EPA 3546

### Surrogates

2-Fluorophenol (S)	74 %.		24-104	1	10/06/14 12:20	10/07/14 01:06	367-12-4	
2,4,6-Tribromophenol (S)	77 %.		16-122	1	10/06/14 12:20	10/07/14 01:06	118-79-6	

### 8260 MSV 5035A VOA

Analytical Method: EPA 8260

Acetone	ND ug/kg	92.1	1		10/11/14 05:43	67-64-1
Acrolein	ND ug/kg	92.1	1		10/11/14 05:43	107-02-8
Acrylonitrile	ND ug/kg	92.1	1		10/11/14 05:43	107-13-1
Benzene	ND ug/kg	4.6	1		10/11/14 05:43	71-43-2
Bromobenzene	ND ug/kg	4.6	1		10/11/14 05:43	108-86-1
Bromochloromethane	ND ug/kg	4.6	1		10/11/14 05:43	74-97-5
Bromodichloromethane	ND ug/kg	4.6	1		10/11/14 05:43	75-27-4
Bromoform	ND ug/kg	4.6	1		10/11/14 05:43	75-25-2
Bromomethane	ND ug/kg	4.6	1		10/11/14 05:43	74-83-9
2-Butanone (MEK)	ND ug/kg	23.0	1		10/11/14 05:43	78-93-3
n-Butylbenzene	ND ug/kg	4.6	1		10/11/14 05:43	104-51-8
sec-Butylbenzene	ND ug/kg	4.6	1		10/11/14 05:43	135-98-8
tert-Butylbenzene	ND ug/kg	4.6	1		10/11/14 05:43	98-06-6
Carbon disulfide	ND ug/kg	9.2	1		10/11/14 05:43	75-15-0
Carbon tetrachloride	ND ug/kg	4.6	1		10/11/14 05:43	56-23-5
Chlorobenzene	ND ug/kg	4.6	1		10/11/14 05:43	108-90-7
Chloroethane	ND ug/kg	4.6	1		10/11/14 05:43	75-00-3
Chloroform	ND ug/kg	4.6	1		10/11/14 05:43	67-66-3
Chloromethane	ND ug/kg	4.6	1		10/11/14 05:43	74-87-3
2-Chlorotoluene	ND ug/kg	4.6	1		10/11/14 05:43	95-49-8
4-Chlorotoluene	ND ug/kg	4.6	1		10/11/14 05:43	106-43-4
Dibromochloromethane	ND ug/kg	4.6	1		10/11/14 05:43	124-48-1
1,2-Dibromoethane (EDB)	ND ug/kg	4.6	1		10/11/14 05:43	106-93-4
Dibromomethane	ND ug/kg	4.6	1		10/11/14 05:43	74-95-3
1,2-Dichlorobenzene	ND ug/kg	4.6	1		10/11/14 05:43	95-50-1
1,3-Dichlorobenzene	ND ug/kg	4.6	1		10/11/14 05:43	541-73-1
1,4-Dichlorobenzene	ND ug/kg	4.6	1		10/11/14 05:43	106-46-7
trans-1,4-Dichloro-2-butene	ND ug/kg	92.1	1		10/11/14 05:43	110-57-6
Dichlorodifluoromethane	ND ug/kg	4.6	1		10/11/14 05:43	75-71-8
1,1-Dichloroethane	ND ug/kg	4.6	1		10/11/14 05:43	75-34-3
1,2-Dichloroethane	ND ug/kg	4.6	1		10/11/14 05:43	107-06-2
1,1-Dichloroethene	ND ug/kg	4.6	1		10/11/14 05:43	75-35-4
cis-1,2-Dichloroethene	ND ug/kg	4.6	1		10/11/14 05:43	156-59-2
trans-1,2-Dichloroethene	ND ug/kg	4.6	1		10/11/14 05:43	156-60-5
1,2-Dichloropropane	ND ug/kg	4.6	1		10/11/14 05:43	78-87-5
1,3-Dichloropropane	ND ug/kg	4.6	1		10/11/14 05:43	142-28-9
2,2-Dichloropropane	ND ug/kg	4.6	1		10/11/14 05:43	594-20-7
1,1-Dichloropropene	ND ug/kg	4.6	1		10/11/14 05:43	563-58-6
cis-1,3-Dichloropropene	ND ug/kg	4.6	1		10/11/14 05:43	10061-01-5
trans-1,3-Dichloropropene	ND ug/kg	4.6	1		10/11/14 05:43	10061-02-6
Ethylbenzene	ND ug/kg	4.6	1		10/11/14 05:43	100-41-4

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-1 Lab ID: 50104622007 Collected: 09/30/14 10:30 Received: 10/01/14 09:41 Matrix: Solid

### Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
Ethyl methacrylate	ND	ug/kg	92.1	1		10/11/14 05:43	97-63-2	
Hexachloro-1,3-butadiene	ND	ug/kg	4.6	1		10/11/14 05:43	87-68-3	
n-Hexane	ND	ug/kg	4.6	1		10/11/14 05:43	110-54-3	
2-Hexanone	ND	ug/kg	92.1	1		10/11/14 05:43	591-78-6	
Iodomethane	ND	ug/kg	92.1	1		10/11/14 05:43	74-88-4	
Isopropylbenzene (Cumene)	ND	ug/kg	4.6	1		10/11/14 05:43	98-82-8	
p-Isopropyltoluene	ND	ug/kg	4.6	1		10/11/14 05:43	99-87-6	
Methylene Chloride	ND	ug/kg	18.4	1		10/11/14 05:43	75-09-2	
1-Methylnaphthalene	ND	ug/kg	9.2	1		10/11/14 05:43	90-12-0	N2
2-Methylnaphthalene	ND	ug/kg	9.2	1		10/11/14 05:43	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	23.0	1		10/11/14 05:43	108-10-1	
Methyl-tert-butyl ether	ND	ug/kg	4.6	1		10/11/14 05:43	1634-04-4	
Naphthalene	ND	ug/kg	4.6	1		10/11/14 05:43	91-20-3	
n-Propylbenzene	ND	ug/kg	4.6	1		10/11/14 05:43	103-65-1	
Styrene	ND	ug/kg	4.6	1		10/11/14 05:43	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/kg	4.6	1		10/11/14 05:43	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/kg	4.6	1		10/11/14 05:43	79-34-5	
Tetrachloroethene	ND	ug/kg	4.6	1		10/11/14 05:43	127-18-4	
Toluene	ND	ug/kg	4.6	1		10/11/14 05:43	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/kg	4.6	1		10/11/14 05:43	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/kg	4.6	1		10/11/14 05:43	120-82-1	
1,1,1-Trichloroethane	ND	ug/kg	4.6	1		10/11/14 05:43	71-55-6	
1,1,2-Trichloroethane	ND	ug/kg	4.6	1		10/11/14 05:43	79-00-5	
Trichloroethene	ND	ug/kg	4.6	1		10/11/14 05:43	79-01-6	
Trichlorofluoromethane	ND	ug/kg	4.6	1		10/11/14 05:43	75-69-4	
1,2,3-Trichloropropane	ND	ug/kg	4.6	1		10/11/14 05:43	96-18-4	
1,2,4-Trimethylbenzene	ND	ug/kg	4.6	1		10/11/14 05:43	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/kg	4.6	1		10/11/14 05:43	108-67-8	
Vinyl acetate	ND	ug/kg	92.1	1		10/11/14 05:43	108-05-4	
Vinyl chloride	ND	ug/kg	4.6	1		10/11/14 05:43	75-01-4	
Xylene (Total)	ND	ug/kg	9.2	1		10/11/14 05:43	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	95 %		85-118	1		10/11/14 05:43	1868-53-7	
Toluene-d8 (S)	95 %		71-128	1		10/11/14 05:43	2037-26-5	
4-Bromofluorobenzene (S)	90 %		56-144	1		10/11/14 05:43	460-00-4	

### Percent Moisture

Analytical Method: ASTM D2974-87

Percent Moisture 18.9 % 0.10 1 10/07/14 13:42

### 9012 Cyanide, Total

Analytical Method: EPA 9012 Preparation Method: EPA 9012

Cyanide ND mg/kg 0.62 1 10/06/14 13:05 10/08/14 14:09 57-12-5

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-2 Lab ID: 50104622008 Collected: 09/30/14 11:40 Received: 10/01/14 09:41 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual	
8081 GCS Pesticides	Analytical Method: EPA 8081   Preparation Method: EPA 3546								
Aldrin	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:10	309-00-2	3d	
alpha-BHC	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:10	319-84-6		
beta-BHC	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:10	319-85-7		
delta-BHC	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:10	319-86-8		
gamma-BHC (Lindane)	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:10	58-89-9		
alpha-Chlordane	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:10	5103-71-9		
gamma-Chlordane	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:10	5103-74-2		
4,4'-DDD	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:10	72-54-8		
4,4'-DDE	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:10	72-55-9		
4,4'-DDT	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:10	50-29-3		
Dieldrin	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:10	60-57-1		
Endosulfan I	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:10	959-98-8		
Endosulfan II	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:10	33213-65-9		
Endosulfan sulfate	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:10	1031-07-8		
Endrin	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:10	72-20-8		
Endrin aldehyde	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:10	7421-93-4		
Endrin ketone	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:10	53494-70-5		
Heptachlor	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:10	76-44-8		
Heptachlor epoxide	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:10	1024-57-3		
Methoxychlor	ND ug/kg		16.6	1	10/11/14 11:02	10/16/14 21:10	72-43-5		
Toxaphene	ND ug/kg		66.3	1	10/11/14 11:02	10/16/14 21:10	8001-35-2		
Surrogates									
Tetrachloro-m-xylene (S)	68 %.		10-178	1	10/11/14 11:02	10/16/14 21:10	877-09-8		
Tetrachloro-m-xylene (S)	84 %.		10-178	1	10/11/14 11:02	10/16/14 21:10	877-09-8		
Decachlorobiphenyl (S)	49 %.		15-177	1	10/11/14 11:02	10/16/14 21:10	2051-24-3		
Decachlorobiphenyl (S)	54 %.		15-177	1	10/11/14 11:02	10/16/14 21:10	2051-24-3		

### 8082 GCS PCB

Analytical Method: EPA 8082 Preparation Method: EPA 3546

PCB-1016 (Aroclor 1016)	ND ug/kg		548	1	10/03/14 11:35	10/07/14 14:18	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/kg		548	1	10/03/14 11:35	10/07/14 14:18	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/kg		548	1	10/03/14 11:35	10/07/14 14:18	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/kg		548	1	10/03/14 11:35	10/07/14 14:18	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/kg		548	1	10/03/14 11:35	10/07/14 14:18	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/kg		548	1	10/03/14 11:35	10/07/14 14:18	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/kg		548	1	10/03/14 11:35	10/07/14 14:18	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	69 %.		30-106	1	10/03/14 11:35	10/07/14 14:18	877-09-8	

### 8151 Chlorinated Herbicides MW

Analytical Method: EPA 8151 Preparation Method: EPA 3546

2,4-D	ND ug/kg		66.3	1	10/10/14 12:18	10/15/14 13:15	94-75-7	
2,4,5-T	78.4 ug/kg		66.3	1	10/10/14 12:18	10/15/14 13:15	93-76-5	
2,4,5-TP (Silvex)	ND ug/kg		66.3	1	10/10/14 12:18	10/15/14 13:15	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	46 %.		10-161	1	10/10/14 12:18	10/15/14 13:15	19719-28-9	
2,4-DCAA (S)	92 %.		10-161	1	10/10/14 12:18	10/15/14 13:15	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-2 Lab ID: 50104622008 Collected: 09/30/14 11:40 Received: 10/01/14 09:41 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050								
Antimony	ND	mg/kg	1.3	1	10/03/14 11:17	10/07/14 08:57	7440-36-0	
Arsenic	3.8	mg/kg	1.3	1	10/03/14 11:17	10/07/14 08:57	7440-38-2	
Barium	34.4	mg/kg	1.3	1	10/03/14 11:17	10/07/14 08:57	7440-39-3	
Beryllium	ND	mg/kg	0.63	1	10/03/14 11:17	10/07/14 08:57	7440-41-7	
Cadmium	ND	mg/kg	0.63	1	10/03/14 11:17	10/07/14 08:57	7440-43-9	
Chromium	6.8	mg/kg	1.3	1	10/03/14 11:17	10/07/14 08:57	7440-47-3	
Cobalt	2.6	mg/kg	1.3	1	10/03/14 11:17	10/07/14 08:57	7440-48-4	
Copper	8.2	mg/kg	1.3	1	10/03/14 11:17	10/07/14 08:57	7440-50-8	
Lead	7.2	mg/kg	1.3	1	10/03/14 11:17	10/07/14 08:57	7439-92-1	
Nickel	6.7	mg/kg	1.3	1	10/03/14 11:17	10/07/14 08:57	7440-02-0	
Selenium	ND	mg/kg	1.3	1	10/03/14 11:17	10/07/14 08:57	7782-49-2	
Silver	ND	mg/kg	0.63	1	10/03/14 11:17	10/07/14 08:57	7440-22-4	
Thallium	ND	mg/kg	1.3	1	10/03/14 11:17	10/07/14 08:57	7440-28-0	
Vanadium	10.2	mg/kg	1.3	1	10/03/14 11:17	10/07/14 08:57	7440-62-2	
Zinc	38.3	mg/kg	1.3	1	10/03/14 11:17	10/07/14 08:57	7440-66-6	

**7471 Mercury** Analytical Method: EPA 7471 Preparation Method: EPA 7471

Mercury	ND	mg/kg	0.39	1	10/07/14 13:07	10/08/14 13:06	7439-97-6	
---------	----	-------	------	---	----------------	----------------	-----------	--

**8270 MSSV PAH by SIM** Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546

Acenaphthene	ND	ug/kg	27.1	1	10/03/14 12:05	10/04/14 12:38	83-32-9	
Acenaphthylene	ND	ug/kg	27.1	1	10/03/14 12:05	10/04/14 12:38	208-96-8	
Anthracene	ND	ug/kg	27.1	1	10/03/14 12:05	10/04/14 12:38	120-12-7	
Benzo(a)anthracene	33.4	ug/kg	27.1	1	10/03/14 12:05	10/04/14 12:38	56-55-3	
Benzo(a)pyrene	39.1	ug/kg	27.1	1	10/03/14 12:05	10/04/14 12:38	50-32-8	
Benzo(b)fluoranthene	60.5	ug/kg	27.1	1	10/03/14 12:05	10/04/14 12:38	205-99-2	
Benzo(g,h,i)perylene	41.6	ug/kg	27.1	1	10/03/14 12:05	10/04/14 12:38	191-24-2	
Benzo(k)fluoranthene	46.0	ug/kg	27.1	1	10/03/14 12:05	10/04/14 12:38	207-08-9	
Chrysene	61.0	ug/kg	27.1	1	10/03/14 12:05	10/04/14 12:38	218-01-9	
Dibenz(a,h)anthracene	ND	ug/kg	27.1	1	10/03/14 12:05	10/04/14 12:38	53-70-3	
Fluoranthene	122	ug/kg	27.1	1	10/03/14 12:05	10/04/14 12:38	206-44-0	
Fluorene	ND	ug/kg	27.1	1	10/03/14 12:05	10/04/14 12:38	86-73-7	
Indeno(1,2,3-cd)pyrene	32.3	ug/kg	27.1	1	10/03/14 12:05	10/04/14 12:38	193-39-5	
1-Methylnaphthalene	ND	ug/kg	27.1	1	10/03/14 12:05	10/04/14 12:38	90-12-0	
2-Methylnaphthalene	ND	ug/kg	27.1	1	10/03/14 12:05	10/04/14 12:38	91-57-6	
Naphthalene	ND	ug/kg	27.1	1	10/03/14 12:05	10/04/14 12:38	91-20-3	
Phenanthrene	53.5	ug/kg	27.1	1	10/03/14 12:05	10/04/14 12:38	85-01-8	
Pyrene	93.3	ug/kg	27.1	1	10/03/14 12:05	10/04/14 12:38	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	66	%.	38-110	1	10/03/14 12:05	10/04/14 12:38	321-60-8	
p-Terphenyl-d14 (S)	65	%.	32-111	1	10/03/14 12:05	10/04/14 12:38	1718-51-0	

**8270 MSSV SHORT LIST MICROWAVE** Analytical Method: EPA 8270 Preparation Method: EPA 3546

Benzyl alcohol	ND	ug/kg	1200	1	10/06/14 12:20	10/07/14 01:29	100-51-6	
4-Bromophenylphenyl ether	ND	ug/kg	602	1	10/06/14 12:20	10/07/14 01:29	101-55-3	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-2 Lab ID: 50104622008 Collected: 09/30/14 11:40 Received: 10/01/14 09:41 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SHORT LIST MICROWAVE</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546								
Butylbenzylphthalate	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	85-68-7	
4-Chloro-3-methylphenol	ND ug/kg		1200	1	10/06/14 12:20	10/07/14 01:29	59-50-7	
4-Chloroaniline	ND ug/kg		1200	1	10/06/14 12:20	10/07/14 01:29	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	111-91-1	
bis(2-Chloroethyl) ether	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	111-44-4	
bis(2chloro1methylethyl) ether	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	108-60-1	
2-Chloronaphthalene	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	91-58-7	
2-Chlorophenol	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	95-57-8	
4-Chlorophenylphenyl ether	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	7005-72-3	
Dibenzofuran	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	132-64-9	
3,3'-Dichlorobenzidine	ND ug/kg		1200	1	10/06/14 12:20	10/07/14 01:29	91-94-1	
2,4-Dichlorophenol	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	120-83-2	
Diethylphthalate	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	84-66-2	
2,4-Dimethylphenol	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	105-67-9	
Dimethylphthalate	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	131-11-3	
Di-n-butylphthalate	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/kg		2920	1	10/06/14 12:20	10/07/14 01:29	534-52-1	
2,4-Dinitrophenol	ND ug/kg		2920	1	10/06/14 12:20	10/07/14 01:29	51-28-5	
2,4-Dinitrotoluene	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	121-14-2	
2,6-Dinitrotoluene	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	606-20-2	
Di-n-octylphthalate	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	117-81-7	
Hexachloro-1,3-butadiene	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	87-68-3	
Hexachlorobenzene	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	118-74-1	
Hexachlorocyclopentadiene	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	77-47-4	
Hexachloroethane	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	67-72-1	
Isophorone	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/kg		1200	1	10/06/14 12:20	10/07/14 01:29		
2-Nitroaniline	ND ug/kg		2920	1	10/06/14 12:20	10/07/14 01:29	88-74-4	
3-Nitroaniline	ND ug/kg		2920	1	10/06/14 12:20	10/07/14 01:29	99-09-2	
4-Nitroaniline	ND ug/kg		2920	1	10/06/14 12:20	10/07/14 01:29	100-01-6	
Nitrobenzene	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	98-95-3	
2-Nitrophenol	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	88-75-5	
4-Nitrophenol	ND ug/kg		2920	1	10/06/14 12:20	10/07/14 01:29	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	621-64-7	
N-Nitrosodiphenylamine	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	86-30-6	
Pentachlorophenol	ND ug/kg		2920	1	10/06/14 12:20	10/07/14 01:29	87-86-5	
Phenol	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	108-95-2	
2,4,5-Trichlorophenol	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	95-95-4	
2,4,6-Trichlorophenol	ND ug/kg		602	1	10/06/14 12:20	10/07/14 01:29	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	49 %.		28-101	1	10/06/14 12:20	10/07/14 01:29	4165-60-0	
2-Fluorobiphenyl (S)	66 %.		31-94	1	10/06/14 12:20	10/07/14 01:29	321-60-8	
p-Terphenyl-d14 (S)	77 %.		26-110	1	10/06/14 12:20	10/07/14 01:29	1718-51-0	
Phenol-d5 (S)	59 %.		28-101	1	10/06/14 12:20	10/07/14 01:29	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-2 Lab ID: 50104622008 Collected: 09/30/14 11:40 Received: 10/01/14 09:41 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
------------	---------	-------	--------------	----	----------	----------	---------	------

**8270 MSSV SHORT LIST MICROWAVE** Analytical Method: EPA 8270 Preparation Method: EPA 3546

### Surrogates

2-Fluorophenol (S)	57 %.		24-104	1	10/06/14 12:20	10/07/14 01:29	367-12-4	
2,4,6-Tribromophenol (S)	83 %.		16-122	1	10/06/14 12:20	10/07/14 01:29	118-79-6	

### 8260 MSV 5035A VOA

Analytical Method: EPA 8260

Acetone	587 ug/kg		165	1		10/11/14 06:14	67-64-1	
Acrolein	ND ug/kg		165	1		10/11/14 06:14	107-02-8	
Acrylonitrile	ND ug/kg		165	1		10/11/14 06:14	107-13-1	
Benzene	ND ug/kg		8.2	1		10/11/14 06:14	71-43-2	
Bromobenzene	ND ug/kg		8.2	1		10/11/14 06:14	108-86-1	
Bromochloromethane	ND ug/kg		8.2	1		10/11/14 06:14	74-97-5	
Bromodichloromethane	ND ug/kg		8.2	1		10/11/14 06:14	75-27-4	
Bromoform	ND ug/kg		8.2	1		10/11/14 06:14	75-25-2	
Bromomethane	ND ug/kg		8.2	1		10/11/14 06:14	74-83-9	
2-Butanone (MEK)	98.3 ug/kg		41.2	1		10/11/14 06:14	78-93-3	
n-Butylbenzene	ND ug/kg		8.2	1		10/11/14 06:14	104-51-8	
sec-Butylbenzene	ND ug/kg		8.2	1		10/11/14 06:14	135-98-8	
tert-Butylbenzene	ND ug/kg		8.2	1		10/11/14 06:14	98-06-6	
Carbon disulfide	ND ug/kg		16.5	1		10/11/14 06:14	75-15-0	
Carbon tetrachloride	ND ug/kg		8.2	1		10/11/14 06:14	56-23-5	
Chlorobenzene	13.0 ug/kg		8.2	1		10/11/14 06:14	108-90-7	
Chloroethane	ND ug/kg		8.2	1		10/11/14 06:14	75-00-3	
Chloroform	ND ug/kg		8.2	1		10/11/14 06:14	67-66-3	
Chloromethane	ND ug/kg		8.2	1		10/11/14 06:14	74-87-3	
2-Chlorotoluene	ND ug/kg		8.2	1		10/11/14 06:14	95-49-8	
4-Chlorotoluene	ND ug/kg		8.2	1		10/11/14 06:14	106-43-4	
Dibromochloromethane	ND ug/kg		8.2	1		10/11/14 06:14	124-48-1	
1,2-Dibromoethane (EDB)	ND ug/kg		8.2	1		10/11/14 06:14	106-93-4	
Dibromomethane	ND ug/kg		8.2	1		10/11/14 06:14	74-95-3	
1,2-Dichlorobenzene	ND ug/kg		8.2	1		10/11/14 06:14	95-50-1	
1,3-Dichlorobenzene	ND ug/kg		8.2	1		10/11/14 06:14	541-73-1	
1,4-Dichlorobenzene	ND ug/kg		8.2	1		10/11/14 06:14	106-46-7	
trans-1,4-Dichloro-2-butene	ND ug/kg		165	1		10/11/14 06:14	110-57-6	
Dichlorodifluoromethane	ND ug/kg		8.2	1		10/11/14 06:14	75-71-8	
1,1-Dichloroethane	ND ug/kg		8.2	1		10/11/14 06:14	75-34-3	
1,2-Dichloroethane	ND ug/kg		8.2	1		10/11/14 06:14	107-06-2	
1,1-Dichloroethene	ND ug/kg		8.2	1		10/11/14 06:14	75-35-4	
cis-1,2-Dichloroethene	ND ug/kg		8.2	1		10/11/14 06:14	156-59-2	
trans-1,2-Dichloroethene	ND ug/kg		8.2	1		10/11/14 06:14	156-60-5	
1,2-Dichloropropane	ND ug/kg		8.2	1		10/11/14 06:14	78-87-5	
1,3-Dichloropropane	ND ug/kg		8.2	1		10/11/14 06:14	142-28-9	
2,2-Dichloropropane	ND ug/kg		8.2	1		10/11/14 06:14	594-20-7	
1,1-Dichloropropene	ND ug/kg		8.2	1		10/11/14 06:14	563-58-6	
cis-1,3-Dichloropropene	ND ug/kg		8.2	1		10/11/14 06:14	10061-01-5	
trans-1,3-Dichloropropene	ND ug/kg		8.2	1		10/11/14 06:14	10061-02-6	
Ethylbenzene	ND ug/kg		8.2	1		10/11/14 06:14	100-41-4	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-2 Lab ID: 50104622008 Collected: 09/30/14 11:40 Received: 10/01/14 09:41 Matrix: Solid

### Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
Ethyl methacrylate	ND	ug/kg	165	1		10/11/14 06:14	97-63-2	
Hexachloro-1,3-butadiene	ND	ug/kg	8.2	1		10/11/14 06:14	87-68-3	
n-Hexane	ND	ug/kg	8.2	1		10/11/14 06:14	110-54-3	
2-Hexanone	ND	ug/kg	165	1		10/11/14 06:14	591-78-6	
Iodomethane	ND	ug/kg	165	1		10/11/14 06:14	74-88-4	
Isopropylbenzene (Cumene)	ND	ug/kg	8.2	1		10/11/14 06:14	98-82-8	
p-Isopropyltoluene	ND	ug/kg	8.2	1		10/11/14 06:14	99-87-6	
Methylene Chloride	ND	ug/kg	33.0	1		10/11/14 06:14	75-09-2	
1-Methylnaphthalene	ND	ug/kg	16.5	1		10/11/14 06:14	90-12-0	N2
2-Methylnaphthalene	ND	ug/kg	16.5	1		10/11/14 06:14	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	41.2	1		10/11/14 06:14	108-10-1	
Methyl-tert-butyl ether	ND	ug/kg	8.2	1		10/11/14 06:14	1634-04-4	
Naphthalene	ND	ug/kg	8.2	1		10/11/14 06:14	91-20-3	
n-Propylbenzene	ND	ug/kg	8.2	1		10/11/14 06:14	103-65-1	
Styrene	ND	ug/kg	8.2	1		10/11/14 06:14	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/kg	8.2	1		10/11/14 06:14	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/kg	8.2	1		10/11/14 06:14	79-34-5	
Tetrachloroethene	ND	ug/kg	8.2	1		10/11/14 06:14	127-18-4	
Toluene	8.8	ug/kg	8.2	1		10/11/14 06:14	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/kg	8.2	1		10/11/14 06:14	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/kg	8.2	1		10/11/14 06:14	120-82-1	
1,1,1-Trichloroethane	ND	ug/kg	8.2	1		10/11/14 06:14	71-55-6	
1,1,2-Trichloroethane	ND	ug/kg	8.2	1		10/11/14 06:14	79-00-5	
Trichloroethene	ND	ug/kg	8.2	1		10/11/14 06:14	79-01-6	
Trichlorofluoromethane	ND	ug/kg	8.2	1		10/11/14 06:14	75-69-4	
1,2,3-Trichloropropane	ND	ug/kg	8.2	1		10/11/14 06:14	96-18-4	
1,2,4-Trimethylbenzene	ND	ug/kg	8.2	1		10/11/14 06:14	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/kg	8.2	1		10/11/14 06:14	108-67-8	
Vinyl acetate	ND	ug/kg	165	1		10/11/14 06:14	108-05-4	
Vinyl chloride	ND	ug/kg	8.2	1		10/11/14 06:14	75-01-4	
Xylene (Total)	ND	ug/kg	16.5	1		10/11/14 06:14	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	97 %		85-118	1		10/11/14 06:14	1868-53-7	
Toluene-d8 (S)	104 %		71-128	1		10/11/14 06:14	2037-26-5	
4-Bromofluorobenzene (S)	81 %		56-144	1		10/11/14 06:14	460-00-4	

### Percent Moisture

Analytical Method: ASTM D2974-87

Percent Moisture 45.8 % 0.10 1 10/07/14 13:43

### 9012 Cyanide, Total

Analytical Method: EPA 9012 Preparation Method: EPA 9012

Cyanide ND mg/kg 0.88 1 10/06/14 13:05 10/08/14 14:10 57-12-5

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-3 Lab ID: 50104622009 Collected: 09/30/14 13:00 Received: 10/01/14 09:41 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual	
8081 GCS Pesticides	Analytical Method: EPA 8081 Preparation Method: EPA 3546								
Aldrin	ND ug/kg		1.6	1	10/11/14 11:02	10/16/14 21:23	309-00-2	3d	
alpha-BHC	ND ug/kg		1.6	1	10/11/14 11:02	10/16/14 21:23	319-84-6		
beta-BHC	ND ug/kg		1.6	1	10/11/14 11:02	10/16/14 21:23	319-85-7		
delta-BHC	ND ug/kg		1.6	1	10/11/14 11:02	10/16/14 21:23	319-86-8		
gamma-BHC (Lindane)	ND ug/kg		1.6	1	10/11/14 11:02	10/16/14 21:23	58-89-9		
alpha-Chlordane	ND ug/kg		1.6	1	10/11/14 11:02	10/16/14 21:23	5103-71-9		
gamma-Chlordane	ND ug/kg		1.6	1	10/11/14 11:02	10/16/14 21:23	5103-74-2		
4,4'-DDD	ND ug/kg		3.2	1	10/11/14 11:02	10/16/14 21:23	72-54-8		
4,4'-DDE	ND ug/kg		3.2	1	10/11/14 11:02	10/16/14 21:23	72-55-9		
4,4'-DDT	ND ug/kg		3.2	1	10/11/14 11:02	10/16/14 21:23	50-29-3		
Dieldrin	ND ug/kg		3.2	1	10/11/14 11:02	10/16/14 21:23	60-57-1		
Endosulfan I	ND ug/kg		1.6	1	10/11/14 11:02	10/16/14 21:23	959-98-8		
Endosulfan II	ND ug/kg		3.2	1	10/11/14 11:02	10/16/14 21:23	33213-65-9		
Endosulfan sulfate	ND ug/kg		3.2	1	10/11/14 11:02	10/16/14 21:23	1031-07-8		
Endrin	ND ug/kg		3.2	1	10/11/14 11:02	10/16/14 21:23	72-20-8		
Endrin aldehyde	ND ug/kg		3.2	1	10/11/14 11:02	10/16/14 21:23	7421-93-4		
Endrin ketone	ND ug/kg		3.2	1	10/11/14 11:02	10/16/14 21:23	53494-70-5		
Heptachlor	ND ug/kg		1.6	1	10/11/14 11:02	10/16/14 21:23	76-44-8		
Heptachlor epoxide	ND ug/kg		1.6	1	10/11/14 11:02	10/16/14 21:23	1024-57-3		
Methoxychlor	ND ug/kg		16.2	1	10/11/14 11:02	10/16/14 21:23	72-43-5		
Toxaphene	ND ug/kg		64.6	1	10/11/14 11:02	10/16/14 21:23	8001-35-2		
Surrogates									
Tetrachloro-m-xylene (S)	70 %.		10-178	1	10/11/14 11:02	10/16/14 21:23	877-09-8		
Tetrachloro-m-xylene (S)	54 %.		10-178	1	10/11/14 11:02	10/16/14 21:23	877-09-8		
Decachlorobiphenyl (S)	63 %.		15-177	1	10/11/14 11:02	10/16/14 21:23	2051-24-3		
Decachlorobiphenyl (S)	51 %.		15-177	1	10/11/14 11:02	10/16/14 21:23	2051-24-3		

### 8082 GCS PCB

Analytical Method: EPA 8082 Preparation Method: EPA 3546

PCB-1016 (Aroclor 1016)	ND ug/kg		174	1	10/09/14 13:55	10/15/14 03:46	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/kg		174	1	10/09/14 13:55	10/15/14 03:46	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/kg		174	1	10/09/14 13:55	10/15/14 03:46	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/kg		174	1	10/09/14 13:55	10/15/14 03:46	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/kg		174	1	10/09/14 13:55	10/15/14 03:46	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/kg		174	1	10/09/14 13:55	10/15/14 03:46	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/kg		174	1	10/09/14 13:55	10/15/14 03:46	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	59 %.		30-106	1	10/09/14 13:55	10/15/14 03:46	877-09-8	

### 8151 Chlorinated Herbicides MW

Analytical Method: EPA 8151 Preparation Method: EPA 3546

2,4-D	ND ug/kg		64.5	1	10/10/14 12:18	10/15/14 13:31	94-75-7	
2,4,5-T	ND ug/kg		64.5	1	10/10/14 12:18	10/15/14 13:31	93-76-5	
2,4,5-TP (Silvex)	ND ug/kg		64.5	1	10/10/14 12:18	10/15/14 13:31	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	103 %.		10-161	1	10/10/14 12:18	10/15/14 13:31	19719-28-9	
2,4-DCAA (S)	88 %.		10-161	1	10/10/14 12:18	10/15/14 13:31	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-3 Lab ID: 50104622009 Collected: 09/30/14 13:00 Received: 10/01/14 09:41 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050								
Antimony	ND	mg/kg	1.7	1	10/03/14 11:17	10/07/14 08:59	7440-36-0	
Arsenic	6.3	mg/kg	1.7	1	10/03/14 11:17	10/07/14 08:59	7440-38-2	
Barium	73.6	mg/kg	1.7	1	10/03/14 11:17	10/07/14 08:59	7440-39-3	
Beryllium	ND	mg/kg	0.86	1	10/03/14 11:17	10/07/14 08:59	7440-41-7	
Cadmium	ND	mg/kg	0.86	1	10/03/14 11:17	10/07/14 08:59	7440-43-9	
Chromium	9.0	mg/kg	1.7	1	10/03/14 11:17	10/07/14 08:59	7440-47-3	
Cobalt	3.8	mg/kg	1.7	1	10/03/14 11:17	10/07/14 08:59	7440-48-4	
Copper	11.9	mg/kg	1.7	1	10/03/14 11:17	10/07/14 08:59	7440-50-8	
Lead	12.3	mg/kg	1.7	1	10/03/14 11:17	10/07/14 08:59	7439-92-1	
Nickel	9.1	mg/kg	1.7	1	10/03/14 11:17	10/07/14 08:59	7440-02-0	
Selenium	ND	mg/kg	1.7	1	10/03/14 11:17	10/07/14 08:59	7782-49-2	
Silver	ND	mg/kg	0.86	1	10/03/14 11:17	10/07/14 08:59	7440-22-4	
Thallium	ND	mg/kg	1.7	1	10/03/14 11:17	10/07/14 08:59	7440-28-0	
Vanadium	12.2	mg/kg	1.7	1	10/03/14 11:17	10/07/14 08:59	7440-62-2	
Zinc	74.8	mg/kg	1.7	1	10/03/14 11:17	10/07/14 08:59	7440-66-6	

**7471 Mercury** Analytical Method: EPA 7471 Preparation Method: EPA 7471

Mercury	ND	mg/kg	0.35	1	10/07/14 13:07	10/08/14 13:08	7439-97-6	
---------	----	-------	------	---	----------------	----------------	-----------	--

**8270 MSSV PAH by SIM** Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546

Acenaphthene	ND	ug/kg	25.7	1	10/03/14 12:05	10/04/14 12:56	83-32-9	
Acenaphthylene	ND	ug/kg	25.7	1	10/03/14 12:05	10/04/14 12:56	208-96-8	
Anthracene	ND	ug/kg	25.7	1	10/03/14 12:05	10/04/14 12:56	120-12-7	
Benzo(a)anthracene	88.1	ug/kg	25.7	1	10/03/14 12:05	10/04/14 12:56	56-55-3	
Benzo(a)pyrene	116	ug/kg	25.7	1	10/03/14 12:05	10/04/14 12:56	50-32-8	
Benzo(b)fluoranthene	141	ug/kg	25.7	1	10/03/14 12:05	10/04/14 12:56	205-99-2	
Benzo(g,h,i)perylene	101	ug/kg	25.7	1	10/03/14 12:05	10/04/14 12:56	191-24-2	
Benzo(k)fluoranthene	124	ug/kg	25.7	1	10/03/14 12:05	10/04/14 12:56	207-08-9	
Chrysene	163	ug/kg	25.7	1	10/03/14 12:05	10/04/14 12:56	218-01-9	
Dibenz(a,h)anthracene	37.6	ug/kg	25.7	1	10/03/14 12:05	10/04/14 12:56	53-70-3	
Fluoranthene	328	ug/kg	25.7	1	10/03/14 12:05	10/04/14 12:56	206-44-0	
Fluorene	ND	ug/kg	25.7	1	10/03/14 12:05	10/04/14 12:56	86-73-7	
Indeno(1,2,3-cd)pyrene	82.7	ug/kg	25.7	1	10/03/14 12:05	10/04/14 12:56	193-39-5	
1-Methylnaphthalene	ND	ug/kg	25.7	1	10/03/14 12:05	10/04/14 12:56	90-12-0	
2-Methylnaphthalene	ND	ug/kg	25.7	1	10/03/14 12:05	10/04/14 12:56	91-57-6	
Naphthalene	ND	ug/kg	25.7	1	10/03/14 12:05	10/04/14 12:56	91-20-3	
Phenanthrene	132	ug/kg	25.7	1	10/03/14 12:05	10/04/14 12:56	85-01-8	
Pyrene	257	ug/kg	25.7	1	10/03/14 12:05	10/04/14 12:56	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	41	%.	38-110	1	10/03/14 12:05	10/04/14 12:56	321-60-8	
p-Terphenyl-d14 (S)	35	%.	32-111	1	10/03/14 12:05	10/04/14 12:56	1718-51-0	

**8270 MSSV SHORT LIST MICROWAVE** Analytical Method: EPA 8270 Preparation Method: EPA 3546

Benzyl alcohol	ND	ug/kg	1150	1	10/06/14 12:20	10/07/14 01:51	100-51-6	
4-Bromophenylphenyl ether	ND	ug/kg	574	1	10/06/14 12:20	10/07/14 01:51	101-55-3	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-3 Lab ID: 50104622009 Collected: 09/30/14 13:00 Received: 10/01/14 09:41 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SHORT LIST MICROWAVE</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546								
Butylbenzylphthalate	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	85-68-7	
4-Chloro-3-methylphenol	ND ug/kg		1150	1	10/06/14 12:20	10/07/14 01:51	59-50-7	
4-Chloroaniline	ND ug/kg		1150	1	10/06/14 12:20	10/07/14 01:51	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	111-91-1	
bis(2-Chloroethyl) ether	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	111-44-4	
bis(2chloro1methylethyl) ether	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	108-60-1	
2-Chloronaphthalene	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	91-58-7	
2-Chlorophenol	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	95-57-8	
4-Chlorophenylphenyl ether	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	7005-72-3	
Dibenzofuran	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	132-64-9	
3,3'-Dichlorobenzidine	ND ug/kg		1150	1	10/06/14 12:20	10/07/14 01:51	91-94-1	
2,4-Dichlorophenol	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	120-83-2	
Diethylphthalate	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	84-66-2	
2,4-Dimethylphenol	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	105-67-9	
Dimethylphthalate	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	131-11-3	
Di-n-butylphthalate	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/kg		2780	1	10/06/14 12:20	10/07/14 01:51	534-52-1	
2,4-Dinitrophenol	ND ug/kg		2780	1	10/06/14 12:20	10/07/14 01:51	51-28-5	
2,4-Dinitrotoluene	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	121-14-2	
2,6-Dinitrotoluene	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	606-20-2	
Di-n-octylphthalate	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	117-81-7	
Hexachloro-1,3-butadiene	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	87-68-3	
Hexachlorobenzene	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	118-74-1	
Hexachlorocyclopentadiene	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	77-47-4	
Hexachloroethane	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	67-72-1	
Isophorone	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/kg		1150	1	10/06/14 12:20	10/07/14 01:51		
2-Nitroaniline	ND ug/kg		2780	1	10/06/14 12:20	10/07/14 01:51	88-74-4	
3-Nitroaniline	ND ug/kg		2780	1	10/06/14 12:20	10/07/14 01:51	99-09-2	
4-Nitroaniline	ND ug/kg		2780	1	10/06/14 12:20	10/07/14 01:51	100-01-6	
Nitrobenzene	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	98-95-3	
2-Nitrophenol	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	88-75-5	
4-Nitrophenol	ND ug/kg		2780	1	10/06/14 12:20	10/07/14 01:51	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	621-64-7	
N-Nitrosodiphenylamine	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	86-30-6	
Pentachlorophenol	ND ug/kg		2780	1	10/06/14 12:20	10/07/14 01:51	87-86-5	
Phenol	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	108-95-2	
2,4,5-Trichlorophenol	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	95-95-4	
2,4,6-Trichlorophenol	ND ug/kg		574	1	10/06/14 12:20	10/07/14 01:51	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	49 %.		28-101	1	10/06/14 12:20	10/07/14 01:51	4165-60-0	
2-Fluorobiphenyl (S)	66 %.		31-94	1	10/06/14 12:20	10/07/14 01:51	321-60-8	
p-Terphenyl-d14 (S)	80 %.		26-110	1	10/06/14 12:20	10/07/14 01:51	1718-51-0	
Phenol-d5 (S)	60 %.		28-101	1	10/06/14 12:20	10/07/14 01:51	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-3 Lab ID: 50104622009 Collected: 09/30/14 13:00 Received: 10/01/14 09:41 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
------------	---------	-------	--------------	----	----------	----------	---------	------

**8270 MSSV SHORT LIST MICROWAVE** Analytical Method: EPA 8270 Preparation Method: EPA 3546

### Surrogates

2-Fluorophenol (S)	56 %.		24-104	1	10/06/14 12:20	10/07/14 01:51	367-12-4	
2,4,6-Tribromophenol (S)	85 %.		16-122	1	10/06/14 12:20	10/07/14 01:51	118-79-6	

### 8260 MSV 5035A VOA

Analytical Method: EPA 8260

Acetone	326 ug/kg		139	1		10/11/14 06:46	67-64-1	
Acrolein	ND ug/kg		139	1		10/11/14 06:46	107-02-8	
Acrylonitrile	ND ug/kg		139	1		10/11/14 06:46	107-13-1	
Benzene	ND ug/kg		6.9	1		10/11/14 06:46	71-43-2	
Bromobenzene	ND ug/kg		6.9	1		10/11/14 06:46	108-86-1	
Bromochloromethane	ND ug/kg		6.9	1		10/11/14 06:46	74-97-5	
Bromodichloromethane	ND ug/kg		6.9	1		10/11/14 06:46	75-27-4	
Bromoform	ND ug/kg		6.9	1		10/11/14 06:46	75-25-2	
Bromomethane	ND ug/kg		6.9	1		10/11/14 06:46	74-83-9	
2-Butanone (MEK)	67.5 ug/kg		34.7	1		10/11/14 06:46	78-93-3	
n-Butylbenzene	ND ug/kg		6.9	1		10/11/14 06:46	104-51-8	
sec-Butylbenzene	ND ug/kg		6.9	1		10/11/14 06:46	135-98-8	
tert-Butylbenzene	ND ug/kg		6.9	1		10/11/14 06:46	98-06-6	
Carbon disulfide	ND ug/kg		13.9	1		10/11/14 06:46	75-15-0	
Carbon tetrachloride	ND ug/kg		6.9	1		10/11/14 06:46	56-23-5	
Chlorobenzene	ND ug/kg		6.9	1		10/11/14 06:46	108-90-7	
Chloroethane	ND ug/kg		6.9	1		10/11/14 06:46	75-00-3	
Chloroform	ND ug/kg		6.9	1		10/11/14 06:46	67-66-3	
Chloromethane	ND ug/kg		6.9	1		10/11/14 06:46	74-87-3	
2-Chlorotoluene	ND ug/kg		6.9	1		10/11/14 06:46	95-49-8	
4-Chlorotoluene	ND ug/kg		6.9	1		10/11/14 06:46	106-43-4	
Dibromochloromethane	ND ug/kg		6.9	1		10/11/14 06:46	124-48-1	
1,2-Dibromoethane (EDB)	ND ug/kg		6.9	1		10/11/14 06:46	106-93-4	
Dibromomethane	ND ug/kg		6.9	1		10/11/14 06:46	74-95-3	
1,2-Dichlorobenzene	ND ug/kg		6.9	1		10/11/14 06:46	95-50-1	
1,3-Dichlorobenzene	ND ug/kg		6.9	1		10/11/14 06:46	541-73-1	
1,4-Dichlorobenzene	ND ug/kg		6.9	1		10/11/14 06:46	106-46-7	
trans-1,4-Dichloro-2-butene	ND ug/kg		139	1		10/11/14 06:46	110-57-6	
Dichlorodifluoromethane	ND ug/kg		6.9	1		10/11/14 06:46	75-71-8	
1,1-Dichloroethane	ND ug/kg		6.9	1		10/11/14 06:46	75-34-3	
1,2-Dichloroethane	ND ug/kg		6.9	1		10/11/14 06:46	107-06-2	
1,1-Dichloroethene	ND ug/kg		6.9	1		10/11/14 06:46	75-35-4	
cis-1,2-Dichloroethene	ND ug/kg		6.9	1		10/11/14 06:46	156-59-2	
trans-1,2-Dichloroethene	ND ug/kg		6.9	1		10/11/14 06:46	156-60-5	
1,2-Dichloropropane	ND ug/kg		6.9	1		10/11/14 06:46	78-87-5	
1,3-Dichloropropane	ND ug/kg		6.9	1		10/11/14 06:46	142-28-9	
2,2-Dichloropropane	ND ug/kg		6.9	1		10/11/14 06:46	594-20-7	
1,1-Dichloropropene	ND ug/kg		6.9	1		10/11/14 06:46	563-58-6	
cis-1,3-Dichloropropene	ND ug/kg		6.9	1		10/11/14 06:46	10061-01-5	
trans-1,3-Dichloropropene	ND ug/kg		6.9	1		10/11/14 06:46	10061-02-6	
Ethylbenzene	ND ug/kg		6.9	1		10/11/14 06:46	100-41-4	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-3 Lab ID: 50104622009 Collected: 09/30/14 13:00 Received: 10/01/14 09:41 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
Ethyl methacrylate	ND	ug/kg	139	1		10/11/14 06:46	97-63-2	
Hexachloro-1,3-butadiene	ND	ug/kg	6.9	1		10/11/14 06:46	87-68-3	
n-Hexane	ND	ug/kg	6.9	1		10/11/14 06:46	110-54-3	
2-Hexanone	ND	ug/kg	139	1		10/11/14 06:46	591-78-6	
Iodomethane	ND	ug/kg	139	1		10/11/14 06:46	74-88-4	
Isopropylbenzene (Cumene)	ND	ug/kg	6.9	1		10/11/14 06:46	98-82-8	
p-Isopropyltoluene	ND	ug/kg	6.9	1		10/11/14 06:46	99-87-6	
Methylene Chloride	ND	ug/kg	27.8	1		10/11/14 06:46	75-09-2	
1-Methylnaphthalene	ND	ug/kg	13.9	1		10/11/14 06:46	90-12-0	N2
2-Methylnaphthalene	ND	ug/kg	13.9	1		10/11/14 06:46	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	34.7	1		10/11/14 06:46	108-10-1	
Methyl-tert-butyl ether	ND	ug/kg	6.9	1		10/11/14 06:46	1634-04-4	
Naphthalene	ND	ug/kg	6.9	1		10/11/14 06:46	91-20-3	
n-Propylbenzene	ND	ug/kg	6.9	1		10/11/14 06:46	103-65-1	
Styrene	ND	ug/kg	6.9	1		10/11/14 06:46	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/kg	6.9	1		10/11/14 06:46	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/kg	6.9	1		10/11/14 06:46	79-34-5	
Tetrachloroethene	ND	ug/kg	6.9	1		10/11/14 06:46	127-18-4	
Toluene	ND	ug/kg	6.9	1		10/11/14 06:46	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/kg	6.9	1		10/11/14 06:46	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/kg	6.9	1		10/11/14 06:46	120-82-1	
1,1,1-Trichloroethane	ND	ug/kg	6.9	1		10/11/14 06:46	71-55-6	
1,1,2-Trichloroethane	ND	ug/kg	6.9	1		10/11/14 06:46	79-00-5	
Trichloroethene	ND	ug/kg	6.9	1		10/11/14 06:46	79-01-6	
Trichlorofluoromethane	ND	ug/kg	6.9	1		10/11/14 06:46	75-69-4	
1,2,3-Trichloropropane	ND	ug/kg	6.9	1		10/11/14 06:46	96-18-4	
1,2,4-Trimethylbenzene	ND	ug/kg	6.9	1		10/11/14 06:46	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/kg	6.9	1		10/11/14 06:46	108-67-8	
Vinyl acetate	ND	ug/kg	139	1		10/11/14 06:46	108-05-4	
Vinyl chloride	ND	ug/kg	6.9	1		10/11/14 06:46	75-01-4	
Xylene (Total)	ND	ug/kg	13.9	1		10/11/14 06:46	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	98 %		85-118	1		10/11/14 06:46	1868-53-7	
Toluene-d8 (S)	101 %		71-128	1		10/11/14 06:46	2037-26-5	
4-Bromofluorobenzene (S)	84 %		56-144	1		10/11/14 06:46	460-00-4	

### Percent Moisture

Analytical Method: ASTM D2974-87

Percent Moisture 42.8 % 0.10 1 10/07/14 13:43

### 9012 Cyanide, Total

Analytical Method: EPA 9012 Preparation Method: EPA 9012

Cyanide ND mg/kg 0.83 1 10/06/14 13:05 10/08/14 14:11 57-12-5

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-4 Lab ID: 50104622010 Collected: 09/30/14 14:40 Received: 10/01/14 09:41 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual	
8081 GCS Pesticides	Analytical Method: EPA 8081    Preparation Method: EPA 3546								
Aldrin	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:36	309-00-2	3d	
alpha-BHC	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:36	319-84-6		
beta-BHC	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:36	319-85-7		
delta-BHC	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:36	319-86-8		
gamma-BHC (Lindane)	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:36	58-89-9		
alpha-Chlordane	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:36	5103-71-9		
gamma-Chlordane	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:36	5103-74-2		
4,4'-DDD	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:36	72-54-8		
4,4'-DDE	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:36	72-55-9		
4,4'-DDT	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:36	50-29-3		
Dieldrin	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:36	60-57-1		
Endosulfan I	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:36	959-98-8		
Endosulfan II	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:36	33213-65-9		
Endosulfan sulfate	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:36	1031-07-8		
Endrin	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:36	72-20-8		
Endrin aldehyde	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:36	7421-93-4		
Endrin ketone	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:36	53494-70-5		
Heptachlor	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:36	76-44-8		
Heptachlor epoxide	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:36	1024-57-3		
Methoxychlor	ND ug/kg		16.6	1	10/11/14 11:02	10/16/14 21:36	72-43-5		
Toxaphene	ND ug/kg		66.4	1	10/11/14 11:02	10/16/14 21:36	8001-35-2		
Surrogates									
Tetrachloro-m-xylene (S)	90 %.		10-178	1	10/11/14 11:02	10/16/14 21:36	877-09-8		
Tetrachloro-m-xylene (S)	74 %.		10-178	1	10/11/14 11:02	10/16/14 21:36	877-09-8		
Decachlorobiphenyl (S)	64 %.		15-177	1	10/11/14 11:02	10/16/14 21:36	2051-24-3		
Decachlorobiphenyl (S)	54 %.		15-177	1	10/11/14 11:02	10/16/14 21:36	2051-24-3		

### 8082 GCS PCB

Analytical Method: EPA 8082 Preparation Method: EPA 3546

PCB-1016 (Aroclor 1016)	ND ug/kg		483	1	10/03/14 11:35	10/07/14 14:30	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/kg		483	1	10/03/14 11:35	10/07/14 14:30	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/kg		483	1	10/03/14 11:35	10/07/14 14:30	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/kg		483	1	10/03/14 11:35	10/07/14 14:30	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/kg		483	1	10/03/14 11:35	10/07/14 14:30	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/kg		483	1	10/03/14 11:35	10/07/14 14:30	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/kg		483	1	10/03/14 11:35	10/07/14 14:30	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	54 %.		30-106	1	10/03/14 11:35	10/07/14 14:30	877-09-8	

### 8151 Chlorinated Herbicides MW

Analytical Method: EPA 8151 Preparation Method: EPA 3546

2,4-D	ND ug/kg		63.6	1	10/10/14 12:18	10/15/14 13:47	94-75-7	
2,4,5-T	ND ug/kg		63.6	1	10/10/14 12:18	10/15/14 13:47	93-76-5	
2,4,5-TP (Silvex)	ND ug/kg		63.6	1	10/10/14 12:18	10/15/14 13:47	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	120 %.		10-161	1	10/10/14 12:18	10/15/14 13:47	19719-28-9	
2,4-DCAA (S)	116 %.		10-161	1	10/10/14 12:18	10/15/14 13:47	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-4 Lab ID: 50104622010 Collected: 09/30/14 14:40 Received: 10/01/14 09:41 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050								
Antimony	ND	mg/kg	1.6	1	10/03/14 11:17	10/07/14 09:01	7440-36-0	
Arsenic	7.9	mg/kg	1.6	1	10/03/14 11:17	10/07/14 09:01	7440-38-2	
Barium	69.7	mg/kg	1.6	1	10/03/14 11:17	10/07/14 09:01	7440-39-3	
Beryllium	ND	mg/kg	0.78	1	10/03/14 11:17	10/07/14 09:01	7440-41-7	
Cadmium	ND	mg/kg	0.78	1	10/03/14 11:17	10/07/14 09:01	7440-43-9	
Chromium	10.5	mg/kg	1.6	1	10/03/14 11:17	10/07/14 09:01	7440-47-3	
Cobalt	4.5	mg/kg	1.6	1	10/03/14 11:17	10/07/14 09:01	7440-48-4	
Copper	14.3	mg/kg	1.6	1	10/03/14 11:17	10/07/14 09:01	7440-50-8	
Lead	12.1	mg/kg	1.6	1	10/03/14 11:17	10/07/14 09:01	7439-92-1	
Nickel	12.3	mg/kg	1.6	1	10/03/14 11:17	10/07/14 09:01	7440-02-0	
Selenium	ND	mg/kg	1.6	1	10/03/14 11:17	10/07/14 09:01	7782-49-2	
Silver	ND	mg/kg	0.78	1	10/03/14 11:17	10/07/14 09:01	7440-22-4	
Thallium	ND	mg/kg	1.6	1	10/03/14 11:17	10/07/14 09:01	7440-28-0	
Vanadium	13.8	mg/kg	1.6	1	10/03/14 11:17	10/07/14 09:01	7440-62-2	
Zinc	87.5	mg/kg	1.6	1	10/03/14 11:17	10/07/14 09:01	7440-66-6	

**7471 Mercury** Analytical Method: EPA 7471 Preparation Method: EPA 7471

Mercury	ND	mg/kg	0.32	1	10/07/14 13:07	10/08/14 13:10	7439-97-6	
---------	----	-------	------	---	----------------	----------------	-----------	--

**8270 MSSV PAH by SIM** Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546

Acenaphthene	ND	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:14	83-32-9	
Acenaphthylene	ND	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:14	208-96-8	
Anthracene	ND	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:14	120-12-7	
Benzo(a)anthracene	81.9	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:14	56-55-3	
Benzo(a)pyrene	98.8	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:14	50-32-8	
Benzo(b)fluoranthene	122	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:14	205-99-2	
Benzo(g,h,i)perylene	82.8	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:14	191-24-2	
Benzo(k)fluoranthene	102	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:14	207-08-9	
Chrysene	136	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:14	218-01-9	
Dibenz(a,h)anthracene	31.9	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:14	53-70-3	
Fluoranthene	288	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:14	206-44-0	
Fluorene	ND	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:14	86-73-7	
Indeno(1,2,3-cd)pyrene	71.9	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:14	193-39-5	
1-Methylnaphthalene	ND	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:14	90-12-0	
2-Methylnaphthalene	ND	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:14	91-57-6	
Naphthalene	ND	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:14	91-20-3	
Phenanthrene	140	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:14	85-01-8	
Pyrene	229	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:14	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	58	%	38-110	1	10/03/14 12:05	10/04/14 13:14	321-60-8	
p-Terphenyl-d14 (S)	66	%	32-111	1	10/03/14 12:05	10/04/14 13:14	1718-51-0	

**8270 MSSV SHORT LIST MICROWAVE** Analytical Method: EPA 8270 Preparation Method: EPA 3546

Benzyl alcohol	ND	ug/kg	1110	1	10/06/14 12:20	10/07/14 02:14	100-51-6	
4-Bromophenylphenyl ether	ND	ug/kg	553	1	10/06/14 12:20	10/07/14 02:14	101-55-3	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-4 Lab ID: 50104622010 Collected: 09/30/14 14:40 Received: 10/01/14 09:41 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SHORT LIST MICROWAVE</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546								
Butylbenzylphthalate	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	85-68-7	
4-Chloro-3-methylphenol	ND ug/kg		1110	1	10/06/14 12:20	10/07/14 02:14	59-50-7	
4-Chloroaniline	ND ug/kg		1110	1	10/06/14 12:20	10/07/14 02:14	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	111-91-1	
bis(2-Chloroethyl) ether	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	111-44-4	
bis(2chloro1methylethyl) ether	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	108-60-1	
2-Chloronaphthalene	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	91-58-7	
2-Chlorophenol	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	95-57-8	
4-Chlorophenylphenyl ether	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	7005-72-3	
Dibenzofuran	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	132-64-9	
3,3'-Dichlorobenzidine	ND ug/kg		1110	1	10/06/14 12:20	10/07/14 02:14	91-94-1	
2,4-Dichlorophenol	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	120-83-2	
Diethylphthalate	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	84-66-2	
2,4-Dimethylphenol	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	105-67-9	
Dimethylphthalate	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	131-11-3	
Di-n-butylphthalate	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/kg		2680	1	10/06/14 12:20	10/07/14 02:14	534-52-1	
2,4-Dinitrophenol	ND ug/kg		2680	1	10/06/14 12:20	10/07/14 02:14	51-28-5	
2,4-Dinitrotoluene	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	121-14-2	
2,6-Dinitrotoluene	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	606-20-2	
Di-n-octylphthalate	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	117-81-7	
Hexachloro-1,3-butadiene	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	87-68-3	
Hexachlorobenzene	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	118-74-1	
Hexachlorocyclopentadiene	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	77-47-4	
Hexachloroethane	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	67-72-1	
Isophorone	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/kg		1110	1	10/06/14 12:20	10/07/14 02:14		
2-Nitroaniline	ND ug/kg		2680	1	10/06/14 12:20	10/07/14 02:14	88-74-4	
3-Nitroaniline	ND ug/kg		2680	1	10/06/14 12:20	10/07/14 02:14	99-09-2	
4-Nitroaniline	ND ug/kg		2680	1	10/06/14 12:20	10/07/14 02:14	100-01-6	
Nitrobenzene	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	98-95-3	
2-Nitrophenol	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	88-75-5	
4-Nitrophenol	ND ug/kg		2680	1	10/06/14 12:20	10/07/14 02:14	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	621-64-7	
N-Nitrosodiphenylamine	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	86-30-6	
Pentachlorophenol	ND ug/kg		2680	1	10/06/14 12:20	10/07/14 02:14	87-86-5	
Phenol	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	108-95-2	
2,4,5-Trichlorophenol	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	95-95-4	
2,4,6-Trichlorophenol	ND ug/kg		553	1	10/06/14 12:20	10/07/14 02:14	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	48 %.		28-101	1	10/06/14 12:20	10/07/14 02:14	4165-60-0	
2-Fluorobiphenyl (S)	61 %.		31-94	1	10/06/14 12:20	10/07/14 02:14	321-60-8	
p-Terphenyl-d14 (S)	82 %.		26-110	1	10/06/14 12:20	10/07/14 02:14	1718-51-0	
Phenol-d5 (S)	54 %.		28-101	1	10/06/14 12:20	10/07/14 02:14	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-4 Lab ID: 50104622010 Collected: 09/30/14 14:40 Received: 10/01/14 09:41 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
------------	---------	-------	--------------	----	----------	----------	---------	------

**8270 MSSV SHORT LIST MICROWAVE** Analytical Method: EPA 8270 Preparation Method: EPA 3546

### Surrogates

2-Fluorophenol (S)	53 %.		24-104	1	10/06/14 12:20	10/07/14 02:14	367-12-4	
2,4,6-Tribromophenol (S)	81 %.		16-122	1	10/06/14 12:20	10/07/14 02:14	118-79-6	

### 8260 MSV 5035A VOA

Analytical Method: EPA 8260

Acetone	628 ug/kg		144	1		10/11/14 07:18	67-64-1	
Acrolein	ND ug/kg		144	1		10/11/14 07:18	107-02-8	
Acrylonitrile	ND ug/kg		144	1		10/11/14 07:18	107-13-1	
Benzene	ND ug/kg		7.2	1		10/11/14 07:18	71-43-2	
Bromobenzene	ND ug/kg		7.2	1		10/11/14 07:18	108-86-1	
Bromochloromethane	ND ug/kg		7.2	1		10/11/14 07:18	74-97-5	
Bromodichloromethane	ND ug/kg		7.2	1		10/11/14 07:18	75-27-4	
Bromoform	ND ug/kg		7.2	1		10/11/14 07:18	75-25-2	
Bromomethane	ND ug/kg		7.2	1		10/11/14 07:18	74-83-9	
2-Butanone (MEK)	108 ug/kg		36.0	1		10/11/14 07:18	78-93-3	
n-Butylbenzene	ND ug/kg		7.2	1		10/11/14 07:18	104-51-8	
sec-Butylbenzene	ND ug/kg		7.2	1		10/11/14 07:18	135-98-8	
tert-Butylbenzene	ND ug/kg		7.2	1		10/11/14 07:18	98-06-6	
Carbon disulfide	ND ug/kg		14.4	1		10/11/14 07:18	75-15-0	
Carbon tetrachloride	ND ug/kg		7.2	1		10/11/14 07:18	56-23-5	
Chlorobenzene	18.5 ug/kg		7.2	1		10/11/14 07:18	108-90-7	
Chloroethane	ND ug/kg		7.2	1		10/11/14 07:18	75-00-3	
Chloroform	ND ug/kg		7.2	1		10/11/14 07:18	67-66-3	
Chloromethane	ND ug/kg		7.2	1		10/11/14 07:18	74-87-3	
2-Chlorotoluene	ND ug/kg		7.2	1		10/11/14 07:18	95-49-8	
4-Chlorotoluene	ND ug/kg		7.2	1		10/11/14 07:18	106-43-4	
Dibromochloromethane	ND ug/kg		7.2	1		10/11/14 07:18	124-48-1	
1,2-Dibromoethane (EDB)	ND ug/kg		7.2	1		10/11/14 07:18	106-93-4	
Dibromomethane	ND ug/kg		7.2	1		10/11/14 07:18	74-95-3	
1,2-Dichlorobenzene	ND ug/kg		7.2	1		10/11/14 07:18	95-50-1	
1,3-Dichlorobenzene	ND ug/kg		7.2	1		10/11/14 07:18	541-73-1	
1,4-Dichlorobenzene	ND ug/kg		7.2	1		10/11/14 07:18	106-46-7	
trans-1,4-Dichloro-2-butene	ND ug/kg		144	1		10/11/14 07:18	110-57-6	
Dichlorodifluoromethane	ND ug/kg		7.2	1		10/11/14 07:18	75-71-8	
1,1-Dichloroethane	ND ug/kg		7.2	1		10/11/14 07:18	75-34-3	
1,2-Dichloroethane	ND ug/kg		7.2	1		10/11/14 07:18	107-06-2	
1,1-Dichloroethene	ND ug/kg		7.2	1		10/11/14 07:18	75-35-4	
cis-1,2-Dichloroethene	ND ug/kg		7.2	1		10/11/14 07:18	156-59-2	
trans-1,2-Dichloroethene	ND ug/kg		7.2	1		10/11/14 07:18	156-60-5	
1,2-Dichloropropane	ND ug/kg		7.2	1		10/11/14 07:18	78-87-5	
1,3-Dichloropropane	ND ug/kg		7.2	1		10/11/14 07:18	142-28-9	
2,2-Dichloropropane	ND ug/kg		7.2	1		10/11/14 07:18	594-20-7	
1,1-Dichloropropene	ND ug/kg		7.2	1		10/11/14 07:18	563-58-6	
cis-1,3-Dichloropropene	ND ug/kg		7.2	1		10/11/14 07:18	10061-01-5	
trans-1,3-Dichloropropene	ND ug/kg		7.2	1		10/11/14 07:18	10061-02-6	
Ethylbenzene	ND ug/kg		7.2	1		10/11/14 07:18	100-41-4	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-4 Lab ID: 50104622010 Collected: 09/30/14 14:40 Received: 10/01/14 09:41 Matrix: Solid

### Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
Ethyl methacrylate	ND	ug/kg	144	1		10/11/14 07:18	97-63-2	
Hexachloro-1,3-butadiene	ND	ug/kg	7.2	1		10/11/14 07:18	87-68-3	
n-Hexane	ND	ug/kg	7.2	1		10/11/14 07:18	110-54-3	
2-Hexanone	ND	ug/kg	144	1		10/11/14 07:18	591-78-6	
Iodomethane	ND	ug/kg	144	1		10/11/14 07:18	74-88-4	
Isopropylbenzene (Cumene)	ND	ug/kg	7.2	1		10/11/14 07:18	98-82-8	
p-Isopropyltoluene	ND	ug/kg	7.2	1		10/11/14 07:18	99-87-6	
Methylene Chloride	ND	ug/kg	28.8	1		10/11/14 07:18	75-09-2	
1-Methylnaphthalene	ND	ug/kg	14.4	1		10/11/14 07:18	90-12-0	N2
2-Methylnaphthalene	ND	ug/kg	14.4	1		10/11/14 07:18	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	36.0	1		10/11/14 07:18	108-10-1	
Methyl-tert-butyl ether	ND	ug/kg	7.2	1		10/11/14 07:18	1634-04-4	
Naphthalene	ND	ug/kg	7.2	1		10/11/14 07:18	91-20-3	
n-Propylbenzene	ND	ug/kg	7.2	1		10/11/14 07:18	103-65-1	
Styrene	ND	ug/kg	7.2	1		10/11/14 07:18	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/kg	7.2	1		10/11/14 07:18	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/kg	7.2	1		10/11/14 07:18	79-34-5	
Tetrachloroethene	ND	ug/kg	7.2	1		10/11/14 07:18	127-18-4	
Toluene	ND	ug/kg	7.2	1		10/11/14 07:18	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/kg	7.2	1		10/11/14 07:18	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/kg	7.2	1		10/11/14 07:18	120-82-1	
1,1,1-Trichloroethane	ND	ug/kg	7.2	1		10/11/14 07:18	71-55-6	
1,1,2-Trichloroethane	ND	ug/kg	7.2	1		10/11/14 07:18	79-00-5	
Trichloroethene	ND	ug/kg	7.2	1		10/11/14 07:18	79-01-6	
Trichlorofluoromethane	ND	ug/kg	7.2	1		10/11/14 07:18	75-69-4	
1,2,3-Trichloropropane	ND	ug/kg	7.2	1		10/11/14 07:18	96-18-4	
1,2,4-Trimethylbenzene	ND	ug/kg	7.2	1		10/11/14 07:18	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/kg	7.2	1		10/11/14 07:18	108-67-8	
Vinyl acetate	ND	ug/kg	144	1		10/11/14 07:18	108-05-4	
Vinyl chloride	ND	ug/kg	7.2	1		10/11/14 07:18	75-01-4	
Xylene (Total)	ND	ug/kg	14.4	1		10/11/14 07:18	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	98 %		85-118	1		10/11/14 07:18	1868-53-7	
Toluene-d8 (S)	100 %		71-128	1		10/11/14 07:18	2037-26-5	
4-Bromofluorobenzene (S)	86 %		56-144	1		10/11/14 07:18	460-00-4	

### Percent Moisture

Analytical Method: ASTM D2974-87

Percent Moisture 40.3 % 0.10 1 10/07/14 13:43

### 9012 Cyanide, Total

Analytical Method: EPA 9012 Preparation Method: EPA 9012

Cyanide ND mg/kg 0.82 1 10/06/14 13:05 10/08/14 14:12 57-12-5

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-5 Lab ID: 50104622011 Collected: 09/30/14 15:35 Received: 10/01/14 09:41 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 GCS Pesticides</b>		Analytical Method: EPA 8081 Preparation Method: EPA 3546						
Aldrin	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:49	309-00-2	
alpha-BHC	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:49	319-84-6	3d
beta-BHC	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:49	319-85-7	R1
delta-BHC	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:49	319-86-8	R1
gamma-BHC (Lindane)	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:49	58-89-9	R1
alpha-Chlordane	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:49	5103-71-9	
gamma-Chlordane	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:49	5103-74-2	
4,4'-DDD	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:49	72-54-8	
4,4'-DDE	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:49	72-55-9	
4,4'-DDT	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:49	50-29-3	
Dieldrin	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:49	60-57-1	
Endosulfan I	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:49	959-98-8	
Endosulfan II	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:49	33213-65-9	
Endosulfan sulfate	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:49	1031-07-8	
Endrin	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:49	72-20-8	
Endrin aldehyde	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:49	7421-93-4	
Endrin ketone	ND ug/kg		3.3	1	10/11/14 11:02	10/16/14 21:49	53494-70-5	
Heptachlor	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:49	76-44-8	
Heptachlor epoxide	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 21:49	1024-57-3	
Methoxychlor	ND ug/kg		16.4	1	10/11/14 11:02	10/16/14 21:49	72-43-5	
Toxaphene	ND ug/kg		65.6	1	10/11/14 11:02	10/16/14 21:49	8001-35-2	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	64 %.		10-178	1	10/11/14 11:02	10/16/14 21:49	877-09-8	
Tetrachloro-m-xylene (S)	49 %.		10-178	1	10/11/14 11:02	10/16/14 21:49	877-09-8	
Decachlorobiphenyl (S)	32 %.		15-177	1	10/11/14 11:02	10/16/14 21:49	2051-24-3	
Decachlorobiphenyl (S)	36 %.		15-177	1	10/11/14 11:02	10/16/14 21:49	2051-24-3	

### 8082 GCS PCB

Analytical Method: EPA 8082 Preparation Method: EPA 3546

PCB-1016 (Aroclor 1016)	ND ug/kg		511	1	10/03/14 12:30	10/06/14 16:02	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/kg		511	1	10/03/14 12:30	10/06/14 16:02	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/kg		511	1	10/03/14 12:30	10/06/14 16:02	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/kg		511	1	10/03/14 12:30	10/06/14 16:02	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/kg		511	1	10/03/14 12:30	10/06/14 16:02	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/kg		511	1	10/03/14 12:30	10/06/14 16:02	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/kg		511	1	10/03/14 12:30	10/06/14 16:02	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	63 %.		30-106	1	10/03/14 12:30	10/06/14 16:02	877-09-8	

### 8151 Chlorinated Herbicides MW

Analytical Method: EPA 8151 Preparation Method: EPA 3546

2,4-D	ND ug/kg		63.2	1	10/10/14 12:18	10/15/14 14:03	94-75-7	R1
2,4,5-T	ND ug/kg		63.2	1	10/10/14 12:18	10/15/14 14:03	93-76-5	M1
2,4,5-TP (Silvex)	ND ug/kg		63.2	1	10/10/14 12:18	10/15/14 14:03	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	108 %.		10-161	1	10/10/14 12:18	10/15/14 14:03	19719-28-9	
2,4-DCAA (S)	92 %.		10-161	1	10/10/14 12:18	10/15/14 14:03	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-5 Lab ID: 50104622011 Collected: 09/30/14 15:35 Received: 10/01/14 09:41 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050								
Antimony	ND	mg/kg	1.1	1	10/03/14 11:17	10/07/14 09:04	7440-36-0	
Arsenic	3.7	mg/kg	1.1	1	10/03/14 11:17	10/07/14 09:04	7440-38-2	
Barium	43.2	mg/kg	1.1	1	10/03/14 11:17	10/07/14 09:04	7440-39-3	
Beryllium	ND	mg/kg	0.55	1	10/03/14 11:17	10/07/14 09:04	7440-41-7	
Cadmium	ND	mg/kg	0.55	1	10/03/14 11:17	10/07/14 09:04	7440-43-9	
Chromium	8.3	mg/kg	1.1	1	10/03/14 11:17	10/07/14 09:04	7440-47-3	
Cobalt	3.1	mg/kg	1.1	1	10/03/14 11:17	10/07/14 09:04	7440-48-4	
Copper	9.7	mg/kg	1.1	1	10/03/14 11:17	10/07/14 09:04	7440-50-8	
Lead	11.5	mg/kg	1.1	1	10/03/14 11:17	10/07/14 09:04	7439-92-1	
Nickel	7.7	mg/kg	1.1	1	10/03/14 11:17	10/07/14 09:04	7440-02-0	
Selenium	ND	mg/kg	1.1	1	10/03/14 11:17	10/07/14 09:04	7782-49-2	
Silver	ND	mg/kg	0.55	1	10/03/14 11:17	10/07/14 09:04	7440-22-4	
Thallium	ND	mg/kg	1.1	1	10/03/14 11:17	10/07/14 09:04	7440-28-0	
Vanadium	11.1	mg/kg	1.1	1	10/03/14 11:17	10/07/14 09:04	7440-62-2	
Zinc	53.6	mg/kg	1.1	1	10/03/14 11:17	10/07/14 09:04	7440-66-6	

### 7471 Mercury

Analytical Method: EPA 7471 Preparation Method: EPA 7471

Mercury	ND	mg/kg	0.33	1	10/07/14 13:07	10/08/14 12:08	7439-97-6	
---------	----	-------	------	---	----------------	----------------	-----------	--

### 8270 MSSV PAH by SIM

Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546

Acenaphthene	ND	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:32	83-32-9	
Acenaphthylene	ND	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:32	208-96-8	
Anthracene	ND	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:32	120-12-7	
Benzo(a)anthracene	119	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:32	56-55-3	
Benzo(a)pyrene	158	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:32	50-32-8	
Benzo(b)fluoranthene	211	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:32	205-99-2	
Benzo(g,h,i)perylene	147	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:32	191-24-2	
Benzo(k)fluoranthene	157	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:32	207-08-9	
Chrysene	203	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:32	218-01-9	
Dibenz(a,h)anthracene	65.2	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:32	53-70-3	
Fluoranthene	384	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:32	206-44-0	
Fluorene	ND	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:32	86-73-7	
Indeno(1,2,3-cd)pyrene	129	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:32	193-39-5	
1-Methylnaphthalene	ND	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:32	90-12-0	
2-Methylnaphthalene	ND	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:32	91-57-6	
Naphthalene	ND	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:32	91-20-3	
Phenanthrene	133	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:32	85-01-8	
Pyrene	295	ug/kg	24.6	1	10/03/14 12:05	10/04/14 13:32	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	55	%.	38-110	1	10/03/14 12:05	10/04/14 13:32	321-60-8	
p-Terphenyl-d14 (S)	68	%.	32-111	1	10/03/14 12:05	10/04/14 13:32	1718-51-0	

### 8270 MSSV SHORT LIST MICROWAVE

Analytical Method: EPA 8270 Preparation Method: EPA 3546

Benzyl alcohol	ND	ug/kg	1120	1	10/06/14 12:20	10/07/14 03:44	100-51-6	
4-Bromophenylphenyl ether	ND	ug/kg	560	1	10/06/14 12:20	10/07/14 03:44	101-55-3	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-5 Lab ID: 50104622011 Collected: 09/30/14 15:35 Received: 10/01/14 09:41 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SHORT LIST MICROWAVE</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546								
Butylbenzylphthalate	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	85-68-7	
4-Chloro-3-methylphenol	ND ug/kg		1120	1	10/06/14 12:20	10/07/14 03:44	59-50-7	
4-Chloroaniline	ND ug/kg		1120	1	10/06/14 12:20	10/07/14 03:44	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	111-91-1	
bis(2-Chloroethyl) ether	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	111-44-4	
bis(2chloro1methylethyl) ether	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	108-60-1	
2-Chloronaphthalene	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	91-58-7	
2-Chlorophenol	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	95-57-8	
4-Chlorophenylphenyl ether	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	7005-72-3	
Dibenzofuran	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	132-64-9	
3,3'-Dichlorobenzidine	ND ug/kg		1120	1	10/06/14 12:20	10/07/14 03:44	91-94-1	
2,4-Dichlorophenol	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	120-83-2	
Diethylphthalate	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	84-66-2	
2,4-Dimethylphenol	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	105-67-9	
Dimethylphthalate	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	131-11-3	
Di-n-butylphthalate	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/kg		2710	1	10/06/14 12:20	10/07/14 03:44	534-52-1	
2,4-Dinitrophenol	ND ug/kg		2710	1	10/06/14 12:20	10/07/14 03:44	51-28-5	
2,4-Dinitrotoluene	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	121-14-2	
2,6-Dinitrotoluene	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	606-20-2	
Di-n-octylphthalate	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	117-81-7	
Hexachloro-1,3-butadiene	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	87-68-3	
Hexachlorobenzene	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	118-74-1	
Hexachlorocyclopentadiene	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	77-47-4	
Hexachloroethane	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	67-72-1	
Isophorone	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/kg		1120	1	10/06/14 12:20	10/07/14 03:44		
2-Nitroaniline	ND ug/kg		2710	1	10/06/14 12:20	10/07/14 03:44	88-74-4	
3-Nitroaniline	ND ug/kg		2710	1	10/06/14 12:20	10/07/14 03:44	99-09-2	
4-Nitroaniline	ND ug/kg		2710	1	10/06/14 12:20	10/07/14 03:44	100-01-6	
Nitrobenzene	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	98-95-3	
2-Nitrophenol	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	88-75-5	
4-Nitrophenol	ND ug/kg		2710	1	10/06/14 12:20	10/07/14 03:44	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	621-64-7	
N-Nitrosodiphenylamine	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	86-30-6	
Pentachlorophenol	ND ug/kg		2710	1	10/06/14 12:20	10/07/14 03:44	87-86-5	
Phenol	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	108-95-2	
2,4,5-Trichlorophenol	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	95-95-4	
2,4,6-Trichlorophenol	ND ug/kg		560	1	10/06/14 12:20	10/07/14 03:44	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	66 %.		28-101	1	10/06/14 12:20	10/07/14 03:44	4165-60-0	
2-Fluorobiphenyl (S)	77 %.		31-94	1	10/06/14 12:20	10/07/14 03:44	321-60-8	
p-Terphenyl-d14 (S)	72 %.		26-110	1	10/06/14 12:20	10/07/14 03:44	1718-51-0	
Phenol-d5 (S)	69 %.		28-101	1	10/06/14 12:20	10/07/14 03:44	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-5 Lab ID: 50104622011 Collected: 09/30/14 15:35 Received: 10/01/14 09:41 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
------------	---------	-------	--------------	----	----------	----------	---------	------

**8270 MSSV SHORT LIST MICROWAVE** Analytical Method: EPA 8270 Preparation Method: EPA 3546

### Surrogates

2-Fluorophenol (S)	72 %.		24-104	1	10/06/14 12:20	10/07/14 03:44	367-12-4	
2,4,6-Tribromophenol (S)	78 %.		16-122	1	10/06/14 12:20	10/07/14 03:44	118-79-6	

### 8260 MSV 5035A VOA

Analytical Method: EPA 8260

Acetone	681 ug/kg		166	1		10/11/14 08:21	67-64-1	
Acrolein	ND ug/kg		166	1		10/11/14 08:21	107-02-8	
Acrylonitrile	ND ug/kg		166	1		10/11/14 08:21	107-13-1	
Benzene	ND ug/kg		8.3	1		10/11/14 08:21	71-43-2	
Bromobenzene	ND ug/kg		8.3	1		10/11/14 08:21	108-86-1	
Bromochloromethane	ND ug/kg		8.3	1		10/11/14 08:21	74-97-5	
Bromodichloromethane	ND ug/kg		8.3	1		10/11/14 08:21	75-27-4	
Bromoform	ND ug/kg		8.3	1		10/11/14 08:21	75-25-2	
Bromomethane	ND ug/kg		8.3	1		10/11/14 08:21	74-83-9	
2-Butanone (MEK)	114 ug/kg		41.5	1		10/11/14 08:21	78-93-3	
n-Butylbenzene	ND ug/kg		8.3	1		10/11/14 08:21	104-51-8	
sec-Butylbenzene	ND ug/kg		8.3	1		10/11/14 08:21	135-98-8	
tert-Butylbenzene	ND ug/kg		8.3	1		10/11/14 08:21	98-06-6	
Carbon disulfide	ND ug/kg		16.6	1		10/11/14 08:21	75-15-0	
Carbon tetrachloride	ND ug/kg		8.3	1		10/11/14 08:21	56-23-5	
Chlorobenzene	ND ug/kg		8.3	1		10/11/14 08:21	108-90-7	
Chloroethane	ND ug/kg		8.3	1		10/11/14 08:21	75-00-3	
Chloroform	ND ug/kg		8.3	1		10/11/14 08:21	67-66-3	
Chloromethane	ND ug/kg		8.3	1		10/11/14 08:21	74-87-3	
2-Chlorotoluene	ND ug/kg		8.3	1		10/11/14 08:21	95-49-8	
4-Chlorotoluene	ND ug/kg		8.3	1		10/11/14 08:21	106-43-4	
Dibromochloromethane	ND ug/kg		8.3	1		10/11/14 08:21	124-48-1	
1,2-Dibromoethane (EDB)	ND ug/kg		8.3	1		10/11/14 08:21	106-93-4	
Dibromomethane	ND ug/kg		8.3	1		10/11/14 08:21	74-95-3	
1,2-Dichlorobenzene	ND ug/kg		8.3	1		10/11/14 08:21	95-50-1	
1,3-Dichlorobenzene	ND ug/kg		8.3	1		10/11/14 08:21	541-73-1	
1,4-Dichlorobenzene	ND ug/kg		8.3	1		10/11/14 08:21	106-46-7	
trans-1,4-Dichloro-2-butene	ND ug/kg		166	1		10/11/14 08:21	110-57-6	
Dichlorodifluoromethane	ND ug/kg		8.3	1		10/11/14 08:21	75-71-8	
1,1-Dichloroethane	ND ug/kg		8.3	1		10/11/14 08:21	75-34-3	
1,2-Dichloroethane	ND ug/kg		8.3	1		10/11/14 08:21	107-06-2	
1,1-Dichloroethene	ND ug/kg		8.3	1		10/11/14 08:21	75-35-4	
cis-1,2-Dichloroethene	ND ug/kg		8.3	1		10/11/14 08:21	156-59-2	
trans-1,2-Dichloroethene	ND ug/kg		8.3	1		10/11/14 08:21	156-60-5	
1,2-Dichloropropane	ND ug/kg		8.3	1		10/11/14 08:21	78-87-5	
1,3-Dichloropropane	ND ug/kg		8.3	1		10/11/14 08:21	142-28-9	
2,2-Dichloropropane	ND ug/kg		8.3	1		10/11/14 08:21	594-20-7	
1,1-Dichloropropene	ND ug/kg		8.3	1		10/11/14 08:21	563-58-6	
cis-1,3-Dichloropropene	ND ug/kg		8.3	1		10/11/14 08:21	10061-01-5	
trans-1,3-Dichloropropene	ND ug/kg		8.3	1		10/11/14 08:21	10061-02-6	
Ethylbenzene	ND ug/kg		8.3	1		10/11/14 08:21	100-41-4	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: SD-5 Lab ID: 50104622011 Collected: 09/30/14 15:35 Received: 10/01/14 09:41 Matrix: Solid

### Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
Ethyl methacrylate	ND	ug/kg	166	1		10/11/14 08:21	97-63-2	
Hexachloro-1,3-butadiene	ND	ug/kg	8.3	1		10/11/14 08:21	87-68-3	
n-Hexane	ND	ug/kg	8.3	1		10/11/14 08:21	110-54-3	
2-Hexanone	ND	ug/kg	166	1		10/11/14 08:21	591-78-6	
Iodomethane	ND	ug/kg	166	1		10/11/14 08:21	74-88-4	
Isopropylbenzene (Cumene)	ND	ug/kg	8.3	1		10/11/14 08:21	98-82-8	
p-Isopropyltoluene	ND	ug/kg	8.3	1		10/11/14 08:21	99-87-6	
Methylene Chloride	ND	ug/kg	33.2	1		10/11/14 08:21	75-09-2	
1-Methylnaphthalene	ND	ug/kg	16.6	1		10/11/14 08:21	90-12-0	N2
2-Methylnaphthalene	ND	ug/kg	16.6	1		10/11/14 08:21	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	41.5	1		10/11/14 08:21	108-10-1	
Methyl-tert-butyl ether	ND	ug/kg	8.3	1		10/11/14 08:21	1634-04-4	
Naphthalene	ND	ug/kg	8.3	1		10/11/14 08:21	91-20-3	
n-Propylbenzene	ND	ug/kg	8.3	1		10/11/14 08:21	103-65-1	
Styrene	ND	ug/kg	8.3	1		10/11/14 08:21	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/kg	8.3	1		10/11/14 08:21	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/kg	8.3	1		10/11/14 08:21	79-34-5	
Tetrachloroethene	ND	ug/kg	8.3	1		10/11/14 08:21	127-18-4	
Toluene	ND	ug/kg	8.3	1		10/11/14 08:21	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/kg	8.3	1		10/11/14 08:21	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/kg	8.3	1		10/11/14 08:21	120-82-1	
1,1,1-Trichloroethane	ND	ug/kg	8.3	1		10/11/14 08:21	71-55-6	
1,1,2-Trichloroethane	ND	ug/kg	8.3	1		10/11/14 08:21	79-00-5	
Trichloroethene	ND	ug/kg	8.3	1		10/11/14 08:21	79-01-6	
Trichlorofluoromethane	ND	ug/kg	8.3	1		10/11/14 08:21	75-69-4	
1,2,3-Trichloropropane	ND	ug/kg	8.3	1		10/11/14 08:21	96-18-4	
1,2,4-Trimethylbenzene	ND	ug/kg	8.3	1		10/11/14 08:21	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/kg	8.3	1		10/11/14 08:21	108-67-8	
Vinyl acetate	ND	ug/kg	166	1		10/11/14 08:21	108-05-4	
Vinyl chloride	ND	ug/kg	8.3	1		10/11/14 08:21	75-01-4	
Xylene (Total)	ND	ug/kg	16.6	1		10/11/14 08:21	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	103 %		85-118	1		10/11/14 08:21	1868-53-7	
Toluene-d8 (S)	103 %		71-128	1		10/11/14 08:21	2037-26-5	
4-Bromofluorobenzene (S)	80 %		56-144	1		10/11/14 08:21	460-00-4	

### Percent Moisture

Analytical Method: ASTM D2974-87

Percent Moisture 41.3 % 0.10 1 10/07/14 13:43

### 9012 Cyanide, Total

Analytical Method: EPA 9012 Preparation Method: EPA 9012

Cyanide ND mg/kg 0.83 1 10/06/14 13:05 10/08/14 14:13 57-12-5

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: F.D. Lab ID: 50104622012 Collected: 09/30/14 08:00 Received: 10/01/14 09:41 Matrix: Solid

### Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 GCS Pesticides</b>		Analytical Method: EPA 8081 Preparation Method: EPA 3546						
Aldrin	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 22:27	309-00-2	
alpha-BHC	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 22:27	319-84-6	3d
beta-BHC	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 22:27	319-85-7	
delta-BHC	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 22:27	319-86-8	
gamma-BHC (Lindane)	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 22:27	58-89-9	
alpha-Chlordane	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 22:27	5103-71-9	
gamma-Chlordane	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 22:27	5103-74-2	
4,4'-DDD	ND ug/kg		3.2	1	10/11/14 11:02	10/16/14 22:27	72-54-8	
4,4'-DDE	ND ug/kg		3.2	1	10/11/14 11:02	10/16/14 22:27	72-55-9	
4,4'-DDT	ND ug/kg		3.2	1	10/11/14 11:02	10/16/14 22:27	50-29-3	
Dieldrin	ND ug/kg		3.2	1	10/11/14 11:02	10/16/14 22:27	60-57-1	
Endosulfan I	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 22:27	959-98-8	
Endosulfan II	ND ug/kg		3.2	1	10/11/14 11:02	10/16/14 22:27	33213-65-9	
Endosulfan sulfate	ND ug/kg		3.2	1	10/11/14 11:02	10/16/14 22:27	1031-07-8	
Endrin	ND ug/kg		3.2	1	10/11/14 11:02	10/16/14 22:27	72-20-8	
Endrin aldehyde	ND ug/kg		3.2	1	10/11/14 11:02	10/16/14 22:27	7421-93-4	
Endrin ketone	ND ug/kg		3.2	1	10/11/14 11:02	10/16/14 22:27	53494-70-5	
Heptachlor	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 22:27	76-44-8	
Heptachlor epoxide	ND ug/kg		1.7	1	10/11/14 11:02	10/16/14 22:27	1024-57-3	
Methoxychlor	ND ug/kg		16.2	1	10/11/14 11:02	10/16/14 22:27	72-43-5	
Toxaphene	ND ug/kg		64.8	1	10/11/14 11:02	10/16/14 22:27	8001-35-2	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	58 %.		10-178	1	10/11/14 11:02	10/16/14 22:27	877-09-8	
Tetrachloro-m-xylene (S)	325 %.		10-178	1	10/11/14 11:02	10/16/14 22:27	877-09-8	S3
Decachlorobiphenyl (S)	36 %.		15-177	1	10/11/14 11:02	10/16/14 22:27	2051-24-3	
Decachlorobiphenyl (S)	65 %.		15-177	1	10/11/14 11:02	10/16/14 22:27	2051-24-3	

### 8082 GCS PCB

Analytical Method: EPA 8082 Preparation Method: EPA 3546

PCB-1016 (Aroclor 1016)	ND ug/kg		535	1	10/03/14 12:30	10/06/14 16:20	12674-11-2	
PCB-1221 (Aroclor 1221)	ND ug/kg		535	1	10/03/14 12:30	10/06/14 16:20	11104-28-2	
PCB-1232 (Aroclor 1232)	ND ug/kg		535	1	10/03/14 12:30	10/06/14 16:20	11141-16-5	
PCB-1242 (Aroclor 1242)	ND ug/kg		535	1	10/03/14 12:30	10/06/14 16:20	53469-21-9	
PCB-1248 (Aroclor 1248)	ND ug/kg		535	1	10/03/14 12:30	10/06/14 16:20	12672-29-6	
PCB-1254 (Aroclor 1254)	ND ug/kg		535	1	10/03/14 12:30	10/06/14 16:20	11097-69-1	
PCB-1260 (Aroclor 1260)	ND ug/kg		535	1	10/03/14 12:30	10/06/14 16:20	11096-82-5	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	71 %.		30-106	1	10/03/14 12:30	10/06/14 16:20	877-09-8	

### 8151 Chlorinated Herbicides MW

Analytical Method: EPA 8151 Preparation Method: EPA 3546

2,4-D	ND ug/kg		65.8	1	10/10/14 12:18	10/15/14 14:52	94-75-7	
2,4,5-T	ND ug/kg		65.8	1	10/10/14 12:18	10/15/14 14:52	93-76-5	
2,4,5-TP (Silvex)	ND ug/kg		65.8	1	10/10/14 12:18	10/15/14 14:52	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	105 %.		10-161	1	10/10/14 12:18	10/15/14 14:52	19719-28-9	
2,4-DCAA (S)	125 %.		10-161	1	10/10/14 12:18	10/15/14 14:52	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: F.D. Lab ID: 50104622012 Collected: 09/30/14 08:00 Received: 10/01/14 09:41 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050								
Antimony	ND	mg/kg	1.7	1	10/03/14 11:17	10/07/14 09:18	7440-36-0	
Arsenic	6.3	mg/kg	1.7	1	10/03/14 11:17	10/07/14 09:18	7440-38-2	
Barium	76.1	mg/kg	1.7	1	10/03/14 11:17	10/07/14 09:18	7440-39-3	
Beryllium	ND	mg/kg	0.83	1	10/03/14 11:17	10/07/14 09:18	7440-41-7	
Cadmium	ND	mg/kg	0.83	1	10/03/14 11:17	10/07/14 09:18	7440-43-9	
Chromium	9.2	mg/kg	1.7	1	10/03/14 11:17	10/07/14 09:18	7440-47-3	
Cobalt	3.8	mg/kg	1.7	1	10/03/14 11:17	10/07/14 09:18	7440-48-4	
Copper	12.9	mg/kg	1.7	1	10/03/14 11:17	10/07/14 09:18	7440-50-8	
Lead	12.8	mg/kg	1.7	1	10/03/14 11:17	10/07/14 09:18	7439-92-1	
Nickel	9.2	mg/kg	1.7	1	10/03/14 11:17	10/07/14 09:18	7440-02-0	
Selenium	ND	mg/kg	1.7	1	10/03/14 11:17	10/07/14 09:18	7782-49-2	
Silver	ND	mg/kg	0.83	1	10/03/14 11:17	10/07/14 09:18	7440-22-4	
Thallium	ND	mg/kg	1.7	1	10/03/14 11:17	10/07/14 09:18	7440-28-0	
Vanadium	12.2	mg/kg	1.7	1	10/03/14 11:17	10/07/14 09:18	7440-62-2	
Zinc	78.6	mg/kg	1.7	1	10/03/14 11:17	10/07/14 09:18	7440-66-6	

### 7471 Mercury

Analytical Method: EPA 7471 Preparation Method: EPA 7471

Mercury	ND	mg/kg	0.35	1	10/07/14 13:07	10/08/14 13:12	7439-97-6	
---------	----	-------	------	---	----------------	----------------	-----------	--

### 8270 MSSV PAH by SIM

Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546

Acenaphthene	ND	ug/kg	26.5	1	10/07/14 13:42	10/09/14 11:02	83-32-9	
Acenaphthylene	ND	ug/kg	26.5	1	10/07/14 13:42	10/09/14 11:02	208-96-8	
Anthracene	ND	ug/kg	26.5	1	10/07/14 13:42	10/09/14 11:02	120-12-7	
Benzo(a)anthracene	107	ug/kg	26.5	1	10/07/14 13:42	10/09/14 11:02	56-55-3	
Benzo(a)pyrene	120	ug/kg	26.5	1	10/07/14 13:42	10/09/14 11:02	50-32-8	
Benzo(b)fluoranthene	152	ug/kg	26.5	1	10/07/14 13:42	10/09/14 11:02	205-99-2	
Benzo(g,h,i)perylene	110	ug/kg	26.5	1	10/07/14 13:42	10/09/14 11:02	191-24-2	
Benzo(k)fluoranthene	138	ug/kg	26.5	1	10/07/14 13:42	10/09/14 11:02	207-08-9	
Chrysene	201	ug/kg	26.5	1	10/07/14 13:42	10/09/14 11:02	218-01-9	
Dibenz(a,h)anthracene	41.6	ug/kg	26.5	1	10/07/14 13:42	10/09/14 11:02	53-70-3	
Fluoranthene	419	ug/kg	26.5	1	10/07/14 13:42	10/09/14 11:02	206-44-0	
Fluorene	ND	ug/kg	26.5	1	10/07/14 13:42	10/09/14 11:02	86-73-7	
Indeno(1,2,3-cd)pyrene	93.9	ug/kg	26.5	1	10/07/14 13:42	10/09/14 11:02	193-39-5	
1-Methylnaphthalene	ND	ug/kg	26.5	1	10/07/14 13:42	10/09/14 11:02	90-12-0	
2-Methylnaphthalene	ND	ug/kg	26.5	1	10/07/14 13:42	10/09/14 11:02	91-57-6	
Naphthalene	ND	ug/kg	26.5	1	10/07/14 13:42	10/09/14 11:02	91-20-3	
Phenanthrene	192	ug/kg	26.5	1	10/07/14 13:42	10/09/14 11:02	85-01-8	
Pyrene	325	ug/kg	26.5	1	10/07/14 13:42	10/09/14 11:02	129-00-0	
<b>Surrogates</b>								
2-Fluorobiphenyl (S)	73	%.	38-110	1	10/07/14 13:42	10/09/14 11:02	321-60-8	
p-Terphenyl-d14 (S)	76	%.	32-111	1	10/07/14 13:42	10/09/14 11:02	1718-51-0	

### 8270 MSSV SHORT LIST MICROWAVE

Analytical Method: EPA 8270 Preparation Method: EPA 3546

Benzyl alcohol	ND	ug/kg	1170	1	10/06/14 12:20	10/07/14 04:52	100-51-6	
4-Bromophenylphenyl ether	ND	ug/kg	585	1	10/06/14 12:20	10/07/14 04:52	101-55-3	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: F.D. Lab ID: 50104622012 Collected: 09/30/14 08:00 Received: 10/01/14 09:41 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV SHORT LIST MICROWAVE</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546								
Butylbenzylphthalate	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	85-68-7	
4-Chloro-3-methylphenol	ND ug/kg		1170	1	10/06/14 12:20	10/07/14 04:52	59-50-7	
4-Chloroaniline	ND ug/kg		1170	1	10/06/14 12:20	10/07/14 04:52	106-47-8	
bis(2-Chloroethoxy)methane	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	111-91-1	
bis(2-Chloroethyl) ether	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	111-44-4	
bis(2chloro1methylethyl) ether	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	108-60-1	
2-Chloronaphthalene	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	91-58-7	
2-Chlorophenol	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	95-57-8	
4-Chlorophenylphenyl ether	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	7005-72-3	
Dibenzofuran	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	132-64-9	
3,3'-Dichlorobenzidine	ND ug/kg		1170	1	10/06/14 12:20	10/07/14 04:52	91-94-1	
2,4-Dichlorophenol	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	120-83-2	
Diethylphthalate	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	84-66-2	
2,4-Dimethylphenol	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	105-67-9	
Dimethylphthalate	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	131-11-3	
Di-n-butylphthalate	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	84-74-2	
4,6-Dinitro-2-methylphenol	ND ug/kg		2840	1	10/06/14 12:20	10/07/14 04:52	534-52-1	
2,4-Dinitrophenol	ND ug/kg		2840	1	10/06/14 12:20	10/07/14 04:52	51-28-5	
2,4-Dinitrotoluene	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	121-14-2	
2,6-Dinitrotoluene	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	606-20-2	
Di-n-octylphthalate	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	117-84-0	
bis(2-Ethylhexyl)phthalate	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	117-81-7	
Hexachloro-1,3-butadiene	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	87-68-3	
Hexachlorobenzene	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	118-74-1	
Hexachlorocyclopentadiene	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	77-47-4	
Hexachloroethane	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	67-72-1	
Isophorone	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	78-59-1	
2-Methylphenol(o-Cresol)	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/kg		1170	1	10/06/14 12:20	10/07/14 04:52		
2-Nitroaniline	ND ug/kg		2840	1	10/06/14 12:20	10/07/14 04:52	88-74-4	
3-Nitroaniline	ND ug/kg		2840	1	10/06/14 12:20	10/07/14 04:52	99-09-2	
4-Nitroaniline	ND ug/kg		2840	1	10/06/14 12:20	10/07/14 04:52	100-01-6	
Nitrobenzene	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	98-95-3	
2-Nitrophenol	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	88-75-5	
4-Nitrophenol	ND ug/kg		2840	1	10/06/14 12:20	10/07/14 04:52	100-02-7	
N-Nitroso-di-n-propylamine	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	621-64-7	
N-Nitrosodiphenylamine	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	86-30-6	
Pentachlorophenol	ND ug/kg		2840	1	10/06/14 12:20	10/07/14 04:52	87-86-5	
Phenol	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	108-95-2	
2,4,5-Trichlorophenol	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	95-95-4	
2,4,6-Trichlorophenol	ND ug/kg		585	1	10/06/14 12:20	10/07/14 04:52	88-06-2	
<b>Surrogates</b>								
Nitrobenzene-d5 (S)	30 %.		28-101	1	10/06/14 12:20	10/07/14 04:52	4165-60-0	
2-Fluorobiphenyl (S)	40 %.		31-94	1	10/06/14 12:20	10/07/14 04:52	321-60-8	
p-Terphenyl-d14 (S)	48 %.		26-110	1	10/06/14 12:20	10/07/14 04:52	1718-51-0	
Phenol-d5 (S)	41 %.		28-101	1	10/06/14 12:20	10/07/14 04:52	4165-62-2	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: F.D. Lab ID: 50104622012 Collected: 09/30/14 08:00 Received: 10/01/14 09:41 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
------------	---------	-------	--------------	----	----------	----------	---------	------

**8270 MSSV SHORT LIST MICROWAVE** Analytical Method: EPA 8270 Preparation Method: EPA 3546

### Surrogates

2-Fluorophenol (S)	38 %.		24-104	1	10/06/14 12:20	10/07/14 04:52	367-12-4	
2,4,6-Tribromophenol (S)	43 %.		16-122	1	10/06/14 12:20	10/07/14 04:52	118-79-6	

### 8260 MSV 5035A VOA

Analytical Method: EPA 8260

Acetone	333 ug/kg		139	1		10/11/14 07:49	67-64-1	
Acrolein	ND ug/kg		139	1		10/11/14 07:49	107-02-8	
Acrylonitrile	ND ug/kg		139	1		10/11/14 07:49	107-13-1	
Benzene	ND ug/kg		6.9	1		10/11/14 07:49	71-43-2	
Bromobenzene	ND ug/kg		6.9	1		10/11/14 07:49	108-86-1	
Bromochloromethane	ND ug/kg		6.9	1		10/11/14 07:49	74-97-5	
Bromodichloromethane	ND ug/kg		6.9	1		10/11/14 07:49	75-27-4	
Bromoform	ND ug/kg		6.9	1		10/11/14 07:49	75-25-2	
Bromomethane	ND ug/kg		6.9	1		10/11/14 07:49	74-83-9	
2-Butanone (MEK)	ND ug/kg		34.7	1		10/11/14 07:49	78-93-3	
n-Butylbenzene	ND ug/kg		6.9	1		10/11/14 07:49	104-51-8	
sec-Butylbenzene	ND ug/kg		6.9	1		10/11/14 07:49	135-98-8	
tert-Butylbenzene	ND ug/kg		6.9	1		10/11/14 07:49	98-06-6	
Carbon disulfide	ND ug/kg		13.9	1		10/11/14 07:49	75-15-0	
Carbon tetrachloride	ND ug/kg		6.9	1		10/11/14 07:49	56-23-5	
Chlorobenzene	ND ug/kg		6.9	1		10/11/14 07:49	108-90-7	
Chloroethane	ND ug/kg		6.9	1		10/11/14 07:49	75-00-3	
Chloroform	ND ug/kg		6.9	1		10/11/14 07:49	67-66-3	
Chloromethane	ND ug/kg		6.9	1		10/11/14 07:49	74-87-3	
2-Chlorotoluene	ND ug/kg		6.9	1		10/11/14 07:49	95-49-8	
4-Chlorotoluene	ND ug/kg		6.9	1		10/11/14 07:49	106-43-4	
Dibromochloromethane	ND ug/kg		6.9	1		10/11/14 07:49	124-48-1	
1,2-Dibromoethane (EDB)	ND ug/kg		6.9	1		10/11/14 07:49	106-93-4	
Dibromomethane	ND ug/kg		6.9	1		10/11/14 07:49	74-95-3	
1,2-Dichlorobenzene	ND ug/kg		6.9	1		10/11/14 07:49	95-50-1	
1,3-Dichlorobenzene	ND ug/kg		6.9	1		10/11/14 07:49	541-73-1	
1,4-Dichlorobenzene	ND ug/kg		6.9	1		10/11/14 07:49	106-46-7	
trans-1,4-Dichloro-2-butene	ND ug/kg		139	1		10/11/14 07:49	110-57-6	
Dichlorodifluoromethane	ND ug/kg		6.9	1		10/11/14 07:49	75-71-8	
1,1-Dichloroethane	ND ug/kg		6.9	1		10/11/14 07:49	75-34-3	
1,2-Dichloroethane	ND ug/kg		6.9	1		10/11/14 07:49	107-06-2	
1,1-Dichloroethene	ND ug/kg		6.9	1		10/11/14 07:49	75-35-4	
cis-1,2-Dichloroethene	ND ug/kg		6.9	1		10/11/14 07:49	156-59-2	
trans-1,2-Dichloroethene	ND ug/kg		6.9	1		10/11/14 07:49	156-60-5	
1,2-Dichloropropane	ND ug/kg		6.9	1		10/11/14 07:49	78-87-5	
1,3-Dichloropropane	ND ug/kg		6.9	1		10/11/14 07:49	142-28-9	
2,2-Dichloropropane	ND ug/kg		6.9	1		10/11/14 07:49	594-20-7	
1,1-Dichloropropene	ND ug/kg		6.9	1		10/11/14 07:49	563-58-6	
cis-1,3-Dichloropropene	ND ug/kg		6.9	1		10/11/14 07:49	10061-01-5	
trans-1,3-Dichloropropene	ND ug/kg		6.9	1		10/11/14 07:49	10061-02-6	
Ethylbenzene	ND ug/kg		6.9	1		10/11/14 07:49	100-41-4	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

**Sample:** F.D. **Lab ID:** 50104622012 **Collected:** 09/30/14 08:00 **Received:** 10/01/14 09:41 **Matrix:** Solid

**Results reported on a "dry-weight" basis**

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV 5035A VOA</b>		Analytical Method: EPA 8260						
Ethyl methacrylate	ND	ug/kg	139	1		10/11/14 07:49	97-63-2	
Hexachloro-1,3-butadiene	ND	ug/kg	6.9	1		10/11/14 07:49	87-68-3	
n-Hexane	ND	ug/kg	6.9	1		10/11/14 07:49	110-54-3	
2-Hexanone	ND	ug/kg	139	1		10/11/14 07:49	591-78-6	
Iodomethane	ND	ug/kg	139	1		10/11/14 07:49	74-88-4	
Isopropylbenzene (Cumene)	ND	ug/kg	6.9	1		10/11/14 07:49	98-82-8	
p-Isopropyltoluene	ND	ug/kg	6.9	1		10/11/14 07:49	99-87-6	
Methylene Chloride	ND	ug/kg	27.8	1		10/11/14 07:49	75-09-2	
1-Methylnaphthalene	ND	ug/kg	13.9	1		10/11/14 07:49	90-12-0	N2
2-Methylnaphthalene	ND	ug/kg	13.9	1		10/11/14 07:49	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	34.7	1		10/11/14 07:49	108-10-1	
Methyl-tert-butyl ether	ND	ug/kg	6.9	1		10/11/14 07:49	1634-04-4	
Naphthalene	ND	ug/kg	6.9	1		10/11/14 07:49	91-20-3	
n-Propylbenzene	ND	ug/kg	6.9	1		10/11/14 07:49	103-65-1	
Styrene	ND	ug/kg	6.9	1		10/11/14 07:49	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/kg	6.9	1		10/11/14 07:49	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/kg	6.9	1		10/11/14 07:49	79-34-5	
Tetrachloroethene	ND	ug/kg	6.9	1		10/11/14 07:49	127-18-4	
Toluene	ND	ug/kg	6.9	1		10/11/14 07:49	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/kg	6.9	1		10/11/14 07:49	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/kg	6.9	1		10/11/14 07:49	120-82-1	
1,1,1-Trichloroethane	ND	ug/kg	6.9	1		10/11/14 07:49	71-55-6	
1,1,2-Trichloroethane	ND	ug/kg	6.9	1		10/11/14 07:49	79-00-5	
Trichloroethene	ND	ug/kg	6.9	1		10/11/14 07:49	79-01-6	
Trichlorofluoromethane	ND	ug/kg	6.9	1		10/11/14 07:49	75-69-4	
1,2,3-Trichloropropane	ND	ug/kg	6.9	1		10/11/14 07:49	96-18-4	
1,2,4-Trimethylbenzene	ND	ug/kg	6.9	1		10/11/14 07:49	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/kg	6.9	1		10/11/14 07:49	108-67-8	
Vinyl acetate	ND	ug/kg	139	1		10/11/14 07:49	108-05-4	
Vinyl chloride	ND	ug/kg	6.9	1		10/11/14 07:49	75-01-4	
Xylene (Total)	ND	ug/kg	13.9	1		10/11/14 07:49	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	99 %		85-118	1		10/11/14 07:49	1868-53-7	
Toluene-d8 (S)	98 %		71-128	1		10/11/14 07:49	2037-26-5	
4-Bromofluorobenzene (S)	85 %		56-144	1		10/11/14 07:49	460-00-4	

### Percent Moisture

Analytical Method: ASTM D2974-87

Percent Moisture **44.0 %** 0.10 1 10/07/14 13:43

### 9012 Cyanide, Total

Analytical Method: EPA 9012 Preparation Method: EPA 9012

Cyanide ND mg/kg 0.89 1 10/06/14 13:05 10/08/14 14:16 57-12-5

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: Trip Blank		Lab ID: 50104622013	Collected: 09/30/14 08:00	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260 MSV Indiana		Analytical Method: EPA 8260						
Acetone	ND ug/L		100	1		10/12/14 04:38	67-64-1	
Acrolein	ND ug/L		50.0	1		10/12/14 04:38	107-02-8	
Acrylonitrile	ND ug/L		100	1		10/12/14 04:38	107-13-1	
Benzene	ND ug/L		5.0	1		10/12/14 04:38	71-43-2	
Bromobenzene	ND ug/L		5.0	1		10/12/14 04:38	108-86-1	
Bromochloromethane	ND ug/L		5.0	1		10/12/14 04:38	74-97-5	
Bromodichloromethane	ND ug/L		5.0	1		10/12/14 04:38	75-27-4	
Bromoform	ND ug/L		5.0	1		10/12/14 04:38	75-25-2	
Bromomethane	ND ug/L		5.0	1		10/12/14 04:38	74-83-9	
2-Butanone (MEK)	ND ug/L		25.0	1		10/12/14 04:38	78-93-3	
n-Butylbenzene	ND ug/L		5.0	1		10/12/14 04:38	104-51-8	
sec-Butylbenzene	ND ug/L		5.0	1		10/12/14 04:38	135-98-8	
tert-Butylbenzene	ND ug/L		5.0	1		10/12/14 04:38	98-06-6	
Carbon disulfide	ND ug/L		10.0	1		10/12/14 04:38	75-15-0	
Carbon tetrachloride	ND ug/L		5.0	1		10/12/14 04:38	56-23-5	
Chlorobenzene	ND ug/L		5.0	1		10/12/14 04:38	108-90-7	
Chloroethane	ND ug/L		5.0	1		10/12/14 04:38	75-00-3	
Chloroform	ND ug/L		5.0	1		10/12/14 04:38	67-66-3	
Chloromethane	ND ug/L		5.0	1		10/12/14 04:38	74-87-3	
2-Chlorotoluene	ND ug/L		5.0	1		10/12/14 04:38	95-49-8	
4-Chlorotoluene	ND ug/L		5.0	1		10/12/14 04:38	106-43-4	
Dibromochloromethane	ND ug/L		5.0	1		10/12/14 04:38	124-48-1	
1,2-Dibromoethane (EDB)	ND ug/L		5.0	1		10/12/14 04:38	106-93-4	
Dibromomethane	ND ug/L		5.0	1		10/12/14 04:38	74-95-3	
1,2-Dichlorobenzene	ND ug/L		5.0	1		10/12/14 04:38	95-50-1	
1,3-Dichlorobenzene	ND ug/L		5.0	1		10/12/14 04:38	541-73-1	
1,4-Dichlorobenzene	ND ug/L		5.0	1		10/12/14 04:38	106-46-7	
trans-1,4-Dichloro-2-butene	ND ug/L		100	1		10/12/14 04:38	110-57-6	
Dichlorodifluoromethane	ND ug/L		5.0	1		10/12/14 04:38	75-71-8	
1,1-Dichloroethane	ND ug/L		5.0	1		10/12/14 04:38	75-34-3	
1,2-Dichloroethane	ND ug/L		5.0	1		10/12/14 04:38	107-06-2	
1,1-Dichloroethene	ND ug/L		5.0	1		10/12/14 04:38	75-35-4	
cis-1,2-Dichloroethene	ND ug/L		5.0	1		10/12/14 04:38	156-59-2	
trans-1,2-Dichloroethene	ND ug/L		5.0	1		10/12/14 04:38	156-60-5	
1,2-Dichloropropane	ND ug/L		5.0	1		10/12/14 04:38	78-87-5	
1,3-Dichloropropane	ND ug/L		5.0	1		10/12/14 04:38	142-28-9	
2,2-Dichloropropane	ND ug/L		5.0	1		10/12/14 04:38	594-20-7	
1,1-Dichloropropene	ND ug/L		5.0	1		10/12/14 04:38	563-58-6	
cis-1,3-Dichloropropene	ND ug/L		5.0	1		10/12/14 04:38	10061-01-5	
trans-1,3-Dichloropropene	ND ug/L		5.0	1		10/12/14 04:38	10061-02-6	
Ethylbenzene	ND ug/L		5.0	1		10/12/14 04:38	100-41-4	
Ethyl methacrylate	ND ug/L		100	1		10/12/14 04:38	97-63-2	
Hexachloro-1,3-butadiene	ND ug/L		5.0	1		10/12/14 04:38	87-68-3	
n-Hexane	ND ug/L		5.0	1		10/12/14 04:38	110-54-3	
2-Hexanone	ND ug/L		25.0	1		10/12/14 04:38	591-78-6	
Iodomethane	ND ug/L		10.0	1		10/12/14 04:38	74-88-4	
Isopropylbenzene (Cumene)	ND ug/L		5.0	1		10/12/14 04:38	98-82-8	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: Trip Blank		Lab ID: 50104622013	Collected: 09/30/14 08:00	Received: 10/01/14 09:41	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV Indiana</b>		Analytical Method: EPA 8260						
p-Isopropyltoluene	ND ug/L		5.0	1		10/12/14 04:38	99-87-6	
Methylene Chloride	ND ug/L		5.0	1		10/12/14 04:38	75-09-2	
1-Methylnaphthalene	ND ug/L		5.0	1		10/12/14 04:38	90-12-0	N2
2-Methylnaphthalene	ND ug/L		10.0	1		10/12/14 04:38	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND ug/L		25.0	1		10/12/14 04:38	108-10-1	
Methyl-tert-butyl ether	ND ug/L		4.0	1		10/12/14 04:38	1634-04-4	
Naphthalene	ND ug/L		1.4	1		10/12/14 04:38	91-20-3	
n-Propylbenzene	ND ug/L		5.0	1		10/12/14 04:38	103-65-1	
Styrene	ND ug/L		5.0	1		10/12/14 04:38	100-42-5	
1,1,1,2-Tetrachloroethane	ND ug/L		5.0	1		10/12/14 04:38	630-20-6	
1,1,2,2-Tetrachloroethane	ND ug/L		5.0	1		10/12/14 04:38	79-34-5	
Tetrachloroethene	ND ug/L		5.0	1		10/12/14 04:38	127-18-4	
Toluene	ND ug/L		5.0	1		10/12/14 04:38	108-88-3	
1,2,3-Trichlorobenzene	ND ug/L		5.0	1		10/12/14 04:38	87-61-6	
1,2,4-Trichlorobenzene	ND ug/L		5.0	1		10/12/14 04:38	120-82-1	
1,1,1-Trichloroethane	ND ug/L		5.0	1		10/12/14 04:38	71-55-6	
1,1,2-Trichloroethane	ND ug/L		5.0	1		10/12/14 04:38	79-00-5	
Trichloroethene	ND ug/L		5.0	1		10/12/14 04:38	79-01-6	
Trichlorofluoromethane	ND ug/L		5.0	1		10/12/14 04:38	75-69-4	
1,2,3-Trichloropropane	ND ug/L		5.0	1		10/12/14 04:38	96-18-4	
1,2,4-Trimethylbenzene	ND ug/L		5.0	1		10/12/14 04:38	95-63-6	
1,3,5-Trimethylbenzene	ND ug/L		5.0	1		10/12/14 04:38	108-67-8	
Vinyl acetate	ND ug/L		50.0	1		10/12/14 04:38	108-05-4	
Vinyl chloride	ND ug/L		2.0	1		10/12/14 04:38	75-01-4	
Xylene (Total)	ND ug/L		10.0	1		10/12/14 04:38	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	98 %.		79-116	1		10/12/14 04:38	1868-53-7	
4-Bromofluorobenzene (S)	91 %.		80-114	1		10/12/14 04:38	460-00-4	
Toluene-d8 (S)	86 %.		81-110	1		10/12/14 04:38	2037-26-5	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: Trip Blank (water)		Lab ID: 50104622014	Collected: 09/30/14 08:00	Received: 10/02/14 09:10	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV Indiana</b>		Analytical Method: EPA 8260						
Acetone	ND ug/L		100	1		10/12/14 05:10	67-64-1	
Acrolein	ND ug/L		50.0	1		10/12/14 05:10	107-02-8	
Acrylonitrile	ND ug/L		100	1		10/12/14 05:10	107-13-1	
Benzene	ND ug/L		5.0	1		10/12/14 05:10	71-43-2	
Bromobenzene	ND ug/L		5.0	1		10/12/14 05:10	108-86-1	
Bromochloromethane	ND ug/L		5.0	1		10/12/14 05:10	74-97-5	
Bromodichloromethane	ND ug/L		5.0	1		10/12/14 05:10	75-27-4	
Bromoform	ND ug/L		5.0	1		10/12/14 05:10	75-25-2	
Bromomethane	ND ug/L		5.0	1		10/12/14 05:10	74-83-9	
2-Butanone (MEK)	ND ug/L		25.0	1		10/12/14 05:10	78-93-3	
n-Butylbenzene	ND ug/L		5.0	1		10/12/14 05:10	104-51-8	
sec-Butylbenzene	ND ug/L		5.0	1		10/12/14 05:10	135-98-8	
tert-Butylbenzene	ND ug/L		5.0	1		10/12/14 05:10	98-06-6	
Carbon disulfide	ND ug/L		10.0	1		10/12/14 05:10	75-15-0	
Carbon tetrachloride	ND ug/L		5.0	1		10/12/14 05:10	56-23-5	
Chlorobenzene	ND ug/L		5.0	1		10/12/14 05:10	108-90-7	
Chloroethane	ND ug/L		5.0	1		10/12/14 05:10	75-00-3	
Chloroform	ND ug/L		5.0	1		10/12/14 05:10	67-66-3	
Chloromethane	ND ug/L		5.0	1		10/12/14 05:10	74-87-3	
2-Chlorotoluene	ND ug/L		5.0	1		10/12/14 05:10	95-49-8	
4-Chlorotoluene	ND ug/L		5.0	1		10/12/14 05:10	106-43-4	
Dibromochloromethane	ND ug/L		5.0	1		10/12/14 05:10	124-48-1	
1,2-Dibromoethane (EDB)	ND ug/L		5.0	1		10/12/14 05:10	106-93-4	
Dibromomethane	ND ug/L		5.0	1		10/12/14 05:10	74-95-3	
1,2-Dichlorobenzene	ND ug/L		5.0	1		10/12/14 05:10	95-50-1	
1,3-Dichlorobenzene	ND ug/L		5.0	1		10/12/14 05:10	541-73-1	
1,4-Dichlorobenzene	ND ug/L		5.0	1		10/12/14 05:10	106-46-7	
trans-1,4-Dichloro-2-butene	ND ug/L		100	1		10/12/14 05:10	110-57-6	
Dichlorodifluoromethane	ND ug/L		5.0	1		10/12/14 05:10	75-71-8	
1,1-Dichloroethane	ND ug/L		5.0	1		10/12/14 05:10	75-34-3	
1,2-Dichloroethane	ND ug/L		5.0	1		10/12/14 05:10	107-06-2	
1,1-Dichloroethene	ND ug/L		5.0	1		10/12/14 05:10	75-35-4	
cis-1,2-Dichloroethene	ND ug/L		5.0	1		10/12/14 05:10	156-59-2	
trans-1,2-Dichloroethene	ND ug/L		5.0	1		10/12/14 05:10	156-60-5	
1,2-Dichloropropane	ND ug/L		5.0	1		10/12/14 05:10	78-87-5	
1,3-Dichloropropane	ND ug/L		5.0	1		10/12/14 05:10	142-28-9	
2,2-Dichloropropane	ND ug/L		5.0	1		10/12/14 05:10	594-20-7	
1,1-Dichloropropene	ND ug/L		5.0	1		10/12/14 05:10	563-58-6	
cis-1,3-Dichloropropene	ND ug/L		5.0	1		10/12/14 05:10	10061-01-5	
trans-1,3-Dichloropropene	ND ug/L		5.0	1		10/12/14 05:10	10061-02-6	
Ethylbenzene	ND ug/L		5.0	1		10/12/14 05:10	100-41-4	
Ethyl methacrylate	ND ug/L		100	1		10/12/14 05:10	97-63-2	
Hexachloro-1,3-butadiene	ND ug/L		5.0	1		10/12/14 05:10	87-68-3	
n-Hexane	ND ug/L		5.0	1		10/12/14 05:10	110-54-3	
2-Hexanone	ND ug/L		25.0	1		10/12/14 05:10	591-78-6	
Iodomethane	ND ug/L		10.0	1		10/12/14 05:10	74-88-4	
Isopropylbenzene (Cumene)	ND ug/L		5.0	1		10/12/14 05:10	98-82-8	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Sample: Trip Blank (water)		Lab ID: 50104622014	Collected: 09/30/14 08:00	Received: 10/02/14 09:10	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV Indiana</b>		Analytical Method: EPA 8260						
p-Isopropyltoluene	ND ug/L		5.0	1		10/12/14 05:10	99-87-6	
Methylene Chloride	ND ug/L		5.0	1		10/12/14 05:10	75-09-2	
1-Methylnaphthalene	ND ug/L		5.0	1		10/12/14 05:10	90-12-0	N2
2-Methylnaphthalene	ND ug/L		10.0	1		10/12/14 05:10	91-57-6	
4-Methyl-2-pentanone (MIBK)	ND ug/L		25.0	1		10/12/14 05:10	108-10-1	
Methyl-tert-butyl ether	ND ug/L		4.0	1		10/12/14 05:10	1634-04-4	
Naphthalene	ND ug/L		1.4	1		10/12/14 05:10	91-20-3	
n-Propylbenzene	ND ug/L		5.0	1		10/12/14 05:10	103-65-1	
Styrene	ND ug/L		5.0	1		10/12/14 05:10	100-42-5	
1,1,1,2-Tetrachloroethane	ND ug/L		5.0	1		10/12/14 05:10	630-20-6	
1,1,2,2-Tetrachloroethane	ND ug/L		5.0	1		10/12/14 05:10	79-34-5	
Tetrachloroethene	ND ug/L		5.0	1		10/12/14 05:10	127-18-4	
Toluene	ND ug/L		5.0	1		10/12/14 05:10	108-88-3	
1,2,3-Trichlorobenzene	ND ug/L		5.0	1		10/12/14 05:10	87-61-6	
1,2,4-Trichlorobenzene	ND ug/L		5.0	1		10/12/14 05:10	120-82-1	
1,1,1-Trichloroethane	ND ug/L		5.0	1		10/12/14 05:10	71-55-6	
1,1,2-Trichloroethane	ND ug/L		5.0	1		10/12/14 05:10	79-00-5	
Trichloroethene	ND ug/L		5.0	1		10/12/14 05:10	79-01-6	
Trichlorofluoromethane	ND ug/L		5.0	1		10/12/14 05:10	75-69-4	
1,2,3-Trichloropropane	ND ug/L		5.0	1		10/12/14 05:10	96-18-4	
1,2,4-Trimethylbenzene	ND ug/L		5.0	1		10/12/14 05:10	95-63-6	
1,3,5-Trimethylbenzene	ND ug/L		5.0	1		10/12/14 05:10	108-67-8	
Vinyl acetate	ND ug/L		50.0	1		10/12/14 05:10	108-05-4	
Vinyl chloride	ND ug/L		2.0	1		10/12/14 05:10	75-01-4	
Xylene (Total)	ND ug/L		10.0	1		10/12/14 05:10	1330-20-7	
<b>Surrogates</b>								
Dibromofluoromethane (S)	98 %.		79-116	1		10/12/14 05:10	1868-53-7	
4-Bromofluorobenzene (S)	90 %.		80-114	1		10/12/14 05:10	460-00-4	
Toluene-d8 (S)	86 %.		81-110	1		10/12/14 05:10	2037-26-5	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch:	MERP/5753	Analysis Method:	EPA 7470
QC Batch Method:	EPA 7470	Analysis Description:	7470 Mercury
Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006			

METHOD BLANK:	1169332	Matrix:	Water
Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006			

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	ND	2.0	10/09/14 11:14	

LABORATORY CONTROL SAMPLE: 1169333						
Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	4.8	97	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1169334													1169335		
Parameter	Units	50104622005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual			
Mercury	ug/L	ND	5	5	4.9	5.0	98	100	75-125	2	20				

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: MERP/5749

Analysis Method: EPA 7471

QC Batch Method: EPA 7471

Analysis Description: 7471 Mercury

Associated Lab Samples: 50104622011

METHOD BLANK: 1168723

Matrix: Solid

Associated Lab Samples: 50104622011

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/kg	ND	0.20	10/08/14 11:05	

LABORATORY CONTROL SAMPLE: 1168724

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	.5	0.55	110	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1168725 1168726

Parameter	Units	50104622011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/kg	ND	.85	.87	0.97	0.98	108	109	75-125	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: MERP/5750

Analysis Method: EPA 7471

QC Batch Method: EPA 7471

Analysis Description: 7471 Mercury

Associated Lab Samples: 50104622007, 50104622008, 50104622009, 50104622010, 50104622012

METHOD BLANK: 1168727

Matrix: Solid

Associated Lab Samples: 50104622007, 50104622008, 50104622009, 50104622010, 50104622012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/kg	ND	0.20	10/08/14 12:14	

LABORATORY CONTROL SAMPLE: 1168728

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	.5	0.53	106	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1168729 1168730

Parameter	Units	50104683008 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/kg	ND	.62	.63	0.70	0.69	105	104	75-125	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: MPRP/14263

Analysis Method: EPA 6010

QC Batch Method: EPA 3050

Analysis Description: 6010 MET

Associated Lab Samples: 50104622007, 50104622008, 50104622009, 50104622010, 50104622011, 50104622012

METHOD BLANK: 1166994

Matrix: Solid

Associated Lab Samples: 50104622007, 50104622008, 50104622009, 50104622010, 50104622011, 50104622012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	mg/kg	ND	1.0	10/07/14 08:50	
Arsenic	mg/kg	ND	1.0	10/07/14 08:50	
Barium	mg/kg	ND	1.0	10/07/14 08:50	
Beryllium	mg/kg	ND	0.50	10/07/14 08:50	
Cadmium	mg/kg	ND	0.50	10/07/14 08:50	
Chromium	mg/kg	ND	1.0	10/07/14 08:50	
Cobalt	mg/kg	ND	1.0	10/07/14 08:50	
Copper	mg/kg	ND	1.0	10/07/14 08:50	
Lead	mg/kg	ND	1.0	10/07/14 08:50	
Nickel	mg/kg	ND	1.0	10/07/14 08:50	
Selenium	mg/kg	ND	1.0	10/07/14 08:50	
Silver	mg/kg	ND	0.50	10/07/14 08:50	
Thallium	mg/kg	ND	1.0	10/07/14 08:50	
Vanadium	mg/kg	ND	1.0	10/07/14 08:50	
Zinc	mg/kg	ND	1.0	10/07/14 08:50	

LABORATORY CONTROL SAMPLE: 1166995

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	mg/kg	50	51.8	104	80-120	
Arsenic	mg/kg	50	51.2	102	80-120	
Barium	mg/kg	50	50.0	100	80-120	
Beryllium	mg/kg	50	50.6	101	80-120	
Cadmium	mg/kg	50	50.2	100	80-120	
Chromium	mg/kg	50	50.1	100	80-120	
Cobalt	mg/kg	50	49.4	99	80-120	
Copper	mg/kg	50	49.2	98	80-120	
Lead	mg/kg	50	48.8	98	80-120	
Nickel	mg/kg	50	50.6	101	80-120	
Selenium	mg/kg	50	50.8	102	80-120	
Silver	mg/kg	25	23.7	95	80-120	
Thallium	mg/kg	50	49.9	100	80-120	
Vanadium	mg/kg	50	51.1	102	80-120	
Zinc	mg/kg	50	49.6	99	80-120	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1166996 1166997												
Parameter	Units	50104622011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	RPD	Qual
Antimony	mg/kg	ND	56	56.2	33.5	32.1	59	57	75-125	4	20	M3
Arsenic	mg/kg	3.7	56	56.2	60.0	60.9	101	102	75-125	2	20	
Barium	mg/kg	43.2	56	56.2	96.4	102	95	104	75-125	5	20	
Beryllium	mg/kg	ND	56	56.2	54.6	54.7	97	97	75-125	0	20	
Cadmium	mg/kg	ND	56	56.2	55.4	55.8	99	99	75-125	1	20	
Chromium	mg/kg	8.3	56	56.2	61.4	62.6	95	97	75-125	2	20	
Cobalt	mg/kg	3.1	56	56.2	53.9	54.2	91	91	75-125	0	20	
Copper	mg/kg	9.7	56	56.2	64.3	63.5	98	96	75-125	1	20	
Lead	mg/kg	11.5	56	56.2	59.4	60.3	86	87	75-125	1	20	
Nickel	mg/kg	7.7	56	56.2	59.1	59.9	92	93	75-125	1	20	
Selenium	mg/kg	ND	56	56.2	54.5	55.6	97	99	75-125	2	20	
Silver	mg/kg	ND	27.9	28.1	24.9	25.3	89	90	75-125	1	20	
Thallium	mg/kg	ND	56	56.2	48.9	48.9	87	87	75-125	0	20	
Vanadium	mg/kg	11.1	56	56.2	68.6	70.0	103	105	75-125	2	20	
Zinc	mg/kg	53.6	56	56.2	99.5	104	82	91	75-125	5	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: MPRP/14269

Analysis Method: EPA 6010

QC Batch Method: EPA 3010

Analysis Description: 6010 MET

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

METHOD BLANK: 1168053

Matrix: Water

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	ug/L	ND	6.0	10/07/14 11:08	
Arsenic	ug/L	ND	10.0	10/07/14 11:08	
Barium	ug/L	ND	10.0	10/07/14 11:08	
Beryllium	ug/L	ND	4.0	10/07/14 11:08	
Cadmium	ug/L	ND	2.0	10/07/14 11:08	
Calcium	ug/L	ND	1000	10/07/14 11:08	
Chromium	ug/L	ND	10.0	10/07/14 11:08	
Cobalt	ug/L	ND	10.0	10/07/14 11:08	
Copper	ug/L	ND	10.0	10/07/14 11:08	
Iron	ug/L	ND	100	10/07/14 11:08	
Lead	ug/L	ND	10.0	10/07/14 11:08	
Magnesium	ug/L	ND	1000	10/07/14 11:08	
Manganese	ug/L	ND	10.0	10/07/14 11:08	
Nickel	ug/L	ND	10.0	10/07/14 11:08	
Potassium	ug/L	ND	1000	10/07/14 11:08	
Selenium	ug/L	ND	10.0	10/07/14 11:08	
Silver	ug/L	ND	10.0	10/07/14 13:43	
Vanadium	ug/L	ND	10.0	10/07/14 11:08	
Zinc	ug/L	ND	20.0	10/07/14 11:08	

LABORATORY CONTROL SAMPLE: 1168054

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	1000	984	98	80-120	
Arsenic	ug/L	1000	988	99	80-120	
Barium	ug/L	1000	976	98	80-120	
Beryllium	ug/L	1000	1040	104	80-120	
Cadmium	ug/L	1000	990	99	80-120	
Calcium	ug/L	10000	10100	101	80-120	
Chromium	ug/L	1000	952	95	80-120	
Cobalt	ug/L	1000	927	93	80-120	
Copper	ug/L	1000	914	91	80-120	
Iron	ug/L	10000	9400	94	80-120	
Lead	ug/L	1000	958	96	80-120	
Magnesium	ug/L	10000	9590	96	80-120	
Manganese	ug/L	1000	999	100	80-120	
Nickel	ug/L	1000	944	94	80-120	
Potassium	ug/L	10000	9630	96	80-120	
Selenium	ug/L	1000	1030	103	80-120	
Silver	ug/L	500	441	88	80-120	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

LABORATORY CONTROL SAMPLE: 1168054

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Vanadium	ug/L	1000	984	98	80-120	
Zinc	ug/L	1000	1030	103	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1168055 1168056

Parameter	Units	50104622005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	ug/L	ND	1000	1000	1060	1040	106	104	75-125	2	20	
Arsenic	ug/L	ND	1000	1000	1060	1030	106	103	75-125	2	20	
Barium	ug/L	73.4	1000	1000	1170	1050	110	97	75-125	11	20	
Beryllium	ug/L	ND	1000	1000	1190	1060	119	105	75-125	12	20	
Cadmium	ug/L	ND	1000	1000	1040	1020	104	102	75-125	2	20	
Calcium	ug/L	81800	10000	10000	86700	90400	49	86	75-125	4	20	P6
Chromium	ug/L	ND	1000	1000	1000	1000	100	100	75-125	0	20	
Cobalt	ug/L	ND	1000	1000	946	927	95	93	75-125	2	20	
Copper	ug/L	ND	1000	1000	971	964	97	96	75-125	1	20	
Iron	ug/L	607	10000	10000	10500	10500	99	99	75-125	0	20	
Lead	ug/L	ND	1000	1000	978	962	98	96	75-125	2	20	
Magnesium	ug/L	27500	10000	10000	35300	36600	78	91	75-125	4	20	
Manganese	ug/L	65.1	1000	1000	1090	1070	102	101	75-125	1	20	
Nickel	ug/L	ND	1000	1000	959	941	96	94	75-125	2	20	
Potassium	ug/L	2670	10000	10000	13500	12200	108	96	75-125	9	20	
Selenium	ug/L	ND	1000	1000	1100	1080	109	108	75-125	2	20	
Silver	ug/L	ND	500	500	436	453	87	91	75-125	4	20	
Vanadium	ug/L	15.1	1000	1000	1040	1020	102	101	75-125	2	20	
Zinc	ug/L	ND	1000	1000	1040	1020	104	102	75-125	1	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1168059 1168060

Parameter	Units	50104817016 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	ug/L	13.2	1000	1000	110	94.3	10	8	75-125	16	20	M3
Arsenic	ug/L	1170	1000	1000	2030	1650	86	48	75-125	21	20	M0, R1
Barium	ug/L	4450	1000	1000	5440	5260	100	81	75-125	3	20	
Beryllium	ug/L	26.5	1000	1000	773	749	75	72	75-125	3	20	M0
Cadmium	ug/L	21.9	1000	1000	1010	970	99	95	75-125	4	20	
Chromium	ug/L	1060	1000	1000	1720	1670	66	61	75-125	3	20	M3
Cobalt	ug/L	510	1000	1000	1130	1090	62	58	75-125	4	20	M3
Copper	ug/L	2320	1000	1000	3100	2950	77	63	75-125	5	20	M0
Iron	ug/L	1180000	10000	10000	1170000	1120000	-140	-660	75-125	5	20	E, P6
Lead	ug/L	728	1000	1000	1350	1300	62	58	75-125	3	20	M3
Magnesium	ug/L	1920000	10000	10000	1770000	1720000	-1450	-1950	75-125	3	20	E, P6
Manganese	ug/L	17500	1000	1000	17900	17300	45	-23	75-125	4	20	E, P6
Nickel	ug/L	1440	1000	1000	2050	1970	61	54	75-125	4	20	M3

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1168059 1168060												
Parameter	Units	50104817016 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	RPD	Qual
Potassium	ug/L	61000	10000	10000	75000	71200	140	102	75-125	5	20	P6
Selenium	ug/L	111	1000	1000	750	462	64	35	75-125	47	20	M3, R2
Silver	ug/L	ND	500	500	287	287	57	57	75-125	0	20	M3
Vanadium	ug/L	893	1000	1000	1590	1500	69	61	75-125	6	20	M3
Zinc	ug/L	5820	1000	1000	6540	6230	72	41	75-125	5	20	P6

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: MPRP/14338

Analysis Method: EPA 6010

QC Batch Method: EPA 3010

Analysis Description: 6010 MET

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

METHOD BLANK: 1171739

Matrix: Water

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Thallium	ug/L	ND	2.0	10/13/14 10:21	

LABORATORY CONTROL SAMPLE: 1171740

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Thallium	ug/L	200	183	92	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1171741 1171742

Parameter	Units	50104622005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Thallium	ug/L	ND	200	200	170	161	85	80	75-125	6	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: MSV/69634

Analysis Method: EPA 8260

QC Batch Method: EPA 8260

Analysis Description: 8260 MSV

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006, 50104622013, 50104622014

METHOD BLANK: 1171223

Matrix: Water

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006, 50104622013, 50104622014

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	ND	5.0	10/11/14 23:22	
1,1,1-Trichloroethane	ug/L	ND	5.0	10/11/14 23:22	
1,1,2,2-Tetrachloroethane	ug/L	ND	5.0	10/11/14 23:22	
1,1,2-Trichloroethane	ug/L	ND	5.0	10/11/14 23:22	
1,1-Dichloroethane	ug/L	ND	5.0	10/11/14 23:22	
1,1-Dichloroethene	ug/L	ND	5.0	10/11/14 23:22	
1,1-Dichloropropene	ug/L	ND	5.0	10/11/14 23:22	
1,2,3-Trichlorobenzene	ug/L	ND	5.0	10/11/14 23:22	
1,2,3-Trichloropropane	ug/L	ND	5.0	10/11/14 23:22	
1,2,4-Trichlorobenzene	ug/L	ND	5.0	10/11/14 23:22	
1,2,4-Trimethylbenzene	ug/L	ND	5.0	10/11/14 23:22	
1,2-Dibromoethane (EDB)	ug/L	ND	5.0	10/11/14 23:22	
1,2-Dichlorobenzene	ug/L	ND	5.0	10/11/14 23:22	
1,2-Dichloroethane	ug/L	ND	5.0	10/11/14 23:22	
1,2-Dichloropropane	ug/L	ND	5.0	10/11/14 23:22	
1,3,5-Trimethylbenzene	ug/L	ND	5.0	10/11/14 23:22	
1,3-Dichlorobenzene	ug/L	ND	5.0	10/11/14 23:22	
1,3-Dichloropropane	ug/L	ND	5.0	10/11/14 23:22	
1,4-Dichlorobenzene	ug/L	ND	5.0	10/11/14 23:22	
1-Methylnaphthalene	ug/L	ND	5.0	10/11/14 23:22	N2
2,2-Dichloropropane	ug/L	ND	5.0	10/11/14 23:22	
2-Butanone (MEK)	ug/L	ND	25.0	10/11/14 23:22	
2-Chlorotoluene	ug/L	ND	5.0	10/11/14 23:22	
2-Hexanone	ug/L	ND	25.0	10/11/14 23:22	
2-Methylnaphthalene	ug/L	ND	10.0	10/11/14 23:22	
4-Chlorotoluene	ug/L	ND	5.0	10/11/14 23:22	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	25.0	10/11/14 23:22	
Acetone	ug/L	ND	100	10/11/14 23:22	
Acrolein	ug/L	ND	50.0	10/11/14 23:22	
Acrylonitrile	ug/L	ND	100	10/11/14 23:22	
Benzene	ug/L	ND	5.0	10/11/14 23:22	
Bromobenzene	ug/L	ND	5.0	10/11/14 23:22	
Bromochloromethane	ug/L	ND	5.0	10/11/14 23:22	
Bromodichloromethane	ug/L	ND	5.0	10/11/14 23:22	
Bromoform	ug/L	ND	5.0	10/11/14 23:22	
Bromomethane	ug/L	ND	5.0	10/11/14 23:22	
Carbon disulfide	ug/L	ND	10.0	10/11/14 23:22	
Carbon tetrachloride	ug/L	ND	5.0	10/11/14 23:22	
Chlorobenzene	ug/L	ND	5.0	10/11/14 23:22	
Chloroethane	ug/L	ND	5.0	10/11/14 23:22	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

METHOD BLANK: 1171223

Matrix: Water

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006, 50104622013, 50104622014

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloroform	ug/L	ND	5.0	10/11/14 23:22	
Chloromethane	ug/L	ND	5.0	10/11/14 23:22	
cis-1,2-Dichloroethene	ug/L	ND	5.0	10/11/14 23:22	
cis-1,3-Dichloropropene	ug/L	ND	5.0	10/11/14 23:22	
Dibromochloromethane	ug/L	ND	5.0	10/11/14 23:22	
Dibromomethane	ug/L	ND	5.0	10/11/14 23:22	
Dichlorodifluoromethane	ug/L	ND	5.0	10/11/14 23:22	
Ethyl methacrylate	ug/L	ND	100	10/11/14 23:22	
Ethylbenzene	ug/L	ND	5.0	10/11/14 23:22	
Hexachloro-1,3-butadiene	ug/L	ND	5.0	10/11/14 23:22	
Iodomethane	ug/L	ND	10.0	10/11/14 23:22	
Isopropylbenzene (Cumene)	ug/L	ND	5.0	10/11/14 23:22	
Methyl-tert-butyl ether	ug/L	ND	4.0	10/11/14 23:22	
Methylene Chloride	ug/L	ND	5.0	10/11/14 23:22	
n-Butylbenzene	ug/L	ND	5.0	10/11/14 23:22	
n-Hexane	ug/L	ND	5.0	10/11/14 23:22	
n-Propylbenzene	ug/L	ND	5.0	10/11/14 23:22	
Naphthalene	ug/L	ND	1.4	10/11/14 23:22	
p-Isopropyltoluene	ug/L	ND	5.0	10/11/14 23:22	
sec-Butylbenzene	ug/L	ND	5.0	10/11/14 23:22	
Styrene	ug/L	ND	5.0	10/11/14 23:22	
tert-Butylbenzene	ug/L	ND	5.0	10/11/14 23:22	
Tetrachloroethene	ug/L	ND	5.0	10/11/14 23:22	
Toluene	ug/L	ND	5.0	10/11/14 23:22	
trans-1,2-Dichloroethene	ug/L	ND	5.0	10/11/14 23:22	
trans-1,3-Dichloropropene	ug/L	ND	5.0	10/11/14 23:22	
trans-1,4-Dichloro-2-butene	ug/L	ND	100	10/11/14 23:22	
Trichloroethene	ug/L	ND	5.0	10/11/14 23:22	
Trichlorofluoromethane	ug/L	ND	5.0	10/11/14 23:22	
Vinyl acetate	ug/L	ND	50.0	10/11/14 23:22	
Vinyl chloride	ug/L	ND	2.0	10/11/14 23:22	
Xylene (Total)	ug/L	ND	10.0	10/11/14 23:22	
4-Bromofluorobenzene (S)	%	91	80-114	10/11/14 23:22	
Dibromofluoromethane (S)	%	96	79-116	10/11/14 23:22	
Toluene-d8 (S)	%	87	81-110	10/11/14 23:22	

LABORATORY CONTROL SAMPLE: 1171224

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	50	47.3	95	61-135	
1,1,1-Trichloroethane	ug/L	50	51.7	103	71-129	
1,1,2,2-Tetrachloroethane	ug/L	50	40.9	82	66-126	
1,1,2-Trichloroethane	ug/L	50	43.0	86	77-130	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

LABORATORY CONTROL SAMPLE: 1171224

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1-Dichloroethane	ug/L	50	42.3	85	75-130	
1,1-Dichloroethene	ug/L	50	46.1	92	68-127	
1,1-Dichloropropene	ug/L	50	45.3	91	78-130	
1,2,3-Trichlorobenzene	ug/L	50	42.9	86	70-130	
1,2,3-Trichloropropane	ug/L	50	41.4	83	58-142	
1,2,4-Trichlorobenzene	ug/L	50	42.3	85	68-131	
1,2,4-Trimethylbenzene	ug/L	50	45.2	90	69-127	
1,2-Dibromoethane (EDB)	ug/L	50	47.3	95	76-125	
1,2-Dichlorobenzene	ug/L	50	44.9	90	75-123	
1,2-Dichloroethane	ug/L	50	42.2	84	75-128	
1,2-Dichloropropane	ug/L	50	46.0	92	74-121	
1,3,5-Trimethylbenzene	ug/L	50	45.5	91	70-126	
1,3-Dichlorobenzene	ug/L	50	45.4	91	74-122	
1,3-Dichloropropane	ug/L	50	41.6	83	74-123	
1,4-Dichlorobenzene	ug/L	50	44.1	88	76-120	
1-Methylnaphthalene	ug/L	50	43.7	87	39-141	N2
2,2-Dichloropropane	ug/L	50	46.0	92	50-137	
2-Butanone (MEK)	ug/L	250	201	80	58-139	
2-Chlorotoluene	ug/L	50	43.0	86	74-122	
2-Hexanone	ug/L	250	207	83	54-140	
2-Methylnaphthalene	ug/L	50	43.4	87	54-151	
4-Chlorotoluene	ug/L	50	44.9	90	77-123	
4-Methyl-2-pentanone (MIBK)	ug/L	250	201	80	58-138	
Acetone	ug/L	250	197	79	49-150	
Acrolein	ug/L	1000	1140	114	41-200	
Acrylonitrile	ug/L	1000	838	84	63-137	
Benzene	ug/L	50	47.8	96	74-122	
Bromobenzene	ug/L	50	44.3	89	72-127	
Bromochloromethane	ug/L	50	36.8	74	63-132	
Bromodichloromethane	ug/L	50	51.4	103	62-136	
Bromoform	ug/L	50	48.4	97	44-134	
Bromomethane	ug/L	50	36.6	73	22-181	
Carbon disulfide	ug/L	100	109	109	59-132	
Carbon tetrachloride	ug/L	50	47.0	94	56-137	
Chlorobenzene	ug/L	50	48.3	97	78-123	
Chloroethane	ug/L	50	46.2	92	60-144	
Chloroform	ug/L	50	47.5	95	78-126	
Chloromethane	ug/L	50	44.5	89	42-134	
cis-1,2-Dichloroethene	ug/L	50	52.8	106	75-122	
cis-1,3-Dichloropropene	ug/L	50	39.0	78	64-126	
Dibromochloromethane	ug/L	50	45.1	90	58-128	
Dibromomethane	ug/L	50	47.6	95	73-125	
Dichlorodifluoromethane	ug/L	50	66.6	133	35-181	
Ethyl methacrylate	ug/L	200	178	89	69-133	
Ethylbenzene	ug/L	50	50.0	100	66-133	
Hexachloro-1,3-butadiene	ug/L	50	47.5	95	59-145	
Iodomethane	ug/L	100	90.5	90	21-170	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

LABORATORY CONTROL SAMPLE: 1171224

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Isopropylbenzene (Cumene)	ug/L	50	51.2	102	69-124	
Methyl-tert-butyl ether	ug/L	100	101	101	69-122	
Methylene Chloride	ug/L	50	48.4	97	68-132	
n-Butylbenzene	ug/L	50	43.6	87	70-126	
n-Hexane	ug/L	50	47.2	94	51-125	
n-Propylbenzene	ug/L	50	43.8	88	71-122	
Naphthalene	ug/L	50	43.1	86	68-127	
p-Isopropyltoluene	ug/L	50	45.7	91	72-132	
sec-Butylbenzene	ug/L	50	46.7	93	70-128	
Styrene	ug/L	50	50.4	101	74-126	
tert-Butylbenzene	ug/L	50	40.0	80	51-118	
Tetrachloroethene	ug/L	50	49.4	99	69-130	
Toluene	ug/L	50	44.2	88	72-122	
trans-1,2-Dichloroethene	ug/L	50	51.3	103	72-124	
trans-1,3-Dichloropropene	ug/L	50	39.4	79	64-121	
trans-1,4-Dichloro-2-butene	ug/L	200	183	92	56-133	
Trichloroethene	ug/L	50	49.6	99	76-126	
Trichlorofluoromethane	ug/L	50	55.6	111	76-149	
Vinyl acetate	ug/L	200	183	91	45-151	
Vinyl chloride	ug/L	50	52.2	104	59-126	
Xylene (Total)	ug/L	150	148	99	70-124	
4-Bromofluorobenzene (S)	%			96	80-114	
Dibromofluoromethane (S)	%			99	79-116	
Toluene-d8 (S)	%			89	81-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1171225 1171226

Parameter	Units	50104622005 Result	MS	MSD	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	RPD	Qual
			Spike Conc.	Spike Conc.								
1,1,1,2-Tetrachloroethane	ug/L	ND	50	50	42.7	45.8	85	92	50-132	7	20	
1,1,1-Trichloroethane	ug/L	ND	50	50	46.6	50.1	93	100	60-138	7	20	
1,1,2,2-Tetrachloroethane	ug/L	ND	50	50	37.1	40.5	74	81	55-128	9	20	
1,1,2-Trichloroethane	ug/L	ND	50	50	39.7	42.7	79	85	61-139	7	20	
1,1-Dichloroethane	ug/L	ND	50	50	39.0	42.0	78	84	57-147	7	20	
1,1-Dichloroethene	ug/L	ND	50	50	42.0	44.1	84	88	55-145	5	20	
1,1-Dichloropropene	ug/L	ND	50	50	42.4	44.7	85	89	55-147	5	20	
1,2,3-Trichlorobenzene	ug/L	ND	50	50	40.4	42.4	81	85	31-141	5	20	
1,2,3-Trichloropropane	ug/L	ND	50	50	37.6	40.0	75	80	58-133	6	20	
1,2,4-Trichlorobenzene	ug/L	ND	50	50	39.6	41.9	79	84	25-143	6	20	
1,2,4-Trimethylbenzene	ug/L	ND	50	50	42.6	45.8	79	86	18-149	7	20	
1,2-Dibromoethane (EDB)	ug/L	ND	50	50	43.0	46.0	86	92	63-129	7	20	
1,2-Dichlorobenzene	ug/L	ND	50	50	41.3	44.7	83	89	38-136	8	20	
1,2-Dichloroethane	ug/L	ND	50	50	37.6	40.6	75	81	62-138	8	20	
1,2-Dichloropropane	ug/L	ND	50	50	43.1	46.1	86	92	59-130	7	20	
1,3,5-Trimethylbenzene	ug/L	ND	50	50	43.1	45.8	86	91	20-147	6	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1171225 1171226											
Parameter	Units	50104622005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	Qual
1,3-Dichlorobenzene	ug/L	ND	50	50	42.2	45.7	84	91	28-141	8	20
1,3-Dichloropropane	ug/L	ND	50	50	37.6	40.1	75	80	62-127	7	20
1,4-Dichlorobenzene	ug/L	ND	50	50	41.4	44.2	83	88	30-139	7	20
1-Methylnaphthalene	ug/L	ND	50	50	38.3	41.6	77	83	23-143	8	20 N2
2,2-Dichloropropane	ug/L	ND	50	50	41.3	44.7	83	89	37-139	8	20
2-Butanone (MEK)	ug/L	ND	250	250	178	187	71	75	37-156	5	20
2-Chlorotoluene	ug/L	ND	50	50	40.3	43.5	81	87	27-142	8	20
2-Hexanone	ug/L	ND	250	250	182	194	73	77	44-143	6	20
2-Methylnaphthalene	ug/L	ND	50	50	39.6	42.3	79	85	24-151	7	20
4-Chlorotoluene	ug/L	ND	50	50	42.1	45.5	84	91	27-144	8	20
4-Methyl-2-pentanone (MIBK)	ug/L	ND	250	250	176	187	71	75	46-144	6	20
Acetone	ug/L	ND	250	250	170	187	68	75	39-156	9	20
Acrolein	ug/L	ND	1000	1000	850	906	85	91	33-200	6	20
Acrylonitrile	ug/L	ND	1000	1000	750	800	75	80	48-149	7	20
Benzene	ug/L	ND	50	50	44.1	47.5	88	95	62-129	8	20
Bromobenzene	ug/L	ND	50	50	40.7	43.6	81	87	39-140	7	20
Bromochloromethane	ug/L	ND	50	50	34.0	34.4	68	69	49-142	1	20
Bromodichloromethane	ug/L	ND	50	50	45.0	49.4	90	99	50-142	9	20
Bromoform	ug/L	ND	50	50	42.3	46.9	85	94	36-125	10	20
Bromomethane	ug/L	ND	50	50	30.3	36.8	61	74	13-179	19	20
Carbon disulfide	ug/L	ND	100	100	97.8	103	98	103	45-142	5	20
Carbon tetrachloride	ug/L	ND	50	50	39.5	42.7	79	85	46-142	8	20
Chlorobenzene	ug/L	ND	50	50	44.6	47.7	89	95	49-136	7	20
Chloroethane	ug/L	ND	50	50	41.6	44.0	83	88	47-160	6	20
Chloroform	ug/L	ND	50	50	42.9	46.7	86	93	54-150	9	20
Chloromethane	ug/L	ND	50	50	39.7	40.7	79	81	30-148	3	20
cis-1,2-Dichloroethene	ug/L	ND	50	50	48.5	52.4	97	105	60-135	8	20
cis-1,3-Dichloropropene	ug/L	ND	50	50	34.2	36.8	68	74	52-123	7	20
Dibromochloromethane	ug/L	ND	50	50	39.6	43.6	79	87	48-125	10	20
Dibromomethane	ug/L	ND	50	50	43.3	46.9	87	94	59-134	8	20
Dichlorodifluoromethane	ug/L	ND	50	50	60.1	59.6	120	119	24-197	1	20
Ethyl methacrylate	ug/L	ND	200	200	158	169	79	84	55-139	7	20
Ethylbenzene	ug/L	ND	50	50	46.2	49.2	92	98	28-153	6	20
Hexachloro-1,3-butadiene	ug/L	ND	50	50	45.0	47.4	90	95	10-176	5	20
Iodomethane	ug/L	ND	100	100	75.0	90.1	75	90	17-157	18	20
Isopropylbenzene (Cumene)	ug/L	ND	50	50	47.4	50.1	95	100	18-152	6	20
Methyl-tert-butyl ether	ug/L	ND	100	100	90.4	98.0	90	98	63-130	8	20
Methylene Chloride	ug/L	ND	50	50	39.7	44.3	79	88	45-156	11	20
n-Butylbenzene	ug/L	ND	50	50	41.3	43.4	83	87	10-161	5	20
n-Hexane	ug/L	ND	50	50	44.3	46.9	89	94	33-144	6	20
n-Propylbenzene	ug/L	ND	50	50	41.2	44.4	82	88	16-150	7	20
Naphthalene	ug/L	ND	50	50	38.8	42.0	77	83	39-140	8	20
p-Isopropyltoluene	ug/L	ND	50	50	43.3	46.2	87	92	10-163	6	20
sec-Butylbenzene	ug/L	ND	50	50	44.0	47.1	88	94	10-160	7	20
Styrene	ug/L	ND	50	50	46.8	49.6	94	99	36-139	6	20

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1171225 1171226												
Parameter	Units	50104622005	MS	MSD	MS	MSD	MS	MSD	% Rec	Max		Qual
		Result	Spike Conc.	Spike Conc.						Result	Result	
tert-Butylbenzene	ug/L	ND	50	50	37.6	40.3	75	81	12-134	7	20	
Tetrachloroethene	ug/L	ND	50	50	46.7	49.0	93	98	33-151	5	20	
Toluene	ug/L	ND	50	50	40.9	43.6	82	87	50-132	6	20	
trans-1,2-Dichloroethene	ug/L	ND	50	50	47.5	50.4	95	101	40-153	6	20	
trans-1,3-Dichloropropene	ug/L	ND	50	50	34.2	37.1	68	74	48-122	8	20	
trans-1,4-Dichloro-2-butene	ug/L	ND	200	200	150	159	75	79	32-139	6	20	
Trichloroethene	ug/L	ND	50	50	45.7	49.5	91	99	50-143	8	20	
Trichlorofluoromethane	ug/L	ND	50	50	49.5	51.9	99	104	60-175	5	20	
Vinyl acetate	ug/L	ND	200	200	111	117	56	59	17-142	5	20	
Vinyl chloride	ug/L	ND	50	50	47.4	48.5	95	97	44-145	2	20	
Xylene (Total)	ug/L	ND	150	150	138	146	92	97	29-145	6	20	
4-Bromofluorobenzene (S)	%.						95	93	80-114			
Dibromofluoromethane (S)	%.						98	98	79-116			
Toluene-d8 (S)	%.						88	88	81-110			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: MSV/69629

Analysis Method: EPA 8260

QC Batch Method: EPA 8260

Analysis Description: 8260 MSV 5035A Volatile Organics

Associated Lab Samples: 50104622007, 50104622008, 50104622009, 50104622010, 50104622011, 50104622012

METHOD BLANK: 1171182

Matrix: Solid

Associated Lab Samples: 50104622007, 50104622008, 50104622009, 50104622010, 50104622011, 50104622012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,1,2-Tetrachloroethane	ug/kg	ND	5.0	10/10/14 23:55	
1,1,1-Trichloroethane	ug/kg	ND	5.0	10/10/14 23:55	
1,1,2,2-Tetrachloroethane	ug/kg	ND	5.0	10/10/14 23:55	
1,1,2-Trichloroethane	ug/kg	ND	5.0	10/10/14 23:55	
1,1-Dichloroethane	ug/kg	ND	5.0	10/10/14 23:55	
1,1-Dichloroethene	ug/kg	ND	5.0	10/10/14 23:55	
1,1-Dichloropropene	ug/kg	ND	5.0	10/10/14 23:55	
1,2,3-Trichlorobenzene	ug/kg	ND	5.0	10/10/14 23:55	
1,2,3-Trichloropropane	ug/kg	ND	5.0	10/10/14 23:55	
1,2,4-Trichlorobenzene	ug/kg	ND	5.0	10/10/14 23:55	
1,2,4-Trimethylbenzene	ug/kg	ND	5.0	10/10/14 23:55	
1,2-Dibromoethane (EDB)	ug/kg	ND	5.0	10/10/14 23:55	
1,2-Dichlorobenzene	ug/kg	ND	5.0	10/10/14 23:55	
1,2-Dichloroethane	ug/kg	ND	5.0	10/10/14 23:55	
1,2-Dichloropropane	ug/kg	ND	5.0	10/10/14 23:55	
1,3,5-Trimethylbenzene	ug/kg	ND	5.0	10/10/14 23:55	
1,3-Dichlorobenzene	ug/kg	ND	5.0	10/10/14 23:55	
1,3-Dichloropropane	ug/kg	ND	5.0	10/10/14 23:55	
1,4-Dichlorobenzene	ug/kg	ND	5.0	10/10/14 23:55	
1-Methylnaphthalene	ug/kg	ND	10.0	10/10/14 23:55	N2
2,2-Dichloropropane	ug/kg	ND	5.0	10/10/14 23:55	
2-Butanone (MEK)	ug/kg	ND	25.0	10/10/14 23:55	
2-Chlorotoluene	ug/kg	ND	5.0	10/10/14 23:55	
2-Hexanone	ug/kg	ND	100	10/10/14 23:55	
2-Methylnaphthalene	ug/kg	ND	10.0	10/10/14 23:55	
4-Chlorotoluene	ug/kg	ND	5.0	10/10/14 23:55	
4-Methyl-2-pentanone (MIBK)	ug/kg	ND	25.0	10/10/14 23:55	
Acetone	ug/kg	ND	100	10/10/14 23:55	
Acrolein	ug/kg	ND	100	10/10/14 23:55	
Acrylonitrile	ug/kg	ND	100	10/10/14 23:55	
Benzene	ug/kg	ND	5.0	10/10/14 23:55	
Bromobenzene	ug/kg	ND	5.0	10/10/14 23:55	
Bromochloromethane	ug/kg	ND	5.0	10/10/14 23:55	
Bromodichloromethane	ug/kg	ND	5.0	10/10/14 23:55	
Bromoform	ug/kg	ND	5.0	10/10/14 23:55	
Bromomethane	ug/kg	ND	5.0	10/10/14 23:55	
Carbon disulfide	ug/kg	ND	10.0	10/10/14 23:55	
Carbon tetrachloride	ug/kg	ND	5.0	10/10/14 23:55	
Chlorobenzene	ug/kg	ND	5.0	10/10/14 23:55	
Chloroethane	ug/kg	ND	5.0	10/10/14 23:55	
Chloroform	ug/kg	ND	5.0	10/10/14 23:55	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

METHOD BLANK: 1171182

Matrix: Solid

Associated Lab Samples: 50104622007, 50104622008, 50104622009, 50104622010, 50104622011, 50104622012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloromethane	ug/kg	ND	5.0	10/10/14 23:55	
cis-1,2-Dichloroethene	ug/kg	ND	5.0	10/10/14 23:55	
cis-1,3-Dichloropropene	ug/kg	ND	5.0	10/10/14 23:55	
Dibromochloromethane	ug/kg	ND	5.0	10/10/14 23:55	
Dibromomethane	ug/kg	ND	5.0	10/10/14 23:55	
Dichlorodifluoromethane	ug/kg	ND	5.0	10/10/14 23:55	
Ethyl methacrylate	ug/kg	ND	100	10/10/14 23:55	
Ethylbenzene	ug/kg	ND	5.0	10/10/14 23:55	
Hexachloro-1,3-butadiene	ug/kg	ND	5.0	10/10/14 23:55	
Iodomethane	ug/kg	ND	100	10/10/14 23:55	
Isopropylbenzene (Cumene)	ug/kg	ND	5.0	10/10/14 23:55	
Methyl-tert-butyl ether	ug/kg	ND	5.0	10/10/14 23:55	
Methylene Chloride	ug/kg	ND	20.0	10/10/14 23:55	
n-Butylbenzene	ug/kg	ND	5.0	10/10/14 23:55	
n-Hexane	ug/kg	ND	5.0	10/10/14 23:55	
n-Propylbenzene	ug/kg	ND	5.0	10/10/14 23:55	
Naphthalene	ug/kg	ND	5.0	10/10/14 23:55	
p-Isopropyltoluene	ug/kg	ND	5.0	10/10/14 23:55	
sec-Butylbenzene	ug/kg	ND	5.0	10/10/14 23:55	
Styrene	ug/kg	ND	5.0	10/10/14 23:55	
tert-Butylbenzene	ug/kg	ND	5.0	10/10/14 23:55	
Tetrachloroethene	ug/kg	ND	5.0	10/10/14 23:55	
Toluene	ug/kg	ND	5.0	10/10/14 23:55	
trans-1,2-Dichloroethene	ug/kg	ND	5.0	10/10/14 23:55	
trans-1,3-Dichloropropene	ug/kg	ND	5.0	10/10/14 23:55	
trans-1,4-Dichloro-2-butene	ug/kg	ND	100	10/10/14 23:55	
Trichloroethene	ug/kg	ND	5.0	10/10/14 23:55	
Trichlorofluoromethane	ug/kg	ND	5.0	10/10/14 23:55	
Vinyl acetate	ug/kg	ND	100	10/10/14 23:55	
Vinyl chloride	ug/kg	ND	5.0	10/10/14 23:55	
Xylene (Total)	ug/kg	ND	10.0	10/10/14 23:55	
4-Bromofluorobenzene (S)	%	96	56-144	10/10/14 23:55	
Dibromofluoromethane (S)	%	96	85-118	10/10/14 23:55	
Toluene-d8 (S)	%	94	71-128	10/10/14 23:55	

LABORATORY CONTROL SAMPLE: 1171183

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,1,2-Tetrachloroethane	ug/kg	50	55.0	110	62-123	
1,1,1-Trichloroethane	ug/kg	50	51.8	104	70-123	
1,1,2,2-Tetrachloroethane	ug/kg	50	47.5	95	65-124	
1,1,2-Trichloroethane	ug/kg	50	49.5	99	74-129	
1,1-Dichloroethane	ug/kg	50	49.3	99	73-130	
1,1-Dichloroethene	ug/kg	50	55.1	110	66-126	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

LABORATORY CONTROL SAMPLE: 1171183

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1-Dichloropropene	ug/kg	50	49.5	99	78-125	
1,2,3-Trichlorobenzene	ug/kg	50	47.8	96	66-131	
1,2,3-Trichloropropane	ug/kg	50	48.8	98	44-157	
1,2,4-Trichlorobenzene	ug/kg	50	45.3	91	68-129	
1,2,4-Trimethylbenzene	ug/kg	50	48.9	98	67-126	
1,2-Dibromoethane (EDB)	ug/kg	50	49.6	99	74-120	
1,2-Dichlorobenzene	ug/kg	50	47.6	95	73-122	
1,2-Dichloroethane	ug/kg	50	51.4	103	73-127	
1,2-Dichloropropane	ug/kg	50	49.7	99	75-118	
1,3,5-Trimethylbenzene	ug/kg	50	49.2	98	65-127	
1,3-Dichlorobenzene	ug/kg	50	47.3	95	73-121	
1,3-Dichloropropane	ug/kg	50	47.2	94	72-121	
1,4-Dichlorobenzene	ug/kg	50	46.8	94	75-119	
1-Methylnaphthalene	ug/kg	50	66.0	132	46-139	N2
2,2-Dichloropropane	ug/kg	50	44.8	90	63-122	
2-Butanone (MEK)	ug/kg	250	237	95	59-139	
2-Chlorotoluene	ug/kg	50	47.0	94	72-121	
2-Hexanone	ug/kg	250	249	99	56-139	
2-Methylnaphthalene	ug/kg	50	69.3	139	63-148	
4-Chlorotoluene	ug/kg	50	48.3	97	75-123	
4-Methyl-2-pentanone (MIBK)	ug/kg	250	251	100	63-136	
Acetone	ug/kg	250	286	114	46-156	
Acrolein	ug/kg	1000	1560	156	47-200	
Acrylonitrile	ug/kg	1000	1010	101	67-130	
Benzene	ug/kg	50	50.7	101	74-119	
Bromobenzene	ug/kg	50	49.6	99	69-129	
Bromochloromethane	ug/kg	50	42.6	85	67-129	
Bromodichloromethane	ug/kg	50	54.4	109	68-121	
Bromoform	ug/kg	50	51.9	104	49-124	
Bromomethane	ug/kg	50	49.3	99	44-142	
Carbon disulfide	ug/kg	100	173	173	61-129	L3
Carbon tetrachloride	ug/kg	50	51.4	103	58-127	
Chlorobenzene	ug/kg	50	49.8	100	77-122	
Chloroethane	ug/kg	50	66.4	133	59-141	
Chloroform	ug/kg	50	51.6	103	75-124	
Chloromethane	ug/kg	50	64.4	129	46-133	
cis-1,2-Dichloroethene	ug/kg	50	54.9	110	72-122	
cis-1,3-Dichloropropene	ug/kg	50	47.4	95	68-115	
Dibromochloromethane	ug/kg	50	53.8	108	60-121	
Dibromomethane	ug/kg	50	49.7	99	72-124	
Dichlorodifluoromethane	ug/kg	50	117	234	26-186	L3
Ethyl methacrylate	ug/kg	200	244	122	63-130	
Ethylbenzene	ug/kg	50	51.2	102	72-123	
Hexachloro-1,3-butadiene	ug/kg	50	46.8	94	55-139	
Iodomethane	ug/kg	100	75.1J	75	38-149	
Isopropylbenzene (Cumene)	ug/kg	50	52.5	105	65-123	
Methyl-tert-butyl ether	ug/kg	100	81.6	82	68-120	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

LABORATORY CONTROL SAMPLE: 1171183

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Methylene Chloride	ug/kg	50	51.6	103	57-142	
n-Butylbenzene	ug/kg	50	47.1	94	68-125	
n-Hexane	ug/kg	50	47.8	96	57-117	
n-Propylbenzene	ug/kg	50	47.6	95	68-122	
Naphthalene	ug/kg	50	54.1	108	67-131	
p-Isopropyltoluene	ug/kg	50	48.5	97	66-133	
sec-Butylbenzene	ug/kg	50	49.5	99	64-131	
Styrene	ug/kg	50	53.3	107	70-126	
tert-Butylbenzene	ug/kg	50	40.0	80	46-124	
Tetrachloroethene	ug/kg	50	46.8	94	72-126	
Toluene	ug/kg	50	48.0	96	71-121	
trans-1,2-Dichloroethene	ug/kg	50	54.6	109	69-123	
trans-1,3-Dichloropropene	ug/kg	50	41.2	82	66-114	
trans-1,4-Dichloro-2-butene	ug/kg	200	200	100	61-124	
Trichloroethene	ug/kg	50	50.3	101	74-123	
Trichlorofluoromethane	ug/kg	50	61.7	123	72-146	
Vinyl acetate	ug/kg	200	229	114	57-131	
Vinyl chloride	ug/kg	50	67.9	136	55-128 L3	
Xylene (Total)	ug/kg	150	152	102	66-124	
4-Bromofluorobenzene (S)	%			99	56-144	
Dibromofluoromethane (S)	%			100	85-118	
Toluene-d8 (S)	%			96	71-128	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1171184 1171185

Parameter	Units	50104622011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,1,1,2-Tetrachloroethane	ug/kg	ND	124	111	109	91.2	88	82	10-129	18	20	
1,1,1-Trichloroethane	ug/kg	ND	124	111	113	106	91	95	26-143	6	20	
1,1,2,2-Tetrachloroethane	ug/kg	ND	124	111	117	108	94	97	10-156	8	20	
1,1,2-Trichloroethane	ug/kg	ND	124	111	107	95.6	86	86	13-156	11	20	
1,1-Dichloroethane	ug/kg	ND	124	111	109	104	88	93	36-150	5	20	
1,1-Dichloroethene	ug/kg	ND	124	111	121	115	97	103	31-146	5	20	
1,1-Dichloropropene	ug/kg	ND	124	111	98.0	88.2	79	79	26-145	11	20	
1,2,3-Trichlorobenzene	ug/kg	ND	124	111	32.9	32.3	26	29	10-119	2	20	
1,2,3-Trichloropropane	ug/kg	ND	124	111	129	115	104	103	10-168	11	20	
1,2,4-Trichlorobenzene	ug/kg	ND	124	111	33.8	31.9	27	29	10-122	6	20	
1,2,4-Trimethylbenzene	ug/kg	ND	124	111	95.1	75.6	76	68	10-139	23	20	
1,2-Dibromoethane (EDB)	ug/kg	ND	124	111	98.8	91.8	79	82	15-136	7	20	
1,2-Dichlorobenzene	ug/kg	ND	124	111	72.1	61.8	58	56	10-132	15	20	
1,2-Dichloroethane	ug/kg	ND	124	111	112	104	90	93	30-140	8	20	
1,2-Dichloropropane	ug/kg	ND	124	111	106	97.5	85	88	29-135	8	20	
1,3,5-Trimethylbenzene	ug/kg	ND	124	111	99.5	76.9	80	69	10-143	26	20	
1,3-Dichlorobenzene	ug/kg	ND	124	111	72.2	60.0	58	54	10-130	18	20	
1,3-Dichloropropane	ug/kg	ND	124	111	102	93.0	82	84	17-139	9	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1171184 1171185											
Parameter	Units	50104622011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	Qual
1,4-Dichlorobenzene	ug/kg	ND	124	111	78.9	66.3	59	55	10-128	17	20
1-Methylnaphthalene	ug/kg	ND	124	111	30.7	36.7	25	33	10-121	18	N2
2,2-Dichloropropane	ug/kg	ND	124	111	79.1	81.1	64	73	29-136	2	20
2-Butanone (MEK)	ug/kg	114	621	557	617	559	81	80	22-176	10	20
2-Chlorotoluene	ug/kg	ND	124	111	94.7	76.3	76	68	10-146	22	20
2-Hexanone	ug/kg	ND	621	557	510	468	82	84	12-165	9	20
2-Methylnaphthalene	ug/kg	ND	124	111	28.0	33.2	23	30	10-156	17	20
4-Chlorotoluene	ug/kg	ND	124	111	89.1	71.8	72	64	10-138	22	20
4-Methyl-2-pentanone (MIBK)	ug/kg	ND	621	557	560	524	90	94	22-155	7	20
Acetone	ug/kg	681	621	557	1630	1460	152	140	11-200	11	20
Acrolein	ug/kg	ND	2490	2230	1750	1680	71	75	10-200	4	20
Acrylonitrile	ug/kg	ND	2490	2230	2110	1970	85	88	20-150	7	20
Benzene	ug/kg	ND	124	111	108	97.9	87	88	27-140	10	20
Bromobenzene	ug/kg	ND	124	111	75.7	62.7	61	56	10-133	19	20
Bromochloromethane	ug/kg	ND	124	111	109	101	88	91	28-142	8	20
Bromodichloromethane	ug/kg	ND	124	111	104	89.0	83	80	13-139	15	20
Bromoform	ug/kg	ND	124	111	94.0	82.0	76	74	10-122	14	20
Bromomethane	ug/kg	ND	124	111	73.9	75.1	59	67	10-154	2	20
Carbon disulfide	ug/kg	ND	249	223	216	212	87	95	20-142	2	20
Carbon tetrachloride	ug/kg	ND	124	111	71.6	68.6	58	62	19-135	4	20
Chlorobenzene	ug/kg	ND	124	111	93.9	78.6	74	68	10-136	18	20
Chloroethane	ug/kg	ND	124	111	145	143	117	128	24-161	2	20
Chloroform	ug/kg	ND	124	111	117	109	94	98	36-138	7	20
Chloromethane	ug/kg	ND	124	111	132	126	106	113	28-143	5	20
cis-1,2-Dichloroethene	ug/kg	ND	124	111	117	108	94	97	29-136	8	20
cis-1,3-Dichloropropene	ug/kg	ND	124	111	63.1	54.9	51	49	10-130	14	20
Dibromochloromethane	ug/kg	ND	124	111	92.4	79.2	74	71	10-124	15	20
Dibromomethane	ug/kg	ND	124	111	110	99.3	89	89	24-136	11	20
Dichlorodifluoromethane	ug/kg	ND	124	111	177	173	142	155	15-187	2	20
Ethyl methacrylate	ug/kg	ND	497	446	ND	ND	1	2	10-147	20	2d,M0
Ethylbenzene	ug/kg	ND	124	111	94.5	75.8	76	68	10-144	22	20
Hexachloro-1,3-butadiene	ug/kg	ND	124	111	31.4	26.4	25	24	10-136	17	20
Iodomethane	ug/kg	ND	249	223	ND	ND	31	37	10-155		20
Isopropylbenzene (Cumene)	ug/kg	ND	124	111	91.1	69.3	73	62	10-134	27	20
Methyl-tert-butyl ether	ug/kg	ND	249	223	184	168	74	75	30-147	9	20
Methylene Chloride	ug/kg	ND	124	111	101	95.3	81	86	23-150	5	20
n-Butylbenzene	ug/kg	ND	124	111	62.1	46.8	50	42	10-141	28	20
n-Hexane	ug/kg	ND	124	111	74.1	68.2	60	61	10-140	8	20
n-Propylbenzene	ug/kg	ND	124	111	94.9	71.7	76	64	10-143	28	20
Naphthalene	ug/kg	ND	124	111	51.0	47.5	41	43	10-130	7	20
p-Isopropyltoluene	ug/kg	ND	124	111	82.6	62.3	66	56	10-146	28	20
sec-Butylbenzene	ug/kg	ND	124	111	86.6	65.7	70	59	10-150	27	20
Styrene	ug/kg	ND	124	111	72.7	59.9	58	54	10-138	19	20
tert-Butylbenzene	ug/kg	ND	124	111	81.2	62.9	65	57	10-135	25	20
Tetrachloroethene	ug/kg	ND	124	111	87.3	71.4	70	64	10-153	20	20

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1171184 1171185											
Parameter	Units	50104622011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	Qual
Toluene	ug/kg	ND	124	111	105	90.4	81	77	10-140	15	20
trans-1,2-Dichloroethene	ug/kg	ND	124	111	112	103	90	92	28-139	9	20
trans-1,3-Dichloropropene	ug/kg	ND	124	111	59.1	53.1	48	48	10-126	11	20
trans-1,4-Dichloro-2-butene	ug/kg	ND	497	446	151J	136J	30	31	10-132		20
Trichloroethene	ug/kg	ND	124	111	98.7	87.1	79	78	17-148	12	20
Trichlorofluoromethane	ug/kg	ND	124	111	139	132	112	118	31-177	6	20
Vinyl acetate	ug/kg	ND	497	446	ND	ND	16	16	10-131		20
Vinyl chloride	ug/kg	ND	124	111	131	132	105	118	30-145	0	20
Xylene (Total)	ug/kg	ND	373	334	280	223	75	67	10-143	23	20
4-Bromofluorobenzene (S)	%.						92	90	56-144		
Dibromofluoromethane (S)	%.						103	101	85-118		
Toluene-d8 (S)	%.						103	103	71-128		

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: OEXT/3069

Analysis Method: EPA 8081

QC Batch Method: EPA 3546

Analysis Description: 8081 GCS Pesticides

Associated Lab Samples: 50104622007, 50104622008, 50104622009, 50104622010, 50104622011, 50104622012

METHOD BLANK: 60695

Matrix: Solid

Associated Lab Samples: 50104622007, 50104622008, 50104622009, 50104622010, 50104622011, 50104622012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
4,4'-DDD	ug/kg	ND	3.3	10/16/14 20:32	
4,4'-DDE	ug/kg	ND	3.3	10/16/14 20:32	
4,4'-DDT	ug/kg	ND	3.3	10/16/14 20:32	
Aldrin	ug/kg	ND	1.7	10/16/14 20:32	
alpha-BHC	ug/kg	ND	1.7	10/16/14 20:32	
alpha-Chlordane	ug/kg	ND	1.7	10/16/14 20:32	
beta-BHC	ug/kg	ND	1.7	10/16/14 20:32	
delta-BHC	ug/kg	ND	1.7	10/16/14 20:32	
Dieldrin	ug/kg	ND	3.3	10/16/14 20:32	
Endosulfan I	ug/kg	ND	1.7	10/16/14 20:32	
Endosulfan II	ug/kg	ND	3.3	10/16/14 20:32	
Endosulfan sulfate	ug/kg	ND	3.3	10/16/14 20:32	
Endrin	ug/kg	ND	3.3	10/16/14 20:32	
Endrin aldehyde	ug/kg	ND	3.3	10/16/14 20:32	
Endrin ketone	ug/kg	ND	3.3	10/16/14 20:32	
gamma-BHC (Lindane)	ug/kg	ND	1.7	10/16/14 20:32	
gamma-Chlordane	ug/kg	ND	1.7	10/16/14 20:32	
Heptachlor	ug/kg	ND	1.7	10/16/14 20:32	
Heptachlor epoxide	ug/kg	ND	1.7	10/16/14 20:32	
Methoxychlor	ug/kg	ND	16.7	10/16/14 20:32	
Toxaphene	ug/kg	ND	66.7	10/16/14 20:32	
Decachlorobiphenyl (S)	%	101	15-177	10/16/14 20:32	
Decachlorobiphenyl (S)	%	86	15-177	10/16/14 20:32	
Tetrachloro-m-xylene (S)	%	104	10-178	10/16/14 20:32	
Tetrachloro-m-xylene (S)	%	94	10-178	10/16/14 20:32	

LABORATORY CONTROL SAMPLE: 60696

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
4,4'-DDD	ug/kg	16.7	12.5	75	33-132	
4,4'-DDE	ug/kg	16.7	13.0	78	36-131	
4,4'-DDT	ug/kg	16.7	12.2	73	33-125	
Aldrin	ug/kg	16.7	12.4	74	33-126	
alpha-BHC	ug/kg	16.7	12.8	77	31-124	
alpha-Chlordane	ug/kg	16.7	12.6	76	36-127	
beta-BHC	ug/kg	16.7	13.8	83	33-130	
delta-BHC	ug/kg	16.7	13.3	80	20-135	
Dieldrin	ug/kg	16.7	12.6	76	35-126	
Endosulfan I	ug/kg	16.7	11.4	68	10-115	
Endosulfan II	ug/kg	16.7	12.1	73	10-115	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

LABORATORY CONTROL SAMPLE: 60696

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Endosulfan sulfate	ug/kg	16.7	12.7	76	30-133	
Endrin	ug/kg	16.7	12.6	75	20-151	
Endrin aldehyde	ug/kg	16.7	13.0	78	26-128	
Endrin ketone	ug/kg	16.7	13.2	79	33-133	
gamma-BHC (Lindane)	ug/kg	16.7	12.5	75	32-127	
gamma-Chlordane	ug/kg	16.7	12.6	76	36-128	
Heptachlor	ug/kg	16.7	12.3	74	34-127	
Heptachlor epoxide	ug/kg	16.7	12.4	74	32-126	
Methoxychlor	ug/kg	16.7	11.2J	67	24-143	
Decachlorobiphenyl (S)	%			89	15-177	
Decachlorobiphenyl (S)	%			100	15-177	
Tetrachloro-m-xylene (S)	%			87	10-178	
Tetrachloro-m-xylene (S)	%			99	10-178	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 60699 60700

Parameter	Units	50104622011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
4,4'-DDD	ug/kg	ND	16.4	16.5	9.2	10.2	55	60	10-174	10	20	
4,4'-DDE	ug/kg	ND	16.4	16.5	8.3	7.3	50	44	10-171	12	20	
4,4'-DDT	ug/kg	ND	16.4	16.5	8.5	8.0	51	48	10-172	6	20	
Aldrin	ug/kg	ND	16.4	16.5	8.2	8.6	50	52	10-157	5	20	
alpha-BHC	ug/kg	ND	16.4	16.5	15.0	17.4	91	105	15-161	15	20	
alpha-Chlordane	ug/kg	ND	16.4	16.5	9.4	10	56	59	10-166	6	20	
beta-BHC	ug/kg	ND	16.4	16.5	15.3	19.1	90	113	10-169	22	20	R1
delta-BHC	ug/kg	ND	16.4	16.5	13.9	19.0	83	114	10-170	31	20	R1
Dieldrin	ug/kg	ND	16.4	16.5	9.8	11.2	59	67	10-166	14	20	
Endosulfan I	ug/kg	ND	16.4	16.5	8.5	8.0	52	49	10-143	6	20	
Endosulfan II	ug/kg	ND	16.4	16.5	10.3	11.3	62	68	10-160	9	20	
Endosulfan sulfate	ug/kg	ND	16.4	16.5	14.4	14.1	86	84	10-172	2	20	
Endrin	ug/kg	ND	16.4	16.5	10.9	12.4	65	73	10-186	12	20	
Endrin aldehyde	ug/kg	ND	16.4	16.5	10.6	11.4	63	67	10-162	7	20	
Endrin ketone	ug/kg	ND	16.4	16.5	12.1	13.1	73	78	10-177	7	20	
gamma-BHC (Lindane)	ug/kg	ND	16.4	16.5	10.6	17.6	65	107	12-164	49	20	R1
gamma-Chlordane	ug/kg	ND	16.4	16.5	9.0	9.4	55	57	10-168	4	20	
Heptachlor	ug/kg	ND	16.4	16.5	11.1	11.8	68	72	10-159	6	20	
Heptachlor epoxide	ug/kg	ND	16.4	16.5	10.3	11.4	63	70	10-161	10	20	
Methoxychlor	ug/kg	ND	16.4	16.5	8.5J	8.9J	52	54	10-195		20	
Decachlorobiphenyl (S)	%						73	50	15-177			
Decachlorobiphenyl (S)	%						106	84	15-177			
Tetrachloro-m-xylene (S)	%						58	52	10-178			
Tetrachloro-m-xylene (S)	%						74	90	10-178			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 60701 60702											
Parameter	Units	2010611007 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	Qual
4,4'-DDD	ug/kg	ND	16.4	16.5	15.8	15.3	96	93	10-174	3	20
4,4'-DDE	ug/kg	ND	16.4	16.5	15.3	15.3	93	93	10-171	.2	20
4,4'-DDT	ug/kg	ND	16.4	16.5	15.0	14.9	91	91	10-172	.09	20
Aldrin	ug/kg	ND	16.4	16.5	14.7	14.8	90	89	10-157	.2	20
alpha-BHC	ug/kg	ND	16.4	16.5	16.0	15.5	97	94	15-161	3	20
alpha-Chlordane	ug/kg	ND	16.4	16.5	15.4	15.1	94	92	10-166	2	20
beta-BHC	ug/kg	ND	16.4	16.5	17.2	16.6	104	100	10-169	4	20
delta-BHC	ug/kg	ND	16.4	16.5	17.1	16.6	104	100	10-170	3	20
Dieldrin	ug/kg	ND	16.4	16.5	15.8	15.2	96	92	10-166	4	20
Endosulfan I	ug/kg	ND	16.4	16.5	13.7	13.1	84	79	10-143	5	20
Endosulfan II	ug/kg	ND	16.4	16.5	15.4	14.8	93	90	10-160	4	20
Endosulfan sulfate	ug/kg	ND	16.4	16.5	17.7	17.5	108	106	10-172	1	20
Endrin	ug/kg	ND	16.4	16.5	16.2	15.3	98	93	10-186	6	20
Endrin aldehyde	ug/kg	ND	16.4	16.5	15.3	15.7	92	94	10-162	3	20
Endrin ketone	ug/kg	ND	16.4	16.5	17.0	16.4	101	98	10-177	3	20
gamma-BHC (Lindane)	ug/kg	ND	16.4	16.5	15.8	15.2	96	92	12-164	4	20
gamma-Chlordane	ug/kg	ND	16.4	16.5	15.5	15.2	94	92	10-168	2	20
Heptachlor	ug/kg	ND	16.4	16.5	15.1	14.9	92	91	10-159	.7	20
Heptachlor epoxide	ug/kg	ND	16.4	16.5	15.9	15.2	97	92	10-161	4	20
Methoxychlor	ug/kg	ND	16.4	16.5	13.4J	13.4J	81	81	10-195		20
Decachlorobiphenyl (S)	%.						96	93	15-177		
Decachlorobiphenyl (S)	%.						140	115	15-177		
Tetrachloro-m-xylene (S)	%.						98	94	10-178		
Tetrachloro-m-xylene (S)	%.						139	120	10-178		

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: OEXT/3029

Analysis Method: EPA 8081

QC Batch Method: EPA 3535

Analysis Description: 8081A GCS Pesticides

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

METHOD BLANK: 59436

Matrix: Water

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
4,4'-DDD	ug/L	ND	0.10	10/18/14 19:33	
4,4'-DDE	ug/L	ND	0.10	10/18/14 19:33	
4,4'-DDT	ug/L	ND	0.10	10/18/14 19:33	
Aldrin	ug/L	ND	0.050	10/18/14 19:33	
alpha-BHC	ug/L	ND	0.050	10/18/14 19:33	
alpha-Chlordane	ug/L	ND	0.050	10/18/14 19:33	
beta-BHC	ug/L	ND	0.050	10/18/14 19:33	
delta-BHC	ug/L	ND	0.050	10/18/14 19:33	
Dieldrin	ug/L	ND	0.10	10/18/14 19:33	
Endosulfan I	ug/L	ND	0.050	10/18/14 19:33	
Endosulfan II	ug/L	ND	0.10	10/18/14 19:33	
Endosulfan sulfate	ug/L	ND	0.10	10/18/14 19:33	
Endrin	ug/L	ND	0.10	10/18/14 19:33	
Endrin aldehyde	ug/L	ND	0.10	10/18/14 19:33	
Endrin ketone	ug/L	ND	0.10	10/18/14 19:33	
gamma-BHC (Lindane)	ug/L	ND	0.050	10/18/14 19:33	
gamma-Chlordane	ug/L	ND	0.050	10/18/14 19:33	
Heptachlor	ug/L	ND	0.050	10/18/14 19:33	
Heptachlor epoxide	ug/L	ND	0.050	10/18/14 19:33	
Methoxychlor	ug/L	ND	0.50	10/18/14 19:33	
Toxaphene	ug/L	ND	2.0	10/18/14 19:33	
Decachlorobiphenyl (S)	%	70	14-126	10/18/14 19:33	
Decachlorobiphenyl (S)	%	79	14-126	10/18/14 19:33	
Tetrachloro-m-xylene (S)	%	58	10-119	10/18/14 19:33	
Tetrachloro-m-xylene (S)	%	59	10-119	10/18/14 19:33	

LABORATORY CONTROL SAMPLE: 59437

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
4,4'-DDD	ug/L	.5	0.38	76	29-130	
4,4'-DDE	ug/L	.5	0.23	45	15-115	
4,4'-DDT	ug/L	.5	0.32	65	24-115	
Aldrin	ug/L	.5	0.080	16	10-115	
alpha-BHC	ug/L	.5	0.34	68	27-124	
alpha-Chlordane	ug/L	.5	0.29	59	21-116	
beta-BHC	ug/L	.5	0.38	76	32-131	
delta-BHC	ug/L	.5	0.35	70	28-134	
Dieldrin	ug/L	.5	0.38	76	31-121	
Endosulfan I	ug/L	.5	0.26	52	13-115	
Endosulfan II	ug/L	.5	0.33	66	14-115	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

LABORATORY CONTROL SAMPLE: 59437

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Endosulfan sulfate	ug/L	.5	0.42	84	33-133	
Endrin	ug/L	.5	0.41	82	20-153	
Endrin aldehyde	ug/L	.5	0.38	76	27-129	
Endrin ketone	ug/L	.5	0.38	75	34-129	
gamma-BHC (Lindane)	ug/L	.5	0.35	70	28-128	
gamma-Chlordane	ug/L	.5	0.26	53	16-116	
Heptachlor	ug/L	.5	0.22	44	10-115	
Heptachlor epoxide	ug/L	.5	0.37	75	30-119	
Methoxychlor	ug/L	.5	.34J	69	21-150	
Decachlorobiphenyl (S)	%			84	14-126	
Decachlorobiphenyl (S)	%			108	14-126	
Tetrachloro-m-xylene (S)	%			64	10-119	
Tetrachloro-m-xylene (S)	%			62	10-119	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 59438 59439

Parameter	Units	50104622005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	Qual
4,4'-DDD	ug/L	ND	.5	.5	0.37	0.38	73	75	22-141	4	20
4,4'-DDE	ug/L	ND	.5	.5	0.33	0.31	66	61	11-125	7	20
4,4'-DDT	ug/L	ND	.5	.5	0.35	0.36	70	71	16-133	1	20
Aldrin	ug/L	ND	.5	.5	0.23	0.21	47	41	10-115	13	20
alpha-BHC	ug/L	ND	.5	.5	0.36	0.39	72	78	14-145	9	20
alpha-Chlordane	ug/L	ND	.5	.5	0.34	0.33	68	66	16-135	3	20
beta-BHC	ug/L	ND	.5	.5	0.40	0.44	79	86	18-155	8	20
delta-BHC	ug/L	ND	.5	.5	0.39	0.41	77	81	16-153	5	20
Dieldrin	ug/L	ND	.5	.5	0.37	0.38	73	76	14-148	4	20
Endosulfan I	ug/L	ND	.5	.5	0.28	0.28	56	56	10-126	.6	20
Endosulfan II	ug/L	ND	.5	.5	0.33	0.33	65	66	10-133	2	20
Endosulfan sulfate	ug/L	ND	.5	.5	0.41	0.43	82	86	24-149	5	20
Endrin	ug/L	ND	.5	.5	0.41	0.42	82	85	22-160	4	20
Endrin aldehyde	ug/L	ND	.5	.5	0.35	0.38	69	76	12-139	9	20
Endrin ketone	ug/L	ND	.5	.5	0.38	0.40	75	80	20-153	6	20
gamma-BHC (Lindane)	ug/L	ND	.5	.5	0.37	0.40	73	80	17-149	8	20
gamma-Chlordane	ug/L	ND	.5	.5	0.33	0.31	65	62	13-136	5	20
Heptachlor	ug/L	ND	.5	.5	0.29	0.28	58	55	10-134	5	20
Heptachlor epoxide	ug/L	ND	.5	.5	0.37	0.39	74	78	13-147	6	20
Methoxychlor	ug/L	ND	.5	.5	.33J	.35J	66	70	17-166		20
Decachlorobiphenyl (S)	%						75	114	14-126		
Decachlorobiphenyl (S)	%						84	89	14-126		
Tetrachloro-m-xylene (S)	%						63	67	10-119		
Tetrachloro-m-xylene (S)	%						67	66	10-119		

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: OEXT/37091

Analysis Method: EPA 8082

QC Batch Method: EPA 3546

Analysis Description: 8082 GCS PCB

Associated Lab Samples: 50104622007, 50104622008, 50104622010

METHOD BLANK: 1167263

Matrix: Solid

Associated Lab Samples: 50104622007, 50104622008, 50104622010

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
PCB-1016 (Aroclor 1016)	ug/kg	ND	100	10/07/14 12:17	
PCB-1221 (Aroclor 1221)	ug/kg	ND	100	10/07/14 12:17	
PCB-1232 (Aroclor 1232)	ug/kg	ND	100	10/07/14 12:17	
PCB-1242 (Aroclor 1242)	ug/kg	ND	100	10/07/14 12:17	
PCB-1248 (Aroclor 1248)	ug/kg	ND	100	10/07/14 12:17	
PCB-1254 (Aroclor 1254)	ug/kg	ND	100	10/07/14 12:17	
PCB-1260 (Aroclor 1260)	ug/kg	ND	100	10/07/14 12:17	
Tetrachloro-m-xylene (S)	%.	71	30-106	10/07/14 12:17	

LABORATORY CONTROL SAMPLE: 1167264

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
PCB-1016 (Aroclor 1016)	ug/kg	167	99.5J	60	42-100	
PCB-1260 (Aroclor 1260)	ug/kg	167	113	68	40-106	
Tetrachloro-m-xylene (S)	%.			58	30-106	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1167265 1167266

Parameter	Units	50104683008 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
PCB-1016 (Aroclor 1016)	ug/kg	ND	201	202	270	372	134	184	10-145	32	20	M0
PCB-1260 (Aroclor 1260)	ug/kg	ND	201	202	160	172	80	85	16-132	7	20	
Tetrachloro-m-xylene (S)	%.						69	76	30-106			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: OEXT/37096

Analysis Method: EPA 8082

QC Batch Method: EPA 3546

Analysis Description: 8082 GCS PCB

Associated Lab Samples: 50104622011, 50104622012

METHOD BLANK: 1167283

Matrix: Solid

Associated Lab Samples: 50104622011, 50104622012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
PCB-1016 (Aroclor 1016)	ug/kg	ND	100	10/06/14 15:51	
PCB-1221 (Aroclor 1221)	ug/kg	ND	100	10/06/14 15:51	
PCB-1232 (Aroclor 1232)	ug/kg	ND	100	10/06/14 15:51	
PCB-1242 (Aroclor 1242)	ug/kg	ND	100	10/06/14 15:51	
PCB-1248 (Aroclor 1248)	ug/kg	ND	100	10/06/14 15:51	
PCB-1254 (Aroclor 1254)	ug/kg	ND	100	10/06/14 15:51	
PCB-1260 (Aroclor 1260)	ug/kg	ND	100	10/06/14 15:51	
Tetrachloro-m-xylene (S)	%.	72	30-106	10/06/14 15:51	

LABORATORY CONTROL SAMPLE: 1167284

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
PCB-1016 (Aroclor 1016)	ug/kg	167	96.6J	58	42-100	
PCB-1260 (Aroclor 1260)	ug/kg	167	110	66	40-106	
Tetrachloro-m-xylene (S)	%.			60	30-106	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1167285 1167286

Parameter	Units	50104622011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
PCB-1016 (Aroclor 1016)	ug/kg	ND	819	826	481J	396J	59	48	10-145		20	
PCB-1260 (Aroclor 1260)	ug/kg	ND	819	826	464J	391J	57	47	16-132		20	
Tetrachloro-m-xylene (S)	%.						69	60	30-106			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: OEXT/37143

Analysis Method: EPA 8082

QC Batch Method: EPA 3546

Analysis Description: 8082 GCS PCB

Associated Lab Samples: 50104622009

METHOD BLANK: 1169941

Matrix: Solid

Associated Lab Samples: 50104622009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
PCB-1016 (Aroclor 1016)	ug/kg	ND	100	10/15/14 01:38	
PCB-1221 (Aroclor 1221)	ug/kg	ND	100	10/15/14 01:38	
PCB-1232 (Aroclor 1232)	ug/kg	ND	100	10/15/14 01:38	
PCB-1242 (Aroclor 1242)	ug/kg	ND	100	10/15/14 01:38	
PCB-1248 (Aroclor 1248)	ug/kg	ND	100	10/15/14 01:38	
PCB-1254 (Aroclor 1254)	ug/kg	ND	100	10/15/14 01:38	
PCB-1260 (Aroclor 1260)	ug/kg	ND	100	10/15/14 01:38	
Tetrachloro-m-xylene (S)	%.	70	30-106	10/15/14 01:38	

LABORATORY CONTROL SAMPLE: 1169942

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
PCB-1016 (Aroclor 1016)	ug/kg	167	121	72	42-100	
PCB-1260 (Aroclor 1260)	ug/kg	167	130	78	40-106	
Tetrachloro-m-xylene (S)	%.			69	30-106	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1169943 1169944

Parameter	Units	50105007004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
PCB-1016 (Aroclor 1016)	ug/kg	ND	183	184	123	129	67	70	10-145	5	20	
PCB-1260 (Aroclor 1260)	ug/kg	ND	183	184	127	133	69	72	16-132	5	20	
Tetrachloro-m-xylene (S)	%.						71	74	30-106			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: OEXT/37103

Analysis Method: EPA 8082

QC Batch Method: EPA 3510

Analysis Description: 8082 GCS PCB Mod

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

METHOD BLANK: 1167634

Matrix: Water

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
PCB-1016 (Aroclor 1016)	ug/L	ND	0.50	10/06/14 14:47	
PCB-1221 (Aroclor 1221)	ug/L	ND	0.50	10/06/14 14:47	
PCB-1232 (Aroclor 1232)	ug/L	ND	0.50	10/06/14 14:47	
PCB-1242 (Aroclor 1242)	ug/L	ND	0.50	10/06/14 14:47	
PCB-1248 (Aroclor 1248)	ug/L	ND	0.50	10/06/14 14:47	
PCB-1254 (Aroclor 1254)	ug/L	ND	0.50	10/06/14 14:47	
PCB-1260 (Aroclor 1260)	ug/L	ND	0.50	10/06/14 14:47	
Tetrachloro-m-xylene (S)	%.	65	32-115	10/06/14 14:47	

LABORATORY CONTROL SAMPLE: 1167635

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
PCB-1016 (Aroclor 1016)	ug/L	5	3.3	67	50-114	
PCB-1260 (Aroclor 1260)	ug/L	5	3.7	74	44-120	
Tetrachloro-m-xylene (S)	%.			62	32-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1167636 1167637

Parameter	Units	50104622005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
PCB-1016 (Aroclor 1016)	ug/L	ND	10	10	7.5	7.7	75	77	41-124	2	20	
PCB-1260 (Aroclor 1260)	ug/L	ND	10	10	7.3	7.6	73	76	34-127	4	20	
Tetrachloro-m-xylene (S)	%.						78	84	32-115			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch:	OEXT/3061	Analysis Method:	EPA 8151
QC Batch Method:	EPA 3546	Analysis Description:	8151 GCS Herbicides
Associated Lab Samples:	50104622007, 50104622008, 50104622009, 50104622010, 50104622011, 50104622012		

METHOD BLANK: 60466

Matrix: Solid

Associated Lab Samples: 50104622007, 50104622008, 50104622009, 50104622010, 50104622011, 50104622012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
2,4,5-T	ug/kg	ND	66.7	10/14/14 15:46	
2,4,5-TP (Silvex)	ug/kg	ND	66.7	10/14/14 15:46	
2,4-D	ug/kg	ND	66.7	10/14/14 15:46	
2,4-DCAA (S)	%.	60	10-161	10/14/14 15:46	
2,4-DCAA (S)	%.	77	10-161	10/14/14 15:46	

LABORATORY CONTROL SAMPLE: 60467

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
2,4,5-T	ug/kg	66.7	44.3J	66	13-174	
2,4,5-TP (Silvex)	ug/kg	66.7	51.2J	77	17-173	
2,4-D	ug/kg	667	467	70	14-171	
2,4-DCAA (S)	%.			80	10-161	
2,4-DCAA (S)	%.			94	10-161	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 60468

60469

Parameter	Units	50104622011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
2,4,5-T	ug/kg	ND	65.5	66.1	45J	ND	50	9	10-210		20	M1
2,4,5-TP (Silvex)	ug/kg	ND	65.5	66.1	52.8J	ND	76	10	10-175		20	
2,4-D	ug/kg	ND	655	661	517	147	78	22	10-174	111	20	R1
2,4-DCAA (S)	%.						115	50	10-161			
2,4-DCAA (S)	%.						78	54	10-161			

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 60470

60471

Parameter	Units	2010611007 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
2,4,5-T	ug/kg	ND	64.9	66.2	40.1J	56.8J	62	86	10-210		20	
2,4,5-TP (Silvex)	ug/kg	ND	64.9	66.2	47J	68.6	72	103	10-175		20	
2,4-D	ug/kg	ND	649	662	449	648	69	98	10-174	36	20	R1
2,4-DCAA (S)	%.						96	96	10-161			
2,4-DCAA (S)	%.						91	102	10-161			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: OEXT/3030

Analysis Method: EPA 8151

QC Batch Method: EPA 3535A

Analysis Description: 8151A GCS Herbicides

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

METHOD BLANK: 59440

Matrix: Water

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
2,4,5-T	ug/L	ND	2.0	10/09/14 15:28	
2,4,5-TP (Silvex)	ug/L	ND	2.0	10/09/14 15:28	
2,4-D	ug/L	ND	2.0	10/09/14 15:28	
2,4-DCAA (S)	%.	65	10-166	10/09/14 15:28	
2,4-DCAA (S)	%.	69	10-166	10/09/14 15:28	

LABORATORY CONTROL SAMPLE: 59441

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
2,4,5-T	ug/L	2	1.4J	70	10-169	
2,4,5-TP (Silvex)	ug/L	2	1.5J	75	22-158	
2,4-D	ug/L	20	13.6	68	10-151	
2,4-DCAA (S)	%.			71	10-166	
2,4-DCAA (S)	%.			74	10-166	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 59442

59443

Parameter	Units	50104622005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
2,4,5-T	ug/L	ND	2	2	1.1J	1.3J	56	66	10-168		20	
2,4,5-TP (Silvex)	ug/L	ND	2	2	1.2J	1.4J	62	71	16-164		20	
2,4-D	ug/L	ND	20	20	12.1	12.6	60	63	10-160	4	20	
2,4-DCAA (S)	%.						65	67	10-166			
2,4-DCAA (S)	%.						60	64	10-166			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: OEXT/37093 Analysis Method: EPA 8270 by SIM  
QC Batch Method: EPA 3546 Analysis Description: 8270 MSSV PAH by SIM  
Associated Lab Samples: 50104622007, 50104622008, 50104622009, 50104622010, 50104622011

METHOD BLANK: 1167273 Matrix: Solid  
Associated Lab Samples: 50104622007, 50104622008, 50104622009, 50104622010, 50104622011

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1-Methylnaphthalene	ug/kg	ND	5.0	10/04/14 10:50	
2-Methylnaphthalene	ug/kg	ND	5.0	10/04/14 10:50	
Acenaphthene	ug/kg	ND	5.0	10/04/14 10:50	
Acenaphthylene	ug/kg	ND	5.0	10/04/14 10:50	
Anthracene	ug/kg	ND	5.0	10/04/14 10:50	
Benzo(a)anthracene	ug/kg	ND	5.0	10/04/14 10:50	
Benzo(a)pyrene	ug/kg	ND	5.0	10/04/14 10:50	
Benzo(b)fluoranthene	ug/kg	ND	5.0	10/04/14 10:50	
Benzo(g,h,i)perylene	ug/kg	ND	5.0	10/04/14 10:50	
Benzo(k)fluoranthene	ug/kg	ND	5.0	10/04/14 10:50	
Chrysene	ug/kg	ND	5.0	10/04/14 10:50	
Dibenz(a,h)anthracene	ug/kg	ND	5.0	10/04/14 10:50	
Fluoranthene	ug/kg	ND	5.0	10/04/14 10:50	
Fluorene	ug/kg	ND	5.0	10/04/14 10:50	
Indeno(1,2,3-cd)pyrene	ug/kg	ND	5.0	10/04/14 10:50	
Naphthalene	ug/kg	ND	5.0	10/04/14 10:50	
Phenanthrene	ug/kg	ND	5.0	10/04/14 10:50	
Pyrene	ug/kg	ND	5.0	10/04/14 10:50	
2-Fluorobiphenyl (S)	%	87	38-110	10/04/14 10:50	
p-Terphenyl-d14 (S)	%	91	32-111	10/04/14 10:50	

LABORATORY CONTROL SAMPLE: 1167274

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1-Methylnaphthalene	ug/kg	333	263	79	40-102	
2-Methylnaphthalene	ug/kg	333	246	74	39-104	
Acenaphthene	ug/kg	333	261	78	43-108	
Acenaphthylene	ug/kg	333	257	77	44-110	
Anthracene	ug/kg	333	290	87	44-112	
Benzo(a)anthracene	ug/kg	333	308	92	43-124	
Benzo(a)pyrene	ug/kg	333	293	88	44-124	
Benzo(b)fluoranthene	ug/kg	333	274	82	44-123	
Benzo(g,h,i)perylene	ug/kg	333	285	86	44-118	
Benzo(k)fluoranthene	ug/kg	333	293	88	42-122	
Chrysene	ug/kg	333	322	97	44-124	
Dibenz(a,h)anthracene	ug/kg	333	293	88	44-119	
Fluoranthene	ug/kg	333	291	87	45-119	
Fluorene	ug/kg	333	270	81	44-113	
Indeno(1,2,3-cd)pyrene	ug/kg	333	283	85	44-119	
Naphthalene	ug/kg	333	243	73	42-103	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

LABORATORY CONTROL SAMPLE: 1167274

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phenanthrene	ug/kg	333	276	83	44-113	
Pyrene	ug/kg	333	303	91	45-123	
2-Fluorobiphenyl (S)	%.			75	38-110	
p-Terphenyl-d14 (S)	%.			87	32-111	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1167275 1167276

Parameter	Units	50104622011 Result	MS	MSD	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	RPD	Qual
			Spike Conc.	Spike Conc.								
1-Methylnaphthalene	ug/kg	ND	1700	1650	1060	1190	62	72	20-116	11	20	
2-Methylnaphthalene	ug/kg	ND	1700	1650	980	1090	58	66	10-131	11	20	
Acenaphthene	ug/kg	ND	1700	1650	1060	1130	62	68	25-117	7	20	
Acenaphthylene	ug/kg	ND	1700	1650	1050	1120	62	68	27-123	6	20	
Anthracene	ug/kg	ND	1700	1650	1160	1270	67	76	20-123	10	20	
Benzo(a)anthracene	ug/kg	119	1700	1650	1220	1440	65	80	23-124	16	20	
Benzo(a)pyrene	ug/kg	158	1700	1650	1150	1360	59	73	23-120	16	20	
Benzo(b)fluoranthene	ug/kg	211	1700	1650	1250	1450	61	75	24-117	15	20	
Benzo(g,h,i)perylene	ug/kg	147	1700	1650	1090	1300	55	70	12-122	18	20	
Benzo(k)fluoranthene	ug/kg	157	1700	1650	1080	1240	54	66	14-123	14	20	
Chrysene	ug/kg	203	1700	1650	1300	1490	64	78	22-124	14	20	
Dibenz(a,h)anthracene	ug/kg	65.2	1700	1650	1090	1280	60	73	26-113	16	20	
Fluoranthene	ug/kg	384	1700	1650	1360	1500	57	68	21-125	10	20	
Fluorene	ug/kg	ND	1700	1650	1110	1180	65	71	19-127	6	20	
Indeno(1,2,3-cd)pyrene	ug/kg	129	1700	1650	1090	1290	57	70	15-121	17	20	
Naphthalene	ug/kg	ND	1700	1650	998	1080	59	66	15-125	8	20	
Phenanthrene	ug/kg	133	1700	1650	1210	1340	63	73	10-139	10	20	
Pyrene	ug/kg	295	1700	1650	1360	1560	63	76	17-132	13	20	
2-Fluorobiphenyl (S)	%.						67	63	38-110			
p-Terphenyl-d14 (S)	%.						81	68	32-111			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: OEXT/37122

Analysis Method: EPA 8270 by SIM

QC Batch Method: EPA 3546

Analysis Description: 8270 MSSV PAH by SIM

Associated Lab Samples: 50104622012

METHOD BLANK: 1168756

Matrix: Solid

Associated Lab Samples: 50104622012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1-Methylnaphthalene	ug/kg	ND	5.0	10/09/14 04:44	
2-Methylnaphthalene	ug/kg	ND	5.0	10/09/14 04:44	
Acenaphthene	ug/kg	ND	5.0	10/09/14 04:44	
Acenaphthylene	ug/kg	ND	5.0	10/09/14 04:44	
Anthracene	ug/kg	ND	5.0	10/09/14 04:44	
Benzo(a)anthracene	ug/kg	ND	5.0	10/09/14 04:44	
Benzo(a)pyrene	ug/kg	ND	5.0	10/09/14 04:44	
Benzo(b)fluoranthene	ug/kg	ND	5.0	10/09/14 04:44	
Benzo(g,h,i)perylene	ug/kg	ND	5.0	10/09/14 04:44	
Benzo(k)fluoranthene	ug/kg	ND	5.0	10/09/14 04:44	
Chrysene	ug/kg	ND	5.0	10/09/14 04:44	
Dibenz(a,h)anthracene	ug/kg	ND	5.0	10/09/14 04:44	
Fluoranthene	ug/kg	ND	5.0	10/09/14 04:44	
Fluorene	ug/kg	ND	5.0	10/09/14 04:44	
Indeno(1,2,3-cd)pyrene	ug/kg	ND	5.0	10/09/14 04:44	
Naphthalene	ug/kg	ND	5.0	10/09/14 04:44	
Phenanthrene	ug/kg	ND	5.0	10/09/14 04:44	
Pyrene	ug/kg	ND	5.0	10/09/14 04:44	
2-Fluorobiphenyl (S)	%	72	38-110	10/09/14 04:44	
p-Terphenyl-d14 (S)	%	81	32-111	10/09/14 04:44	

LABORATORY CONTROL SAMPLE: 1168757

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1-Methylnaphthalene	ug/kg	333	252	76	40-102	
2-Methylnaphthalene	ug/kg	333	235	70	39-104	
Acenaphthene	ug/kg	333	251	75	43-108	
Acenaphthylene	ug/kg	333	252	76	44-110	
Anthracene	ug/kg	333	279	84	44-112	
Benzo(a)anthracene	ug/kg	333	290	87	43-124	
Benzo(a)pyrene	ug/kg	333	233	70	44-124	
Benzo(b)fluoranthene	ug/kg	333	234	70	44-123	
Benzo(g,h,i)perylene	ug/kg	333	226	68	44-118	
Benzo(k)fluoranthene	ug/kg	333	222	67	42-122	
Chrysene	ug/kg	333	291	87	44-124	
Dibenz(a,h)anthracene	ug/kg	333	234	70	44-119	
Fluoranthene	ug/kg	333	279	84	45-119	
Fluorene	ug/kg	333	261	78	44-113	
Indeno(1,2,3-cd)pyrene	ug/kg	333	224	67	44-119	
Naphthalene	ug/kg	333	230	69	42-103	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

LABORATORY CONTROL SAMPLE: 1168757

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phenanthrene	ug/kg	333	275	82	44-113	
Pyrene	ug/kg	333	287	86	45-123	
2-Fluorobiphenyl (S)	%.			77	38-110	
p-Terphenyl-d14 (S)	%.			88	32-111	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1168758 1168759

Parameter	Units	50104773014	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		Result	Conc.	Conc.	Result	Result	% Rec	% Rec	Limits			
1-Methylnaphthalene	ug/kg	662	366	366	973	1030	85	102	20-116	6	20	
2-Methylnaphthalene	ug/kg	1350	366	366	1660	1780	85	116	10-131	7	20	
Acenaphthene	ug/kg	ND	366	366	300	312	81	84	25-117	4	20	
Acenaphthylene	ug/kg	ND	366	366	290	303	79	83	27-123	4	20	
Anthracene	ug/kg	ND	366	366	312	323	85	88	20-123	3	20	
Benzo(a)anthracene	ug/kg	ND	366	366	326	344	89	94	23-124	5	20	
Benzo(a)pyrene	ug/kg	ND	366	366	260	272	71	74	23-120	4	20	
Benzo(b)fluoranthene	ug/kg	ND	366	366	268	285	73	78	24-117	6	20	
Benzo(g,h,i)perylene	ug/kg	ND	366	366	248	259	68	71	12-122	5	20	
Benzo(k)fluoranthene	ug/kg	ND	366	366	242	253	66	69	14-123	5	20	
Chrysene	ug/kg	ND	366	366	332	349	91	95	22-124	5	20	
Dibenz(a,h)anthracene	ug/kg	ND	366	366	257	270	70	74	26-113	5	20	
Fluoranthene	ug/kg	ND	366	366	318	332	87	91	21-125	4	20	
Fluorene	ug/kg	ND	366	366	313	323	84	87	19-127	3	20	
Indeno(1,2,3-cd)pyrene	ug/kg	ND	366	366	247	259	67	71	15-121	5	20	
Naphthalene	ug/kg	1770	366	366	2030	2180	71	111	15-125	7	20	E
Phenanthrene	ug/kg	7.6	366	366	325	341	87	91	10-139	5	20	
Pyrene	ug/kg	ND	366	366	331	347	90	94	17-132	5	20	
2-Fluorobiphenyl (S)	%.						81	83	38-110			
p-Terphenyl-d14 (S)	%.						89	93	32-111			

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1171979 1171980

Parameter	Units	50104683008	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		Result	Conc.	Conc.	Result	Result	% Rec	% Rec	Limits			
1-Methylnaphthalene	ug/kg	ND	406	402	288	299	71	74	20-116	4	20	
2-Methylnaphthalene	ug/kg	ND	406	402	244	259	60	64	10-131	6	20	
Acenaphthene	ug/kg	ND	406	402	244	267	60	66	25-117	9	20	
Acenaphthylene	ug/kg	ND	406	402	236	265	58	66	27-123	11	20	
Anthracene	ug/kg	ND	406	402	253	274	62	68	20-123	8	20	
Benzo(a)anthracene	ug/kg	ND	406	402	257	275	60	65	23-124	7	20	
Benzo(a)pyrene	ug/kg	ND	406	402	214	229	49	53	23-120	7	20	
Benzo(b)fluoranthene	ug/kg	ND	406	402	222	227	55	56	24-117	2	20	
Benzo(g,h,i)perylene	ug/kg	ND	406	402	200	213	45	49	12-122	6	20	
Benzo(k)fluoranthene	ug/kg	ND	406	402	204	227	50	56	14-123	11	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1171979											
1171980											
Parameter	Units	50104683008 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	Qual
Chrysene	ug/kg	ND	406	402	260	282	59	65	22-124	8	20
Dibenz(a,h)anthracene	ug/kg	ND	406	402	209	222	51	55	26-113	6	20
Fluoranthene	ug/kg	ND	406	402	284	299	63	67	21-125	5	20
Fluorene	ug/kg	ND	406	402	246	280	61	70	19-127	13	20
Indeno(1,2,3-cd)pyrene	ug/kg	ND	406	402	210	220	49	52	15-121	5	20
Naphthalene	ug/kg	ND	406	402	236	249	58	62	15-125	5	20 1d
Phenanthrene	ug/kg	ND	406	402	278	296	62	67	10-139	6	20
Pyrene	ug/kg	ND	406	402	279	298	63	68	17-132	7	20
2-Fluorobiphenyl (S)	%						62	67	38-110		
p-Terphenyl-d14 (S)	%						65	65	32-111		

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1171981											
1171982											
Parameter	Units	50104726009 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	Qual
1-Methylnaphthalene	ug/kg	ND	418	417	300	291	72	70	20-116	3	20
2-Methylnaphthalene	ug/kg	ND	418	417	282	272	67	65	10-131	4	20
Acenaphthene	ug/kg	ND	418	417	298	293	71	70	25-117	2	20
Acenaphthylene	ug/kg	ND	418	417	292	286	70	68	27-123	2	20
Anthracene	ug/kg	ND	418	417	311	312	74	75	20-123	0	20
Benzo(a)anthracene	ug/kg	ND	418	417	312	317	75	76	23-124	1	20
Benzo(a)pyrene	ug/kg	ND	418	417	243	250	58	60	23-120	3	20
Benzo(b)fluoranthene	ug/kg	ND	418	417	235	244	56	58	24-117	4	20
Benzo(g,h,i)perylene	ug/kg	ND	418	417	225	242	54	58	12-122	7	20
Benzo(k)fluoranthene	ug/kg	ND	418	417	236	247	56	59	14-123	4	20
Chrysene	ug/kg	ND	418	417	325	336	78	81	22-124	3	20
Dibenz(a,h)anthracene	ug/kg	ND	418	417	246	262	59	63	26-113	6	20
Fluoranthene	ug/kg	ND	418	417	306	307	73	74	21-125	0	20
Fluorene	ug/kg	ND	418	417	305	304	73	73	19-127	0	20
Indeno(1,2,3-cd)pyrene	ug/kg	ND	418	417	228	236	54	56	15-121	3	20
Naphthalene	ug/kg	ND	418	417	279	277	67	66	15-125	1	20
Phenanthrene	ug/kg	ND	418	417	319	317	76	76	10-139	1	20
Pyrene	ug/kg	ND	418	417	315	316	74	75	17-132	0	20
2-Fluorobiphenyl (S)	%						74	73	38-110		
p-Terphenyl-d14 (S)	%						77	78	32-111		

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: OEXT/37109

Analysis Method: EPA 8270

QC Batch Method: EPA 3546

Analysis Description: 8270 Solid MSSV Microwave Short Spike

Associated Lab Samples: 50104622007, 50104622008, 50104622009, 50104622010, 50104622011, 50104622012

METHOD BLANK: 1168277

Matrix: Solid

Associated Lab Samples: 50104622007, 50104622008, 50104622009, 50104622010, 50104622011, 50104622012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
2,4,5-Trichlorophenol	ug/kg	ND	330	10/06/14 22:51	
2,4,6-Trichlorophenol	ug/kg	ND	330	10/06/14 22:51	
2,4-Dichlorophenol	ug/kg	ND	330	10/06/14 22:51	
2,4-Dimethylphenol	ug/kg	ND	330	10/06/14 22:51	
2,4-Dinitrophenol	ug/kg	ND	1600	10/06/14 22:51	
2,4-Dinitrotoluene	ug/kg	ND	330	10/06/14 22:51	
2,6-Dinitrotoluene	ug/kg	ND	330	10/06/14 22:51	
2-Chloronaphthalene	ug/kg	ND	330	10/06/14 22:51	
2-Chlorophenol	ug/kg	ND	330	10/06/14 22:51	
2-Methylphenol(o-Cresol)	ug/kg	ND	330	10/06/14 22:51	
2-Nitroaniline	ug/kg	ND	1600	10/06/14 22:51	
2-Nitrophenol	ug/kg	ND	330	10/06/14 22:51	
3&4-Methylphenol(m&p Cresol)	ug/kg	ND	660	10/06/14 22:51	
3,3'-Dichlorobenzidine	ug/kg	ND	660	10/06/14 22:51	
3-Nitroaniline	ug/kg	ND	1600	10/06/14 22:51	
4,6-Dinitro-2-methylphenol	ug/kg	ND	1600	10/06/14 22:51	
4-Bromophenylphenyl ether	ug/kg	ND	330	10/06/14 22:51	
4-Chloro-3-methylphenol	ug/kg	ND	660	10/06/14 22:51	
4-Chloroaniline	ug/kg	ND	660	10/06/14 22:51	
4-Chlorophenylphenyl ether	ug/kg	ND	330	10/06/14 22:51	
4-Nitroaniline	ug/kg	ND	1600	10/06/14 22:51	
4-Nitrophenol	ug/kg	ND	1600	10/06/14 22:51	
Benzyl alcohol	ug/kg	ND	660	10/06/14 22:51	
bis(2-Chloroethoxy)methane	ug/kg	ND	330	10/06/14 22:51	
bis(2-Chloroethyl) ether	ug/kg	ND	330	10/06/14 22:51	
bis(2-Ethylhexyl)phthalate	ug/kg	ND	330	10/06/14 22:51	
bis(2chloro1methylethyl) ether	ug/kg	ND	330	10/06/14 22:51	
Butylbenzylphthalate	ug/kg	ND	330	10/06/14 22:51	
Di-n-butylphthalate	ug/kg	ND	330	10/06/14 22:51	
Di-n-octylphthalate	ug/kg	ND	330	10/06/14 22:51	
Dibenzofuran	ug/kg	ND	330	10/06/14 22:51	
Diethylphthalate	ug/kg	ND	330	10/06/14 22:51	
Dimethylphthalate	ug/kg	ND	330	10/06/14 22:51	
Hexachloro-1,3-butadiene	ug/kg	ND	330	10/06/14 22:51	
Hexachlorobenzene	ug/kg	ND	330	10/06/14 22:51	
Hexachlorocyclopentadiene	ug/kg	ND	330	10/06/14 22:51	
Hexachloroethane	ug/kg	ND	330	10/06/14 22:51	
Isophorone	ug/kg	ND	330	10/06/14 22:51	
N-Nitroso-di-n-propylamine	ug/kg	ND	330	10/06/14 22:51	
N-Nitrosodiphenylamine	ug/kg	ND	330	10/06/14 22:51	
Nitrobenzene	ug/kg	ND	330	10/06/14 22:51	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

METHOD BLANK: 1168277

Matrix: Solid

Associated Lab Samples: 50104622007, 50104622008, 50104622009, 50104622010, 50104622011, 50104622012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Pentachlorophenol	ug/kg	ND	1600	10/06/14 22:51	
Phenol	ug/kg	ND	330	10/06/14 22:51	
2,4,6-Tribromophenol (S)	%.	92	16-122	10/06/14 22:51	
2-Fluorobiphenyl (S)	%.	82	31-94	10/06/14 22:51	
2-Fluorophenol (S)	%.	82	24-104	10/06/14 22:51	
Nitrobenzene-d5 (S)	%.	82	28-101	10/06/14 22:51	
p-Terphenyl-d14 (S)	%.	103	26-110	10/06/14 22:51	
Phenol-d5 (S)	%.	76	28-101	10/06/14 22:51	

LABORATORY CONTROL SAMPLE: 1168278

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
2,4-Dinitrotoluene	ug/kg	3330	2750	82	39-103	
2-Chlorophenol	ug/kg	3330	2770	83	38-96	
4-Chloro-3-methylphenol	ug/kg	3330	2900	87	38-104	
4-Nitrophenol	ug/kg	3330	2890	87	34-104	
N-Nitroso-di-n-propylamine	ug/kg	3330	2600	78	37-96	
Pentachlorophenol	ug/kg	3330	2660	80	21-103	
Phenol	ug/kg	3330	2750	82	37-101	
2,4,6-Tribromophenol (S)	%.			93	16-122	
2-Fluorobiphenyl (S)	%.			81	31-94	
2-Fluorophenol (S)	%.			85	24-104	
Nitrobenzene-d5 (S)	%.			82	28-101	
p-Terphenyl-d14 (S)	%.			95	26-110	
Phenol-d5 (S)	%.			79	28-101	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1168279

1168280

Parameter	Units	50104622011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	Qual
2,4-Dinitrotoluene	ug/kg	ND	5670	5670	2340	2890	41	51	15-102	21	R1
2-Chlorophenol	ug/kg	ND	5670	5670	2810	3910	49	69	22-96	33	R1
4-Chloro-3-methylphenol	ug/kg	ND	5670	5670	3790	4200	67	74	21-105	10	
4-Nitrophenol	ug/kg	ND	5670	5670	4010	4050	71	71	12-107	1	
N-Nitroso-di-n-propylamine	ug/kg	ND	5670	5670	2830	3800	50	67	18-103	29	R1
Pentachlorophenol	ug/kg	ND	5670	5670	3430	4130	60	73	10-100	18	
Phenol	ug/kg	ND	5670	5670	2850	3780	50	67	22-97	28	R1
2,4,6-Tribromophenol (S)	%.						73	75	16-122		
2-Fluorobiphenyl (S)	%.						61	74	31-94		
2-Fluorophenol (S)	%.						50	68	24-104		
Nitrobenzene-d5 (S)	%.						48	63	26-98		
p-Terphenyl-d14 (S)	%.						74	74	26-110		

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1168279 1168280											
Parameter	Units	50104622011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	Qual
Phenol-d5 (S)	%.						52	64	28-101		

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1168827 1168828											
Parameter	Units	50104634009 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	Qual
2,4-Dinitrotoluene	ug/kg	ND	33400	33400	23700	25800	71	77	15-102	8	20
2-Chlorophenol	ug/kg	ND	33400	33400	21600	24100	65	72	22-96	11	20
4-Chloro-3-methylphenol	ug/kg	ND	33400	33400	25400	28000	76	84	21-105	10	20
4-Nitrophenol	ug/kg	ND	33400	33400	28400	30100	85	90	12-107	6	20
N-Nitroso-di-n-propylamine	ug/kg	ND	33400	33400	19700	22400	59	67	18-103	13	20
Pentachlorophenol	ug/kg	ND	33400	33400	19700	21500	59	64	10-100	9	20
Phenol	ug/kg	ND	33400	33400	21400	24000	64	72	22-97	11	20
2,4,6-Tribromophenol (S)	%.						80	87	16-122		
2-Fluorobiphenyl (S)	%.						69	79	31-94		
2-Fluorophenol (S)	%.						63	73	24-104		
Nitrobenzene-d5 (S)	%.						63	72	26-98		
p-Terphenyl-d14 (S)	%.						90	98	26-110		
Phenol-d5 (S)	%.						61	69	28-101		

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: OEXT/37098

Analysis Method: EPA 8270 by SIM

QC Batch Method: EPA 3510

Analysis Description: 8270 Water PAH

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

METHOD BLANK: 1167292

Matrix: Water

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1-Methylnaphthalene	ug/L	ND	1.0	10/03/14 22:49	
2-Methylnaphthalene	ug/L	ND	1.0	10/03/14 22:49	
Acenaphthene	ug/L	ND	1.0	10/03/14 22:49	
Acenaphthylene	ug/L	ND	1.0	10/03/14 22:49	
Anthracene	ug/L	ND	0.10	10/03/14 22:49	
Benzo(a)anthracene	ug/L	ND	0.10	10/03/14 22:49	
Benzo(a)pyrene	ug/L	ND	0.10	10/03/14 22:49	
Benzo(b)fluoranthene	ug/L	ND	0.10	10/03/14 22:49	
Benzo(g,h,i)perylene	ug/L	ND	0.10	10/03/14 22:49	
Benzo(k)fluoranthene	ug/L	ND	0.10	10/03/14 22:49	
Chrysene	ug/L	ND	0.50	10/03/14 22:49	
Dibenz(a,h)anthracene	ug/L	ND	0.10	10/03/14 22:49	
Fluoranthene	ug/L	ND	1.0	10/03/14 22:49	
Fluorene	ug/L	ND	1.0	10/03/14 22:49	
Indeno(1,2,3-cd)pyrene	ug/L	ND	0.10	10/03/14 22:49	
Naphthalene	ug/L	ND	1.0	10/03/14 22:49	
Phenanthrene	ug/L	ND	1.0	10/03/14 22:49	
Pyrene	ug/L	ND	1.0	10/03/14 22:49	
2-Fluorobiphenyl (S)	%	74	21-114	10/03/14 22:49	
p-Terphenyl-d14 (S)	%	82	25-131	10/03/14 22:49	

LABORATORY CONTROL SAMPLE: 1167293

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1-Methylnaphthalene	ug/L	10	8.7	87	29-112	
2-Methylnaphthalene	ug/L	10	8.4	84	29-110	
Acenaphthene	ug/L	10	8.5	85	39-117	
Acenaphthylene	ug/L	10	8.7	87	40-120	
Anthracene	ug/L	10	9.6	96	48-126	
Benzo(a)anthracene	ug/L	10	9.8	98	51-134	
Benzo(a)pyrene	ug/L	10	7.8	78	48-141	
Benzo(b)fluoranthene	ug/L	10	8.1	81	49-139	
Benzo(g,h,i)perylene	ug/L	10	6.7	67	44-134	
Benzo(k)fluoranthene	ug/L	10	7.4	74	48-140	
Chrysene	ug/L	10	9.9	99	53-136	
Dibenz(a,h)anthracene	ug/L	10	6.9	69	44-132	
Fluoranthene	ug/L	10	9.8	98	50-135	
Fluorene	ug/L	10	8.8	88	44-124	
Indeno(1,2,3-cd)pyrene	ug/L	10	6.8	68	45-132	
Naphthalene	ug/L	10	8.2	82	30-112	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

LABORATORY CONTROL SAMPLE: 1167293

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phenanthrene	ug/L	10	9.7	97	47-128	
Pyrene	ug/L	10	10.3	103	50-134	
2-Fluorobiphenyl (S)	%			73	21-114	
p-Terphenyl-d14 (S)	%			83	25-131	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1167294 1167295

Parameter	Units	50104622005		MS		MSD		MS		MSD		MS		MSD		% Rec		Max		Qual
		Result	Conc.	Spike Conc.	Conc.	Result	Conc.	Result	Conc.	Result	Conc.	% Rec	% Rec	% Rec	% Rec	Limits	RPD	RPD	RPD	
1-Methylnaphthalene	ug/L	ND	20.8	20.8	20.8	19.0	18.3	91	88	10-135	4	20								
2-Methylnaphthalene	ug/L	ND	20.8	20.8	20.8	18.3	17.8	88	85	16-116	3	20								
Acenaphthene	ug/L	ND	20.8	20.8	20.8	18.2	18.0	87	86	28-116	1	20								
Acenaphthylene	ug/L	ND	20.8	20.8	20.8	18.6	18.3	89	88	34-115	2	20								
Anthracene	ug/L	ND	20.8	20.8	20.8	19.0	18.1	91	87	39-121	5	20								
Benzo(a)anthracene	ug/L	ND	20.8	20.8	20.8	17.8	17.6	86	85	31-127	1	20								
Benzo(a)pyrene	ug/L	ND	20.8	20.8	20.8	13.8	13.6	66	65	10-121	1	20								
Benzo(b)fluoranthene	ug/L	ND	20.8	20.8	20.8	14.7	14.3	71	69	10-119	3	20								
Benzo(g,h,i)perylene	ug/L	ND	20.8	20.8	20.8	13.1	12.9	63	62	10-108	1	20								
Benzo(k)fluoranthene	ug/L	ND	20.8	20.8	20.8	14.1	14.3	68	69	10-118	2	20								
Chrysene	ug/L	ND	20.8	20.8	20.8	18.3	18.3	88	88	32-127	0	20								
Dibenz(a,h)anthracene	ug/L	ND	20.8	20.8	20.8	13.5	13.2	65	63	10-104	2	20								
Fluoranthene	ug/L	ND	20.8	20.8	20.8	20.2	19.3	97	93	38-131	4	20								
Fluorene	ug/L	ND	20.8	20.8	20.8	18.9	18.8	91	90	33-121	1	20								
Indeno(1,2,3-cd)pyrene	ug/L	ND	20.8	20.8	20.8	13.2	13.0	63	62	10-108	2	20								
Naphthalene	ug/L	ND	20.8	20.8	20.8	17.6	16.9	84	81	16-119	4	20								
Phenanthrene	ug/L	ND	20.8	20.8	20.8	20.4	19.8	98	95	32-130	3	20								
Pyrene	ug/L	ND	20.8	20.8	20.8	20.5	19.4	98	93	39-131	5	20								
2-Fluorobiphenyl (S)	%							76	76	21-114										
p-Terphenyl-d14 (S)	%							74	73	25-131										

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: OEXT/37097

Analysis Method: EPA 8270

QC Batch Method: EPA 3510

Analysis Description: 8270 Water Scan

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

METHOD BLANK: 1167288

Matrix: Water

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
2,4,5-Trichlorophenol	ug/L	ND	10.0	10/04/14 19:07	
2,4,6-Trichlorophenol	ug/L	ND	10.0	10/04/14 19:07	
2,4-Dichlorophenol	ug/L	ND	10.0	10/04/14 19:07	
2,4-Dimethylphenol	ug/L	ND	10.0	10/04/14 19:07	
2,4-Dinitrophenol	ug/L	ND	50.0	10/04/14 19:07	
2,4-Dinitrotoluene	ug/L	ND	10.0	10/04/14 19:07	
2,6-Dinitrotoluene	ug/L	ND	10.0	10/04/14 19:07	
2-Chloronaphthalene	ug/L	ND	10.0	10/04/14 19:07	
2-Chlorophenol	ug/L	ND	10.0	10/04/14 19:07	
2-Methylphenol(o-Cresol)	ug/L	ND	10.0	10/04/14 19:07	
2-Nitroaniline	ug/L	ND	50.0	10/04/14 19:07	
2-Nitrophenol	ug/L	ND	10.0	10/04/14 19:07	
3&4-Methylphenol(m&p Cresol)	ug/L	ND	20.0	10/04/14 19:07	
3,3'-Dichlorobenzidine	ug/L	ND	20.0	10/04/14 19:07	
3-Nitroaniline	ug/L	ND	50.0	10/04/14 19:07	
4,6-Dinitro-2-methylphenol	ug/L	ND	50.0	10/04/14 19:07	
4-Bromophenylphenyl ether	ug/L	ND	10.0	10/04/14 19:07	
4-Chloro-3-methylphenol	ug/L	ND	20.0	10/04/14 19:07	
4-Chloroaniline	ug/L	ND	20.0	10/04/14 19:07	
4-Chlorophenylphenyl ether	ug/L	ND	10.0	10/04/14 19:07	
4-Nitroaniline	ug/L	ND	50.0	10/04/14 19:07	
4-Nitrophenol	ug/L	ND	50.0	10/04/14 19:07	
Benzyl alcohol	ug/L	ND	20.0	10/04/14 19:07	
bis(2-Chloroethoxy)methane	ug/L	ND	10.0	10/04/14 19:07	
bis(2-Chloroethyl) ether	ug/L	ND	10.0	10/04/14 19:07	
bis(2-Chloroisopropyl) ether	ug/L	ND	5.0	10/04/14 19:07	
bis(2-Ethylhexyl)phthalate	ug/L	ND	5.0	10/04/14 19:07	
bis(2chloro1 methylethyl) ether	ug/L	ND	5.0	10/04/14 19:07	
Butylbenzylphthalate	ug/L	ND	10.0	10/04/14 19:07	
Di-n-butylphthalate	ug/L	ND	10.0	10/04/14 19:07	
Di-n-octylphthalate	ug/L	ND	10.0	10/04/14 19:07	
Dibenzofuran	ug/L	ND	10.0	10/04/14 19:07	
Diethylphthalate	ug/L	ND	10.0	10/04/14 19:07	
Dimethylphthalate	ug/L	ND	10.0	10/04/14 19:07	
Hexachloro-1,3-butadiene	ug/L	ND	5.0	10/04/14 19:07	
Hexachlorobenzene	ug/L	ND	10.0	10/04/14 19:07	
Hexachlorocyclopentadiene	ug/L	ND	20.0	10/04/14 19:07	
Hexachloroethane	ug/L	ND	10.0	10/04/14 19:07	
Isophorone	ug/L	ND	10.0	10/04/14 19:07	
N-Nitroso-di-n-propylamine	ug/L	ND	10.0	10/04/14 19:07	
N-Nitrosodiphenylamine	ug/L	ND	10.0	10/04/14 19:07	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

METHOD BLANK: 1167288

Matrix: Water

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrobenzene	ug/L	ND	10.0	10/04/14 19:07	
Pentachlorophenol	ug/L	ND	50.0	10/04/14 19:07	
Phenol	ug/L	ND	10.0	10/04/14 19:07	
2,4,6-Tribromophenol (S)	%	109	31-161	10/04/14 19:07	
2-Fluorophenol (S)	%	30	10-67	10/04/14 19:07	
Nitrobenzene-d5 (S)	%	92	29-126	10/04/14 19:07	
Phenol-d5 (S)	%	18	10-47	10/04/14 19:07	

LABORATORY CONTROL SAMPLE: 1167289

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
2,4-Dinitrotoluene	ug/L	100	87.7	88	36-126	
2-Chlorophenol	ug/L	100	53.3	53	40-98	
4-Chloro-3-methylphenol	ug/L	100	67.8	68	43-113	
4-Nitrophenol	ug/L	100	ND	14	10-42	
N-Nitroso-di-n-propylamine	ug/L	100	80.4	80	43-120	
Pentachlorophenol	ug/L	100	89.1	89	31-125	
Phenol	ug/L	100	14.4	14	10-37	
2,4,6-Tribromophenol (S)	%			102	31-161	
2-Fluorophenol (S)	%			26	10-67	
Nitrobenzene-d5 (S)	%			81	29-126	
Phenol-d5 (S)	%			15	10-47	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1167290

1167291

Parameter	Units	50104622005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
2,4-Dinitrotoluene	ug/L	ND	208	208	186	191	89	92	34-124	2	20	
2-Chlorophenol	ug/L	ND	208	208	139	134	67	64	34-106	4	20	
4-Chloro-3-methylphenol	ug/L	ND	208	208	168	173	81	83	41-116	3	20	
4-Nitrophenol	ug/L	ND	208	208	ND	ND	32	30	10-78		20	
N-Nitroso-di-n-propylamine	ug/L	ND	208	208	173	182	83	87	40-115	5	20	
Pentachlorophenol	ug/L	ND	208	208	188	178	90	85	30-128	5	20	
Phenol	ug/L	ND	208	208	62.7	57.7	30	28	10-65	8	20	
2,4,6-Tribromophenol (S)	%						101	100	31-161			
2-Fluorophenol (S)	%						45	43	10-67			
Nitrobenzene-d5 (S)	%						82	83	29-126			
Phenol-d5 (S)	%						32	29	10-47			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: PMST/9933

Analysis Method: ASTM D2974-87

QC Batch Method: ASTM D2974-87

Analysis Description: Dry Weight/Percent Moisture

Associated Lab Samples: 50104622007, 50104622008, 50104622009, 50104622010, 50104622011, 50104622012

SAMPLE DUPLICATE: 1169026

Parameter	Units	50104649018 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	10.0	9.9	2	5	

SAMPLE DUPLICATE: 1169259

Parameter	Units	50104622011 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	41.3	40.6	1	5	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: WET/17781

Analysis Method: SM 2320B

QC Batch Method: SM 2320B

Analysis Description: 2320B Alkalinity

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

METHOD BLANK: 1169863

Matrix: Water

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity, Total as CaCO <sub>3</sub>	mg/L	ND	2.0	10/09/14 13:35	

LABORATORY CONTROL SAMPLE: 1169864

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO <sub>3</sub>	mg/L	50	47.6	95	90-110	

SAMPLE DUPLICATE: 1169865

Parameter	Units	50104519008 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO <sub>3</sub>	mg/L	374	390	4	20	

SAMPLE DUPLICATE: 1169866

Parameter	Units	50104622005 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO <sub>3</sub>	mg/L	241	241	0	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: WET/17687 Analysis Method: SM 2540C  
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids  
Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

METHOD BLANK: 1166368 Matrix: Water  
Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	ND	10.0	10/02/14 06:33	

LABORATORY CONTROL SAMPLE: 1166369

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	300	300	100	80-120	

SAMPLE DUPLICATE: 1166370

Parameter	Units	50104519008 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	1260	1600	24	10	R1

SAMPLE DUPLICATE: 1166371

Parameter	Units	50104622005 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	426	433	2	10	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: WET/17772

Analysis Method: SM 4500F/C

QC Batch Method: SM 4500F/C

Analysis Description: SM4500FC Fluoride Water

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

METHOD BLANK: 1169352

Matrix: Water

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Fluoride	mg/L	ND	0.10	10/08/14 12:46	

LABORATORY CONTROL SAMPLE: 1169353

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Fluoride	mg/L	1	1.1	107	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1169354 1169355

Parameter	Units	50104622005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Fluoride	mg/L	0.13	1	1	1.3	1.3	116	116	90-110	0	20	M3

MATRIX SPIKE SAMPLE: 1169356

Parameter	Units	50104891001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Fluoride	mg/L	0.91	1	2.1	117	90-110	M0

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch:	WET/17726	Analysis Method:	SM 4500-S2-D
QC Batch Method:	SM 4500-S2-D	Analysis Description:	4500S2D Sulfide Water
Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006			

METHOD BLANK:	1168290	Matrix:	Water
Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006			

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfide	mg/L	ND	0.10	10/06/14 09:44	

LABORATORY CONTROL SAMPLE: 1168291						
Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfide	mg/L	.5	0.51	102	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1168292													1168293		
Parameter	Units	50104622005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual			
Sulfide	mg/L	ND	.5	.5	0.52	0.52	104	105	90-110	0	20				

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: WETA/13401

Analysis Method: EPA 335.4

QC Batch Method: EPA 335.4

Analysis Description: 335.4 Cyanide, Total

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

METHOD BLANK: 1168334

Matrix: Water

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Cyanide	mg/L	ND	0.010	10/08/14 14:17	

LABORATORY CONTROL SAMPLE: 1168335

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cyanide	mg/L	.2	0.19	95	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1168336 1168337

Parameter	Units	50104622005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cyanide	mg/L	ND	.2	.2	0.21	0.21	107	104	90-110	2	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: WETA/13421 Analysis Method: EPA 350.1  
QC Batch Method: EPA 350.1 Analysis Description: 350.1 Ammonia  
Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

METHOD BLANK: 1168856 Matrix: Water  
Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Ammonia	mg/L	ND	0.10	10/09/14 10:13	

LABORATORY CONTROL SAMPLE: 1168857

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Ammonia	mg/L	1.7	1.8	109	90-110	

MATRIX SPIKE SAMPLE: 1168858

Parameter	Units	50104800001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Nitrogen, Ammonia	mg/L	ND	10	10.8	105	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1168859 1168860

Parameter	Units	50104622005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Nitrogen, Ammonia	mg/L	ND	1.7	1.7	1.8	1.8	106	105	90-110	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: WETA/13376

Analysis Method: EPA 353.2

QC Batch Method: EPA 353.2

Analysis Description: 353.2 Nitrate + Nitrite, Unpres.

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

METHOD BLANK: 1166077

Matrix: Water

Associated Lab Samples: 50104622001, 50104622002, 50104622003, 50104622004, 50104622005, 50104622006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Nitrate	mg/L	ND	0.10	10/01/14 14:04	

LABORATORY CONTROL SAMPLE: 1166078

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Nitrate	mg/L	2	1.9	95	90-110	

MATRIX SPIKE SAMPLE: 1166079

Parameter	Units	50104543001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Nitrogen, Nitrate	mg/L	ND	2	1.8	91	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1166080 1166081

Parameter	Units	50104622005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Nitrogen, Nitrate	mg/L	0.23	2	2	2.1	2.1	95	95	90-110	0	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

QC Batch: WETA/13400

Analysis Method: EPA 9012

QC Batch Method: EPA 9012

Analysis Description: 9012 Cyanide

Associated Lab Samples: 50104622007, 50104622008, 50104622009, 50104622010, 50104622011, 50104622012

METHOD BLANK: 1168325

Matrix: Solid

Associated Lab Samples: 50104622007, 50104622008, 50104622009, 50104622010, 50104622011, 50104622012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Cyanide	mg/kg	ND	0.50	10/08/14 13:55	

LABORATORY CONTROL SAMPLE: 1168326

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cyanide	mg/kg	10	10.6	106	90-110	

MATRIX SPIKE SAMPLE: 1168327

Parameter	Units	50104755001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cyanide	mg/kg	ND	11.9	13.1	109	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1168328

1168329

Parameter	Units	50104622011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cyanide	mg/kg	ND	16.7	16.9	18.4	17.5	110	104	90-110	5	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALIFIERS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

### DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

### LABORATORIES

PASI-I Pace Analytical Services - Indianapolis

PASI-N Pace Analytical Services - New Orleans

### ANALYTE QUALIFIERS

1d Due to the extract's physical characteristics, the analysis was performed at dilution. CEM 10/13/14

2d Multiple compounds are outside acceptance limits due to sample matrix. Refer to LCS for system control and data acceptability. JLZ 10/13/14.

3d The closing calibration on the B column was high biased for several analytes, including TCX. Since there were no hits in the samples, no further corrective action was taken.

CU The continuing calibration for this compound is outside of Pace Analytical acceptance limits. Analyte presence below reporting limits in associated samples. Results unaffected by high bias.

E Analyte concentration exceeded the calibration range. The reported result is estimated.

H2 Extraction or preparation conducted outside EPA method holding time.

L3 Analyte recovery in the laboratory control sample (LCS) exceeded QC limits. Analyte presence below reporting limits in associated samples. Results unaffected by high bias.

M0 Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.

M1 Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

M3 Matrix spike recovery was outside laboratory control limits due to matrix interferences.

N2 The lab does not hold TNI accreditation for this parameter.

P6 Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

R1 RPD value was outside control limits.

R2 RPD value was outside control limits due to matrix interference

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALIFIERS

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

---

### ANALYTE QUALIFIERS

S3	Surrogate recovery exceeded laboratory control limits. Analyte presence below reporting limits in associated samples. Results unaffected by high bias.
----	---

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
50104622007	SD-1	EPA 3546	OEXT/3069	EPA 8081	GCSV/2586
50104622008	SD-2	EPA 3546	OEXT/3069	EPA 8081	GCSV/2586
50104622009	SD-3	EPA 3546	OEXT/3069	EPA 8081	GCSV/2586
50104622010	SD-4	EPA 3546	OEXT/3069	EPA 8081	GCSV/2586
50104622011	SD-5	EPA 3546	OEXT/3069	EPA 8081	GCSV/2586
50104622012	F.D.	EPA 3546	OEXT/3069	EPA 8081	GCSV/2586
50104622001	SW-1	EPA 3535	OEXT/3029	EPA 8081	GCSV/2608
50104622002	SW-2	EPA 3535	OEXT/3029	EPA 8081	GCSV/2608
50104622003	SW-3	EPA 3535	OEXT/3029	EPA 8081	GCSV/2608
50104622004	SW-4	EPA 3535	OEXT/3029	EPA 8081	GCSV/2608
50104622005	SW-5	EPA 3535	OEXT/3029	EPA 8081	GCSV/2608
50104622006	F.D.	EPA 3535	OEXT/3029	EPA 8081	GCSV/2608
50104622007	SD-1	EPA 3546	OEXT/37091	EPA 8082	GCSV/13254
50104622008	SD-2	EPA 3546	OEXT/37091	EPA 8082	GCSV/13254
50104622009	SD-3	EPA 3546	OEXT/37143	EPA 8082	GCSV/13293
50104622010	SD-4	EPA 3546	OEXT/37091	EPA 8082	GCSV/13254
50104622011	SD-5	EPA 3546	OEXT/37096	EPA 8082	GCSV/13247
50104622012	F.D.	EPA 3546	OEXT/37096	EPA 8082	GCSV/13247
50104622001	SW-1	EPA 3510	OEXT/37103	EPA 8082	GCSV/13246
50104622002	SW-2	EPA 3510	OEXT/37103	EPA 8082	GCSV/13246
50104622003	SW-3	EPA 3510	OEXT/37103	EPA 8082	GCSV/13246
50104622004	SW-4	EPA 3510	OEXT/37103	EPA 8082	GCSV/13246
50104622005	SW-5	EPA 3510	OEXT/37103	EPA 8082	GCSV/13246
50104622006	F.D.	EPA 3510	OEXT/37103	EPA 8082	GCSV/13246
50104622007	SD-1	EPA 3546	OEXT/3061	EPA 8151	GCSV/2557
50104622008	SD-2	EPA 3546	OEXT/3061	EPA 8151	GCSV/2557
50104622009	SD-3	EPA 3546	OEXT/3061	EPA 8151	GCSV/2557
50104622010	SD-4	EPA 3546	OEXT/3061	EPA 8151	GCSV/2557
50104622011	SD-5	EPA 3546	OEXT/3061	EPA 8151	GCSV/2557
50104622012	F.D.	EPA 3546	OEXT/3061	EPA 8151	GCSV/2557
50104622001	SW-1	EPA 3535A	OEXT/3030	EPA 8151	GCSV/2526
50104622002	SW-2	EPA 3535A	OEXT/3030	EPA 8151	GCSV/2526
50104622003	SW-3	EPA 3535A	OEXT/3030	EPA 8151	GCSV/2526
50104622004	SW-4	EPA 3535A	OEXT/3030	EPA 8151	GCSV/2526
50104622005	SW-5	EPA 3535A	OEXT/3030	EPA 8151	GCSV/2526
50104622006	F.D.	EPA 3535A	OEXT/3030	EPA 8151	GCSV/2526
50104622007	SD-1	EPA 3050	MPRP/14263	EPA 6010	ICP/16943
50104622008	SD-2	EPA 3050	MPRP/14263	EPA 6010	ICP/16943
50104622009	SD-3	EPA 3050	MPRP/14263	EPA 6010	ICP/16943
50104622010	SD-4	EPA 3050	MPRP/14263	EPA 6010	ICP/16943
50104622011	SD-5	EPA 3050	MPRP/14263	EPA 6010	ICP/16943
50104622012	F.D.	EPA 3050	MPRP/14263	EPA 6010	ICP/16943
50104622001	SW-1	EPA 3010	MPRP/14269	EPA 6010	ICP/16950

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
50104622001	SW-1	EPA 3010	MPRP/14338	EPA 6010	ICP/17014
50104622002	SW-2	EPA 3010	MPRP/14269	EPA 6010	ICP/16950
50104622002	SW-2	EPA 3010	MPRP/14338	EPA 6010	ICP/17014
50104622003	SW-3	EPA 3010	MPRP/14269	EPA 6010	ICP/16950
50104622003	SW-3	EPA 3010	MPRP/14338	EPA 6010	ICP/17014
50104622004	SW-4	EPA 3010	MPRP/14269	EPA 6010	ICP/16950
50104622004	SW-4	EPA 3010	MPRP/14338	EPA 6010	ICP/17014
50104622005	SW-5	EPA 3010	MPRP/14269	EPA 6010	ICP/16950
50104622005	SW-5	EPA 3010	MPRP/14338	EPA 6010	ICP/17014
50104622006	F.D.	EPA 3010	MPRP/14269	EPA 6010	ICP/16950
50104622006	F.D.	EPA 3010	MPRP/14338	EPA 6010	ICP/17014
50104622001	SW-1	EPA 7470	MERP/5753	EPA 7470	MERC/6385
50104622002	SW-2	EPA 7470	MERP/5753	EPA 7470	MERC/6385
50104622003	SW-3	EPA 7470	MERP/5753	EPA 7470	MERC/6385
50104622004	SW-4	EPA 7470	MERP/5753	EPA 7470	MERC/6385
50104622005	SW-5	EPA 7470	MERP/5753	EPA 7470	MERC/6385
50104622006	F.D.	EPA 7470	MERP/5753	EPA 7470	MERC/6385
50104622007	SD-1	EPA 7471	MERP/5750	EPA 7471	MERC/6381
50104622008	SD-2	EPA 7471	MERP/5750	EPA 7471	MERC/6381
50104622009	SD-3	EPA 7471	MERP/5750	EPA 7471	MERC/6381
50104622010	SD-4	EPA 7471	MERP/5750	EPA 7471	MERC/6381
50104622011	SD-5	EPA 7471	MERP/5749	EPA 7471	MERC/6380
50104622012	F.D.	EPA 7471	MERP/5750	EPA 7471	MERC/6381
50104622007	SD-1	EPA 3546	OEXT/37093	EPA 8270 by SIM	MSSV/16260
50104622008	SD-2	EPA 3546	OEXT/37093	EPA 8270 by SIM	MSSV/16260
50104622009	SD-3	EPA 3546	OEXT/37093	EPA 8270 by SIM	MSSV/16260
50104622010	SD-4	EPA 3546	OEXT/37093	EPA 8270 by SIM	MSSV/16260
50104622011	SD-5	EPA 3546	OEXT/37093	EPA 8270 by SIM	MSSV/16260
50104622012	F.D.	EPA 3546	OEXT/37122	EPA 8270 by SIM	MSSV/16287
50104622007	SD-1	EPA 3546	OEXT/37109	EPA 8270	MSSV/16267
50104622008	SD-2	EPA 3546	OEXT/37109	EPA 8270	MSSV/16267
50104622009	SD-3	EPA 3546	OEXT/37109	EPA 8270	MSSV/16267
50104622010	SD-4	EPA 3546	OEXT/37109	EPA 8270	MSSV/16267
50104622011	SD-5	EPA 3546	OEXT/37109	EPA 8270	MSSV/16267
50104622012	F.D.	EPA 3546	OEXT/37109	EPA 8270	MSSV/16267
50104622001	SW-1	EPA 3510	OEXT/37098	EPA 8270 by SIM	MSSV/16253
50104622002	SW-2	EPA 3510	OEXT/37098	EPA 8270 by SIM	MSSV/16253
50104622003	SW-3	EPA 3510	OEXT/37098	EPA 8270 by SIM	MSSV/16253
50104622004	SW-4	EPA 3510	OEXT/37098	EPA 8270 by SIM	MSSV/16253
50104622005	SW-5	EPA 3510	OEXT/37098	EPA 8270 by SIM	MSSV/16253

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
50104622006	F.D.	EPA 3510	OEXT/37098	EPA 8270 by SIM	MSSV/16253
50104622001	SW-1	EPA 3510	OEXT/37097	EPA 8270	MSSV/16254
50104622002	SW-2	EPA 3510	OEXT/37097	EPA 8270	MSSV/16254
50104622003	SW-3	EPA 3510	OEXT/37097	EPA 8270	MSSV/16254
50104622004	SW-4	EPA 3510	OEXT/37097	EPA 8270	MSSV/16254
50104622005	SW-5	EPA 3510	OEXT/37097	EPA 8270	MSSV/16254
50104622006	F.D.	EPA 3510	OEXT/37097	EPA 8270	MSSV/16254
50104622001	SW-1	EPA 8260	MSV/69634		
50104622002	SW-2	EPA 8260	MSV/69634		
50104622003	SW-3	EPA 8260	MSV/69634		
50104622004	SW-4	EPA 8260	MSV/69634		
50104622005	SW-5	EPA 8260	MSV/69634		
50104622006	F.D.	EPA 8260	MSV/69634		
50104622013	Trip Blank	EPA 8260	MSV/69634		
50104622014	Trip Blank (water)	EPA 8260	MSV/69634		
50104622007	SD-1	EPA 8260	MSV/69629		
50104622008	SD-2	EPA 8260	MSV/69629		
50104622009	SD-3	EPA 8260	MSV/69629		
50104622010	SD-4	EPA 8260	MSV/69629		
50104622011	SD-5	EPA 8260	MSV/69629		
50104622012	F.D.	EPA 8260	MSV/69629		
50104622007	SD-1	ASTM D2974-87	PMST/9933		
50104622008	SD-2	ASTM D2974-87	PMST/9933		
50104622009	SD-3	ASTM D2974-87	PMST/9933		
50104622010	SD-4	ASTM D2974-87	PMST/9933		
50104622011	SD-5	ASTM D2974-87	PMST/9933		
50104622012	F.D.	ASTM D2974-87	PMST/9933		
50104622001	SW-1	SM 2320B	WET/17781		
50104622002	SW-2	SM 2320B	WET/17781		
50104622003	SW-3	SM 2320B	WET/17781		
50104622004	SW-4	SM 2320B	WET/17781		
50104622005	SW-5	SM 2320B	WET/17781		
50104622006	F.D.	SM 2320B	WET/17781		
50104622001	SW-1	SM 2540C	WET/17687		
50104622002	SW-2	SM 2540C	WET/17687		
50104622003	SW-3	SM 2540C	WET/17687		
50104622004	SW-4	SM 2540C	WET/17687		
50104622005	SW-5	SM 2540C	WET/17687		
50104622006	F.D.	SM 2540C	WET/17687		
50104622001	SW-1	SM 4500F/C	WET/17772		
50104622002	SW-2	SM 4500F/C	WET/17772		
50104622003	SW-3	SM 4500F/C	WET/17772		
50104622004	SW-4	SM 4500F/C	WET/17772		
50104622005	SW-5	SM 4500F/C	WET/17772		
50104622006	F.D.	SM 4500F/C	WET/17772		

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Karwick Rd. Nature Park

Pace Project No.: 50104622

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
50104622001	SW-1	SM 4500-S2-D	WET/17726		
50104622002	SW-2	SM 4500-S2-D	WET/17726		
50104622003	SW-3	SM 4500-S2-D	WET/17726		
50104622004	SW-4	SM 4500-S2-D	WET/17726		
50104622005	SW-5	SM 4500-S2-D	WET/17726		
50104622006	F.D.	SM 4500-S2-D	WET/17726		
50104622001	SW-1	EPA 335.4	WETA/13401	EPA 335.4	WETA/13440
50104622002	SW-2	EPA 335.4	WETA/13401	EPA 335.4	WETA/13440
50104622003	SW-3	EPA 335.4	WETA/13401	EPA 335.4	WETA/13440
50104622004	SW-4	EPA 335.4	WETA/13401	EPA 335.4	WETA/13440
50104622005	SW-5	EPA 335.4	WETA/13401	EPA 335.4	WETA/13440
50104622006	F.D.	EPA 335.4	WETA/13401	EPA 335.4	WETA/13440
50104622001	SW-1	EPA 350.1	WETA/13421	EPA 350.1	WETA/13451
50104622002	SW-2	EPA 350.1	WETA/13421	EPA 350.1	WETA/13451
50104622003	SW-3	EPA 350.1	WETA/13421	EPA 350.1	WETA/13451
50104622004	SW-4	EPA 350.1	WETA/13421	EPA 350.1	WETA/13451
50104622005	SW-5	EPA 350.1	WETA/13421	EPA 350.1	WETA/13451
50104622006	F.D.	EPA 350.1	WETA/13421	EPA 350.1	WETA/13451
50104622001	SW-1	EPA 353.2	WETA/13376		
50104622002	SW-2	EPA 353.2	WETA/13376		
50104622003	SW-3	EPA 353.2	WETA/13376		
50104622004	SW-4	EPA 353.2	WETA/13376		
50104622005	SW-5	EPA 353.2	WETA/13376		
50104622006	F.D.	EPA 353.2	WETA/13376		
50104622007	SD-1	EPA 9012	WETA/13400	EPA 9012	WETA/13439
50104622008	SD-2	EPA 9012	WETA/13400	EPA 9012	WETA/13439
50104622009	SD-3	EPA 9012	WETA/13400	EPA 9012	WETA/13439
50104622010	SD-4	EPA 9012	WETA/13400	EPA 9012	WETA/13439
50104622011	SD-5	EPA 9012	WETA/13400	EPA 9012	WETA/13439
50104622012	F.D.	EPA 9012	WETA/13400	EPA 9012	WETA/13439

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..





# CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

<b>Section A</b> Required Client Information:		<b>Section B</b> Required Project Information:		<b>Section C</b> Invoice Information:	
Company:	Waver Boes Consultants	Report To:	Steve Sanford	Attention:	Lyle Cable
Address:	7121 Grape Rd. Granger, IN 46530	Copy To:	ahuang@weaverboes.com	Company Name:	Pace Analytical
Email To:	SSanford@weaverboes.com	Purchase Order No.:		Address:	7726 Mellow Rd.
Phone:	574-271-3484	Project Name:	Karwick Rd. Nature Park	Pace Quote Reference:	
Requested Due Date/TAT:		Project Number:	1873-356-04-00	Pace Project Manager:	
				Pace Profile #:	

Page:	1	of	2
1854694			
REGULATORY AGENCY			
<input type="checkbox"/> NPDES <input type="checkbox"/> GROUND WATER <input type="checkbox"/> RCRA <input type="checkbox"/> UST <input type="checkbox"/> OTHER			
Site Location		STATE:	
IN			

Section D Required Client Information	Matrix Codes MATRIX J CODE Drinking Water DW Water WT Waste Water WW Product P Soil/Solid SL Oil OL Wipe WP Air AR Tissue TS Other OT	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP) (see veld codes to left)	MATRIX CODE	DATE	TIME	DATE	TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives										Analysis Test ↓	Y/N	Requested Analysis Filtered (Y/N)	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
		COMPOSITE START	COMPOSITE END/GRAB									H <sub>2</sub> SO <sub>4</sub>	HNO <sub>3</sub>	HCl	NaOH	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	Methanol	Other																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
SAMPLE ID (A-Z, 0-9 / . - ) Sample IDs MUST BE UNIQUE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			</

ADDITIONAL COMMENTS		RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS								
Alex Huang / Weaver Boes		Alex Huang / Weaver Boes	9/30	20:00	Brian Stoltz / Pace	10-14	9:41	3.6	Y	Y	Y	Y	Y	Y	Y	Y
Temp in °C																
Received on																
Sealed Cooler (Y/N)																
Custody (Y/N)																
Samples Intact (Y/N)																

SAMPLER NAME AND SIGNATURE	
PRINT Name of SAMPLER:	Alex Huang
SIGNATURE of SAMPLER:	
DATE Signed (MM/DD/YY):	09/30/14

W/FEDEX 80604974 2350 ORIGINAL

\*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.





**CHAIN-OF-CUSTODY / Analytical Request Document**

**The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.**

<b>Section A</b> Requested Client Information:		<b>Section B</b> Required Project Information:		<b>Section C</b> Invoice Information:	
Company: Weaver Boss Consulting	Report To: Steve Stanford	Attention: Lyle Cable	Company Name: Rice Analytical	Regulatory Agency: NPDES <input type="checkbox"/> GROUND WATER <input type="checkbox"/> DRINKING WATER <input type="checkbox"/>	Page: 2 of 2
Address: 7771 Grape Rd. Granger, IN 46530	Copy To: ahwang@weaverboss.com	Address: 7726 Moller Rd.	Address: 7726 Moller Rd.	NPDES <input type="checkbox"/> UST <input type="checkbox"/> RCRA <input type="checkbox"/> OTHER <input type="checkbox"/>	1854690
Email To: stanford@weaverboss.com	Purchase Order No.:	Project Name: Keweenaw Rd, Nature Park	Project Manager: Project Profile #:	Site Location: IN	
Phone: 574-271-3847	Project Number: 1873-356-0400				
Requested Due Date/TAT:					

[illegible]

FED EX 8060 4974 2360 ORIGINAL Page 139 of 150		SAMPLER NAME AND SIGNATURE		Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
		PRINT Name of SAMPLER: Alex Huang	DATE Signed (MM/DD/YYYY): 09/30/14				
Alex Huang / Weaver Box 9/30 20:00	Bio-Starch / PALE	10-1-14 9:41	3.6	Y	Y	Y	Y





**CHAIN-OF-CUSTODY / Analytical Request Document**

**The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.**

<b>Section A</b> Requested Client Information:		<b>Section B</b> Required Project Information:		<b>Section C</b> Invoice Information:	
Company: Weaver Bros. Consultants	Report To: Steve Stamford	Attention: Lyle Cable	Company Name: Pace Analytical	Regulatory Agency <input type="checkbox"/> NPDES <input type="checkbox"/> Ground Water <input type="checkbox"/> Drinking Water <input type="checkbox"/> UST <input type="checkbox"/> RCRA <input type="checkbox"/> Other	Pages: 1 of 2 1854691
Address: 7121 Grape Rd. Granger, IN 46530	Copy To: alhuang@weaverbros.com	Address: 7726 Moller Rd.	Pace Quote Reference:	Site Location STATE: IN	
Email To: ssstamford@weaverbros.com	Purchase Order No.:	Project Name: Karmick Rd. Nat'l Park	Pace Project Manager:		
Phone: 574-271-3447	Project Number: 1873-356-04-00				
Fax: Requested Due Date/TAT:					

[illegible]

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
							Temp In °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
Samples labeled "Field Data"	Alex Huang / Weaver Bios	10/1	15:00	Caitie Weaver / PACE	1002/4	0910	2.1°C	Y	Y	Y
And Ed. are from the							0.6°C			0.7°C
<del>Same sample set.</del>							1.4°C			
							1.1°C	0.6°C	1.1°C	0.5°C

ORIGINAL

NR / FE

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Alex Huang

SIGNATURE of SAMPLER: *[Signature]*

DATE Signed (MM/DD/YYYY): 10/11/14

F-ALL-Q-020rev.07. 15-May-2007



# CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

## Section A

### Required Client Information:

Company: Weaver Bros Consignments  
Address: 7121 Grape Rd  
Granger, IN 46530  
Email To: 55stanford@weaverbros.com  
Phone: 574-271-3444 Fax:  
Requested Due Date/TAT:

## Section B

### Required Project Information:

Report To: Steve Stanford  
Copy To: ahuang@weaverbros.com  
Purchase Order No.:  
Project Name: Karwica Rd. Nature Park  
Project Number: 1873-356-04-00

## Section C

### Invoice Information:

Attention: Lyle Cable  
Company Name: Pace Analytical  
Address: 7726 Moller Rd.  
Pace Quote Reference:  
Pace Project Manager:  
Pace Profile #:

## Section D

### Required Client Information:

Page: 2 of 2  
1854692  
REGULATORY AGENCY  
☐ NPDES ☐ GROUND WATER ☐ RCRA ☐ UST ☐ OTHER  
Site Location  
STATE: IN

Section D Required Client Information		Matrix Codes MATRIX / CODE: Drinking Water Water Waste Water Product Soil/Solid Oil Wipe Air Tissue Other	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED				SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives										Analysis Test ↑	Y/N ↑	Requested Analysis Filtered (Y/N)												Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
ITEM #	SAMPLE ID (A-Z, 0-9 / -)				COMPOSITE START	DATE	TIME	COMPOSITE END/GRAB			Unpreserved	H <sub>2</sub> SO <sub>4</sub>	HNO <sub>3</sub>	HCl	NaOH	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	Methanol	Other																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				</

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS		
							Received on	Sealed Cooler	Samples Intact
Samples labeled "F.D." are from	Alex Huang / Weaver Bros	10/1	15:00	Patricia Weaver / PACE	10/24	09:10			
and "F.D." are from									
We same sample set									

**ORIGINAL**

SAMPLER NAME AND SIGNATURE  
PRINT Name of SAMPLER: Alex Huang  
SIGNATURE of SAMPLER: Alex Huang  
DATE Signed (MM/DD/YYYY): 10/1/14



Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company: Mewer Doss Consultants	Report To: Steve Stamford	Company: Mewer Doss Consultants	Report To: Steve Stamford	Company Name: Mewer Doss Consultants	Attention: Steve Stamford
Address: 1721 Grape Rd.	Copy To: ahong@meaverboss.com	Address: 1721 Grape Rd.	Copy To: ahong@meaverboss.com	Address: 7726 Mellon Rd.	Address: 7726 Mellon Rd.
Granger, IN 46530		Granger, IN 46530			
Email To: Stamford@meaverboss.com	Purchase Order No.:			Pace Quote Reference:	Pace Quote Reference:
Phone: 317-271-3497	Project Name: Harwick Rd. Nature Park			Pace Project Manager:	Pace Project Manager:
Fax: 317-271-3497	Project Number: 1873-356-04-00			Pace Profile #:	Pace Profile #:
Requested Due Date/TAT:					

[illegible]





Sample Condition Upon Receipt

Client Name: Weaver Boos Project # seron622

Courier: ☒ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other \_\_\_\_\_

Tracking #: 806049742350

Custody Seal on Cooler/Box Present: ☐ yes ☐ no Seals intact: ☐ yes ☐ no

Date/Time 5036A kits placed in freezer  
10-1-14 9:52

Packing Material: ☐ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other \_\_\_\_\_

Thermometer 120456 ABCDEF

Type of Ice: Wet Blue None ☐ Samples on ice, cooling process has begun

Cooler Temperature 3.6°C  
(Corrected, if applicable)

Ice Visible in Sample Containers: ☐ yes ☒ no

Temp should be above freezing to 6°C

Comments:

Date and Initials of person examining contents: 10-1-14 BAS

Chain of Custody Present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	1.
Chain of Custody Filled Out:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	2.
Chain of Custody Relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	3.
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	4.
Short Hold Time Analysis (<72hr):	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	5. <u>Terra Core, Nitrates</u>
Rush Turn Around Time Requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	6.
Containers Intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	7.
Sample Labels match COC: -Includes date/time/ID/Analysis	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	8.
All containers needing acid/base pres. have been checked? exceptions: VOA, coliform, TOC, O&G	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	9. (Circle) HNO3 H2SO4 NaOH HCl
All containers needing preservation are found to be in compliance with EPA recommendation (<2, >9, >12) unless otherwise noted.		
Headspace in VOA Vials (>6mm):	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	10.
Trip Blank Present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	11.
Trip Blank Custody Seals Present	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Project Manager Review		
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	12.
Sufficient Volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	13.
Correct Containers Used:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	14.

Client Notification/ Resolution:

Field Data Required? Y / N

Person Contacted: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Comments/ Resolution: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Project Manager Review: [Signature]

Date: 10-1-14



# Sample Condition Upon Receipt

Face Analytical

Client Name: Weaver Boos

Project # 50104622

Courier: ☒ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other

Tracking #: 8060 4974 2360, 1801 4516 1683, 1694, 1709, 1710, 1720, 1731, 1742

Custody Seal on Cooler/Box Present: ☒ yes ☐ no Seals intact: ☒ yes ☐ no

Packing Material: ☒ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other

Thermometer 1 2 3 4 5 6 A B C D E F

Type of Ice: Wet Blue None

☐ Samples on ice, cooling process has begun

Cooler Temperature 2.1°C, 0.6°C, 1.4°C, 1.1°C, 0.6°C, Ice Visible in Sample Containers: ☐ yes ☒ no

(Corrected, if applicable) 1.1°C, 0.5°C, 0.7°C

Temp should be above freezing to 6°C

Comments:

Date and Initials of person examining contents: 10/2/14 CN

Chain of Custody Present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	1.
Chain of Custody Filled Out:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	2.
Chain of Custody Relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	3.
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	4.
Short Hold Time Analysis (<72hr):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	5.
Rush Turn Around Time Requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	6.
Containers Intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	7.
Sample Labels match COC:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	8.
-Includes date/time/ID/Analysis		
All containers needing acid/base pres. have been checked?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	9.
exceptions: <u>VOA</u> coliform, TOC, O&G		(Circle) HNO <sub>3</sub> H <sub>2</sub> SO <sub>4</sub> NaOH HCl
All containers needing preservation are found to be in compliance with EPA recommendation (<2, >9, >12) unless otherwise noted.		
Headspace in VOA Vials (>6mm):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	10.
Trip Blank Present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	11.
Trip Blank Custody Seals Present	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Project Manager Review		
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	12.
Sufficient Volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	13.
Correct Containers Used:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	14.

Client Notification/ Resolution:

Field Data Required? Y / N

Person Contacted: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Comments/ Resolution: The following samples has water in the containers: SD-2 (5), SD-3 (4), SD-4 (1), SD-5 (10)

Project Manager Review: \_\_\_\_\_

Date: 10-2-14



# Sample Condition Upon Receipt

Pace Analytical

Client Name: Weaver Boos

Project # S0204622

Courier: ☒ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other

Tracking #: 9000 4974 2360 (M)

Custody Seal on Cooler/Box Present: ☒ yes ☐ no Seals intact: ☒ yes ☐ no

Packing Material: ☒ Bubble Wrap ☐ Bubble Bags ☐ None ☐ Other

Thermometer 1 2 3 4 5 6 A B C D E F

Type of Ice: Wet Blue None

☐ Samples on ice, cooling process has begun

Cooler Temperature 2.1°C  
(Corrected, if applicable)

Ice Visible in Sample Containers: ☐ yes ☒ no

Date/Time 5035A kits placed in freezer

Temp should be above freezing to 6°C

Comments:

Date and Initials of person examining contents: 100214 CW

Chain of Custody Present: ☒ Yes ☐ No ☐ N/A

1.

Chain of Custody Filled Out: ☒ Yes ☐ No ☐ N/A

2.

Chain of Custody Relinquished: ☒ Yes ☐ No ☐ N/A

3.

Sampler Name & Signature on COC: ☒ Yes ☐ No ☐ N/A

4.

Short Hold Time Analysis (<72hr): ☐ Yes ☒ No ☐ N/A

5.

Rush Turn Around Time Requested: ☐ Yes ☒ No ☐ N/A

6.

Containers Intact: ☒ Yes ☐ No ☐ N/A

7.

Sample Labels match COC: ☒ Yes ☐ No ☐ N/A

8.

-Includes date/time/ID/Analysis

All containers needing acid/base pres. have been checked? ☒ Yes ☐ No ☐ N/A

9.

exceptions: VOA, coliform, TOC, O&G

All containers needing preservation are found to be in compliance with EPA recommendation (<2, >9, >12) unless otherwise noted.

(Circle) HNO3 H2SO4 NaOH HCl

SW-3, SW-4

Headspace in VOA Vials (>6mm): ☐ Yes ☐ No ☒ N/A

10.

Trip Blank Present: ☐ Yes ☐ No ☒ N/A

11.

Trip Blank Custody Seals Present ☐ Yes ☐ No ☒ N/A

12.

Project Manager Review

Samples Arrived within Hold Time: ☒ Yes ☐ No ☐ N/A

13.

Sufficient Volume: ☐ Yes ☐ No ☐ N/A

14.

Correct Containers Used: ☐ Yes ☐ No ☐ N/A

Client Notification/ Resolution:

Field Data Required? Y / N

Person Contacted: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Comments/ Resolution: \_\_\_\_\_

Project Manager Review:

Date: 10-2-14



# Sample Container Count



CLIENT: Weaver Boos

COC PAGE 1 of 2  
COC ID# 1854694

Project # 50104622

Bulk

Sample Line

Item	DG9H	AG1U	WGUF	AG0U	R	6	BP2N	BP2U	BP2S	BP3N	BP3U	BP3S	AG3S	AG1H	BP3C	BP1U	SPST	pH <2	pH >12	Comments
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				

## Container Codes

DG9H	40mL HCL amber vial	AG0U	100mL unpreserved amber glass	BP1N	1 liter HNO3 plastic	DG9P	40mL TSP amber vial
AG1U	1 liter unpreserved amber glass	AG1H	1 liter HCL amber glass	BP1S	1 liter H2SO4 plastic	DG9S	40mL H2SO4 amber vial
WGUF	4oz clear soil jar	AG1S	1 liter H2SO4 amber glass	BP1U	1 liter unpreserved plastic	DG9T	40mL Na Thio amber vial
R	terra core kit	AG1T	1 liter Na Thiosulfate amber glass	BP1Z	1 liter NaOH, Zn, Ac	DG9U	40mL unpreserved amber vial
BP2N	500mL HNO3 plastic	AG2N	500mL HNO3 amber glass	BP2A	500mL NaOH, Asc Acid plastic	I	Wipe/Swab
BP2U	500mL unpreserved plastic	AG2S	500mL H2SO4 amber glass	BP2O	500mL NaOH plastic	JG9U	4oz unpreserved amber wide
BP2S	500mL H2SO4 plastic	AG2U	500mL unpreserved amber glass	BP2Z	500mL NaOH, Zn Ac	U	Summa Can
BP3N	250mL HNO3 plastic	AG3U	250mL unpreserved amber glass	AF	Air Filter	VG9H	40mL HCL clear vial
BP3U	250mL unpreserved plastic	BG1H	1 liter HCL clear glass	BP3C	250mL NaOH plastic	VG9T	40mL Na Thio. clear vial
BP3S	250mL H2SO4 plastic	BG1S	1 liter H2SO4 clear glass	BP3Z	250mL NaOH, Zn Ac plastic	VG9U	40mL unpreserved clear vial
AG3S	250mL H2SO4 glass amber	BG1T	1 liter Na Thiosulfate clear glass	C	Air Cassettes	VSG	Headspace septa vial & HCL
AG1S	1 liter H2SO4 amber glass	BG1U	1 liter unpreserved glass	DG9B	40mL Na Bisulfate amber vial	WGFX	4oz wide jar w/hexane wipe
BP1U	1 liter unpreserved plastic	BP1A	1 liter NaOH, Asc Acid plastic	DG9M	40mL MeOH clear vial	ZPLC	Ziploc Bag



# Sample Container Count

CLIENT: Weaver Boos

COC PAGE 2 of 2  
COC ID# 1854690

Project # SP04622



Sample Line

Bulk

Item	DG9H	AG1U	WG9U	AG0U	R	BP2N	BP2U	BP2S	BP3N	BP3U	BP3S	AG3S	AG1H	BP3C	BP1U	SPST	pH <2	pH >12	Comments
1																			
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			

Trip Blank

## Container Codes

DG9H	40mL HCL amber vial	AG0U	100mL unpreserved amber glass	BP1N	1 liter HNO3 plastic	DG9P	40mL TSP amber vial
AG1U	1 liter unpreserved amber glass	AG1H	1 liter HCL amber glass	BP1S	1 liter H2SO4 plastic	DG9S	40mL H2SO4 amber vial
WG9U	4oz clear soil jar	AG1S	1 liter H2SO4 amber glass	BP1U	1 liter unpreserved plastic	DG9T	40mL Na Thio amber vial
R	terra core kit	AG1T	1 liter Na Thiosulfate amber glass	BP1Z	1 liter NaOH, Zn, Ac	DG9U	40mL unpreserved amber vial
BP2N	500mL HNO3 plastic	AG2N	500mL HNO3 amber glass	BP2A	500mL NaOH, Asc Acid plastic	I	Wipe/Swab
BP2U	500mL unpreserved plastic	AG2S	500mL H2SO4 amber glass	BP2O	500mL NaOH plastic	JGFU	4oz unpreserved amber wide
BP2S	500mL H2SO4 plastic	AG2U	500mL unpreserved amber glass	BP2Z	500mL NaOH, Zn Ac	U	Summa Can
BP3N	250mL HNO3 plastic	AG3U	250mL unpreserved amber glass	AF	Air Filter	VG9H	40mL HCL clear vial
BP3U	250mL unpreserved plastic	BG1H	1 liter HCL clear glass	BP3C	250mL NaOH plastic	VG9T	40mL Na Thio. clear vial
BP3S	250mL H2SO4 plastic	BG1S	1 liter H2SO4 clear glass	BP3Z	250mL NaOH, Zn Ac plastic	VG9U	40mL unpreserved clear vial
AG3S	250mL H2SO4 glass amber	BG1T	1 liter Na Thiosulfate clear glass	C	Air Cassettes	VSG	Headspace septa vial & HCL
AG1S	1 liter H2SO4 amber glass	BG1U	1 liter unpreserved glass	DG9B	40mL Na Bisulfate amber vial	WGFX	4oz wide jar w/hexane wipe
BP1U	1 liter unpreserved plastic	BP1A	1 liter NaOH, Asc Acid plastic	DG9M	40mL MeOH clear vial	ZPLC	Ziploc Bag



# Sample Container Count

CLIENT: Weaver Boos

COC PAGE 1 of 2

COC ID# 1054091

Project # 5000622



Sample Line

Item	DG9H	AG1U	WG9U	AG0U	R	4/6	BP2N	BP2U	BP2S	BP3N	BP3U	BP3S	AG3S	AG1H	BP3C	BP1U	SPST	pH < 2	pH > 12	Comments
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				

## Container Codes

DG9H	40mL HCL amber vial	AG0U	100mL unpreserved amber glass	BP1N	1 liter HNO3 plastic	DG9P	40mL TSP amber vial
AG1U	1 liter unpreserved amber glass	AG1H	1 liter HCL amber glass	BP1S	1 liter H2SO4 plastic	DG9S	40mL H2SO4 amber vial
WG9U	4oz clear soil jar	AG1S	1 liter H2SO4 amber glass	BP1U	1 liter unpreserved plastic	DG9T	40mL Na Thio amber vial
R	terra core kit	AG1T	1 liter Na Thiosulfate amber glass	BP1Z	1 liter NaOH, Zn, Ac	DG9U	40mL unpreserved amber vial
BP2N	500mL HNO3 plastic	AG2N	500mL HNO3 amber glass	BP2A	500mL NaOH, Asc Acid plastic		Wipe/Swab
BP2U	500mL unpreserved plastic	AG2S	500mL H2SO4 amber glass	BP2O	500mL NaOH plastic	JG9U	4oz unpreserved amber wide
BP2S	500mL H2SO4 plastic	AG2U	500mL unpreserved amber glass	BP2Z	500mL NaOH, Zn Ac		Summa Can
BP3N	250mL HNO3 plastic	AG3U	250mL unpreserved amber glass	AF	Air Filter	VG9H	40mL HCL clear vial
BP3U	250mL unpreserved plastic	BG1H	1 liter HCL clear glass	BP3C	250mL NaOH plastic	VG9T	40mL Na Thio. clear vial
BP3S	250mL H2SO4 plastic	BG1S	1 liter H2SO4 clear glass	BP3Z	250mL NaOH, Zn Ac plastic	VG9U	40mL unpreserved clear vial
AG3S	250mL H2SO4 glass amber	BG1T	1 liter Na Thiosulfate clear glass	C	Air Cassettes	VSG	Headspace septa vial & HCL
AG1S	1 liter H2SO4 amber glass	BG1U	1 liter unpreserved glass	DG9B	40mL Na Bisulfate amber vial	WG9X	4oz wide jar w/hexane wipe
BP1U	1 liter unpreserved plastic	BP1A	1 liter NaOH, Asc Acid plastic	DG9M	40mL MeOH clear vial	ZPLC	Ziptloc Bag







# Sample Container Count

CLIENT: WEAVER BOOS

COC PAGE 1 of 1  
COC ID# 1854693

Project # SR0622



Sample Line

Item	DG9H	AG1U	WG9U	AG0U	R	4/6	BP2N	BP2U	BP2S	BP3N	BP3U	BP3S	AG3S	AG1H	BP3C	BP1U	SPST	pH <2	pH >12	Comments
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				

## Container Codes

DG9H	40mL HCL amber vial	AG0U	100mL unpreserved amber glass	BP1N	1 liter HNO3 plastic	DG9P	40mL TSP amber vial
AG1U	1 liter unpreserved amber glass	AG1H	1 liter HCL amber glass	BP1S	1 liter H2SO4 plastic	DG9S	40mL H2SO4 amber vial
WG9U	4oz clear soil jar	AG1S	1 liter H2SO4 amber glass	BP1U	1 liter unpreserved plastic	DG9T	40mL Na Thio amber vial
R	terra core kit	AG1T	1 liter Na Thiosulfate amber glass	BP1Z	1 liter NaOH, Zn, Ac	DG9U	40mL unpreserved amber vial
BP2N	500mL HNO3 plastic	AG2N	500mL HNO3 amber glass	BP2A	500mL NaOH, Asc Acid plastic	I	Wipe/Swab
BP2U	500mL unpreserved plastic	AG2S	500mL H2SO4 amber glass	BP2O	500mL NaOH plastic	JGFU	4oz unpreserved amber wide
BP2S	500mL H2SO4 plastic	AG2U	500mL unpreserved amber glass	BP2Z	500mL NaOH, Zn Ac	U	Summa Can
BP3N	250mL HNO3 plastic	AG3U	250mL unpreserved amber glass	AF	Air Filter	VG9H	40mL HCL clear vial
BP3U	250mL unpreserved plastic	BG1H	1 liter HCL clear glass	BP3C	250mL NaOH plastic	VG9T	40mL Na Thio. clear vial
BP3S	250mL H2SO4 plastic	BG1S	1 liter H2SO4 clear glass	BP3Z	250mL NaOH, Zn Ac plastic	VG9U	40mL unpreserved clear vial
AG3S	250mL H2SO4 glass amber	BG1T	1 liter Na Thiosulfate clear glass	C	Air Cassettes	VSG	Headspace septa vial & HCL
AG1S	1 liter H2SO4 amber glass	BG1U	1 liter unpreserved glass	DG9B	40mL Na Bisulfate amber vial	WGFX	4oz wide jar w/hexane wipe
BP1U	1 liter unpreserved plastic	BP1A	1 liter NaOH, Asc Acid plastic	DG9M	40mL MeOH clear vial	ZPLC	Ziploc Bag



## SURFACE WATER RE-SAMPLING FIELD SHEET

Site:	<u>Karwick Rd. Nature Park</u>	County:	<u>La Porte</u>
Name of Person(s) Sampling:	<u>Alex Huang</u>	Title:	<u>Environmental Specialist</u>
Sample Location:	<u>SW-1</u>		
Date:	<u>10/9/2014</u>		
Weather Conditions:	Skies: <u>Clear</u>	Temp: <u>52</u> deg F	Wind: <u>WSW 3</u>
	Precipitation: <u>None</u>		

Monitoring Equipment:	<u>Oakton pHTestr 30, Oakton ECTestr High</u>		
Sampling Equipment:	<u>Dip sampler</u>		
Calibration Notes:	<u>Three-Point Calibration (pH) calibrated on 10/8/2014 @ 11:45</u>		
Sample Appearance:	<u>See notes.</u>		
Water Sample pH:	<u>8.31</u>	Standard Units	Sample Time <u>14:30</u>
Water Sample Temperature:	<u>14.7</u>	Degree C	Sample Date <u>10/9/14</u>
Water Sample Spec. Conductivity:	<u>660</u>	$\mu$ S	

Notes / Observations:	<u>The surface water sample (SW-1) was collected from a wide and shallow section of the creek with a dip sampler from the top 0.5 feet of water. The water sample was mostly colorless with minor turbidity from suspended solids, and no detectable odors. This is consistent with water collected during the previous event.</u>		
	<u></u>		
	<u></u>		
	<u></u>		
	<u></u>		
	<u></u>		
	<u></u>		
	<u></u>		



## SURFACE WATER RE-SAMPLING FIELD SHEET

Site:	<u>Karwick Rd. Nature Park</u>	County:	<u>La Porte</u>
Name of Person(s) Sampling:	<u>Alex Huang</u>	Title:	<u>Environmental Specialist</u>
Sample Location:	<u>SW-2</u>		
Date:	<u>10/9/2014</u>		
Weather Conditions:	Skies: <u>Clear</u>	Temp: <u>52</u> deg F	Wind: <u>WSW 3</u>
	Precipitation: <u>None</u>		

Monitoring Equipment:	<u>Oakton pHTestr 30, Oakton ECTestr High</u>		
Sampling Equipment:	<u>Disposable bailer</u>		
Calibration Notes:	<u>Three-Point Calibration (pH) calibrated on 10/8/2014 @ 11:45</u>		
Sample Appearance:	<u>See notes.</u>		
Water Sample pH:	<u>8.36</u>	Standard Units	Sample Time <u>14:50</u>
Water Sample Temperature:	<u>12.9</u>	Degree C	Sample Date <u>10/9/14</u>
Water Sample Spec. Conductivity:	<u>650</u>	$\mu$ S	

Notes / Observations:	<u>The surface water sample (SW-2) was collected from a deep section of the creek with</u>
	<u>a disposable bailer, representing the uppermost 3 feet of water from the surface. The water sample was mostly</u>
	<u>colorless with minor turbidity from suspended solids, and no detectable odors. This is consistent with water</u>
	<u>collected during the previous event.</u>
	<u></u>
	<u></u>
	<u></u>
	<u></u>
	<u></u>
	<u></u>



## SURFACE WATER RE-SAMPLING FIELD SHEET

Site:	<u>Karwick Rd. Nature Park</u>	County:	<u>La Porte</u>
Name of Person(s) Sampling:	<u>Alex Huang</u>	Title:	<u>Environmental Specialist</u>
Sample Location:	<u>SW-3</u>		
Date:	<u>10/9/2014</u>		
Weather Conditions:	Skies: <u>Clear</u>	Temp: <u>52</u> deg F	Wind: <u>WSW 3</u>
	Precipitation: <u>None</u>		

Monitoring Equipment:	<u>Oakton pHTestr 30, Oakton ECTestr High</u>		
Sampling Equipment:	<u>Dip sampler</u>		
Calibration Notes:	<u>Three-Point Calibration (pH) calibrated on 10/8/2014 @ 11:45</u>		
Sample Appearance:	<u>See notes.</u>		
Water Sample pH:	<u>6.71</u>	Standard Units	Sample Time <u>15:25</u>
Water Sample Temperature:	<u>13</u>	Degree C	Sample Date <u>10/9/14</u>
Water Sample Spec. Conductivity:	<u>1100</u>	$\mu$ S	

Notes / Observations:	<u>The water sample (SW-3) was collected from the corrugated metal pipe located above the</u>		
	<u>waterline near monitoring well #4. The water was collected from the outfall with a dip sampler and containerized</u>		
	<u>before it entered Trail Creek. The water had a light orange color. These observations are all consistent with water</u>		
	<u>collected from this location from the previous sampling event. The vaguely metallic odor of the water was</u>		
	<u>significantly stronger during this sampling event when compared to the previous. A surface water field duplicate,</u>		
	<u>labeled "F.D.," was collected alongside SW-3.</u>		
	<u></u>		
	<u></u>		
	<u></u>		



## SURFACE WATER RE-SAMPLING FIELD SHEET

Site:	<u>Karwick Rd. Nature Park</u>	County:	<u>La Porte</u>
Name of Person(s) Sampling:	<u>Alex Huang</u>	Title:	<u>Environmental Specialist</u>
Sample Location:	<u>SW-4</u>		
Date:	<u>10/9/2014</u>		
Weather Conditions:	Skies: <u>Clear</u>	Temp: <u>52</u> deg F	Wind: <u>WSW 3</u>
	Precipitation: <u>None</u>		

Monitoring Equipment:	<u>Oakton pHTestr 30, Oakton ECTestr High</u>		
Sampling Equipment:	<u>Disposable bailer</u>		
Calibration Notes:	<u>Three-Point Calibration (pH) calibrated on 10/8/2014 @ 11:45</u>		
Sample Appearance:	<u>See notes.</u>		
Water Sample pH:	<u>8.32</u>	Standard Units	Sample Time <u>16:30</u>
Water Sample Temperature:	<u>12.4</u>	Degree C	Sample Date <u>10/9/14</u>
Water Sample Spec. Conductivity:	<u>660</u>	$\mu$ S	

Notes / Observations:	<u>The surface water sample (SW-4) was collected from a deep section of the creek with</u>
	<u>a disposable bailer, representing the uppermost 3 feet of water from the surface. The water sample was mostly</u>
	<u>colorless with minor turbidity from suspended solids, and no detectable odors. This is consistent with water</u>
	<u>collected during the previous event.</u>
	<u></u>
	<u></u>
	<u></u>
	<u></u>
	<u></u>
	<u></u>



## SURFACE WATER RE-SAMPLING FIELD SHEET

Site:	<u>Karwick Rd. Nature Park</u>	County:	<u>La Porte</u>
Name of Person(s) Sampling:	<u>Alex Huang</u>	Title:	<u>Environmental Specialist</u>
Sample Location:	<u>SW-5</u>		
Date:	<u>10/9/2014</u>		
Weather Conditions:	Skies: <u>Clear</u>	Temp: <u>52</u> deg F	Wind: <u>WSW 3</u>
	Precipitation: <u>None</u>		

Monitoring Equipment:	<u>Oakton pHTestr 30, Oakton ECTestr High</u>		
Sampling Equipment:	<u>Dip sampler</u>		
Calibration Notes:	<u>Three-Point Calibration (pH) calibrated on 10/8/2014 @ 11:45</u>		
Sample Appearance:	<u>See notes.</u>		
Water Sample pH:	<u>8.25</u>	Standard Units	Sample Time <u>16:00</u>
Water Sample Temperature:	<u>12.4</u>	Degree C	Sample Date <u>10/9/14</u>
Water Sample Spec. Conductivity:	<u>680</u>	$\mu$ S	

Notes / Observations:	<u>The surface water sample (SW-5) was collected from a straight section of the creek with</u>		
	<u>a dip sampler, representing the uppermost one foot of water. The water sample was mostly colorless with minor</u>		
	<u>turbidity from suspended solids, and no detectable odors. This is consistent with water collected in the previous</u>		
	<u>event. A surface water matrix spike/matrix spike duplicate, labeled "MS/MSD," was collected alongside SW-5.</u>		
	<u></u>		
	<u></u>		
	<u></u>		
	<u></u>		
	<u></u>		



October 23, 2014

Mr. Steve Stanford  
Weaver Boos & Gordon  
7121 Grape Road  
Granger, IN 46530

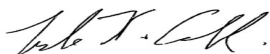
RE: Project: Karwick Rd. Nature Park  
Pace Project No.: 50105170

Dear Mr. Stanford:

Enclosed are the analytical results for sample(s) received by the laboratory on October 10, 2014. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Lyle Cable  
lyle.cable@pacelabs.com  
Project Manager

Enclosures

cc: Mr. Alex Huang, Weaver Boos



## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## CERTIFICATIONS

Project: Karwick Rd. Nature Park

Pace Project No.: 50105170

---

### New Orleans Certification IDs

California Env. Lab Accreditation Program Branch:  
11277CA

Florida Department of Health (NELAC): E87595

Illinois Environmental Protection Agency: 0025721

Kansas Department of Health and Environment (NELAC):

E-10266

Louisiana Dept. of Environmental Quality (NELAC/LELAP):

02006

Oklahoma Department of Environmental Quality: 2010-

139

Oregon Environmental Laboratory Accreditation:

LA200001

Pennsylvania Dept. of Env Protection (NELAC): 68-04202

Texas Commission on Env. Quality (NELAC):

T104704405-09-TX

U.S. Dept. of Agriculture Foreign Soil Import: P330-10-

00119

Washington Department of Ecology: C2078

---

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## SAMPLE SUMMARY

Project: Karwick Rd. Nature Park

Pace Project No.: 50105170

Lab ID	Sample ID	Matrix	Date Collected	Date Received
50105170001	SW-1	Water	10/09/14 14:30	10/10/14 11:12
50105170002	SW-2	Water	10/09/14 14:50	10/10/14 11:12
50105170003	SW-3	Water	10/09/14 15:25	10/10/14 11:12
50105170004	SW-4	Water	10/09/14 16:30	10/10/14 11:12
50105170005	SW-5	Water	10/09/14 16:00	10/10/14 11:12
50105170006	F.D.	Water	10/09/14 08:00	10/10/14 11:12

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## SAMPLE ANALYTE COUNT

Project: Karwick Rd. Nature Park

Pace Project No.: 50105170

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
50105170001	SW-1	EPA 8081	SPP1	23	PASI-N
		EPA 8151	SPP1	4	PASI-N
50105170002	SW-2	EPA 8081	SPP1	23	PASI-N
		EPA 8151	SPP1	4	PASI-N
50105170003	SW-3	EPA 8081	SPP1	23	PASI-N
		EPA 8151	SPP1	4	PASI-N
50105170004	SW-4	EPA 8081	SPP1	23	PASI-N
		EPA 8151	SPP1	4	PASI-N
50105170005	SW-5	EPA 8081	SPP1	23	PASI-N
		EPA 8151	SPP1	4	PASI-N
50105170006	F.D.	EPA 8081	SPP1	23	PASI-N
		EPA 8151	SPP1	4	PASI-N

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50105170

Sample: SW-1		Lab ID: 50105170001	Collected: 10/09/14 14:30	Received: 10/10/14 11:12	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b>		Analytical Method: EPA 8081 Preparation Method: EPA 3535						
Aldrin	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 12:52	309-00-2	
alpha-BHC	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 12:52	319-84-6	
beta-BHC	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 12:52	319-85-7	
delta-BHC	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 12:52	319-86-8	
gamma-BHC (Lindane)	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 12:52	58-89-9	
alpha-Chlordane	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 12:52	5103-71-9	
gamma-Chlordane	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 12:52	5103-74-2	
4,4'-DDD	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 12:52	72-54-8	
4,4'-DDE	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 12:52	72-55-9	
4,4'-DDT	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 12:52	50-29-3	
Dieldrin	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 12:52	60-57-1	
Endosulfan I	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 12:52	959-98-8	
Endosulfan II	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 12:52	33213-65-9	
Endosulfan sulfate	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 12:52	1031-07-8	
Endrin	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 12:52	72-20-8	
Endrin aldehyde	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 12:52	7421-93-4	
Endrin ketone	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 12:52	53494-70-5	
Heptachlor	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 12:52	76-44-8	
Heptachlor epoxide	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 12:52	1024-57-3	
Methoxychlor	ND ug/L		0.50	1	10/15/14 13:04	10/22/14 12:52	72-43-5	
Toxaphene	ND ug/L		2.0	1	10/15/14 13:04	10/22/14 12:52	8001-35-2	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	59 %.		10-119	1	10/15/14 13:04	10/22/14 12:52	877-09-8	
Tetrachloro-m-xylene (S)	57 %.		10-119	1	10/15/14 13:04	10/22/14 12:52	877-09-8	
Decachlorobiphenyl (S)	74 %.		14-126	1	10/15/14 13:04	10/22/14 12:52	2051-24-3	
Decachlorobiphenyl (S)	66 %.		14-126	1	10/15/14 13:04	10/22/14 12:52	2051-24-3	
<b>8151 Chlorinated Herbicides</b>		Analytical Method: EPA 8151 Preparation Method: EPA 3535A						
2,4-D	ND ug/L		2.0	1	10/15/14 16:07	10/17/14 22:57	94-75-7	
2,4,5-T	ND ug/L		2.0	1	10/15/14 16:07	10/17/14 22:57	93-76-5	
2,4,5-TP (Silvex)	ND ug/L		2.0	1	10/15/14 16:07	10/17/14 22:57	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	41 %.		10-166	1	10/15/14 16:07	10/17/14 22:57	19719-28-9	
2,4-DCAA (S)	45 %.		10-166	1	10/15/14 16:07	10/17/14 22:57	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50105170

Sample: SW-2		Lab ID: 50105170002	Collected: 10/09/14 14:50	Received: 10/10/14 11:12	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b>		Analytical Method: EPA 8081 Preparation Method: EPA 3535						
Aldrin	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:05	309-00-2	
alpha-BHC	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:05	319-84-6	
beta-BHC	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:05	319-85-7	
delta-BHC	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:05	319-86-8	
gamma-BHC (Lindane)	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:05	58-89-9	
alpha-Chlordane	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:05	5103-71-9	
gamma-Chlordane	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:05	5103-74-2	
4,4'-DDD	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:05	72-54-8	
4,4'-DDE	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:05	72-55-9	
4,4'-DDT	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:05	50-29-3	
Dieldrin	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:05	60-57-1	
Endosulfan I	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:05	959-98-8	
Endosulfan II	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:05	33213-65-9	
Endosulfan sulfate	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:05	1031-07-8	
Endrin	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:05	72-20-8	
Endrin aldehyde	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:05	7421-93-4	
Endrin ketone	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:05	53494-70-5	
Heptachlor	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:05	76-44-8	
Heptachlor epoxide	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:05	1024-57-3	
Methoxychlor	ND ug/L		0.50	1	10/15/14 13:04	10/22/14 13:05	72-43-5	
Toxaphene	ND ug/L		2.0	1	10/15/14 13:04	10/22/14 13:05	8001-35-2	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	66 %.		10-119	1	10/15/14 13:04	10/22/14 13:05	877-09-8	
Tetrachloro-m-xylene (S)	64 %.		10-119	1	10/15/14 13:04	10/22/14 13:05	877-09-8	
Decachlorobiphenyl (S)	83 %.		14-126	1	10/15/14 13:04	10/22/14 13:05	2051-24-3	
Decachlorobiphenyl (S)	74 %.		14-126	1	10/15/14 13:04	10/22/14 13:05	2051-24-3	
<b>8151 Chlorinated Herbicides</b>		Analytical Method: EPA 8151 Preparation Method: EPA 3535A						
2,4-D	ND ug/L		2.0	1	10/15/14 16:07	10/17/14 23:13	94-75-7	
2,4,5-T	ND ug/L		2.0	1	10/15/14 16:07	10/17/14 23:13	93-76-5	
2,4,5-TP (Silvex)	ND ug/L		2.0	1	10/15/14 16:07	10/17/14 23:13	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	75 %.		10-166	1	10/15/14 16:07	10/17/14 23:13	19719-28-9	
2,4-DCAA (S)	68 %.		10-166	1	10/15/14 16:07	10/17/14 23:13	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50105170

Sample: SW-3		Lab ID: 50105170003	Collected: 10/09/14 15:25	Received: 10/10/14 11:12	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b>		Analytical Method: EPA 8081 Preparation Method: EPA 3535						
Aldrin	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:18	309-00-2	
alpha-BHC	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:18	319-84-6	
beta-BHC	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:18	319-85-7	
delta-BHC	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:18	319-86-8	
gamma-BHC (Lindane)	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:18	58-89-9	
alpha-Chlordane	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:18	5103-71-9	
gamma-Chlordane	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:18	5103-74-2	
4,4'-DDD	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:18	72-54-8	
4,4'-DDE	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:18	72-55-9	
4,4'-DDT	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:18	50-29-3	
Dieldrin	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:18	60-57-1	
Endosulfan I	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:18	959-98-8	
Endosulfan II	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:18	33213-65-9	
Endosulfan sulfate	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:18	1031-07-8	
Endrin	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:18	72-20-8	
Endrin aldehyde	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:18	7421-93-4	
Endrin ketone	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:18	53494-70-5	
Heptachlor	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:18	76-44-8	
Heptachlor epoxide	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:18	1024-57-3	
Methoxychlor	ND ug/L		0.50	1	10/15/14 13:04	10/22/14 13:18	72-43-5	
Toxaphene	ND ug/L		2.0	1	10/15/14 13:04	10/22/14 13:18	8001-35-2	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	61 %.		10-119	1	10/15/14 13:04	10/22/14 13:18	877-09-8	
Tetrachloro-m-xylene (S)	64 %.		10-119	1	10/15/14 13:04	10/22/14 13:18	877-09-8	
Decachlorobiphenyl (S)	74 %.		14-126	1	10/15/14 13:04	10/22/14 13:18	2051-24-3	
Decachlorobiphenyl (S)	80 %.		14-126	1	10/15/14 13:04	10/22/14 13:18	2051-24-3	
<b>8151 Chlorinated Herbicides</b>		Analytical Method: EPA 8151 Preparation Method: EPA 3535A						
2,4-D	ND ug/L		2.0	1	10/15/14 16:07	10/17/14 23:29	94-75-7	
2,4,5-T	ND ug/L		2.0	1	10/15/14 16:07	10/17/14 23:29	93-76-5	
2,4,5-TP (Silvex)	ND ug/L		2.0	1	10/15/14 16:07	10/17/14 23:29	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	81 %.		10-166	1	10/15/14 16:07	10/17/14 23:29	19719-28-9	
2,4-DCAA (S)	89 %.		10-166	1	10/15/14 16:07	10/17/14 23:29	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50105170

Sample: SW-4		Lab ID: 50105170004	Collected: 10/09/14 16:30	Received: 10/10/14 11:12	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b>		Analytical Method: EPA 8081 Preparation Method: EPA 3535						
Aldrin	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:31	309-00-2	
alpha-BHC	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:31	319-84-6	
beta-BHC	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:31	319-85-7	
delta-BHC	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:31	319-86-8	
gamma-BHC (Lindane)	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:31	58-89-9	
alpha-Chlordane	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:31	5103-71-9	
gamma-Chlordane	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:31	5103-74-2	
4,4'-DDD	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:31	72-54-8	
4,4'-DDE	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:31	72-55-9	
4,4'-DDT	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:31	50-29-3	
Dieldrin	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:31	60-57-1	
Endosulfan I	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:31	959-98-8	
Endosulfan II	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:31	33213-65-9	
Endosulfan sulfate	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:31	1031-07-8	
Endrin	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:31	72-20-8	
Endrin aldehyde	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:31	7421-93-4	
Endrin ketone	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:31	53494-70-5	
Heptachlor	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:31	76-44-8	
Heptachlor epoxide	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:31	1024-57-3	
Methoxychlor	ND ug/L		0.50	1	10/15/14 13:04	10/22/14 13:31	72-43-5	
Toxaphene	ND ug/L		2.0	1	10/15/14 13:04	10/22/14 13:31	8001-35-2	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	57 %.		10-119	1	10/15/14 13:04	10/22/14 13:31	877-09-8	
Tetrachloro-m-xylene (S)	59 %.		10-119	1	10/15/14 13:04	10/22/14 13:31	877-09-8	
Decachlorobiphenyl (S)	76 %.		14-126	1	10/15/14 13:04	10/22/14 13:31	2051-24-3	
Decachlorobiphenyl (S)	69 %.		14-126	1	10/15/14 13:04	10/22/14 13:31	2051-24-3	
<b>8151 Chlorinated Herbicides</b>		Analytical Method: EPA 8151 Preparation Method: EPA 3535A						
2,4-D	ND ug/L		2.0	1	10/15/14 16:07	10/18/14 00:17	94-75-7	
2,4,5-T	ND ug/L		2.0	1	10/15/14 16:07	10/18/14 00:17	93-76-5	
2,4,5-TP (Silvex)	ND ug/L		2.0	1	10/15/14 16:07	10/18/14 00:17	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	73 %.		10-166	1	10/15/14 16:07	10/18/14 00:17	19719-28-9	
2,4-DCAA (S)	81 %.		10-166	1	10/15/14 16:07	10/18/14 00:17	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50105170

Sample: SW-5		Lab ID: 50105170005	Collected: 10/09/14 16:00	Received: 10/10/14 11:12	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b>		Analytical Method: EPA 8081 Preparation Method: EPA 3535						
Aldrin	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:43	309-00-2	R1
alpha-BHC	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:43	319-84-6	R1
beta-BHC	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:43	319-85-7	R1
delta-BHC	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:43	319-86-8	R1
gamma-BHC (Lindane)	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:43	58-89-9	R1
alpha-Chlordane	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:43	5103-71-9	R1
gamma-Chlordane	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:43	5103-74-2	R1
4,4'-DDD	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:43	72-54-8	R1
4,4'-DDE	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:43	72-55-9	R1
4,4'-DDT	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:43	50-29-3	R1
Dieldrin	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:43	60-57-1	R1
Endosulfan I	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:43	959-98-8	R1
Endosulfan II	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:43	33213-65-9	R1
Endosulfan sulfate	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:43	1031-07-8	
Endrin	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:43	72-20-8	R1
Endrin aldehyde	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:43	7421-93-4	
Endrin ketone	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 13:43	53494-70-5	
Heptachlor	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:43	76-44-8	R1
Heptachlor epoxide	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 13:43	1024-57-3	R1
Methoxychlor	ND ug/L		0.50	1	10/15/14 13:04	10/22/14 13:43	72-43-5	
Toxaphene	ND ug/L		2.0	1	10/15/14 13:04	10/22/14 13:43	8001-35-2	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	52 %.		10-119	1	10/15/14 13:04	10/22/14 13:43	877-09-8	
Tetrachloro-m-xylene (S)	54 %.		10-119	1	10/15/14 13:04	10/22/14 13:43	877-09-8	
Decachlorobiphenyl (S)	67 %.		14-126	1	10/15/14 13:04	10/22/14 13:43	2051-24-3	
Decachlorobiphenyl (S)	74 %.		14-126	1	10/15/14 13:04	10/22/14 13:43	2051-24-3	
<b>8151 Chlorinated Herbicides</b>		Analytical Method: EPA 8151 Preparation Method: EPA 3535A						
2,4-D	ND ug/L		2.0	1	10/15/14 16:07	10/18/14 00:33	94-75-7	R1
2,4,5-T	ND ug/L		2.0	1	10/15/14 16:07	10/18/14 00:33	93-76-5	
2,4,5-TP (Silvex)	ND ug/L		2.0	1	10/15/14 16:07	10/18/14 00:33	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	77 %.		10-166	1	10/15/14 16:07	10/18/14 00:33	19719-28-9	
2,4-DCAA (S)	85 %.		10-166	1	10/15/14 16:07	10/18/14 00:33	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## ANALYTICAL RESULTS

Project: Karwick Rd. Nature Park

Pace Project No.: 50105170

Sample: F.D.		Lab ID: 50105170006	Collected: 10/09/14 08:00	Received: 10/10/14 11:12	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8081 Organochlorine Pesticides</b>		Analytical Method: EPA 8081 Preparation Method: EPA 3535						
Aldrin	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 14:21	309-00-2	
alpha-BHC	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 14:21	319-84-6	
beta-BHC	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 14:21	319-85-7	
delta-BHC	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 14:21	319-86-8	
gamma-BHC (Lindane)	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 14:21	58-89-9	
alpha-Chlordane	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 14:21	5103-71-9	
gamma-Chlordane	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 14:21	5103-74-2	
4,4'-DDD	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 14:21	72-54-8	
4,4'-DDE	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 14:21	72-55-9	
4,4'-DDT	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 14:21	50-29-3	
Dieldrin	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 14:21	60-57-1	
Endosulfan I	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 14:21	959-98-8	
Endosulfan II	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 14:21	33213-65-9	
Endosulfan sulfate	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 14:21	1031-07-8	
Endrin	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 14:21	72-20-8	
Endrin aldehyde	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 14:21	7421-93-4	
Endrin ketone	ND ug/L		0.10	1	10/15/14 13:04	10/22/14 14:21	53494-70-5	
Heptachlor	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 14:21	76-44-8	
Heptachlor epoxide	ND ug/L		0.050	1	10/15/14 13:04	10/22/14 14:21	1024-57-3	
Methoxychlor	ND ug/L		0.50	1	10/15/14 13:04	10/22/14 14:21	72-43-5	
Toxaphene	ND ug/L		2.0	1	10/15/14 13:04	10/22/14 14:21	8001-35-2	
<b>Surrogates</b>								
Tetrachloro-m-xylene (S)	58 %.		10-119	1	10/15/14 13:04	10/22/14 14:21	877-09-8	
Tetrachloro-m-xylene (S)	56 %.		10-119	1	10/15/14 13:04	10/22/14 14:21	877-09-8	
Decachlorobiphenyl (S)	65 %.		14-126	1	10/15/14 13:04	10/22/14 14:21	2051-24-3	
Decachlorobiphenyl (S)	68 %.		14-126	1	10/15/14 13:04	10/22/14 14:21	2051-24-3	
<b>8151 Chlorinated Herbicides</b>		Analytical Method: EPA 8151 Preparation Method: EPA 3535A						
2,4-D	ND ug/L		2.0	1	10/15/14 16:07	10/18/14 01:22	94-75-7	
2,4,5-T	ND ug/L		2.0	1	10/15/14 16:07	10/18/14 01:22	93-76-5	
2,4,5-TP (Silvex)	ND ug/L		2.0	1	10/15/14 16:07	10/18/14 01:22	93-72-1	
<b>Surrogates</b>								
2,4-DCAA (S)	86 %.		10-166	1	10/15/14 16:07	10/18/14 01:22	19719-28-9	
2,4-DCAA (S)	77 %.		10-166	1	10/15/14 16:07	10/18/14 01:22	19719-28-9	

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50105170

QC Batch:	OEXT/3112	Analysis Method:	EPA 8081
QC Batch Method:	EPA 3535	Analysis Description:	8081A GCS Pesticides
Associated Lab Samples:	50105170001, 50105170002, 50105170003, 50105170004, 50105170005, 50105170006		

METHOD BLANK: 61707 Matrix: Water

Associated Lab Samples: 50105170001, 50105170002, 50105170003, 50105170004, 50105170005, 50105170006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
4,4'-DDD	ug/L	ND	0.10	10/22/14 11:36	
4,4'-DDE	ug/L	ND	0.10	10/22/14 11:36	
4,4'-DDT	ug/L	ND	0.10	10/22/14 11:36	
Aldrin	ug/L	ND	0.050	10/22/14 11:36	
alpha-BHC	ug/L	ND	0.050	10/22/14 11:36	
alpha-Chlordane	ug/L	ND	0.050	10/22/14 11:36	
beta-BHC	ug/L	ND	0.050	10/22/14 11:36	
delta-BHC	ug/L	ND	0.050	10/22/14 11:36	
Dieldrin	ug/L	ND	0.10	10/22/14 11:36	
Endosulfan I	ug/L	ND	0.050	10/22/14 11:36	
Endosulfan II	ug/L	ND	0.10	10/22/14 11:36	
Endosulfan sulfate	ug/L	ND	0.10	10/22/14 11:36	
Endrin	ug/L	ND	0.10	10/22/14 11:36	
Endrin aldehyde	ug/L	ND	0.10	10/22/14 11:36	
Endrin ketone	ug/L	ND	0.10	10/22/14 11:36	
gamma-BHC (Lindane)	ug/L	ND	0.050	10/22/14 11:36	
gamma-Chlordane	ug/L	ND	0.050	10/22/14 11:36	
Heptachlor	ug/L	ND	0.050	10/22/14 11:36	
Heptachlor epoxide	ug/L	ND	0.050	10/22/14 11:36	
Methoxychlor	ug/L	ND	0.50	10/22/14 11:36	
Toxaphene	ug/L	ND	2.0	10/22/14 11:36	
Decachlorobiphenyl (S)	%	62	14-126	10/22/14 11:36	
Decachlorobiphenyl (S)	%	68	14-126	10/22/14 11:36	
Tetrachloro-m-xylene (S)	%	48	10-119	10/22/14 11:36	
Tetrachloro-m-xylene (S)	%	50	10-119	10/22/14 11:36	

LABORATORY CONTROL SAMPLE: 61708

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
4,4'-DDD	ug/L	.5	0.34	69	29-130	
4,4'-DDE	ug/L	.5	0.21	41	15-115	
4,4'-DDT	ug/L	.5	0.29	58	24-115	
Aldrin	ug/L	.5	0.12	24	10-115	
alpha-BHC	ug/L	.5	0.36	72	27-124	
alpha-Chlordane	ug/L	.5	0.28	55	21-116	
beta-BHC	ug/L	.5	0.38	75	32-131	
delta-BHC	ug/L	.5	0.38	76	28-134	
Dieldrin	ug/L	.5	0.35	69	31-121	
Endosulfan I	ug/L	.5	0.29	59	13-115	
Endosulfan II	ug/L	.5	0.35	70	14-115	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50105170

LABORATORY CONTROL SAMPLE: 61708

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Endosulfan sulfate	ug/L	.5	0.40	79	33-133	
Endrin	ug/L	.5	0.38	76	20-153	
Endrin aldehyde	ug/L	.5	0.37	73	27-129	
Endrin ketone	ug/L	.5	0.38	77	34-129	
gamma-BHC (Lindane)	ug/L	.5	0.37	75	28-128	
gamma-Chlordane	ug/L	.5	0.24	49	16-116	
Heptachlor	ug/L	.5	0.22	44	10-115	
Heptachlor epoxide	ug/L	.5	0.35	71	30-119	
Methoxychlor	ug/L	.5	.3J	60	21-150	
Decachlorobiphenyl (S)	%			73	14-126	
Decachlorobiphenyl (S)	%			88	14-126	
Tetrachloro-m-xylene (S)	%			63	10-119	
Tetrachloro-m-xylene (S)	%			66	10-119	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 61709 61710

Parameter	Units	50105170005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
4,4'-DDD	ug/L	ND	.5	.5	0.31	0.40	62	80	22-141	26	20	R1
4,4'-DDE	ug/L	ND	.5	.5	0.24	0.34	48	67	11-125	33	20	R1
4,4'-DDT	ug/L	ND	.5	.5	0.30	0.38	59	77	16-133	26	20	R1
Aldrin	ug/L	ND	.5	.5	0.17	0.25	34	50	10-115	38	20	R1
alpha-BHC	ug/L	ND	.5	.5	0.33	0.43	66	86	14-145	26	20	R1
alpha-Chlordane	ug/L	ND	.5	.5	0.28	0.39	56	77	16-135	31	20	R1
beta-BHC	ug/L	ND	.5	.5	0.34	0.43	66	85	18-155	25	20	R1
delta-BHC	ug/L	ND	.5	.5	0.36	0.45	69	87	16-153	23	20	R1
Dieldrin	ug/L	ND	.5	.5	0.33	0.43	65	84	14-148	26	20	R1
Endosulfan I	ug/L	ND	.5	.5	0.27	0.36	55	71	10-126	26	20	R1
Endosulfan II	ug/L	ND	.5	.5	0.32	0.41	63	82	10-133	26	20	R1
Endosulfan sulfate	ug/L	ND	.5	.5	0.40	0.48	80	97	24-149	19	20	
Endrin	ug/L	ND	.5	.5	0.37	0.47	73	93	22-160	24	20	R1
Endrin aldehyde	ug/L	ND	.5	.5	0.34	0.41	67	81	12-139	20	20	
Endrin ketone	ug/L	ND	.5	.5	0.37	0.46	74	91	20-153	20	20	
gamma-BHC (Lindane)	ug/L	ND	.5	.5	0.34	0.44	68	88	17-149	26	20	R1
gamma-Chlordane	ug/L	ND	.5	.5	0.25	0.36	51	71	13-136	33	20	R1
Heptachlor	ug/L	ND	.5	.5	0.22	0.31	44	63	10-134	34	20	R1
Heptachlor epoxide	ug/L	ND	.5	.5	0.33	0.42	65	84	13-147	25	20	R1
Methoxychlor	ug/L	ND	.5	.5	.29J	.36J	55	70	17-166		20	
Decachlorobiphenyl (S)	%						67	82	14-126			
Decachlorobiphenyl (S)	%						74	90	14-126			
Tetrachloro-m-xylene (S)	%						55	72	10-119			
Tetrachloro-m-xylene (S)	%						56	72	10-119			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA

Project: Karwick Rd. Nature Park

Pace Project No.: 50105170

QC Batch: OEXT/3115 Analysis Method: EPA 8151  
QC Batch Method: EPA 3535A Analysis Description: 8151A GCS Herbicides  
Associated Lab Samples: 50105170001, 50105170002, 50105170003, 50105170004, 50105170005, 50105170006

METHOD BLANK: 61893 Matrix: Water  
Associated Lab Samples: 50105170001, 50105170002, 50105170003, 50105170004, 50105170005, 50105170006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
2,4,5-T	ug/L	ND	2.0	10/17/14 21:04	
2,4,5-TP (Silvex)	ug/L	ND	2.0	10/17/14 21:04	
2,4-D	ug/L	ND	2.0	10/17/14 21:04	
2,4-DCAA (S)	%.	58	10-166	10/17/14 21:04	
2,4-DCAA (S)	%.	63	10-166	10/17/14 21:04	

LABORATORY CONTROL SAMPLE: 61894

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
2,4,5-T	ug/L	2	1.3J	65	10-169	
2,4,5-TP (Silvex)	ug/L	2	1.4J	69	22-158	
2,4-D	ug/L	20	13.8	69	10-151	
2,4-DCAA (S)	%.			64	10-166	
2,4-DCAA (S)	%.			66	10-166	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 61895 61896

Parameter	Units	50105170005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
2,4,5-T	ug/L	ND	2	2	1.2J	1.6J	62	81	10-168		20	
2,4,5-TP (Silvex)	ug/L	ND	2	2	1.3J	1.7J	65	85	16-164		20	
2,4-D	ug/L	ND	20	20	13.1	17.7	65	89	10-160	30	20	R1
2,4-DCAA (S)	%.						65	81	10-166			
2,4-DCAA (S)	%.						67	87	10-166			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALIFIERS

Project: Karwick Rd. Nature Park

Pace Project No.: 50105170

---

### DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

### LABORATORIES

PASI-N Pace Analytical Services - New Orleans

### ANALYTE QUALIFIERS

R1 RPD value was outside control limits.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Karwick Rd. Nature Park

Pace Project No.: 50105170

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
50105170001	SW-1	EPA 3535	OEXT/3112	EPA 8081	GCSV/2632
50105170002	SW-2	EPA 3535	OEXT/3112	EPA 8081	GCSV/2632
50105170003	SW-3	EPA 3535	OEXT/3112	EPA 8081	GCSV/2632
50105170004	SW-4	EPA 3535	OEXT/3112	EPA 8081	GCSV/2632
50105170005	SW-5	EPA 3535	OEXT/3112	EPA 8081	GCSV/2632
50105170006	F.D.	EPA 3535	OEXT/3112	EPA 8081	GCSV/2632
50105170001	SW-1	EPA 3535A	OEXT/3115	EPA 8151	GCSV/2605
50105170002	SW-2	EPA 3535A	OEXT/3115	EPA 8151	GCSV/2605
50105170003	SW-3	EPA 3535A	OEXT/3115	EPA 8151	GCSV/2605
50105170004	SW-4	EPA 3535A	OEXT/3115	EPA 8151	GCSV/2605
50105170005	SW-5	EPA 3535A	OEXT/3115	EPA 8151	GCSV/2605
50105170006	F.D.	EPA 3535A	OEXT/3115	EPA 8151	GCSV/2605

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



**CHAIN-OF-CUSTODY / Analytical Request Document**

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company: Weaver Boos Consultants	Report To: Steve Stanford	Attention: Lyfe Cable	<div style="float: right;">             Page: <u>1</u> of <u>1</u>  <b>1803908</b> </div>		
Address: 7121 Grape Rd. Granger, IN 46530	Copy To: ahuang@weaverboos.com	Company Name: Pace Analytical			
Email To: Stanford@weaverboos.com		Address: 7726 Miller Rd.			
Phone: 574-271-3947	Purchase Order No.:	Pace Quote Reference: 00015667			
Fax:	Project Name: Karwack Rd. Nature Park	Pace Project Manager:			
Requested Due Date/TAT:	Project Number: 1873-356-04-00	Pace Profile #:	<div style="float: right;">             Site Location: <u>IN</u>              STATE:           </div>		

[illegible]



# Sample Condition Upon Receipt

Pace Analytical

Client Name: Weaver Roo Project # 50105170

Courier: ☒ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other

Tracking #: 8024 83843706

Custody Seal on Cooler/Box Present: ☒ yes ☐ no Seals intact: ☒ yes ☐ no

Date/Time 5035A kits placed in freezer

Packing Material: ☐ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other

Thermometer 1 2 3 4 5 6 A B C D E F Type of Ice: Wet Blue None ☐ Samples on ice, cooling process has begun

Cooler Temperature 3.2, 1.1, 0.9 Ice Visible in Sample Containers: ☐ yes ☒ no  
(Corrected, if applicable)

Temp should be above freezing to 6°C

Comments:

Date and Initials of person examining contents: EP 10-10-14

Chain of Custody Present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	1.
Chain of Custody Filled Out:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	2.
Chain of Custody Relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	3.
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	4.
Short Hold Time Analysis (<72hr):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	5.
Rush Turn Around Time Requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	6.
Containers Intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	7.
Sample Labels match COC:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	8.
-Includes date/time/ID/Analysis		
All containers needing acid/base pres. have been checked?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	9.
exceptions: VOA, coliform, TOC, O&G		(Circle) HNO3 H2SO4 NaOH HCl
All containers needing preservation are found to be in compliance with EPA recommendation (<2, >9, >12) unless otherwise noted.		
Headspace in VOA Vials (>6mm):	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	10.
Trip Blank Present:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	11.
Trip Blank Custody Seals Present	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Project Manager Review		
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	12.
Sufficient Volume:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	13.
Correct Containers Used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	14.

Client Notification/ Resolution:

Field Data Required? Y / N

Person Contacted: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Comments/ Resolution: \_\_\_\_\_

Project Manager Review:

Date: 10-10-14



# Sample Container Count

CLIENT: Weaver Bo

COC PAGE 1 of 1  
COC ID# 1803908

Project #

5010570



Sample Line

Item	DG9H	AG1U	WG9U	AG0U	R	4/6	BP2N	BP2U	BP2S	BP3N	BP3U	BP3S	AG3S	AG1H	BP3C	BP1U	SPST	pH <2	pH >12	Comments
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				

## Container Codes

DG9H	40mL HCL amber vial	AG0U	100mL unpreserved amber glass	BP1N	1 liter HNO3 plastic	DG9P	40mL TSP amber vial
AG1U	1 liter unpreserved amber glass	AG1H	1 liter HCL amber glass	BP1S	1 liter H2SO4 plastic	DG9S	40mL H2SO4 amber vial
WG9U	4oz clear soil jar	AG1S	1 liter H2SO4 amber glass	BP1U	1 liter unpreserved plastic	DG9T	40mL Na Thio amber vial
R	terra core kit	AG1T	1 liter Na Thiosulfate amber glass	BP1Z	1 liter NaOH, Zn, Ac	DG9U	40mL unpreserved amber vial
BP2N	500mL HNO3 plastic	AG2N	500mL HNO3 amber glass	BP2A	500mL NaOH, Asc Acid plastic	I	Wipe/Swab
BP2U	500mL unpreserved plastic	AG2S	500mL H2SO4 amber glass	BP2O	500mL NaOH plastic	JGFU	4oz unpreserved amber wide
BP2S	500mL H2SO4 plastic	AG2U	500mL unpreserved amber glass	BP2Z	500mL NaOH, Zn Ac	U	Summa Can
BP3N	250mL HNO3 plastic	AG3U	250mL unpreserved amber glass	AF	Air Filter	VG9H	40mL HCL clear vial
BP3U	250mL unpreserved plastic	BG1H	1 liter HCL clear glass	BP3C	250mL NaOH plastic	VG9T	40mL Na Thio. clear vial
BP3S	250mL H2SO4 plastic	BG1S	1 liter H2SO4 clear glass	BP3Z	250mL NaOH, Zn Ac plastic	VG9U	40mL unpreserved clear vial
AG3S	250mL H2SO4 glass amber	BG1T	1 liter Na Thiosulfate clear glass	C	Air Cassettes	VSG	Headspace septa vial & HCL
AG1S	1 liter H2SO4 amber glass	BG1U	1 liter unpreserved glass	DG9B	40mL Na Bisulfate amber vial	WGFU	4oz wide jar w/hexane wipe
BP1U	1 liter unpreserved plastic	BP1A	1 liter NaOH, Asc Acid plastic	DG9M	40mL MeOH clear vial	ZPLC	Ziploc Bag



# **APPENDIX I**

VRP Documents



**Voluntary Remediation Agreement  
Relating to Karwick Road Landfill**

Michigan City Parks & Recreation Department     )  
Michigan City, Indiana                                 )  
Applicant   )  
Voluntary Remediation at:                             )  
Karwick Road Landfill Site                           )  
Karwick Road    )  
Michigan City, IN 46360                               )  
IDEM Project # 6020118                                )  
Proceeding under                                        )  
the Environmental                                        )  
Management Act                                        )  
(Indiana Code 13-25-5)                                 )

IDEM Office of Land Quality - Fileroom Stamp	
VRP Project Name: _____	
VRP#: _____	File Code: <u>100</u>
Description: _____	
Confidential? _____ Yes	<u>X</u> No
Deliberative? _____ Yes	<u>X</u> No

**I. INTRODUCTION**

1. The Indiana Department of Environmental Management ("IDEM"), by its Commissioner or his or her designee ("Commissioner"), and the Michigan City Parks & Recreation Department ("Applicant"), hereby enter into this Voluntary Remediation Agreement ("Agreement"), pursuant to IC § 13-25-5-8, for the purpose of remediating the release of hazardous substances or petroleum at the former Karwick Road Landfill Site, Michigan City, Laporte County, Indiana.

**II. JURISDICTION**

2. This Agreement is entered into by and between Applicant and IDEM, by its Commissioner, pursuant to IC § 13-25-5-8, hereafter collectively referred to as the "Parties."

3. The Parties agree to the following terms and conditions for the evaluation and implementation of the Voluntary Remediation Work Plan ("Remediation Work Plan"), to waive their rights to administrative and judicial review of the binding effect and enforceability of the Agreement, and to not contest the jurisdiction of IDEM to enter into this Agreement. However, the Applicant reserves all rights it may have under common law, Indiana law, and federal law to seek contribution or indemnity from others not signatories to this Agreement.

4. By entering into this Agreement, the Applicant neither admits nor denies liability.



RECEIVED

FEB 21 2002

RY CLEANUP

OCR



### III. STATEMENT OF ELIGIBILITY

5. The Commissioner has determined that the application submitted by Applicant is complete and that Applicant is eligible to participate in the Voluntary Remediation Program ("VRP") established under IC 13-25-5. However, neither the Commissioner's determination of eligibility nor the entry into this Agreement precludes any finding by the Commissioner at a later date that the Site poses an imminent and substantial threat to human health or the environment within the meaning of IC 13-25-5. In addition, if it is determined that Applicant withheld or misrepresented information that would be relevant to the Applicant's eligibility, IDEM may withdraw from this Agreement.

6. If it is determined that Applicant is eligible for the Indiana Underground Petroleum Storage Tank Excess Liability Fund pursuant to IC 13-23 and all applicable rules, Applicant may apply for reimbursement of the costs of the remediation required by this Agreement. However, Applicant expressly waives the right to claim reimbursement for costs paid to IDEM as Administrative Costs, as described in Section XIX, and for the application fee as provided in IC § 13-25-5-2.

7. Applicant shall comply with all applicable Indiana and federal requirements for corrective action. For purposes of determining compliance with applicable Indiana and federal requirements for Leaking Underground Storage Tank ("LUST") remediation and for determining eligibility for the Indiana Underground Petroleum Storage Tank Excess Liability Fund ("ELF"), IDEM will evaluate the Remediation Work Plan for consistency with guidance applicable to the LUST Program and ELF. Applicant shall notify the IDEM Project Manager if this evaluation is desired.

### IV. PARTIES BOUND

8. This Agreement shall apply to and be binding upon the Applicant, its officers, directors, principals, employees, agents, successors, subsidiaries, and assigns, and upon IDEM, its employees, agents and successors. The signatories to this Agreement certify that they are fully authorized to execute this Agreement and legally bind the Parties they represent. No change in ownership, corporate, or partnership status of the Applicant shall in any way alter its status or responsibilities under this Agreement unless Applicant or IDEM withdraws from this Agreement.

9. The Applicant shall provide a copy of this Agreement to any subsequent owners or successors before ownership rights are transferred. The Applicant shall provide a copy of this Agreement to all contractors, sub-contractors, laboratories, and consultants that are retained to conduct any work performed under this Agreement, within fourteen (14) days after the effective date of this Agreement or within fourteen (14) days of the date of retaining their services.



## V. DEFINITIONS

10. "Commissioner" shall mean the Commissioner of IDEM or her or his designee.

11. "Day" shall be defined as the 24-hour period from 12:00 A.M. up to but not including 12:00 A.M.

12. "Site" shall be used in the manner as defined by IC § 13-11-2-203(a) and includes the legal description of the former Karwick Road Landfill facility located at Karwick Road, Michigan City, Laporte County, Indiana.

13. All other terms contained in this Agreement shall be used in the manner as defined by IC 13-11-2.

## VI. STATEMENT OF PURPOSE

14. This Agreement sets forth the terms and conditions of evaluation and implementation of a Remediation Work Plan proposed by the Applicant for the remediation of the release or threatened release of petroleum or hazardous substances from the Site.

15. The activities conducted by the Applicant under this Agreement are subject to approval by IDEM. Applicant shall provide all necessary information for a Remediation Work Plan for the Site. The activities conducted by the Applicant shall be consistent with this Agreement, all applicable laws and regulations, and appropriate guidance documents as described in Paragraphs 16. Applicant shall employ sound scientific, engineering, and construction practices.

## VII. WORK TO BE PERFORMED

16. All work to be performed by the Applicant pursuant to this Agreement shall be under the direction and supervision of qualified person(s) with expertise in hazardous substance or petroleum site investigation and remediation. This individual may or may not be designated by Applicant as Applicant's Project Manager in Paragraph 25. Prior to the initiation of Site work, the Applicant shall notify IDEM, in writing, regarding the name, title, and qualifications of such qualified person and of any contractors and/or subcontractors to be used in carrying out the terms of this Agreement. All work performed and all documents submitted shall be in accordance with all VRP guidance documents available and in effect as of the Effective Date of this Agreement. The Applicant may elect to comply with either the VRP's *Resource Guide* (July, 1996 edition) or the guidance pertaining to IDEM's *Risk-Integrated System of Closure* in accordance with the RISC Transition Policy (adopted by the RISC Nonrule Policy Statement (Waste-0046-NPD, 24 Ind. Reg. 1986 (2001)) and attached hereto). In the event that this Agreement is not executed or submitted in the time and manner specified in the RISC Transition Policy, the applicant shall comply with the guidance pertaining to IDEM's *Risk-Integrated System of Closure*. The Applicant may supplement this guidance with guidance or other documents approved by VRP. Guidance documents identified in this Agreement are named for the convenience of the



Applicant; the failure to specify a specific guidance document in this Agreement shall not be construed as a limitation on the applicability of a guidance document.

17. Applicant may, at Applicant's discretion, submit to IDEM an Investigation Work Plan detailing the investigation of the nature and extent of the contamination at the Site. The Investigation Work Plan, including the Investigation Work Plan format, shall be developed in accordance with the guidance documents specified in Paragraph 16.

(a) The Investigation Work Plan shall include the following project plans: (1) a quality assurance project plan; (2) a sampling and analysis plan; (3) a health and safety plan; (4) a schedule for implementation of all tasks set forth in the Investigation Work Plan; and (5) a data management plan.

(b) IDEM may require Applicant to submit additional or corrected information pursuant to IC § 13-25-5-9(b).

(c) The Investigation Work Plan shall be subject to review and evaluation for technical sufficiency by IDEM within approximately sixty (60) days of receipt. IDEM's failure to act on the Investigation Work Plan shall not constitute IDEM's acceptance of the Investigation Work Plan. Acceptance of the Investigation Work Plan by the IDEM Project Manager shall not preclude IDEM from requiring further investigation before final approval of the Remediation Work Plan is given.

18. Applicant may, at Applicant's discretion, submit to IDEM an Investigation Report detailing the results of an investigation of the nature and extent of the contamination at the Site. The Investigation Report may be, but need not be, the results of the Investigation Work Plan in Paragraph 17.

(a) The Investigation Report, including the Investigation Report format, shall be developed in accordance with the guidance documents specified in Paragraph 16.

(b) IDEM may require Applicant to submit additional or corrected information pursuant to IC 13-25-5-9(b).

(c) The Investigation Report shall be subject to review and evaluation for technical sufficiency by IDEM within approximately sixty (60) days of receipt. IDEM's failure to act on the Investigation Report shall not constitute IDEM's acceptance of the Investigation Report. Acceptance of the Investigation Report by the IDEM Project Manager shall not preclude IDEM from requiring further investigation before final approval of the Remediation Work Plan is given.

19. The Applicant shall submit a Remediation Work Plan not later than one hundred eighty (180) days after the date this Agreement is executed, or longer if an extension is agreed to by the Parties. If Applicant fails to submit the Remediation Work Plan within that period, the Agreement is voidable at the discretion of IDEM. If IDEM determines the Agreement is void, all



protection provided under IC § 13-25-5-18(e) is extinguished. In the event this Agreement is voided, the Applicant shall remain responsible to IDEM under Section XIX, Administrative Costs. The Remediation Work Plan must specify the objectives for the remediation of hazardous substances or petroleum that are based on: background levels of hazardous substances and petroleum that occur naturally on the Site; or, an assessment of the risks posed by the hazardous substances and petroleum, taking into consideration the expected future use of the Site and measurable risks to human health, natural resources, or the environment. Risk based objectives shall be based on one of the following: 1) levels of hazardous substances and petroleum calculated by IDEM using standard equations and default values for that particular contaminant; 2) levels of hazardous substances and petroleum calculated using site specific data for the default values in IDEM's standard equations; or, 3) levels of hazardous substances and petroleum developed based on site specific risk assessments that take into account site specific factors. The Remediation Work Plan, including the Remediation Work Plan format, shall be developed in accordance with the guidance documents specified in Paragraph 16.

20. The Remediation Work Plan shall include: (1) a detailed description of the investigation conducted by the Applicant in preparing the Remediation Work Plan and a description of the work performed by the Applicant to determine the nature and extent of the actual or threatened release; (2) a proposed statement of work to accomplish the remediation in accordance with guidelines established by the department; and (3) the following project plans: (a) a quality assurance project plan, (b) a sampling and analysis plan, (c) a health and safety plan, (d) a community relations plan, (e) a schedule for implementation of all tasks set forth in the Remediation Work Plan, and (f) a data management plan. The community relations plan shall be consistent with the *Voluntary Remediation Program Community Relations Plan* non-rule policy document, 24 Ind. Reg. 2598 (May 1, 2001).

21. IDEM may request Applicant to submit additional or corrected information pursuant to IC § 13-25-5-9(b). The Applicant may comply with the request or withdraw the proposed plan from consideration.

22. The Remediation Work Plan shall be subject to review and evaluation by IDEM pursuant to IC § 13-25-5-9(a) for approximately sixty (60) days after receipt of the Remediation Work Plan. IDEM's failure to act on the Remediation Work Plan shall not constitute IDEM's acceptance of the Remediation Work Plan. Additionally, IDEM may request the applicant to supply additional information or corrected information pursuant to IC § 13-25-5-9(b). This time period shall not include the time required for public comment under IC § 13-25-5-11.

23. The Commissioner shall make a determination concerning the approval, modification and approval, or rejection of the Remediation Work Plan within thirty (30) days of close of the public comment period provided for in IC § 13-25-5-11 and notify the Applicant of the determination as provided in IC § 13-25-5-12 or IC § 13-25-5-13.

24. If the Applicant desires to proceed with the implementation of the approved Remediation Work Plan, the Applicant must notify IDEM in writing not more than sixty (60) days after the Remediation Work Plan is approved. After providing such notice, the Applicant



shall initiate the work detailed in the Remediation Work Plan according to the schedule as set forth in the Remediation Work Plan. Upon IDEM's receipt of notice that the Applicant intends to proceed, the fully approved Remediation Work Plan shall be deemed incorporated into and made an enforceable part of this Agreement.

#### VIII. ADDRESSES FOR ALL CORRESPONDENCE

25. Documents, including reports, approvals, notifications, disapprovals, and other correspondence, to be submitted under this Agreement, may be sent by U.S. First Class mail, hand delivery, overnight mail, or by courier service to the following addresses or to such addresses as the Applicant or IDEM may designate in writing.

Documents to be submitted to IDEM shall be sent to:

Brent A. Dayharsh  
100 North Senate Avenue  
P.O. Box 6015  
Indianapolis, Indiana 46206-6015  
(317) 234-0967

Documents to be submitted to the Applicant shall be sent to:

John Klanke  
Advanced Pollution Technologists, Inc.  
3505 N. Home Street, Suite 100  
Mishawaka, IN 46545  
(219) 257-8196

#### IX. COMPLIANCE WITH APPLICABLE LAWS

26. All work undertaken by the Applicant pursuant to this Agreement shall be performed in compliance with all applicable federal, state and local laws, ordinances and regulations, including, but not limited to, all Occupational Safety and Health Administration, Department of Transportation and Resource Conservation and Recovery Act regulations. In the event of a conflict in the application of federal, state, or local laws, ordinances, or regulations, the Applicant shall comply with the more/most stringent of such laws, ordinances, or regulations, unless provided otherwise in writing by IDEM. Where it is determined that a permit is required under law, Applicant shall submit timely and complete applications and take all other actions necessary to obtain all such permits or approvals. The Applicant shall be responsible for obtaining all permits that are necessary for the performance of any work hereunder.

27. Nothing in IC 13-25-5 relieves Applicant of its obligations or responsibilities under the Resource Conservation and Recovery Act, 42 U.S.C. § 6901 *et seq.*, including, but not limited to, the duty to meet any permit conditions, financial responsibility, closure, post-closure



or corrective action,, regardless of whether the Remediation Work Plan addressed the contaminants or property at issue.

28. Nothing in this Agreement, the Certificate of Completion, or the Covenant Not To Sue shall be construed to relieve the Applicant of any natural resource damage liability arising from contaminants, even if addressed by the Remediation Work Plan, including under the following authorities: 42 U.S.C. § 9601 *et seq.* (CERCLA), 33 U.S.C. § 2701 *et seq.*, IC § 13-25-4-8, or any common law theories of public trust doctrine in Indiana. Applicant agrees that the period from the Effective Date of this Agreement until the Agreement is terminated or satisfied shall toll all statutes of limitations applicable to the contaminants addressed by the Remediation Work Plan.

29. A Certificate of Completion and Covenant Not To Sue issued under Section XXV (Termination and Satisfaction) shall not release Applicant from liability for claims for natural resources damages. Applicant may devise and carry out a plan for restoration, rehabilitation, replacement, or acquisition of equivalent natural resources or pay to the State the value of the natural resources, as determined by the Natural Resource Trustees. The plan may be developed and implemented as part of the Remediation Work Plan. If Applicant wishes to address natural resource damages in the Remediation Work Plan, Applicant shall so indicate in the notice to the State and Federal Natural Resources Trustees per Section X (Interagency Coordination).

30. After receiving notice of Applicant's desire to address natural resource damages, the Natural Resources Trustees may perform a pre-assessment screen for injury to, destruction of, or loss of natural resources. The Applicant expressly agrees to reimburse IDEM for any and all costs incurred by either IDEM or the Indiana Department of Natural Resources in performing the pre-assessment screen. The Applicant will perform the assessment of damages based on the pre-assessment screen. This Agreement and the Covenant Not To Sue issued hereunder do not alter the liability of Applicant or any other person to the federal government for claims of natural resource damages under any federal law.

#### X. INTERAGENCY COORDINATION

31. The following agencies may have an interest in the Remediation Work Plan because of concurrent jurisdiction over the Site:

1. Indiana Department of Natural Resources  
Fish & Wildlife Division  
Rm-W273  
402 W. Washington, Indianapolis, IN 46204  
Attn: Mr. Wayne Faatz  
Phone: (317) 232-4080  
Fax: (317) 233-4579



2. Indiana State Department of Health  
Epidemiology Resource Center  
Rm 234W  
1330 W. Michigan St.  
Indianapolis, IN 46202
3. Fire Prevention and Building Safety Commission  
Office of the Fire Marshal  
Rm E-241  
402 W. Washington St.  
Indianapolis, IN 46204  
Phone: (317) 232-2222  
Fax: (317) 233-0307
4. U.S. Department of Interior  
Fish & Wildlife Service  
Bloomington Ecological Services Field Office  
620 South Walker Street  
Bloomington, Indiana 47403-2102  
Telephone: (812) 334-4261  
Fax: (812) 334-4273

32. The Applicant shall provide notice to these agencies of the submission of the Remediation Work Plan by sending them a copy of the Remediation Work Plan Executive Summary, a Site map, and the names of the Project Managers for IDEM and Applicant. Any of the above named agencies that wish to review the Remediation Work Plan shall be given an opportunity by IDEM to comment during the time that IDEM is reviewing the Remediation Work Plan. IDEM shall consider any comments from state agencies that are received at least thirty (30) days prior to the deadline established in this Agreement for approval or rejection of the Remediation Work Plan. If Applicant wishes to address natural resource damages in the Remediation Work Plan, Applicant shall so notify the State and Federal Natural Resources Trustees within thirty (30) days of the Effective Date of this Agreement.

#### XI. DESIGNATED PROJECT MANAGER

33. On or before the Effective Date of this Agreement, IDEM and the Applicant shall each designate a Project Manager. Each Project Manager shall be responsible for overseeing the implementation of this Agreement. The IDEM Project Manager will be the designated IDEM representative at the Site. To the maximum extent possible, communications between the Applicant and IDEM and all documents (including reports, approvals, and other correspondence) concerning the activities performed pursuant to this Agreement shall be directed through the Project Managers. During implementation of this Agreement, the Project Managers shall, whenever possible, operate by consensus and shall attempt in good faith to resolve disputes informally through discussion of the issues. Each Party has the right to change its respective



Project Manager, which Party shall notify the other Party of the change in writing and in a timely fashion.

34. The IDEM Project Manager shall have the authority to halt, conduct, or direct any work required by this Agreement and/or any response actions or portions thereof if Site conditions present an imminent and substantial threat to human health or the environment. In the event that the IDEM Project Manager halts work pursuant to this paragraph, the schedule of work described in the Remediation Work Plan and this Agreement shall be modified accordingly, or IDEM may withdraw its approval of the Remediation Work Plan pursuant to Section XVIII (Reservation of Rights).

35. The absence of the Applicant's or IDEM's Project Manager from the Site shall not be cause for the stoppage of work. The Applicant's Project Manager or his or her supervisor shall reasonably be available by telephone while work is being performed at the Site. The Applicant's Project Manager shall designate a person to be in charge who will be available at the Site when work is being performed at the Site.

## XII. QUALITY ASSURANCE

36. The Applicant shall use quality assurance, quality control, and chain of custody procedures in accordance with the Quality Assurance Project Plan approved for use by IDEM throughout any sample collection and analysis activities under this Agreement, unless IDEM agrees otherwise.

37. Applicant shall provide the IDEM Project Manager with reasonable advance notice of all sampling and analysis as detailed in the Investigation or Remediation Work Plans. IDEM requires the presence of an IDEM representative during any sampling that the Applicant uses as confirmation sampling. To provide quality assurance and maintain quality control, the Applicant shall do each of the following.

(a) Applicant shall allow IDEM personnel and/or IDEM authorized representatives reasonable access to laboratories and personnel utilized by the Applicant for analyses.

(b) Applicant shall ensure that all sampling and analyses are performed according to U.S. EPA methods, the approved Quality Assurance Project Plan, or other methods deemed satisfactory by IDEM.

(c) Applicant shall ensure that any laboratories used by the Applicant for analyses participate in a documented Quality Assurance/Quality Control program that complies with U.S. EPA guidance documents. As part of such a program, and upon request by IDEM, such laboratories shall perform analyses of samples provided by IDEM to demonstrate the quality of analytical data for each such laboratory.



(d) Applicant shall perform confirmatory sampling for all contaminants and all media for which a Certificate of Completion and Covenant Not To Sue are sought. Applicant shall specify in the Remediation Work Plan the means of taking confirmatory samples and notify IDEM personnel a minimum of fourteen (14) days prior to taking confirmatory samples.

38. IDEM reserves the right to reject any data not gathered consistent with the requirements of this section and Section XIII (Sampling and Data/Document Availability) and to require that the Applicant utilize a different laboratory.

### XIII. SAMPLING AND DATA/DOCUMENT AVAILABILITY

39. The Applicant shall, upon request, make the results of all sampling, including raw data, and/or tests or other data generated by the Applicant, or on the Applicant's behalf, available to IDEM. IDEM will make available to the Applicant the quality assured results of sampling and/or tests or other data similarly generated by IDEM.

40. At the request of IDEM, the Applicant shall provide to IDEM (and/or its authorized representative) splits or duplicates of any samples collected by the Applicant pursuant to the implementation of this Agreement. At the request of the Applicant, IDEM (or its authorized representative) shall provide split or duplicate samples to the Applicant of any samples collected by IDEM and/or its authorized representative pursuant to the implementation of this Agreement. Each Party shall notify the other in advance of any sample collection activity.

### XIV. ACCESS

41. To the extent that the Site or other areas where work is to be performed hereunder are presently owned or controlled by parties other than those bound by this Agreement, the Applicant shall obtain access agreements from the present owners. Such agreements shall provide access for IDEM and authorized representatives of IDEM, as specified below. In the event that access to the Site is not obtained, the Applicant shall so notify IDEM, which may at its discretion assist the Applicant in gaining access. IDEM may withdraw from or modify this Agreement should the Applicant's inability to gain access to the Site or other areas materially affect the Applicant's ability to perform the work required herein.

42. The Applicant shall provide authorized representatives of IDEM access to the Site and other areas where work is to be performed at all reasonable times. Such access shall be related solely to the work being performed on the Site and shall include, but not be limited to: inspecting records, operating logs, and contracts related to the Site; reviewing the progress of the Applicant in carrying out the terms of this Agreement; conducting such tests, inspections, and sampling as IDEM may deem necessary; using a camera, sound recording, or other documentary equipment for field activities; and, verifying the data submitted to IDEM by the Applicant hereunder. The Applicant shall permit IDEM's authorized representatives to inspect and copy all records, files, photographs, documents, and other writings, including all sampling and monitoring data, which pertain to this Agreement and over which the Applicant exercises



control. All persons with access to the Site pursuant to this Agreement shall comply with the approved Health and Safety Plan and established health and safety protocols.

43. Nothing herein shall be construed as restricting the inspection or access authority of IDEM under any law or regulation. Furthermore, nothing herein shall be construed as restricting the authority of IDEM to abate any pollution or contamination at the Site.

#### XV. RECORD PRESERVATION

44. The Applicant agrees to preserve, during the pendency of this Agreement and for a minimum of six (6) years after its termination, all records and documents in the Applicant's possession or in the possession of its employees, agents, accountants, contractors, which relate in any way to the subject matters covered by this Agreement. Upon request by IDEM, the Applicant shall make available to IDEM such records or copies of any such records. After this six (6) year period, the Applicant shall notify IDEM in writing thirty (30) days prior to the destruction of any such documents. At that time, if IDEM requests that some or all documents be preserved for a longer period of time, the Applicant shall provide IDEM with the documents that IDEM wishes to preserve.

45. Applicant may assert a confidentiality claim with respect to any or all of the information requested or submitted pursuant to this Agreement, pursuant to applicable laws and rules including IC 13-14-11, IC 5-14-3, and 329 IAC 6.1-3. Applicant shall adequately substantiate any assertion of confidentiality when the assertion is made. Information determined to be confidential by IDEM shall be disclosed only to the extent permitted by law. If no such confidentiality claim accompanies the information when it is submitted to IDEM, it may be made available to the public by IDEM without further notice to the Applicant. Applicant agrees not to assert any confidentiality claim with regard to any physical or analytical data.

#### XVI. DISPUTE RESOLUTION

46. This section (Dispute Resolution) shall apply to any dispute arising under any section of this Agreement, unless specifically excepted.

47. The Parties shall use their best efforts, in good faith, to resolve all disputes or differences of opinion informally. If, however, disputes arise concerning this Agreement which the Parties are unable to resolve informally, the Applicant may present written notice of such dispute to IDEM and set forth specific points of dispute and the position of the Applicant. This written notice shall be submitted no later than five (5) business days after the Applicant discovers the Project Managers are unable to resolve the dispute. The Applicant's Project Manager will notify IDEM's Project Manager immediately by phone or other appropriate method of communication, prior to written notice, when s/he believes the Parties are unable to resolve a dispute.

48. Within ten (10) business days of receipt of such a written notice, IDEM shall provide a written response to the Applicant setting forth its position and the basis therefor. During the



five (5) business days following the receipt of the response, the Parties shall attempt to negotiate in good faith a resolution of their differences.

49. Following the expiration of the time periods described in the immediately preceding paragraph, if IDEM concurs with the position of the Applicant, the Applicant shall be notified in writing. This Agreement and the Remediation Work Plan shall be modified to include any necessary extensions of time or variances of work. If IDEM does not concur with the position of the Applicant, IDEM, through the Commissioner, shall make a determination regarding the dispute, based upon and consistent with the terms of this Agreement, and shall provide written determination of such resolution to the Applicant. In the event that such determination is not acceptable to either Party, either Party may submit the dispute to an impartial third party for mediation in the following manner:

(a) The Parties shall select a mediator from the Indiana Supreme Court's approved list of mediators as established by the Indiana Rules of Alternative Dispute Resolution (ADR Rules) within five (5) business days of Applicant's receipt of the Commissioner's determination. In the event such a list does not exist or does not contain mediators that the Parties agree are qualified to mediate environmental disputes, the Parties shall use a mutually acceptable list and select a mediator within five (5) business days of compilation of such other mutually acceptable list. In addition to the qualifications required by the ADR Rules, the mediator shall have experience in environmental issues.

(b) The dispute shall be initially submitted to the mediator via a written request for dispute resolution through mediation; the written request shall be issued within ten (10) business days after notification of the Parties of IDEM's final determination of the dispute, as provided by Paragraph 49(a) of this section. The request for assistance shall include the written determination of the Commissioner issued pursuant to Paragraph 49(a) and the documents specified in Paragraphs 47 and 48 of this section, Dispute Resolution. A copy of the written request shall be delivered to the other Parties at the time the request is made.

(c) The Party which submitted the dispute to mediation may make a written submission in support of its position to the mediator within ten (10) business days of the mediator's selection, and any other Party may make a written response in support of its position within seven (7) business days thereafter. The mediator shall immediately thereafter contact all Parties and determine the course of the mediation, including scheduling any meetings deemed necessary.

(d) The mediation process shall be conducted in accordance with Indiana Rules of Alternative Dispute Resolution in any aspect not covered by this Agreement.

(e) The mediator and the Parties shall proceed with reasonable promptness to resolve the dispute.



(f) All communications, whether oral or written, between the mediator and the Parties, shall be kept confidential in accordance with the Indiana Rules for Alternative Dispute Resolution Rule 2.12, and to the extent allowed under Indiana law.

(g) The cost of the mediator shall be included in the administrative costs paid by the Applicant. IDEM's costs of mediation shall be included in the administrative costs paid by the Applicant, except to the extent that the mediator determines that IDEM acted unreasonably. The Applicant shall pay the Applicant's costs of mediation.

50. If either Party determines or the mediator declares that the dispute cannot be resolved through the mediation process, the Parties retain all rights under the Indiana Administrative Orders and Procedures Act, IC 4-21.5.

51. Until the dispute is resolved, any actions concerning that element of work in dispute shall be halted. The resolution of the dispute shall be incorporated into the Remediation Work Plan and made an enforceable part thereof. The time schedule for the work in dispute shall be extended by the amount of time needed for resolution. Elements of work and/or obligations not affected by the dispute shall be completed in accordance with the schedule contained in the Remediation Work Plan.

52. Elements of work and any actions required as a result of such dispute resolution shall immediately be incorporated, if necessary, into the appropriate plan or procedure, and into this Agreement. The Applicant shall proceed with all remaining work according to the modified plan or procedure.

## XVII. FORCE MAJEURE

53. The Applicant shall cause all work or required reporting to be performed within the time limits set forth herein, unless performance is delayed by events that constitute a force majeure. For purposes of this Agreement, a force majeure is an event arising from circumstances beyond the reasonable control of the Applicant which delays performance of any obligations required by this Agreement. Increases of costs shall not be considered an event of force majeure.

54. The Applicant shall notify IDEM by calling IDEM's Project Manager within three (3) days and by writing no later than seven (7) days after any event that the Applicant contends is a force majeure. Such notification shall describe the anticipated length of the delay, the cause or causes of the delay, the measures taken or to be taken by the Applicant to minimize the delay, and the timetable by which these measures will be implemented. The Applicant shall have the burden of demonstrating that the event is a force majeure. The Commissioner shall make the decision of whether an event is a force majeure. This decision shall be promptly communicated to Applicant.

55. If a delay is attributable to a force majeure as determined in this section, the time period for performance under this Agreement shall be extended by IDEM, in writing, by the amount of time that is attributable to the event constituting the force majeure.



## XVIII. RESERVATION OF RIGHTS

56. IDEM and Applicant reserve all rights and defenses they may have pursuant to any available legal authority unless expressly waived herein.

57. Nothing herein is intended to release, discharge, or in any way affect any claims, causes of action, or demands, in law or in equity, that the Parties may have against any person, firm, partnership, or corporation, not a Party to this Agreement, for any liability it may have arising out of, or relating in any way to, the generation, storage, treatment, handling, transportation, release, or disposal of any materials, hazardous substances, hazardous waste, contaminants, or pollutants at, to, or from the Site. The Parties to this Agreement expressly reserve all rights, claims, demands, and causes of action they have against any and all other persons and entities who are not Parties to this Agreement, and as to each other for matters not covered in this Agreement.

58. The Applicant reserves the right to seek contribution, indemnity, or any other available remedy against any person other than IDEM found to be responsible or liable for contributions, indemnity, or otherwise for any amounts which have been or will be expended by the Applicant in connection with the Site.

59. IDEM reserves the right to bring an action, including an administrative action, against Applicant for any violations of statutes or regulations except for the specific violations or releases that are being remediated in the Remediation Work Plan.

60. Pursuant to IC 13-25-5, IDEM may withdraw its approval of the Remediation Work Plan at any time during the implementation of the Remediation Work Plan if:

- (a) IDEM determines that the Applicant has failed to substantially comply with the terms and conditions of this Agreement or the Remediation Work Plan;
- (b) the Applicant declines to implement the Remediation Work Plan after being notified of its approval by IDEM; or
- (c) IDEM determines that a hazardous substance or petroleum has become an imminent or substantial threat to human health or the environment.

Upon withdrawal of its approval, this Agreement shall be terminated and IDEM reserves the right to bring any action to enforce any statute or regulation under Title 13 of the Indiana Code, including an action regarding the violations or releases that were the subject of this Agreement.

61. IDEM acknowledges that, pursuant to IC § 13-25-5-20(b), Applicant, upon receipt of the Certificate of Completion, is not liable for claims for contribution concerning matters addressed in the Remediation Work Plan or the Certificate of Completion.



## XIX. ADMINISTRATIVE COSTS

62. Applicant agrees to reimburse IDEM for all of its Administrative Costs associated with implementation of this Agreement. An itemized list of estimated Administrative Costs that IDEM expects to incur under this Agreement will be forwarded to the Applicant as soon as is practicable.. This estimate does not bind IDEM to a maximum cost that IDEM is entitled to bill the Applicant under this Agreement.

63. IDEM shall routinely send an accounting of IDEM's Administrative Costs to Applicant. The accounting shall itemize all Administrative Costs incurred by IDEM. Applicant shall pay these Administrative Costs within thirty (30) days of receipt of the accounting. Interest shall accrue at a rate of one half percent (1/2 %) per month of delinquency. Applicant understands that IDEM may incur Administrative Costs after this Agreement is satisfied. IDEM may issue the Certificate of Completion and Covenant Not To Sue before IDEM has accounted for all Administrative Costs. Therefore, Applicant further understands that the Applicant may receive bills after the Certificate of Completion and the Covenant Not To Sue have been issued.

64. Checks shall be made payable to the Voluntary Remediation Fund and be mailed, along with a transmittal letter stating the Site name, number, and address, to the Indiana Department of Environmental Management; Attention: Cashier; 100 North Senate Avenue; P.O. Box 7060; Indianapolis, Indiana 46207-7060. In addition, a copy of the check and transmittal letter shall be mailed to IDEM Project Manager.

65. Administrative Costs include all actual costs, direct and indirect, of IDEM's oversight of this Agreement and the work contemplated herein including, but not limited to: time, salary, benefits, and travel costs of IDEM personnel and its contractors and associated indirect costs, contractor costs, compliance monitoring (such as the collection and analysis of split or duplicate samples, inspection of Applicant's activities, and Site visits), discussions regarding disputes that may arise as a result of this Agreement, review and approval or disapproval of reports, and the costs of dispute resolution as provided in Section XVI (Dispute Resolution). Administrative Costs shall also include the actual costs incurred by IDEM in having a qualified person oversee the conduct of the Applicant under this Agreement and the Remediation Work Plan. Administrative Costs shall include an additional amount not to exceed ten percent (10%). As authorized by IC § 13-25-5-8(a), IDEM considers this additional amount to be reasonable and necessary for the effective and efficient implementation of the Voluntary Remediation Program and to ensure that IDEM meets its obligations and all other expenses not covered above. IDEM will not issue the Certificate of Completion or the Covenant Not To Sue before the payment of any Administrative Costs that are due and payable. Costs incurred prior to and after satisfaction of this Agreement must be paid regardless of the issuance of the Certificate of Completion and the Covenant Not To Sue.

66. In the event that this Agreement is terminated for any reason, Applicant agrees to reimburse IDEM for all of its Administrative Costs incurred to the time of termination. IDEM agrees to reimburse Applicant any unused portion of the application fee in accordance with IC § 13-25-5-8(b)(2).



## XX. COMMUNITY RELATIONS

67. In addition to performing the requirements specified in the Community Relations Plan in the Applicant's Remediation Work Plan, the Applicant shall cooperate with IDEM in providing information about the Remediation Work Plan to the public. IDEM will give the Applicant reasonable advance notice of and may require the Applicant's or its agent's attendance at any such public meetings it may hold or sponsor at times and locations which are agreed upon by IDEM and the Applicant.

68. Before the Commissioner may approve or disapprove the Remediation Work Plan, the Commissioner shall provide thirty (30) days for public comment pursuant to IC § 13-25-5-11.

69. IDEM shall maintain a public information file containing the Remediation Work Plan during the thirty (30) day Public Comment period at a public repository near the Site. Applicant shall provide the location of a suitable public repository in accordance with applicable guidance.

## XXI. NOTICE OF BANKRUPTCY OR DEATH

70. As soon as Applicant has knowledge of its intention to file bankruptcy or no later than seven (7) days after the actual filing of a voluntary or involuntary bankruptcy petition, Applicant shall notify IDEM of the filing of a bankruptcy petition. If an Applicant dies, as soon as a personal representative of a deceased Applicant's estate becomes aware of this VRP project, the personal representative shall notify IDEM of the probate of the estate. IDEM shall be notified as a creditor of the bankruptcy and/or estate. IDEM's claim may be a contingent claim, in whole or in part, as there may be oversight costs due after the closing of the bankruptcy and/or probate estate.

## XXII. INDEMNIFICATION

71. The Applicant agrees to indemnify and hold the State of Indiana, its agencies, departments, agents, and employees, harmless from any and all claims or causes of action arising from, or on account of, acts or omissions of the Applicant, its officers, employees, receivers, trustees, agents, or assigns, in carrying out the activities pursuant to this Agreement.

## XXIII. EFFECTIVE DATE AND SUBSEQUENT MODIFICATION

72. The Effective Date of this Agreement shall be the date on which the Commissioner signs this Agreement.

73. This Agreement may be amended by mutual agreement of IDEM and the Applicant. Amendments shall be in writing and shall be effective when signed by the Commissioner.



#### XXIV. EXTENSIONS OF TIME PERIODS

74. Any written response shall be deemed timely performed if hand delivered or postmarked by the last day of any time period prescribed herein. Whenever a Party has the right or an obligation to do some act or make some response within a prescribed period after the service of a notice by mail, three (3) days shall be added to the prescribed period.

75. Whenever any Party is called upon to respond or otherwise act in a certain number of days, and the final day occurs on a Saturday, Sunday or legal holiday (whether state or national), such time limitation shall automatically extend to the next business day after such Saturday, Sunday or legal holiday.

76. Any time periods specified in this Agreement may be extended only by agreement of the Parties.

#### XXV. TERMINATION AND SATISFACTION

77. The provisions of this Agreement shall be satisfied when IDEM issues a Certificate of Completion to the Applicant. The Parties understand that IDEM will issue the Certificate of Completion to the Applicant only. Termination or satisfaction of this Agreement does not end the obligations found in Section XV (Record Preservation) and Section XIX (Administrative Costs). The Applicant shall continue to responsible under Section XV (Record Preservation) and Section XIX (Administrative Costs) for the performance of the duties specified therein regardless of the termination or satisfaction of this Agreement.

78. Nothing in this Agreement shall restrict the State of Indiana from seeking other appropriate relief to protect human health or the environment from pollution or contamination at or from this Site not remediated in accordance with this Agreement.

79. After IDEM issues the Certificate of Completion, the Governor's Office shall provide Applicant with a Covenant Not To Sue pursuant to IC § 13-25-5-18. The Covenant Not To Sue shall contain a listing of the specific work and contaminants covered. The Parties understand that the Governor's Office will issue the Covenant Not To Sue to the Applicant only.

#### XXVI. PRECEDENCE OF AGREEMENT

80. In the event that conflict arises among the terms and conditions of this Agreement or the approved Remediation Work Plan, this Agreement shall govern and the terms and conditions hereunder shall determine the Parties' rights and responsibilities.



IN WITNESS WHEREOF, the following hereby execute this Voluntary Remediation Agreement:

For the Applicant:

Anthony P. Rodriguez  
Applicant (please type)

Larry J. Allen, Jr.  
Attorney for the Applicant (please type)

By: [Signature]  
For: MAYOR SHEILA BRILLSON  
CITY of Michigan City, IN.  
Title: EXECUTIVE DIRECTOR

By: [Signature]  
Title: Corporate Counsel

Date: 2/15/2002

Date: 2/15/2002

For the Indiana Department of Environmental Management:

TECHNICAL RECOMMENDATION:

APPROVED FOR LEGALITY AND FORM:

By: [Signature]  
Peggy Dorsch  
Section Chief  
Voluntary Remediation Program

By: [Signature]  
Thomas W. Baker  
Attorney  
Office of Legal Counsel

Date: Feb. 21, 2002

Date: MARCH 6, 2002

Approved and adopted by the Indiana Department of Environmental Management

this 15<sup>TH</sup> day of MARCH, 2002.

Bruce Palin  
Assistant Commissioner  
Office of Land Quality





# INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

*We make Indiana a cleaner, healthier place to live.*

Mitchell E. Daniels, Jr.  
Governor

Thomas W. Easterly  
Commissioner

100 North Senate Avenue  
Indianapolis, Indiana 46204  
(317) 232-8603  
(800) 451-6027  
www.IN.gov/idem

Mr. John Pugh  
City of Michigan City  
Planning and Inspection Department  
100 E. Michigan Blvd.  
Michigan City, IN 46360

November 9, 2007

IDEM Office of Land Quality - Fileroom Stamp

VRP Project Name: Karwick Rd LF

VRP#: 6020118 File Code: 600

Description: \_\_\_\_\_

Confidential? ☐ Yes ☒ No

Deliberative? ☐ Yes ☒ No

Re: Application Withdrawal  
Former Karwick Road Landfill  
Intersection of Warnke and  
Karwick Road  
Michigan City, Indiana  
VRP # 6020118

Dear Mr. Pugh:

As requested by Mr. John Pugh in a letter dated October 30, 1997, IDEM recognizes Former Karwick Road Landfill as voluntarily withdrawing from the Voluntary Remediation Program. For administrative purposes, IDEM considers the withdrawal to be effective November 20, 2007. However, please be advised that incremental cost-oversight charges may be incurred by the project until IDEM can issue a final accounting for the project that can continue until the end of the state fiscal year (June 30, 2008).

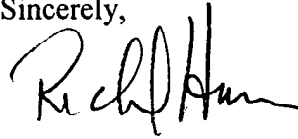
The Indiana Department of Environmental Management's (IDEM's), Accounting Department will also receive a copy of this letter so they may perform a final audit of your account balance. Any balances due or refunds due will be calculated in order to close out the project. Please note, as part of the cost recovery process outlined in the Voluntary Remediation Agreement (VRA), the Applicant agrees to reimburse IDEM for all of its administrative costs reasonably incurred to the time of termination/withdrawal. IDEM agrees to reimburse Applicant any unused portion of the application fee in accordance with IC 13-25-5-8 (b) (2).

**In addition, if this site was referred to VRP from another program, VRP will transfer this site back to that program. If your site was not previously in another program, it will be referred to the Emergency Response Section to be recorded as an historic release.**



If you have any further questions, please contact me at (317) 234-0966. You may also contact Dionne Stewart in Accounting at (317) 232-8212, or Christi Bunch in the Cashier's office at (317) 233-2394.

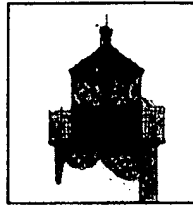
Sincerely,

A handwritten signature in black ink, appearing to read "Rich Harris", with a stylized flourish at the end.

Richard Harris, Section Chief  
Voluntary Remediation Program

Cc: Bill Holland, Voluntary Remediation Program, IDEM  
Dionne Stewart, IDEM Accounting Office  
Christi Bunch, IDEM Cashier's Office  
Richard Harris, Section Chief, Voluntary Remediation Program  
Anita Hatfield, IDEM Operations





# MICHIGAN CITY

*the place is here, the time is now!*

Planning Department – John W. Pugh – Phone: 219.873.1419 – Fax: 219.873.1580 – e-mail: johnp@emichigancity.com

October 30, 2007

Mr. William Holland  
Project Manager  
Indiana Department of Environmental Management  
Office of Land Quality  
Voluntary Remediation Section  
100 North Senate Avenue  
Indianapolis, Indiana 46204

IDEM Office of Land Quality - Fileroom Stamp	
VRP Project Name: <u>Karwick Rd LF</u>	
VRP#: <u>6020118</u>	File Code: <u>600</u>
Description: _____	
Confidential? <input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Deliberative? <input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

**SUBJECT: OFFICIAL WITHDRAWAL OF THE FORMER KARWICK ROAD LANDFILL FROM THE INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT'S (IDEM) VOLUNTARY REMEDIATION PROGRAM (VRP) - VRP SITE NO. 6020118**

Dear Mr. Holland:

This letter represents the official withdrawal by the City of Michigan City, Indiana from the IDEM's VRP for the Former Karwick Road Landfill, located at the Intersection of Warnke and Karwick Road, Michigan City, Indiana 46360 (VRP Site No. 6020118).

If there are any questions or comments regarding this letter, please contact me at 219-873-1419 (ext. 324) or Mr. Thomas Stevenson of Environmental Inc. at 219-462-7576.

Sincerely,

John Pugh  
Director  
Michigan City Planning and Redevelopment Department

cc: T. Stevenson (EI)

RECEIVED  
NOV 01 2007  
DEPARTMENT OF  
ENVIRONMENTAL MANAGEMENT  
OFFICE OF LAND QUALITY

CHUCK OBERLIE - MAYOR

City of Michigan City ~ City Hall ~ 100 East Michigan Boulevard, Michigan City, IN 46360 ~ 219.873.1400 ~ fax 219.873.1515  
web ~ emichigancity.com e-mail ~ mayorchucko@emichigancity.com