UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

IN THE MATTER OF:
North Plant
Manufactured Gas Plant Site
Waukegan, Lake County, Illinois

North Shore Gas,
Respondent

Docket No. V-W-13-C-J09

ADMINISTRATIVE SETTLEMENT AGREEMENT AND ORDER ON CONSENT FOR REMOVAL ACTION

Proceeding under Sections 104, 106(a), 107, and 122 of the Comprehensive Environmental Response, Compensation and Liability Act, as amended 42 U.S.C. §§ 9604, 9606(a), 9607 and 9622

I. JURISDICTION AND GENERAL PROVISIONS

1. This Administrative Settlement Agreement and Order on Consent ("Settlement Agreement") is entered into voluntarily by the United States Environmental Protection Agency ("U.S. EPA") and Respondent, North Shore Gas Company ("Respondent"). This Settlement Agreement provides for the performance of a removal action by Respondent and the reimbursement of certain response costs incurred by the United States at or in connection with property located at 849 Pershing Road, Waukegan, Illinois ("North Plant Site").

2. This Settlement Agreement is issued under the authority vested in the President of the United States by Sections 104, 106(a), 107 and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. §§ 9604, 9606(a), 9607 and 9622, as amended ("CERCLA"). This authority has been delegated to the Administrator of the U.S. EPA by Executive Order No. 12580, January 23, 1987, 52 Federal Register 2923, and further delegated to the Regional Administrators by U.S. EPA Delegation Nos. 14-14-A, 14-14-C and 14-14-D, and to the Director, Superfund Division, Region 5, by Regional Delegation Nos. 14-14-A, 14-14-C and 14-14-D.

3. U.S. EPA has notified the State of Illinois (the "State") of this action pursuant to Section 106(a) of CERCLA, 42 U.S.C. § 9606(a).

4. U.S. EPA and Respondent recognize that this Settlement Agreement has been negotiated in good faith and that the actions undertaken by Respondent in accordance with this Settlement Agreement do not constitute an admission of any liability. Respondent does not admit, and retains the right to controvert in any subsequent proceedings other than proceedings to implement or enforce this Settlement Agreement, the validity of the findings of facts, conclusions of law, and determinations in Sections IV and V of this Settlement Agreement. Respondent agrees to comply with and be bound by the terms of this Settlement Agreement and further agrees that it will not contest the basis or validity of this Settlement Agreement or its terms.

II. PARTIES BOUND

5. This Settlement Agreement applies to and is binding upon U.S. EPA and upon Respondent and its successors and assigns. Any change in ownership or corporate status of the Respondent including, but not limited to, any transfer of assets or real or personal property shall not alter the Respondent's responsibilities under this Settlement Agreement.

6. Respondent shall ensure that its contractors, subcontractors, and representatives comply with this Settlement Agreement. Respondent shall be responsible for any noncompliance with this Settlement Agreement.

III. DEFINITIONS

7. Unless otherwise expressly provided herein, terms used in this Settlement Agreement which are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Settlement Agreement or in the appendices attached hereto and incorporated hereunder, the following definitions shall apply:

a. "AOC" or "Settlement Agreement" shall mean this Agreement and all appendices attached hereto. In the event of conflict between the AOC and any appendices, this AOC shall control.

b. "CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§ 9601, et seq.

c. "Day" shall mean a calendar day unless expressly stated to be a business day. "Business day" shall mean a day other than a Saturday, Sunday, or Federal holiday. In computing any period of time under this AOC, where the last day would fall on a Saturday, Sunday, or Federal holiday, the period shall run until the close of business of the next business day.

d. "Effective Date" shall be the effective date of this Settlement Agreement as provided in Section XXVIII.

e. "Future Response Costs" or "Oversight Costs" shall mean all costs, including direct and indirect costs that the United States incurs in reviewing or developing plans, reports and other items pursuant to this Settlement Agreement, verifying the Work, or otherwise implementing, overseeing, or enforcing this Settlement Agreement on or after the Effective Date.

f. "Interest" shall mean interest at the rate specified for interest on investments of the U.S. EPA Hazardous Substance Superfund established by 26 U.S.C. § 9507, compounded annually on October 1 of each year, in accordance with 42 U.S.C. § 9607(a). The applicable rate of interest shall be the rate in effect at the time the interest accrues. The rate of interest is subject to change on October 1 of each year.

g. "MGP" shall mean manufactured gas plant.

h. "National Contingency Plan" or "NCP" shall mean the National Oil and Hazardous Substances Pollution Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300, and any amendments thereto.

i. "PAHs" shall mean polycyclic aromatic hydrocarbons.

j. "Paragraph" shall mean a portion of this AOC identified by an Arabic numeral or a letter.

k. "Parties" shall mean the U.S. EPA and the Settling Respondent.

l. "Respondent" shall mean North Shore Gas Company.

m. "Site" or "North Plant Site" shall mean the property located at 849 Pershing Road, Waukegan, Illinois and depicted in Appendix 1.

n. "State" shall mean the State of Illinois.

0. "U.S. EPA" shall mean the United States Environmental Protection Agency and any successor departments or agencies of the United States.

p. "Waste Material" shall mean 1) any "hazardous substance" under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); 2) any pollutant or contaminant under Section 101(33) of CERCLA, 42 U.S.C. § 9601(33); and 3) any "solid waste" under Section 1004(27) of RCRA, 42 U.S.C. § 6903(27).

q. "Work" shall mean all activities Respondent is required to perform under this Settlement Agreement except those required by the provisions of Section XI dealing with the retention of records.

IV. FINDINGS OF FACT

8. Based on available information, including the Administrative Record in this matter, U.S. EPA hereby finds that:

a. The North Plant Former MGP Site is located at 849 Pershing Road, Waukegan, Illinois. The Site currently encompasses approximately 16 acres and is vacant with the exception of some concrete foundations. The Site and surrounding areas are currently zoned for light industrial/commercial purposes. The City of Waukegan's Lakefront-Downtown Master Plan (2003) and Design Guidelines (2005) show the Site as being located in a future open space recreational area.

b. Although ownership of the property that constitutes the former North Plant MGP has changed over time, the northern portion of the former MGP property is currently owned by North Shore Gas. North Shore Gas transferred ownership of the entire MGP property to the City of Waukegan in 1975, and the City sold the northern portion of the property to the North Shore Sanitary District ("NSSD") in 1982. North Shore Gas repurchased this northern portion of the property from NSSD in 2002. The small parcel on the southern portion of the property owned by North Shore Gas during the MGP operating period is currently owned and used by the City of Waukegan as a burning and composting area. MGP operations were not conducted on this parcel. The Wisconsin Central Ltd, formerly the Elgin, Joliet and Eastern Railway (EJ & E), owns a portion of the northeast corner of the Site.

c. The North Plant MGP was constructed in 1912 as a gas production and storage facility. Prior to its excavation in 1992, a tar pond (the "Waukegan Tar Pit") was located in the northeast corner of the Site. The facility was operated by North Shore Gas as a manufactured gas plant and storage facility between 1912 and 1953. Gas was manufactured via coal carbonization (1912–1927), water gas (1927–1951), and oil gas (1951–1953) processes. From 1953 to 1965, the facility provided a propane-air supplement to natural gas suppliers. Documents indicate potential contamination and migration of contaminants during plant demolition activities, including the rupture of a relief holder which released 400,000 gallons of water, tar emulsion, and tar to the soil.

d. Groundwater is encountered at 2 to 5 feet below ground surface ("bgs"). Lake Michigan is the source of drinking water in the Waukegan area, and the water supply intake is approximately two miles southeast of the Site. The general direction of groundwater flow at the Site is to the east, but the influence of the retention basins and dewatering wells on the adjacent NSSD property causes the groundwater flow direction to vary. Chemicals detected in groundwater samples collected during investigations at the Site include VOCs (primarily BETX and chlorinated solvent compounds), SVOCs (primarily PAHs and phenols), metals, and cyanide.

e. The uppermost layer of soil at the Site is miscellaneous fill material composed of sand, gravel and clinker. Gypsum was also encountered on the eastern edge of the Site. Between 0.5 to 1.5 feet of native peat was encountered immediately below the fill materials, with fine to medium sand underlying the peat layer to 22 feet bgs. Impacted soils were found as early as 1968 during plant closure activities when free tar removal efforts were conducted at an on-site ditch. Later, stained soils with strong odors and heavy oil sheens were observed during site investigations. Although the Waukegan Tar Pit was excavated in 1992, tar impacts were observed well beyond the limits of the excavation; the volume of soil containing tar and tarry residues in areas surrounding the former Waukegan Tar Pit was estimated at 67,400 cubic yards. Evidence of chlorinated solvents, free phase coal tar, and oily hydrocarbons has been observed in soil samples collected at the Site. The contaminants found in soil samples collected during site investigations include VOCs, SVOCs (including PAHs), metals, and cyanide.

f. Free tar removal efforts were performed at a ditch located on the Site during the initial plant closing in 1968; 25,000 tons of tar was removed at this time. North

Shore Gas performed removal activities to address impacted material at the Waukegan Tar Pit under an Administrative Order issued by the U.S. EPA in 1992. Visible free-phase tar was excavated, and the excavated area was covered with a high-density polyethylene ("HDPE") cover. Additional site characterization at the tar pit was conducted in 1995, and soil and groundwater sampling was conducted in other portions of the Site in 2002 and 2004. Tar-impacted materials were identified in several areas, including: the northeast portion near the Waukegan Tar Pit; the eastern and southeastern portions along the EJ&E railroad tracks; the northwest portion near the former aboveground gas holder and generator house; the center portion near the former purifying house and coke bins; and the southwest portion near a former tar pit structure.

g. The North Plant Site has not been proposed to the National Priorities List (NPL). It is, however, designated as a Superfund Alternative (SA) site, requiring the site to go through the Superfund remedial cleanup process, as described in the NCP.

h. In July 2007, U.S. EPA and Respondent entered into an Administrative Order on Consent for the Respondent to conduct a remedial investigation and feasibility study of the Site.

i. Previous site investigations performed by Respondent on the Site have confirmed the presence of tar and tar-like material in both surface and subsurface soil. The presence of these hazardous substances warrants this time-critical removal action.

V. CONCLUSIONS OF LAW AND DETERMINATIONS

9. Based on the Findings of Fact set forth above, and the Administrative Record supporting this removal action, U.S. EPA has determined that:

a. The Site is a "facility" as defined by Section 101(9) of CERCLA, 42 U.S.C. § 9601(9).

b. The contamination found on portions of the Site, as identified in the Findings of Fact above, includes "hazardous substance(s)" as defined by Section 101(14) of CERCLA, 42 U.S.C. § 9601(14).

c. The Respondent is a "person" as defined by Section 101(21) of CERCLA, 42 U.S.C. § 9601(21).

d. The Respondent is a responsible party under Section 107(a) of CERCLA, 42 U.S.C. § 9607(a), and is liable for the performance of this response action and for response costs incurred and to be incurred at the Site.

i. The Respondent is the present "owner" and/or "operator" of all or a portion of the Site as defined by Section 101(20) of CERCLA, 42 U.S.C. § 9601(20).

ii. The Respondent is also an "owner" and/or "operator" of the Site at the time of disposal of hazardous substances at the Site, as defined by Section 101(20) of CERCLA, 42 U.S.C. § 9601(20), and within the meaning of Section 107(a)(2) of CERCLA, 42 U.S.C. § 9607(a)(2); and/or persons who arranged for disposal or treatment, or arranged with a transporter for transport for disposal or treatment of hazardous substances at the Site, within the meaning of Section 107(a)(3) of CERCLA, 42 U.S.C. § 9607(a)(3); and/or persons who accept or accepted hazardous substances for transport to the Site, within the meaning of Section 107(a)(4) of CERCLA, 42 U.S.C. § 9607(a)(4).

e. The conditions described in the Findings of Fact above constitute an actual or threatened "release" of a hazardous substance from the facility into the "environment" as defined by Sections 101(22) and 101(8) of CERCLA, 42 U.S.C.§§ 9601(22) and 9601(8).

f. The conditions present on portions of the Site constitute a threat to public health, welfare, or the environment based upon the factors set forth in Section 300.415(b)(2) of the NCP, 40 CFR § 300.415(b)(2). These factors include, but are not limited to, the following:

i. actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances, pollutants or contaminants;

This factor is present due to exposed MGP residual materials, including weathered tar at ground surface, where TPH concentrations exceed the default value of 2,000 mg/kg (TACO) for soil attenuation capacity. TPH is assumed to be representative of the primary constituents of concern including benzene, toluene, ethylbenzene, xylenes and total PAH. Subsurface migration also presents a potential exposure to groundwater and Lake Michigan.

ii. high levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate;

This factor is present as MGP residuals in soil were identified at the surface, containing elevated levels of contaminants exceeding the State's TACO cleanup levels and EPA RMLs as described above. Trespassers may come in contact with contaminated soil in the surface either through dermal contact or inhalation. Typical security measures, including fencing, are currently employed to limit potential exposure.

iii. Actual or potential contamination of drinking water supplies or sensitive ecosystems;

This factor is present as depth to groundwater in the area varies from 2-5 ft below ground surface. Groundwater flows east towards Lake Michigan and organics contained in the DNAPL may leach into the groundwater and migrate to Lake Michigan.

iv. Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released;

This factor is present as migration could occur as a result of wind action during dry periods, which could pose a breathing hazard. Such wind action could also lead to deposition of materials in uncontaminated areas. Migration of contaminants in surface soil could also occur through surface water flow or groundwater flow during wet periods, due to the high levels of PAHs and benzene found in some of the samples.

g. The removal action required by this Settlement Agreement at the Site is necessary to protect the public health, welfare, or the environment and, if carried out in compliance with the terms of this Settlement Agreement, will be considered consistent with the NCP, as provided in Section 300.700(c)(3)(ii) of the NCP.

VI. SETTLEMENT AGREEMENT AND ORDER

10. Based upon the foregoing Findings of Fact, Conclusions of Law, Determinations, and the Administrative Record for the Site, it is hereby Ordered and Agreed that Respondent shall comply with all provisions of this Settlement Agreement, including, but not limited to, all attachments to this Settlement Agreement and all documents incorporated by reference into this Settlement Agreement.

VII. DESIGNATION OF CONTRACTOR, PROJECT COORDINATOR, AND ON-SCENE COORDINATOR

11. Respondent shall retain one or more contractors to perform the Work and shall notify U.S. EPA of the name and qualifications of such contractor within 5 business days of the Effective Date. Respondent shall also notify U.S. EPA of the name and qualification of any other contractor or subcontractor retained to perform the Work at least 5 business days prior to commencement of such Work. U.S. EPA retains the right to disapprove of any or all of the contractors and/or subcontractors retained by Respondent. If U.S. EPA disapproves of a selected contractor, Respondent shall retain a different contractor and shall notify U.S. EPA of that contractor's name and qualifications within 3 business days of U.S. EPA's disapproval. The contractor must demonstrate compliance with ANSI/ASQC E-4-1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995), by submitting a copy of the proposed contractor's Quality Management Plan ("QMP"). The QMP should be prepared consistent with "EPA Requirements for Quality Management Plans (QA/R-2)" (EPA/240/B0-1/002), or equivalent documentation as required by U.S. EPA.

12. Respondent has designated Narendra Prasad as Project Coordinator for the Site. The Project Coordinator shall be responsible for administration of all actions by Respondent required by this Settlement Agreement. To the greatest extent possible, the Project Coordinator shall be present on Site or readily available during Site work. U.S. EPA retains the right to disapprove of the designated Project Coordinator. If U.S. EPA disapproves of the designated Project Coordinator, Respondent shall retain a different Project Coordinator and shall notify U.S. EPA of that person's name, address, telephone number, and qualifications within 4 business days following U.S. EPA's disapproval. Receipt by Respondent's Project Coordinator of any notice or

communication from U.S. EPA relating to this Settlement Agreement shall constitute receipt by Respondent.

13. U.S. EPA has designated Jaime Brown of the Superfund Division, Removal Response Branch, Region 5, as its On-Scene Coordinator ("OSC"). Except as otherwise provided in this Settlement Agreement, Respondent shall direct all submissions required by this Settlement Agreement to the OSC at U.S. EPA, Superfund Division, 77 West Jackson Boulevard, SE-5J, Chicago, Illinois 60604-3590, by certified or express mail. Respondent shall also send a copy of all submissions to Peter Felitti, Assistant Regional Counsel, 77 West Jackson Boulevard, C-14J, Chicago, Illinois, 606004-3590. Respondent is encouraged to make its submissions to U.S. EPA on recycled paper (which includes significant post consumer waste paper content where possible) and using two-sided copies.

14. U.S. EPA and Respondent shall have the right, subject to Paragraph 12, to change their respective designated OSC or Project Coordinator. U.S. EPA shall notify the Respondent, and Respondent shall notify U.S. EPA, as early as possible before such a change is made, but in no case less than 24 hours before such a change. The initial notification may be made orally but it shall be promptly followed by a written notice.

VIII. WORK TO BE PERFORMED

15. Respondent shall perform and complete the removal action required by this Settlement Agreement on the portions of the Site depicted in Appendix 2 in accordance with the provisions of this Settlement Agreement and the attached Work Plan, Appendix 3.

16. Respondent shall not commence implementation of the Work Plan developed hereunder until receiving written approval from U.S. EPA.

17. Health and Safety Plan. Respondent shall implement the health and safety plan previously reviewed by U.S. EPA. Respondent shall implement the plan during the pendency of the removal action.

18. Quality Assurance and Sampling.

a. All sampling and analyses performed pursuant to this Settlement Agreement shall conform to U.S. EPA direction, approval, and guidance regarding sampling, quality assurance/quality control ("QA/QC"), data validation, and chain of custody procedures. Respondent shall ensure that the laboratory used to perform the analyses participates in a QA/QC program that complies with the appropriate U.S. EPA guidance. Respondent shall follow, as appropriate, "Quality Assurance/Quality Control Guidance for Removal Activities: Sampling QA/QC Plan and Data Validation Procedures" (OSWER Directive No. 9360.4-01, April 1, 1990), as guidance for QA/QC and sampling. Respondent shall only use laboratories that have a documented Quality System that complies with ANSI/ASQC E-4 1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995), and "EPA Requirements for Quality Management Plans (QA/R-2) (EPA/240/B-01/002, March 2001)," or equivalent documentation as determined by U.S. EPA. U.S. EPA may consider laboratories accredited under the National Environmental Laboratory Accreditation Program ("NELAP") as meeting the Quality System requirements.

b. Upon request by U.S. EPA, Respondent shall have such a laboratory analyze samples submitted by U.S. EPA for QA monitoring. Respondent shall provide to U.S. EPA the QA/QC procedures followed by all sampling teams and laboratories performing data collection and/or analysis.

c. Upon request by U.S. EPA, Respondent shall allow U.S. EPA or its authorized representatives to take split and/or duplicate samples. Respondent shall notify U.S. EPA not less than 3 business days in advance of any sample collection activity, unless shorter notice is agreed to by U.S. EPA. U.S. EPA shall have the right to take any additional samples that U.S. EPA deems necessary. Upon request, U.S. EPA shall allow Respondent to take split or duplicate samples of any samples it takes as part of its oversight of Respondent's implementation of the Work.

19. Reporting.

a. Respondent shall submit a written progress report for the Site to U.S. EPA concerning actions undertaken pursuant to this Settlement Agreement every 30th day after the Effective Date of this Settlement Agreement until termination of this Settlement Agreement, unless otherwise directed in writing by the OSC. The report shall describe all significant developments during the preceding period, including the actions performed and any problems encountered, analytical data received during the reporting period, and the developments anticipated during the next reporting period, including a schedule of actions to be performed, anticipated problems, and planned resolutions of past or anticipated problems.

b. Respondent shall submit 3 copies of all plans, reports or other submissions required by this Settlement Agreement, or any approved work plan. Upon request by U.S. EPA, Respondent shall submit such documents in electronic form.

c. If the Respondent owns or controls any portion of the Site, it shall, at least 30 days prior to the conveyance of any interest in real property at the Site, give written notice to the transferee that the property is subject to this Settlement Agreement and written notice to U.S. EPA of the proposed conveyance, including the name and address of the transferee. For property the Respondent owns or controls, it also agrees to require that its successors comply with the immediately preceding sentence and Sections IX (Site Access) and X (Access to Information).

20. Final Report. Within 60 calendar days after completion of all Work at the Site that is required by Section VIII of this Settlement Agreement, Respondent shall submit for U.S. EPA review a final report summarizing the actions taken to comply with this Settlement Agreement. The final report shall conform, at a minimum, with the requirements set forth in Section 300.165 of the NCP entitled "OSC Reports" and with the guidance set forth in "Superfund Removal

Procedures: Removal Response Reporting - POLREPS and OSC Reports" (OSWER Directive No. 9360.3-03, June 1, 1994). The final report shall include a good faith estimate of total costs or a statement of actual costs incurred in complying with the Settlement Agreement, a listing of quantities and types of materials removed off-Site or handled on-Site, a discussion of removal and disposal options considered for those materials, a listing of the ultimate destination(s) of those materials, a presentation of the analytical results of all sampling and analyses performed, and accompanying appendices containing all relevant documentation generated during the removal action (e.g., manifests, invoices, bills, contracts, and permits). The final report shall also include the following certification signed by a person who supervised or directed the preparation of that report:

"Under penalty of law, I certify that to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of the report, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

21. Off-Site Shipments.

a. Respondent shall, prior to any off-Site shipment of Waste Material from the Site to an out-of-state waste management facility, provide written notification of such shipment of waste material to the appropriate state environmental official in the receiving facility's state and to the OSC . However, this notification requirement shall not apply to any off-Site shipments when the total volume of all such shipments will not exceed 10 cubic yards.

i. Respondent shall include in the written notification the following information: 1) the name and location of the facility to which the Waste Material is to be shipped; 2) the type and quantity of the Waste Material to be shipped; 3) the expected schedule for the shipment of the Waste Material; and 4) the method of transportation. Respondent shall notify the state in which the planned receiving facility is located of major changes in the shipment plan, such as a decision to ship the Waste Material to another facility within the same state, or to a facility in another state.

ii. The identity of the receiving facility and state will be determined by Respondent following the award of the contract for the removal action. Respondent shall provide the information required by this Paragraph 21(a) and 21(b) as soon as practicable after the award of the contract and before the Waste Material is actually shipped.

b. Before shipping any hazardous substances, pollutants, or contaminants from the Site to an off-site location, Respondent shall obtain U.S. EPA's certification that the proposed receiving facility is operating in compliance with the requirements of CERCLA Section 121(d)(3), 42 U.S.C. § 9621(d)(3), and 40 C.F.R. § 300.440. Respondent shall only send hazardous substances, pollutants, or contaminants from the Site to an off-site facility that complies with the requirements of the statutory provision and regulation cited in the preceding sentence.

IX. SITE ACCESS

22. If the Site, or any other property where access is needed to implement this Settlement Agreement, is owned or controlled by the Respondent, the Respondent shall, commencing on the Effective Date, provide U.S. EPA , the State, and their representatives, including contractors, with access at all reasonable times to the Site, or such other property, for the purpose of conducting any activity related to this Settlement Agreement.

23. Where any action under this Settlement Agreement is to be performed in areas owned by or in possession of someone other than Respondent, Respondent shall use its best efforts to obtain all necessary access agreements within 20 business days after the Effective Date, or as otherwise specified in writing by the OSC, whichever date is later. Respondent shall immediately notify U.S. EPA if after using its best efforts it is unable to obtain such agreements. For purposes of this Paragraph, "best efforts" includes the payment of reasonable sums of money in consideration of access, though "best efforts" shall not include monetary payments where the current owner is a potentially responsible party. Respondent shall describe in writing its efforts to obtain access. U.S. EPA may then assist Respondent in gaining access, to the extent necessary to effectuate the response actions described herein, using such means as U.S. EPA deems appropriate. Respondent shall reimburse U.S. EPA for all costs and attorney's fees incurred by the United States in obtaining such access, in accordance with the procedures in Section XV (Payment of Response Costs).

24. Notwithstanding any provision of this Settlement Agreement, U.S. EPA and the State retain all of their access authorities and rights, including enforcement authorities related thereto, under CERCLA, RCRA, and any other applicable statutes or regulations.

X. ACCESS TO INFORMATION

25. Respondent shall provide to U.S. EPA, upon request, copies of all documents and information within its possession or control or that of its contractors or agents relating to activities at the Site or to the implementation of this Settlement Agreement, including, but not limited to, sampling, analysis, chain of custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information related to the Work. Respondent shall also make available to U.S. EPA, for purposes of investigation, information gathering, or testimony, their employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work.

26. Respondent may assert business confidentiality claims covering part or all of the documents or information submitted to U.S. EPA under this Settlement Agreement to the extent permitted by and in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), and 40 C.F.R. § 2.203(b). Documents or information determined to be confidential by U.S. EPA will be afforded the protection specified in 40 C.F.R. Part 2, Subpart B. If no claim of confidentiality accompanies documents or information when they are submitted to U.S. EPA, or if U.S. EPA has notified Respondent that the documents or information are not confidential under the standards

of Section 104(e)(7) of CERCLA or 40 C.F.R. Part 2, Subpart B, the public may be given access to such documents or information without further notice to Respondent.

27. Respondent may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If the Respondent asserts such a privilege in lieu of providing documents, it shall provide U.S. EPA with the following: 1) the title of the document, record, or information; 2) the date of the document, record, or information; 3) the name and title of the author of the document, record, or information; 4) the name and title of each addressee and recipient; 5) a description of the contents of the document, record, or information; and 6) the privilege asserted by Respondent. However, no documents, reports or other information created or generated pursuant to the requirements of this Settlement Agreement shall be withheld on the grounds that they are privileged.

28. No claim of confidentiality shall be made with respect to any data, including, but not limited to, all sampling, analytical, monitoring, hydrogeologic, scientific, chemical, or engineering data, or any other documents or information evidencing conditions at or around a Site.

XI. RECORD RETENTION

29. Until 6 years after Respondent's receipt of U.S. EPA's notification pursuant to Section XXVI (Notice of Completion of Work), Respondent shall preserve and retain all non-identical copies of records and documents (including records or documents in electronic form) now in its possession or control or which come into its possession or control that relate in any manner to the performance of the Work or the liability of any person under CERCLA with respect to the Site, regardless of any corporate retention policy to the contrary. Until 6 years after Respondent's receipt of U.S. EPA's notification pursuant to Section XXVI (Notice of Completion of Work), Respondent shall also instruct its contractors and agents to preserve all documents, records, and information of whatever kind, nature or description relating to performance of the Work.

30. At the conclusion of this document retention period, Respondent shall notify U.S. EPA at least 60 days prior to the destruction of any such records or documents, and, upon request by U.S. EPA, Respondent shall deliver any such records or documents to U.S. EPA. Respondent may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If Respondent asserts such a privilege, it shall provide U.S. EPA with the following: 1) the title of the document, record, or information; 2) the date of the document, record, or information; 3) the name and title of the author of the document, record, or information; 4) the name and title of each addressee and recipient; 5) a description of the subject of the document, record, or information; and 6) the privilege asserted by Respondent. However, no documents, reports or other information created or generated pursuant to the requirements of this Settlement Agreement shall be withheld on the grounds that they are privileged.

31. Respondent hereby certifies that to the best of its knowledge and belief, after thorough inquiry, it has not altered, mutilated, discarded, destroyed or otherwise disposed of any records, documents or other information (other than identical copies) relating to its potential liability regarding the Site since notification of potential liability by U.S. EPA or the State or the filing of suit against it regarding the Site and that it has fully complied and will fully comply with any and all U.S. EPA requests for information pursuant to Sections 104(e) and 122(e) of CERCLA, 42 U.S.C. §§ 9604(e) and 9622(e), and Section 3007 of RCRA, 42 U.S.C. § 6927.

XII. COMPLIANCE WITH OTHER LAWS

32. Respondent shall perform all actions required pursuant to this Settlement Agreement in accordance with all applicable local, state, and federal laws and regulations except as provided in Section 121(e) of CERCLA, 42 U.S.C. § 6921(e), and 40 C.F.R. §§ 300.400(e) and 300.415(j). In accordance with 40 C.F.R. § 300.415(j), all on-Site actions required pursuant to this Settlement Agreement shall, to the extent practicable, as determined by U.S. EPA, considering the exigencies of the situation, attain applicable or relevant and appropriate requirements ("ARARs") under federal environmental or state environmental or facility siting laws.

XIII. EMERGENCY RESPONSE AND NOTIFICATION OF RELEASES

33. In the event of any action or occurrence during performance of the Work which causes or threatens a release of Waste Material from the Site that constitutes an emergency situation or may present an immediate threat to public health or welfare or the environment, Respondent shall immediately take all appropriate action. Respondent shall take these actions in accordance with all applicable provisions of this Settlement Agreement, including, but not limited to, the Health and Safety Plan, in order to prevent, abate or minimize such release or endangerment caused or threatened by the release. Respondent shall also immediately notify the OSC or, in the event of his/her unavailability, the Regional Duty Officer, Emergency Response Branch, Region 5 at (312) 353-2318, of the incident or Site conditions. In the event that Respondent fails to take appropriate response action as required by this Paragraph, and U.S. EPA takes such action instead, Respondent shall reimburse U.S. EPA all costs of the response action not inconsistent with the NCP pursuant to Section XV (Payment of Response Costs).

34. In addition, in the event of any release of a hazardous substance from the Site, Respondent shall immediately notify the OSC at (312) 353-2318 and the National Response Center at (800) 424-8802. Respondent shall submit a written report to U.S. EPA within 7 business days after each release, setting forth the events that occurred and the measures taken or to be taken to mitigate any release or endangerment caused or threatened by the release and to prevent the reoccurrence of such a release. This reporting requirement is in addition to, and not in lieu of, reporting under Section 103(c) of CERCLA, 42 U.S.C. § 9603(c), and Section 304 of the Emergency Planning and Community Right-To-Know Act of 1986, 42 U.S.C. § 11004, et seq.

XIV. AUTHORITY OF ON-SCENE COORDINATOR

35. The OSC shall be responsible for overseeing Respondent's implementation of this Settlement Agreement. The OSC shall have the authority vested in an OSC by the NCP, including the authority to halt, conduct, or direct any Work required by this Settlement Agreement, or to direct any other removal action undertaken at the Site. Absence of the OSC from the Site shall not be cause for stoppage of work unless specifically directed by the OSC.

XV. PAYMENT OF RESPONSE COSTS

36. Payments for Future Response Costs.

a. Respondent shall pay U.S. EPA all Future Response Costs not inconsistent with the NCP. On a periodic basis, U.S. EPA will send Respondent a bill requiring payment that consists of an Itemized Cost Summary. Respondent shall make all payments within 30 calendar days of receipt of each bill requiring payment, except as otherwise provided in Paragraph 38 of this Settlement Agreement according to the following procedures.

i. If the payment amount demanded in the bill is for $10,000 or greater, payment shall be made to U.S. EPA by Electronic Funds Transfer ("EFT") in accordance with current EFT procedures to be provided to Respondent by U.S. EPA Region 5. Payment shall be accompanied by a statement identifying the name and address of the Respondent, the Site name, U.S. EPA Region 5, and the Site/Spill ID Number B5HQ.

ii. If the amount demanded in the bill is $10,000 or less, the Respondent may in lieu of the procedures in subparagraph 36(a)(i) make all payments required by this Paragraph by a certified or cashier's check or checks made payable to "EPA Hazardous Substance Superfund," referencing the name and address of the party making the payment, and the EPA Site/Spill ID Number B5HQ. Respondent shall send the check(s) to:

US Environmental Protection Agency
Superfund Payments
Cincinnati Finance Center
PO Box 979076
St. Louis, MO 63197-9000

For checks sent by express mail:

U.S. Bank
1005 Convention Plaza
Mail Station SL-MO-C2GL
St. Louis, MO 63101

Wire transfers should be directed to the Federal Reserve Bank of New York

Federal Reserve Bank of New York

ABA = 021030004
Account = 68010727
SWIFT address = FRNYUS33
33 Liberty Street
New York NY 10045

Field Tag 4200 of the Fedwire message should read " D 68010727
Environmental Protection Agency "

b. At the time of payment, Respondent shall send notice that payment has been made to the Director, Superfund Division, U.S. EPA Region 5, 77 West Jackson Blvd., Chicago, Illinois, 60604-3590 and to Peter Felitti, Associate Regional Counsel, 77 West Jackson Boulevard, C-14J, Chicago, Illinois, 60604-3590.

c. The total amount to be paid by Respondent pursuant to Paragraph 36(a) shall be deposited in the North Shore Gas Special Account within the U.S. EPA Hazardous Substance Superfund to be retained and used to conduct or finance response actions at or in connection with the Site, or to be transferred by U.S. EPA to the U.S. EPA Hazardous Substance Superfund.

37. In the event that the payment for Future Response Costs is not made within 30 days of Respondent's receipt of a bill, Respondent shall pay Interest on the unpaid balance. The Interest on Future Response Costs shall begin to accrue on the date of the bill and shall continue to accrue until the date of payment. Payments of Interest made under this Paragraph shall be in addition to such other remedies or sanctions available to the United States by virtue of Respondent's failure to make timely payments under this Section, including but not limited to, payment of stipulated penalties pursuant to Section XVIII.

38. Respondent may dispute all or part of a bill for Future Response Costs submitted under this Settlement Agreement, only if Respondent alleges that U.S. EPA has made an accounting error, or if Respondent alleges that a cost item is inconsistent with the NCP. If any dispute over costs is resolved before payment is due, the amount due will be adjusted as necessary. If the dispute is not resolved before payment is due, Respondent shall pay the full amount of the uncontested costs to U.S. EPA as specified in Paragraph 36 on or before the due date. Within the same time period, Respondent shall pay the full amount of the contested costs into an interest-bearing escrow account. Respondent shall simultaneously transmit a copy of both checks to the persons listed in Paragraph 36(b) above. Respondent shall ensure that the prevailing party in the dispute shall receive the amount upon which they prevailed from the escrow funds plus interest within 20 calendar days after the dispute is resolved.

XVI. DISPUTE RESOLUTION

39. Unless otherwise expressly provided for in this Settlement Agreement, the dispute resolution procedures of this Section shall be the exclusive mechanism for resolving disputes arising under this Settlement Agreement. The Parties shall attempt to resolve any disagreements concerning this Settlement Agreement expeditiously and informally.

40. If Respondent objects to any U.S. EPA action taken pursuant to this Settlement Agreement, including billings for Future Response Costs, it shall notify U.S. EPA in writing of its objection(s) within 10 calendar days of such action, unless the objection(s) has/have been resolved informally. This written notice shall include a statement of the issues in dispute, the relevant facts upon which the dispute is based, all factual data, analysis or opinion supporting Respondent's position, and all supporting documentation on which such party relies. U.S. EPA shall provide its Statement of Position, including supporting documentation, no later than 10 calendar days after receipt of the written notice of dispute. In the event that these 10-day time periods for exchange of written documents may cause a delay in the work, they shall be shortened upon, and in accordance with, notice by U.S. EPA. The time periods for exchange of written documents relating to disputes over billings for response costs may be extended at the sole discretion of U.S. EPA. An administrative record of any dispute under this Section shall be maintained by U.S. EPA. The record shall include the written notification of such dispute, and the Statement of Position served pursuant to the preceding paragraph. Upon review of the administrative record, the Director of the Superfund Division, U.S. EPA Region 5, shall resolve the dispute consistent with the NCP and the terms of this Settlement Agreement.

41. Respondent's obligations under this Settlement Agreement shall not be tolled by submission of any objection for dispute resolution under this Section. Following resolution of the dispute, as provided by this Section, Respondent shall fulfill the requirement that was the subject of the dispute in accordance with the agreement reached or with U.S. EPA's decision, whichever occurs.

XVII. FORCE MAJEURE

42. Respondent agrees to perform all requirements of this Settlement Agreement within the time limits established under this Settlement Agreement, unless the performance is delayed by a force majeure. For purposes of this Settlement Agreement, a force majeure is defined as any event arising from causes beyond the control of Respondent, or of any entity controlled by Respondent, including but not limited to their contractors and subcontractors, which delays or prevents performance of any obligation under this Settlement Agreement despite Respondent's best efforts to fulfill the obligation. Force majeure does not include financial inability to complete the Work or increased cost of performance.

43. If any event occurs or has occurred that may delay the performance of any obligation under this Settlement Agreement, whether or not caused by a force majeure event, Respondent shall notify U.S. EPA orally within 24 hours of when Respondent first knew that the event might cause a delay. Within 7 calendar days thereafter, Respondent shall provide to U.S. EPA in writing an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; Respondent's rationale for attributing such delay to a force majeure event if they intend to assert such a claim; and a statement as to whether, in the opinion of Respondent, such event may cause or contribute to an endangerment to public health, welfare or the environment. Failure to comply with the above requirements shall be grounds for U.S. EPA to deny Respondent an

extension of time for performance. Respondent shall have the burden of demonstrating by a preponderance of the evidence that the event is a force majeure, that the delay is warranted under the circumstances, and that best efforts were exercised to avoid and mitigate the effects of the delay.

44. If U.S. EPA agrees that the delay or anticipated delay is attributable to a force majeure event, the time for performance of the obligations under this Settlement Agreement that are affected by the force majeure event will be extended by U.S. EPA for such time as is necessary to complete those obligations. An extension of the time for performance of the obligations affected by the force majeure event shall not, of itself, extend the time for performance of any other obligation. If U.S. EPA does not agree that the delay or anticipated delay has been or will be caused by a force majeure event, U.S. EPA will notify Respondent in writing of its decision. If U.S. EPA agrees that the delay is attributable to a force majeure event, U.S. EPA will notify Respondent in writing of the length of the extension, if any, for performance of the obligations affected by the force majeure event.

XVIII. STIPULATED PENALTIES

45. Respondent shall be liable to U.S. EPA for stipulated penalties in the amounts set forth in Paragraph 46 for failure to comply with the requirements of this Settlement Agreement specified below, unless excused under Section XVII (Force Majeure). "Compliance" by Respondent shall include completion of the activities under this Settlement Agreement or any work plan or other plan approved under this Settlement Agreement identified below in accordance with all applicable requirements of this Settlement Agreement within the specified time schedules established by and approved under this Settlement Agreement.

46. Stipulated Penalty Amounts.

Deliverable/Activity	Penalty for Days 1 - 7	Penalty for > 7 Days
Late submittal of Progress Reports or other miscellaneous Reports/Submittals	$250/day	$500/day
Failure to meet any other scheduled Deadline in the AOC, or Work Plans	$250/day	$500/day

47. All penalties shall begin to accrue on the day after the complete performance is due or the day a violation occurs, and shall continue to accrue through the final day of the correction of the noncompliance or completion of the activity. However, stipulated penalties shall not accrue: 1) with respect to a deficient submission under Section VIII (Work to be Performed), during the period, if any, beginning on the 31st day after U.S. EPA's receipt of such submission until the date that U.S. EPA notifies Respondent of any deficiency; and 2) with respect to a decision by the Director of the Superfund Division, Region 5, under Paragraph 40 of Section XVI (Dispute Resolution), during the period, if any, beginning on the 21st day after U.S. EPA submits its written statement of position until the date that the Director of the Superfund Division issues a final decision regarding such dispute. Nothing herein shall prevent the simultaneous accrual of separate penalties for separate violations of this Settlement Agreement.

48. Following U.S. EPA's determination that Respondent has failed to comply with a requirement of this Settlement Agreement, U.S. EPA may give Respondent written notification of the failure and describe the noncompliance. U.S. EPA may send Respondent a written demand for payment of the penalties. However, penalties shall accrue as provided in the preceding Paragraph regardless of whether U.S. EPA has notified Respondent of a violation.

49. All penalties accruing under this Section shall be due and payable to U.S. EPA within 30 days of Respondent's receipt from U.S. EPA of a demand for payment of the penalties, unless Respondent invokes the dispute resolution procedures under Section XVI (Dispute Resolution). All payments to U.S. EPA under this Section shall be paid by certified or cashier's check(s) made payable to "U.S. EPA Hazardous Substances Superfund," shall be mailed to:

US Environmental Protection Agency
Fines and Penalties
Cincinnati Finance Center
PO Box 979077
St. Louis, MO 63197-9000

The cover letter shall indicate that the payment is for stipulated penalties, and shall reference the U.S. EPA Site/Spill ID Number B5HQ, the U.S. EPA Docket Number, and the name and address of the Respondent. Copies of check(s) paid pursuant to this Section, and any accompanying transmittal letter(s), shall be sent to U.S. EPA as provided in Paragraph 36(b).

50. The payment of penalties shall not alter in any way Respondent's obligation to complete performance of the Work required under this Settlement Agreement.

51. Penalties shall continue to accrue during any dispute resolution period, but need not be paid until 20 days after the dispute is resolved by agreement or by receipt of U.S. EPA's decision.

52. If Respondent fails to pay stipulated penalties when due, U.S. EPA may institute proceedings to collect the penalties, as well as Interest. Respondent shall pay Interest on the unpaid balance, which shall begin to accrue on the date of demand made pursuant to Paragraph

48. Nothing in this Settlement Agreement shall be construed as prohibiting, altering, or in any way limiting the ability of U.S. EPA to seek any other remedies or sanctions available by virtue of Respondent's violation of this Settlement Agreement or of the statutes and regulations upon which it is based, including, but not limited to, penalties pursuant to Sections 106(b) and 122(l) of CERCLA, 42 U.S.C. §§ 9606(b) and 9622(l), and punitive damages pursuant to Section 107(c)(3) of CERCLA, 42 U.S.C. § 9607(c)(3). Provided, however, that U.S. EPA shall not seek civil penalties pursuant to Section 106(b) or 122(l) of CERCLA or punitive damages pursuant to Section 107(c)(3) of CERCLA for any violation for which a stipulated penalty is provided herein, except in the case of a willful violation of this Settlement Agreement. Should Respondent violate this Settlement Agreement or any portion hereof, U.S. EPA may carry out the required actions unilaterally, pursuant to Section 104 of CERCLA, 42 U.S.C. § 9604, and/or may seek judicial enforcement of this Settlement Agreement pursuant to Section 106 of CERCLA, 42 U.S.C. § 9606. Notwithstanding any other provision of this Section, U.S. EPA may, in its unreviewable discretion, waive in writing any portion of stipulated penalties that have accrued pursuant to this Settlement Agreement.

XIX. COVENANT NOT TO SUE BY U.S. EPA

53. In consideration of the actions that will be performed and the payments that will be made by Respondent under the terms of this Settlement Agreement, and except as otherwise specifically provided in this Settlement Agreement, U.S. EPA covenants not to sue or to take administrative action against Respondent pursuant to Sections 106 and 107(a) of CERCLA, 42 U.S.C. §§ 9606 and 9607(a), for the Work and Future Response Costs. This covenant not to sue shall take effect upon the Effective Date and is conditioned upon the complete and satisfactory performance by Respondent of all obligations under this Settlement Agreement, including, but not limited to, payment of Future Response Costs pursuant to Section XV. This covenant not to sue extends only to Respondent and does not extend to any other person.

XX. RESERVATIONS OF RIGHTS BY U.S. EPA

54. Except as specifically provided in this Settlement Agreement, nothing herein shall limit the power and authority of U.S. EPA or the United States to take, direct, or order all actions necessary to protect public health, welfare, or the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances, pollutants or contaminants, or hazardous or solid waste on, at, or from the Site. Further, nothing herein shall prevent U.S. EPA from seeking legal or equitable relief to enforce the terms of this Settlement Agreement. U.S. EPA also reserves the right to take any other legal or equitable action as it deems appropriate and necessary, or to require the Respondent in the future to perform additional activities pursuant to CERCLA or any other applicable law.

55. The covenant not to sue set forth in Section XIX above does not pertain to any matters other than those expressly identified therein. U.S. EPA reserves, and this Settlement Agreement is without prejudice to, all rights against Respondent with respect to all other matters, including, but not limited to:

a. claims based on a failure by Respondent to meet a requirement of this Settlement Agreement;

b. liability for costs not included within the definition of Future Response Costs;

c. liability for performance of response action other than the Work, including but not limited to conducting an EE/CA on the Site;

d. criminal liability;

e. liability for damages for injury to, destruction of, or loss of natural resources, and for the costs of any natural resource damage assessments;

f. liability arising from the past, present, or future disposal, release or threat of release of Waste Materials outside the Site; and

g. liability for costs incurred or to be incurred by the Agency for Toxic Substances and Disease Registry related to the Site.

XXI. COVENANT NOT TO SUE BY RESPONDENT

56. Respondent covenants not to sue and agrees not to assert any claims or causes of action against the United States, or its contractors or employees, with respect to the Work, Future Response Costs, or this Settlement Agreement, including, but not limited to:

a. any direct or indirect claim for reimbursement from the Hazardous Substance Superfund established by 26 U.S.C. § 9507, based on Sections 106(b)(2), 107, 111, 112, or 113 of CERCLA, 42 U.S.C. §§ 9606(b)(2), 9607, 9611, 9612, or 9613, or any other provision of law;

b. any claim arising out of response actions at or in connection with the Site, including any claim under the United States Constitution, the Illinois Constitution, the Tucker Act, 28 U.S.C. § 1491, the Equal Access to Justice Act, 28 U.S.C. § 2412, as amended, or at common law; or

c. any claim against the United States pursuant to Sections 107 and 113 of CERCLA, 42 U.S.C. §§ 9607 and 9613, relating to the Site.

57. Nothing in this Agreement shall be deemed to constitute approval or preauthorization of a claim within the meaning of Section 111 of CERCLA, 42 U.S.C. § 9611, or 40 C.F.R. §300.700(d).

XXII. OTHER CLAIMS

58. By issuance of this Settlement Agreement, the United States and U.S. EPA assume no liability for injuries or damages to persons or property resulting from any acts or omissions of Respondent. The United States or U.S. EPA shall not be deemed a party to any contract entered

into by Respondent or its directors, officers, employees, agents, successors, representatives, assigns, contractors, or consultants in carrying out actions pursuant to this Settlement Agreement.

59. Nothing in this Settlement Agreement constitutes a satisfaction of or release from any claim or cause of action against Respondent or any person not a party to this Settlement Agreement, for any liability such person may have under CERCLA, other statutes, or common law, including but not limited to any claims of the United States for costs, damages and interest under Sections 106 and 107 of CERCLA, 42 U.S.C. §§ 9606 and 9607.

60. No action or decision by U.S. EPA pursuant to this Settlement Agreement shall give rise to any right to judicial review, except as set forth in Section 113(h) of CERCLA, 42 U.S.C. §9613(h). Also, Respondent agrees not to seek judicial review of the final rule listing the Site on the NPL based on a claim that changed site conditions that resulted from the performance of the Work in any way affected the basis for listing the Site.

XXIII. CONTRIBUTION

61. a. The Parties agree that this Settlement Agreement constitutes an administrative settlement for purposes of Section 113(f)(2) of CERCLA, 42 U.S.C. § 9613(f)(2), and that Respondent is entitled, as of the Effective Date, to protection from contribution actions or claims as provided by Sections 113(f)(2) and 122(h)(4) of CERCLA, 42 U.S.C. §§ 9613(f)(2) and 9622(h)(4), for "matters addressed" in this Settlement Agreement. The "matters addressed" in this Settlement Agreement are the Work and Future Response Costs.

b. The Parties agree that this Settlement Agreement constitutes an administrative settlement for purposes of Section 113(f)(3)(B) of CERCLA, 42. U.S.C. § 9613(f)(3)(B), pursuant to which the Respondent has, as of the Effective Date, resolved its liability to the United States for the Work and Future Response Costs.

XXIV. INDEMNIFICATION

62. Respondent shall indemnify, save and hold harmless the United States, its officials, agents, contractors, subcontractors, employees and representatives from any and all claims or causes of action arising from, or on account of, negligent or other wrongful acts or omissions of Respondent, its officers, directors, employees, agents, contractors, or subcontractors, in carrying out actions pursuant to this Settlement Agreement. In addition, Respondent agrees to pay the United States all costs incurred by the United States, including but not limited to attorneys fees and other expenses of litigation and settlement, arising from or on account of claims made against the United States based on negligent or other wrongful acts or omissions of Respondent, its officers, directors, employees, agents, contractors, subcontractors and any persons acting on its behalf or under its control, in carrying out activities pursuant to this Settlement Agreement. The United States shall not be held out as a party to any contract entered into by or on behalf of Respondent in carrying out activities pursuant to this Settlement Agreement. Neither Respondent nor any such contractor shall be considered an agent of the United States. The Federal Tort

Claims Act (28 U.S.C. §§ 2671, 2680) provides coverage for injury or loss of property, or injury or death caused by the negligent or wrongful act or omission of an employee of U.S. EPA while acting within the scope of his or her employment, under circumstances where U.S. EPA, if a private person, would be liable to the claimant in accordance with the law of the place where the act or omission occurred.

63. The United States shall give Respondent notice of any claim for which the United States plans to seek indemnification pursuant to this Section and shall consult with Respondent prior to settling such claim.

64. Respondent waives all claims against the United States for damages or reimbursement or for set-off of any payments made or to be made to the United States, arising from or on account of any contract, agreement, or arrangement between Respondent and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays. In addition, Respondent shall indemnify and hold harmless the United States with respect to any and all claims for damages or reimbursement arising from or on account of any contract, agreement, or arrangement between Respondent and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays.

XXV. MODIFICATIONS

65. The OSC may make modifications to any plan or schedule in writing or by oral direction. Any oral modification will be memorialized in writing by U.S. EPA promptly, but shall have as its effective date the date of the OSC's oral direction. Any other requirements of this Settlement Agreement may be modified in writing by mutual agreement of the parties.

66. If Respondent seeks permission to deviate from any approved work plan or schedule, Respondent's Project Coordinator shall submit a written request to U.S. EPA for approval outlining the proposed modification and its basis. Respondent may not proceed with the requested deviation until receiving oral or written approval from the OSC pursuant to Paragraph 65.

67. No informal advice, guidance, suggestion, or comment by the OSC or other U.S. EPA representatives regarding reports, plans, specifications, schedules, or any other writing submitted by Respondent shall relieve Respondent of its obligation to obtain any formal approval required by this Settlement Agreement, or to comply with all requirements of this Settlement Agreement, unless it is formally modified.

XXVI. NOTICE OF COMPLETION OF WORK

68. When U.S. EPA determines, after U.S. EPA's review of the Final Report, that all Work has been fully performed in accordance with this Settlement Agreement, with the exception of any continuing obligations required by this Settlement Agreement, including, e.g., post-removal site controls, payment of Future Response Costs, and record retention, U.S. EPA

will provide written notice to Respondent. If U.S. EPA determines that any such Work has not been completed in accordance with this Settlement Agreement, U.S. EPA will notify Respondent, provide a list of the deficiencies, and require that Respondent modify the Work Plan if appropriate in order to correct such deficiencies. Respondent shall implement the modified and approved Work Plan and shall submit a modified Final Report in accordance with the U.S. EPA notice. Failure by Respondent to implement the approved modified Work Plan shall be a violation of this Settlement Agreement.

XXVII. SEVERABILITY/INTEGRATION/ATTACHMENTS

69. If a court issues an order that invalidates any provision of this Settlement Agreement or finds that Respondent has sufficient cause not to comply with one or more provisions of this Settlement Agreement, Respondent shall remain bound to comply with all provisions of this Settlement Agreement not invalidated or determined to be subject to a sufficient cause defense by the court's order.

70. This Settlement Agreement and its attachments constitute the final, complete and exclusive agreement and understanding among the Parties with respect to the settlement embodied in this Settlement Agreement. The parties acknowledge that there are no representations, agreements or understandings relating to the settlement other than those expressly contained in this Settlement Agreement. The following attachments are incorporated into this Settlement Agreement:

Appendix 1- Site Location Map

Appendix 2- Site Diagram Showing Location of Work

Appendix 3- Work Plan

XXVIII. EFFECTIVE DATE

71. This Settlement Agreement shall be effective upon signature by the Director, Superfund Division, U.S. EPA Region 5.

The undersigned representative of the Respondent certifies that he/she is fully authorized to enter into the terms and conditions of this Settlement Agreement and to bind the party they represent to this document.

Agreed this 1 day of March, 2013.

For Respondent North Shore Gas Company

By: ______________________
Willard S. Evans, Jr.

Title: President

IN THE MATTER OF:

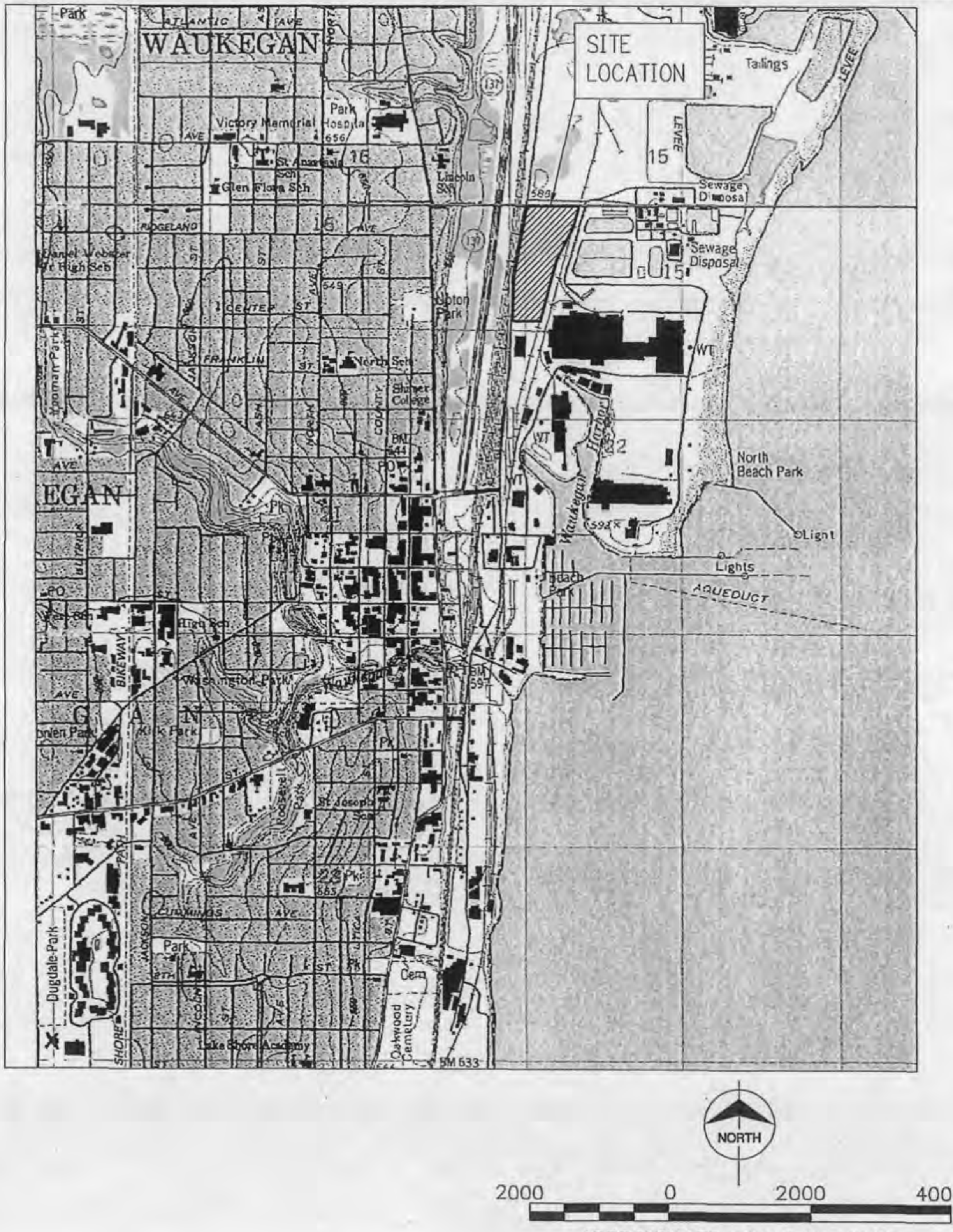
North Plant
Manufactured Gas Plant Site
Chicago, Cook County, Illinois

It is so ORDERED and Agreed this 8 day of APRIL, 2013.

BY:

Richard C. Karl, Director
Superfund Division
United States Environmental Protection Agency
Region 5

APPENDIX 1



Burns & McDonnell
SINCE 1898

SITE LOCATION MAP
FORMER NORTH PLANT
WAUKEGAN, ILLINOIS

I:\PEOPLES GAS\SAS INITIATIVE\ADMIN ORDER ON CONSENT\SITE LOCATION MAPS\NORTH PLANT SITE LOCATION

APPENDIX 2

SOURCE NOTES:

1. THIS DRAWING WAS DEVELOPED FROM MCCLURE ENGINEERING & ASSOCIATES, INC. PLAT OF SURVEY, SHEET 1 OF 1, JOB NO. 02-13-12-070, DRAWING NAME 12070PERSHING.DWG, DATED 06/27/2012.
2. AERIAL PHOTOGRAPHY TAKEN FROM BING MAPS 2012.
3. COORDINATE SYSTEM IS NAD83, IL STATE PLANE EAST, US FOOT.

DRAWN BY: NWD DATE: 01/29/13
CHECKED BY: GRL DATE: 01/29/13
APPROVED BY: GRL DATE: 01/29/13
DRAWING NO: 2088-45-B01-PERMIT EX AREAS
REFERENCE: SEE INFO BLOCK

REMOVAL ACTION AREAS

REMOVAL ACTION CONSTRUCTION
FORMER NORTH PLANT MGP SITE
NORTH SHORE GAS COMPANY
WAUKEGAN, ILLINOIS

NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO.
2088/4.5

FIGURE NO.
1

Jan 29, 2013 12:54pm PLOTTED BY: [illegible] SAVED BY: [illegible]
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IMAGES: T:\ACAData\Projects\20\2088\Source\2088_Bing_Aerial.tif;
XREFS: T:\ACAData\Projects\20\2088\BD_CON\2088 Basemap-McClure Plat.dwg

APPENDIX 3

NATURAL
RESOURCE
TECHNOLOGY

ENVIRONMENTAL CONSULTANTS

23713 W. PAUL ROAD, SUITE D
PEWAUKEE, WI 53072
(P) 262.523.9000
(F) 262.523.9001

REMOVAL ACTION WORK PLAN

NORTH SHORE GAS COMPANY
FORMER NORTH PLANT MGP SITE
WAUKEGAN, ILLINOIS

CERCLA Docket No. V-W-'07-C-877
USEPA ID: ILD984807990
Illinois EPA ID: 0971900063

Project No. 2088

Prepared For:

INTEGRYS BUSINESS SUPPORT, LLC
130 East Randolph Street, 22nd Floor
Chicago, IL 60601

Prepared By:

Natural Resource Technology, Inc.
23713 West Paul Road, Suite D
Pewaukee, WI 53072

September 21, 2012

Andrew M. Millspaugh, EIT
Environmental Engineer

Glenn R. Luke
Project Manager/Engineer

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

ABBREVIATIONS / ACRONYMS

AAC	Acceptable air concentration
ANS	American Nuclear Society
ANSI	American National Standard Institute
Barr	Barr Engineering Co.
BTEX	Benzene, toluene, ethylbenzene, and xylenes
bgs	Below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
COC	Constituents of concern
CQA	Construction quality assurance
DNAPL	Dense non-aqueous phase liquid
FAM	Fixed air monitor
FS	Feasibility study
GGBFS	Ground granulated blast furnace slag
HDPE	High-density polyethylene
HEY	Hey and Associates, Inc.
IAC	Illinois Administrative Code
IEPA	Illinois Environmental Protection Agency
IBS	Integrys Business Support, LLC
ISS	In situ solidification/stabilization
LCSMC	Lake County Stormwater Management Commission
MCL	Maximum contaminant level
MGP	Manufactured gas plant
NAPL	Non-aqueous phase liquid
NPDES	National Pollution Discharge Elimination System
NRT	Natural Resource Technology, Inc.
NSG	North Shore Gas Company
NSSD	North Shore Sanitary District
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PID	Photoionization detector
QA	Quality assurance
QC	Quality control
RAWP	Removal action work plan
RCRA	Resource Conservation and Recovery Act
RI	Remedial investigation
RSL	Regional screening level
SI	Site investigation

SPLP	Synthetic precipitation leaching procedure
SSWP	Site-specific work plan
SWPPP	Storm water pollution prevention plan
SVOC	Semi-volatile organic compound
TACO	Tiered Approach to Corrective Action Objectives
TCL	Target compound list
TCLP	Toxicity characteristic leaching procedure
T.E.S.T.	Timely Engineering Soil Tests LLC
TPH	Total petroleum hydrocarbons
TVOC	Total volatile organic compounds
UCS	Unconfined compressive strength
USEPA	United States Environmental Protection Agency
VOC	Volatile organic compound
WDO	Watershed Development Ordinance
WDP	Watershed Development Permit

1 INTRODUCTION

1.1 Overview

This *Removal Action Work Plan (RAWP)* is for the former North Plant manufactured gas plant (MGP) site in Waukegan, Illinois (Figure 1). North Shore Gas Company (NSG), a subsidiary of Integrys Energy Group, owns the former MGP. Integrys Business Support, LLC (IBS) will manage the removal action on behalf of NSG. NSG and the United States Environmental Protection Agency (USEPA) entered into an Administrative Order on Consent and Statement of Work, CERCLA Docket No. V-W-'07-C-877, effective July 23, 2007, to perform Remedial Investigation/Feasibility Study (RI/FS) activities at two NSG sites under the Superfund Alternative Sites Program.

The North Plant Site is composed of three Parcels (Parcels 1, 2, and 4). The former MGP was located on Parcel 1. Currently, NSG owns Parcels 1 and 2, the City of Waukegan owns Parcel 3, and the EJ&E Railroad owns Parcel 4. This RAWP has been prepared to address residual impacts on Parcels 1 and 2.

Although the RI/FS activities have not been completed, site investigations have identified MGP source material at and near the ground surface that may present an exposure risk. Therefore, this work plan outlines an emergency response (i.e., time critical) removal action to mitigate the exposure risk. The removal action addressed by this RAWP is focused on addressing MGP residuals characterized as source material that pose a potential exposure risk. USEPA concurred via email correspondence dated April 11, 2012 and requested a work plan to conduct a time-critical removal action. On May 22, 2012, USEPA, IBS, and Natural Resource Technology (NRT) reviewed site subsurface conditions and agreed that a removal action including in situ solidification/stabilization (ISS) and focused excavation was appropriate.

This RAWP outlines the scope of the proposed removal action and will serve as the statement of work for a final Administrative Order on Consent between USEPA and NSG pertaining specifically to this removal action.

The removal action is intended as an interim action to address exposed and subsurface MGP source material that will contribute to the overall site remediation goals under the RI/FS Settlement Agreement.

1.2 Project Information

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Project Contact:	Integrys Business Support, LLC 130 East Randolph Drive, 22nd Floor Chicago, IL 60601 Naren M. Prasad, P.E., MPH, LEED AP Senior Environmental Engineer (312) 240-4569
Site Name:	NSG Former North Plant MGP Site
Site Location:	T45N, R12E, Section 15 849 Pershing Road Waukegan, Illinois Lake County
USEPA ID #:	ILD984807990
Illinois EPA ID:	0971900063
Environmental Consultant:	Natural Resource Technology, Inc. 23713 West Paul Road, Suite D Pewaukee, WI 53072
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1.3 Site History

According to a report titled *Preliminary Site Investigation, North Plant Site, Waukegan, Illinois,* prepared by Barr Engineering Co. (Barr), dated January 1993, the original parcel of land located at the southeast corner of Dahringer Road and Pershing Road (formerly Sand Street) was purchased by NSG in 1912 from Everett and Elizabeth Millard. According to a report titled *Final Report and Supplemental Extent of Contamination Study, Docket No. V-W-'91-C-115 Waukegan Tar Pit Site*, prepared by Barr, dated February 1994, the former North Plant MGP was constructed and operational by the end of 1912. In 1925, NSG sold a triangular parcel of land along the eastern property line to EJ&E Railroad, who then sold two parcels of land, one triangular parcel in the northeast corner of the property and one parcel near the southern property line, to NSG. In 1975, NSG sold all of its property (inclusive of Parcels 1 and 3) to the City of Waukegan, who subsequently sold the northern two-thirds of its property (Parcel 1) to the North Shore Sanitary District (NSSD) in 1982. NSSD also purchased a parcel of land located directly east of the former NSG property (Parcel 2) from EJ&E Railroad in 1982 (Barr 1994). In 2002, NSG re-purchased the portion of the former North Plant and the adjacent property that was owned by the NSSD (Parcels 1 and 2). The southern parcel (Parcel 3) of the former North Plant MGP is owned by the City of Waukegan. EJ&E has owned Parcel 4 since 1925.

The former North Plant MGP operations primarily occurred in the northern, central, and western portions of Parcel 1. The MGP produced gas using a coal carbonization process from 1912 to 1927 when the plant was converted into a carbureted water gas facility. In 1951, the MGP equipment was converted to manufactured oil gas. Manufactured gas production using the oil gas process ceased by 1953. The former MGP also had propane air equipment on site from 1940 through 1965 to meet peak energy demands. By 1965, operations ceased, and the former North Plant MGP was dismantled in stages between 1966 and 1968.

During plant demolition in the late 1960s, a relief holder ruptured and a mixture of water and tar were released to the soil. In response, 25,000 tons of impacted soil was excavated from the Site in 1968. In 1992, the northeast corner of the site referred to as the Waukegan Tar Pit was the subject of a removal action conducted pursuant to a Removal Order issued to NSG by the USEPA. Visual tar was excavated and a high-density polyethylene (HDPE) liner was installed over the excavated pit. Over time, water and sediment has accumulated above the HDPE liner.

1.4 Site Description

The North Plant Site is located at 849 Pershing Road, southeast of the intersection of Pershing Road and Dahringer Road in Waukegan, Lake County, Illinois (Figure 2). The North Plant Site is bounded to the north by Dahringer Road, to the west by Pershing Road, to the east by property owned by the EJ&E Railroad, and to the south by property owned by A.L. Hansen Manufacturing Company. Surrounding land use is shown on Figure 3.

The following terms are used throughout this RAWP and are shown on Figure 2:

- Parcel 1 – Currently vacant property owned by NSG where all MGP structures were formerly located (Figure 4). Parcel 1 is bounded by Dahringer Road to the north, Pershing Road to the west, Parcel 2 to the east, and Parcel 3 to the south.
- Parcel 2 – Currently vacant property owned by NSG that was never occupied by MGP structures. Parcel 2 is bounded by Dahringer Road to the north, Parcel 1 to the west, and Parcel 4 and EJ&E Railroad to the east. The majority of the Waukegan Tar Pit is on Parcel 2 and wetlands have historically been identified.

- Parcel 3 – Property formerly owned by NSG, now owned by the City of Waukegan, that was never occupied by MGP structures. Parcel 3 is bounded by Parcel 1 to the north, Pershing Road to the west, property owned by A. L. Hansen Manufacturing to the south, and EJ&E Railroad property to the east. The property is currently used by the City of Waukegan for stockpiling yard waste and asphalt grindings.
- Parcel 4 – Currently vacant property owned by EJ&E Railroad that contains the remainder of the Waukegan Tar Pit and was never occupied by MGP structures. Parcel 4 is bounded by Dahringer Road to the north, Parcel 2 to the west, and EJ&E Railroad tracks to the east. Beyond the tracks to the east lies the NSSD facility.
- EJ&E Railroad – Refers to the active EJ&E Railroad tracks located east of the North Plant Site and west of the NSSD treatment facility.
- North Shore Sanitary District (NSSD) – Refers to the active wastewater treatment facility east of the former North Plant Site and EJ&E Railroad.
- Site – Areas where impacts to environmental media associated with the Former North Plant MGP are present. At this time these areas include Parcels 1, 2, and 4. No known investigation activities have been conducted on Parcel 3.

1.5 Previous Investigations

Several site investigations (SI) have occurred on the North Plant Site since 1990. Documents associated with the SI activities described below were included as appendices to the USEPA-approved *Site-Specific Work Plan Revision 2* (SSWP), prepared by NRT, and dated November 29, 2011. Historical soil boring and test pit locations are shown on Figure 5. Some of the SI activities were conducted in accordance with the Illinois EPA Site Remediation Program, as defined in Chapter 35 of the Illinois Administrative Code (IAC), Part 740 (35 IAC, Part 740). Soil and groundwater samples were collected, analyzed, and in many cases the results were compared to Tiered Approach to Corrective Action Objectives (TACO) Tier 1 Remediation objectives contained in 35 IAC, Part 742. A contaminant source evaluation was conducted pursuant to TACO, 35 IAC Part 742.305, based on the soil samples analytical results. Each report provides detailed information on specific activities; however, a brief summary is presented below.

1.5.1 Weston, 1990

<u>*Site Assessment for Waukegan Tar Pit; Weston, 1990*</u>

This report was completed for the USEPA following reconnaissance of the Waukegan Tar Pit by the USEPA Technical Assistance Team. The team observed unrestricted access to a pit of free tar that was covered with water.

The presence of surface water gave the appearance of a natural pond, which attracted birds and other animals that became trapped by the tar. Free tar and oil was also observed on the ground surrounding the tar pit.

The pit measured approximately 125 by 60 feet. One water sample and two tar samples were collected and analyzed. Laboratory results indicated volatile organic compounds (VOC) and semi-volatile organic compounds (SVOC) were present in the water and tar. The flash point for one of the tar samples was below acceptable levels resulting in conditions that warranted an emergency removal action due to actual or potential exposure to hazardous substances and the threat of fire or explosion.

1.5.2 Barr, 1991

Extent of Contamination Study; Waukegan Tar Pit Site; Barr Engineering Company (Barr); May 1991

Barr conducted an Extent of Contamination study from February to March 1991 to laterally and vertically delineate the limits of the tar pit and to identify removal methods in response to the USEPA preliminary assessment.

Sixteen hand auger borings and ten hand probes were advanced within the Waukegan Tar Pit limits to characterize soil and assess the depth of tar. Samples were collected from three locations in the tar pit and were composited into one sample. The tar sample was analyzed for VOCs and SVOCs.

Twenty borings were advanced to further delineate the limits of the tar pit. Two composite soil samples were collected: one north and one south of the tar pit. The samples were analyzed for VOCs, SVOCs, and metals. Additional testing included flashpoint, specific gravity, and BTU content. Select samples were also analyzed for toxicity characteristic leaching procedure (TCLP) metals.

Analytical results indicated elevated levels of VOCs, SVOCs, and metals. Most of the free tar was present within the limits of the tar pit. Tar was found in many of the other borings, but was present as a mixture of tar and sand mostly within the upper 10 feet of the soil.

1.5.3 Illinois EPA, 1992

CERCLA Preliminary Assessment Report; Waukegan Tar Pit; Illinois EPA, 1992

A Preliminary Site Inspection was conducted from September through November 1990. Based on the inspection, the USEPA recommended that the Waukegan Tar Pit be placed on the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) list and be assigned a high priority status. Surface water and soil contamination were confirmed.

1.5.4 Barr, 1993

Preliminary Site Investigation; North Plant Site; North Shore Gas Company, Waukegan, Illinois; Barr, January 1993

Barr conducted a preliminary SI to determine if there was a potential for environmental impact at the Former North Plant MGP. The preliminary SI concluded that chemicals associated with past MGP operations may be present in surface soils. No sampling was conducted as part of this event.

1.5.5 Barr, 1994

Final Report and Supplemental Extent of Contamination Study, Docket No. V-W-'91-C-115, Waukegan Tar Pit Site; North Shore Gas Company, Barr, January 1994

In August 1992, Barr conducted a Supplemental Extent of Contamination Study at the Waukegan Tar Pit under Administrative Order, Docket Number V-W-'91-C-115, pursuant to Section 106 of CERCLA (Section 106 Order). The Waukegan Tar Pit was excavated on January 10, 1992 and covered with an HDPE cover. The removal action was conducted to "remove all visible free tar" (i.e., tar that is not mixed with any soil or other foreign material) from the tar pit.

Notable observations from the study include the following:

- Free tar within the pit ranged from 1 to 3.5 feet thick.
- An estimated 67,000 cubic yards of soil that contain tar remained in the vicinity of the tar pit extending to a depth of approximately 26 feet.

In addition to documenting the removal action specified in the Section 106 Order, 66 soil borings were advanced, 5 groundwater monitoring wells were installed, 54 soil samples were collected and analyzed for VOCs and polycyclic aromatic hydrocarbons (PAH), and several rounds of groundwater samples were collected and analyzed for VOCs, PAHs, and inorganics. Free tar was identified in the northeast portion of the Site (Parcels 1 and 2) and on the property immediately east of the Site based on visual observation.

Chlorinated compounds (including trichloroethene (TCE), 1,1,1-trichloroethane (TCA), 1,2-dichloroethene (DCE), 1,1-dichloroethane (DCA), and vinyl chloride) were detected in soil samples along Dahringer Road (i.e., borings B47, B47A, and B48A). The soil samples were collected below the water table between 8 and 16 feet below ground surface (bgs). Chlorinated compounds were not detected in samples from the tar pit and Barr concluded that their presence was unrelated to tar migration and is likely from and off-site source.

1.5.6 Dames & Moore, 1995

Site Investigation Report of the Waukegan Tar Pit and the North Shore Gas Company; Dames & Moore, September 1995

Dames & Moore was retained by the EJ&E Railroad and conducted an SI in September 1995. The SI included a geophysical survey to locate former MGP structures and the advancement of 16 soil borings to collect soil samples for visual characterization, lithology, and chemical analyses. Fifteen soil samples were collected and analyzed for VOCs and SVOCs. Tar was identified in the northeast, northwest, and central portions of the Site based on visual characterization and laboratory analyses. Samples indicated dense non-aqueous phase liquid (DNAPL) was present in borings centrally located on the Site.

1.5.7 Burns & McDonnell, 2005

Comprehensive Site Investigation, Former North Plant Manufactured Gas Plant Operational Area and Adjacent Property, Waukegan, Illinois; North Shore Gas Company; Burns & McDonnell, November 2005, (CSI Report, Burns & McDonnell 2005)

Burns & McDonnell conducted a source delineation SI in July and August 2002 and a comprehensive SI on Parcels 1 and 2 from July through September 2004. The objectives of the SI were to delineate the extent of previously identified tar and other contaminants and determine if there is a threat to human health and the environment.

During the August 2002 SI, 61 soil borings and 16 test pits were advanced. During the 2004 SI, 27 soil borings, 54 soil probes, and 23 test pits were advanced. Fourteen of the soil borings were converted into groundwater monitoring well nests screened at varying depth intervals within the same unconfined water-bearing unit. Soil samples were analyzed for target compound list (TCL) VOCs, TCL SVOCs, priority pollutant metals, and total cyanide. Select samples were additionally analyzed for TCLP Resource Conservation and Recovery Act (RCRA) metals, synthetic precipitate leaching procedure (SPLP) metals, polychlorinated biphenlys (PCB), reactive cyanide, reactive sulfide, flashpoint, total petroleum hydrocarbons (TPH), and soil pH for waste characterization purposes. Groundwater samples were collected once from monitoring wells and samples were analyzed for TCL VOCs, TCL SVOCs, priority pollutant metals, and amenable cyanide.

Contaminant source material in the form of tar, tarry residue, or related sheen was identified based on visual observation and analytical results. Tar was identified on the surface in portions of the Site and in one groundwater monitoring well nest. Chlorinated VOCs, which are not associated with former MGP operations, were identified in the northeast portion of the Site and are believed to be associated with former industrial operations located north of the Site. Five areas of concern were identified as the following:

- The northeast portion of the Site near the Waukegan Tar Pit.
- The eastern and southeastern portions of the Site along the EJ&E railroad tracks.
- The northwest portion of the Site, including the area of the former aboveground gas holder, tar wells, and generator house.
- The center of the Site near the former purifying room, purifier house, aboveground tar tank, and coke bins.
- The southwest portion of the Site north of a former tar pit structure.

1.6 Previous Actions

Previous actions at the Site include the following:

- Activities associated with plant decommissioning in 1968: During plant decommissioning, a relief holder ruptured and released a mixture of water, tar emulsion, and tar to the soil. Approximately 25,000 tons of tar was excavated from an area of approximately 300 by 10 feet. No other details regarding this rupture and excavation are available.
- Free tar removal from the Waukegan Tar Pit in 1991: Executed pursuant to a CERCLA Removal Action Order. The objective was to remove all visible tar from the Waukegan Tar Pit. Six inches of water was removed from the pit, treated, and discharged into an NSSD sanitary sewer. The depth of tar that was removed ranged from approximately 3 to 6 feet bgs. An HDPE liner was installed and approximately 19,000 gallons of water was placed on top of the liner to hold it in place.
- Limited excavation activities in 2003: Excavation occurred in the central portion of the Site in one of the five areas identified in 2002. Excavation activities were conducted in the central portion of Parcel 1 in an area where several aboveground oil tanks were formerly located. Approximately 1,700 tons of excavated material was managed as non-hazardous special waste. The excavation extended to the water table and the area was subsequently backfilled with imported, clean granular material. The excavation was suspended because of potential litigation issues with other potentially responsible parties.

2 SUMMARY OF SITE CONDITIONS

2.1 Site Geology and Hydrogeology

Based on SI activities conducted by Burns & McDonnell, site geology was characterized through the advancement of soil probes/borings and test pits. The unconsolidated materials identified at the Site consist of silty clay overlain by sand and fill material. Bedrock was not encountered during the SI activities. Geotechnical testing was conducted and the soils were classified. The identified soils are described as follows:

- Fill Unit – The fill unit is primarily sand with lesser amounts of gravel, cinders, gypsum, brick fragments, and wood fragments. The fill unit generally ranged from 3.5 to 11 feet thick with an average thickness of approximately 7 feet.
- Sand Unit – Underlying the fill unit is the native sand unit that is primarily olive gray to light olive gray medium to fine-grained sand. The top of the sand unit was generally encountered at depths ranging from 3.5 to 11 feet bgs with an average thickness of 17 feet. In two soil borings/probes, SB36 and SP157, the top of the sand unit was encountered at depths of approximately 12 and 15 feet bgs, respectively.
- Silty Clay Unit – Underlying the sand unit is the silty clay unit that is olive gray to light olive gray, hard to very hard, low plasticity, moist silty clay. This unit serves as a low-permeability barrier directly beneath the sand layer. The clay unit was encountered in soil borings and probes advanced across the Site except where shallow refusal was encountered. The top of the clay unit was encountered at depths ranging from 18.5 to 29 feet bgs.

The sand unit functions as the main water-bearing unit at the Site and groundwater is encountered at about 3 to 7 feet bgs. Recharge of groundwater in the fill, sand, and silty clay units are expected to occur locally and are presumed to be affected by infiltrating precipitation. The porous nature of the upper fill and sand units allow for adequate percolation into the subsurface. Slug tests performed during past investigations indicate the hydraulic conductivity of the silty sand unit is approximately 5.66 x 10^{-3} cm/s.

2.1.1 Site Topography and Drainage

The closest surface water body to the Site is the North Ditch that lies approximately 800 feet to the east southeast. Surface water bodies near the Site include Waukegan Harbor, (approximately 2,000 feet southeast) and Lake Michigan (approximately 3,000 feet east). Natural surface water runoff is primarily influenced by local topography. There are no storm sewer inlets located on the Site. There are no buildings or paved areas on the Site, and the ground surface consists mainly of grass and gravel.

According to the Federal Emergency Management Agency Flood Insurance Rate Map, the Site is not within the limits of the 100-year floodplain. The Illinois Department of Conservation's Natural Heritage Database lists no federal or state threatened and endangered species or pristine natural areas located within the Site boundaries.

A portion of the former Waukegan Tar Pit is located within Parcel 2, and previously defined wetlands were located within Parcels 1, 2, and 4. Historically, a wetlands jurisdictional determination, wetland delineation, and wetland concurrence were performed and approved on the property. On October 15, 2001, the U.S. Army Corps of Engineers provided jurisdictional determination for the property; the wetlands were considered isolated and did not require a permit from the Corp. The jurisdictional determination was valid for 5 years. A Wetlands Delineation Report was prepared for the Site in October 2003 (Burns & McDonnell, 2003). A Wetland Boundary Verification submittal was prepared by Burns & McDonnell in July 2004 to supplement the Wetlands Delineation Report. Four wetlands were identified at the Site. Three wetlands designated as high quality were located on the eastern portion of the Site and one low quality wetland was located along the western Site boundary. According to the National Wetland Inventory map developed by the US Fish and Wildlife Service, a Palustrine Open Water/Unknown Bottom Semipermanently Flooded wetland area is located on the northeast portion of the Site. Burns & McDonnell conducted further wetland delineation on the Site at the direction of the Lake County Stormwater Management Commission (LCSMC). Three wetland areas were revised by Burns & McDonnell and were approved by a wetland specialist from LCSMC through correspondence addressed to Burns & McDonnell, dated August 16, 2004. The wetland delineation approval was valid for three years. Subsequent wetland delineations and permitting were initiated in May 2012, as described in Section 5.2.

2.2 Pre-Removal Site Characterization Activities

Pre-removal site characterization activities were completed during the weeks of April 23, June 18, June 25, and July 2, 2012. The activities included soil borings and test pit excavations to achieve the following objectives:

- Refine the proposed removal action excavation areas shown on Figures 6 and 7
- Verify subsurface observation and analytical data from previous investigations indicating the presence of source material
- Assess the presence of former MGP foundation structures and/or debris in the removal action areas

- Characterize phases of MGP impacts found
- Characterize the subsurface fill for excavatability considerations including side slope stability
- Characterize material for waste disposal
- Assess the dewatering conditions and presence or absence of non-aqueous phase liquid (NAPL)
- Assess odors and air quality conditions to prepare for fugitive emission controls during full-scale removal actions

During the week of April 23, 2012, three soil borings (SB200, SB201, and SB202) and nine test pits were advanced on the Site. Challenging subsurface conditions, including shallow water table and sandy soil, limited the success of advancing soil borings using direct-push drilling methods (i.e., Geoprobe®). Soil borings could not be advanced to target depths for complete site characterization and the investigation was stopped. Two soil samples, from SB200 and SB201, were collected for TPH analysis and source area delineation.

Nine test pits (TP3 through TP11) were excavated while alternate drilling methods were evaluated for completing the site characterization activities. The excavated test pits yielded the following observations of subsurface conditions:

- Former MGP foundation structures and/or debris are present in the removal action areas.
- Various phases of MGP impacts are present in each of the removal areas.
- The groundwater table is present at shallow depths ranging from 2 to 5 feet bgs. The combination of shallow water and high permeability soil conditions produced unmanageable amounts of groundwater infiltration into the test pits and prevented accurate assessment of subsurface soils and representative soil sampling below the water table.
- Shallow groundwater, granular subsurface fill, and sandy soils contributed to unstable, challenging, and potentially unfeasible excavation conditions to the depths required for a removal action. Test pit excavations filled with groundwater and could not be advanced deeper than approximately 15 to 18 feet bgs.

Soil samples were not collected during the test pit investigation. One water sample was collected from TP4 for representative excavation dewatering conditions and potential treatment and discharge during construction. The water sample was analyzed for PCBs, dissolved metals, dissolved mercury, SVOCs, VOCs, dissolved kjeldahl nitrogen, and total phosphorus.

Subsurface conditions observed during test pit excavation resulted in re-evaluation of removal approaches for the Site. IBS and NRT presented the observed conditions and removal alternatives to the

USEPA in a meeting on May 22, 2012. At this meeting, the USEPA agreed that the conditions warranted evaluation of a remedy that included excavation in combination with ISS, as further discussed in Sections 3 and 4.

Site characterization activities resumed during the week of June 18, 2012. A combination of hollow-stem auger and mud-rotary drilling techniques were used to complete 31 soil borings (SB203 through SB229) for collection of subsurface observational and analytical data. Soil borings were advanced to the silty clay unit with depths ranging from 19 to 25 feet bgs. Geologic observations were consistent with historically complete soil borings with the fill, sand, and clay units observed as described in Section 2.1. Thirteen soil samples were collected from discrete intervals for laboratory analysis for TPH via Method 8015B gasoline and diesel range organics. Analytical results are summarized in Table 1 and were used to verify the presence of source material from previous investigations and refine removal action area extents.

Soil boring and test pit locations are shown on Figure 5. Analytical reports and completed soil boring logs are provided in Appendix A1 and A2, respectively.

2.3 Existing Utilities and Site Constraints

2.3.1 Existing Utilities

Utility mapping has identified aboveground and underground utilities near the site boundaries. The identified utilities are shown on Figure 2. A private utility locate was performed on and surrounding the Site on March 27, 2012. The private utility locate did not identify any additional active utilities within or near the site boundaries other than those shown on Figure 2.

Identified utilities include the following:

- **Sanitary Sewers:** Sanitary sewers ranging in size from 10-inch to 54-inch exist along Pershing and Dahringer Roads in the Right-of-Way. Two sanitary sewers (54-inch and 48-inch) cross the Site in the southern portion of Parcels 1 and 2, and one 54-inch sanitary sewer crosses the Site in the northern portion of the parcels. Based on the current removal action plan, these utilities are outside of the proposed work area and will not be affected.
- **Water Mains:** 10-inch and 16-inch water mains exist along Pershing and Dahringer Road in the Right-of-Way. These utilities are outside of the Site and will not be affected by removal action activities.

- Overhead Utilities: Overhead utilities exist along Pershing Road and Dahringer Road outside of the site boundaries. Additional overhead utilities exist along the EJ&E Railroad east of the Site within Parcels 4 and 2. Overhead utilities that exist in Parcel 2 may require coordination with the utility provider to support, relocate, or remove the utility prior to or during removal action activities. This utility crosses the planned removal action area on Parcel 2.
- Gas Utilities: A gas line exists along Dahringer Road in the Right-of-Way. This utility is outside of the Site and will not be affected by removal action activities.

2.3.2 Site Constraints

As noted in Section 1.4, Parcels 1 and 2 are currently owned by NSG, Parcel 3 by the City of Waukegan, and Parcel 4 by the EJ&E Railroad. This RAWP addresses residual impacts on Parcels 1 and 2 currently owned by NSG. Site constraints that will limit the extents of proposed removal action include the following:

- Parcel 4: At this time, NSG does not have an access agreement with the EJ&E Railroad to access Parcel 4.
- Former Waukegan Tar Pit: The existing water impoundment created as a result of the free tar removal from the Former Waukegan Tar Pit exists on both Parcels 2 and 4. Due to technical feasibility and impracticality of removing only a portion of the lined water impoundment without access to Parcel 4, this area of Parcel 2 will not be addressed during the removal action. Further investigation of the pond liner anchor trench and a geotechnical investigation may be required to determine an appropriate offset from the pond for removal action area limits.
- Railroads: The removal action will address residual impacts up to the eastern property boundaries with the EJ&E Railroad and Parcel 4, to the extent practical and allowable.
- Roads: The removal action will address residual impacts up to Pershing Road and Dahringer Road Right-of-Ways as needed and to the extent practical and allowable.

2.4 Soil Data Compilation and Interpolation

Prior and new site boring logs, field observations, and analytical data were compiled and summarized to evaluate potential source material and delineate removal action areas as part of the removal action planning.

Proposed removal action limits were primarily defined based on descriptions of visual NAPL identified as MGP source material as described in Section 3.2. Soil analytical data were used to correlate visual indicators of NAPL. The proposed removal action areas were verified and refined to include areas where TPH concentrations exceeded the default value of 2,000 mg/kg in accordance with TACO regulations for determination of soil attenuation capacity (Illinois TACO: 35 IAC 742, Section 742.215). TPH was assumed to be representative of the primary constituents of concern (COC) including benzene, toluene, ethylbenzene, xylenes (BTEX), and total PAHs. The visual descriptions of NAPL and associated analytical data were used to delineate lateral and vertical extents of source material in soil boring locations. This approach is consistent with the USEPA-approved time-critical removal action at Crawford Station Parcels A, B, and O, Chicago, Illinois.

2.5 Characterization of Material for Disposal

Excavated MGP-impacted debris and soil will be disposed at Countryside Landfill, located in Grayslake, IL, a Subtitle D landfill. Countryside is approved by the USEPA with respect to the Off-Site Rule as set forth in the National Contingency Plan in 40 CFR 300.440. Soil and debris disposal will be in accordance with the existing Waste Management Profile Number EF 1496 (Appendix E).

Analytical results from several historical samples collected in the proposed removal areas indicate that TCLP benzene concentrations may be greater than 0.5 mg/L, the allowable limit based on Illinois' Subtitle D solid waste landfill permit criteria. However, these discrete samples, with the exception of one, were collected at depths that are targeted for ISS. Any soil that may exhibit benzene concentrations greater than 0.5 mg/L will be managed on site and remediated with ISS.

Under applicable Illinois regulations (Title 35, Subtitle G: Waste Disposal, Chapter I: Pollution Control Board, Subchapter c: Hazardous Waste Operating Requirements, Section 721) TCLP analysis for benzene at MGP sites is exempt from toxicity characteristic requirements.

2.6 Risk to Public Health, Welfare or the Environment

Site soil analytical data for constituents of concern including VOCs, SVOCs, PAHs, and metals are presented in the SSWP (NRT, November 2011). Soil analytical data are compared to screening levels following the hierarchical approach identified in the USEPA-approved Risk Assessment Framework (Exponent, September 2007). The screening levels are a combination of USEPA Regional Screening Levels (RSLs) and Illinois TACO Tier I values.

Compared to factors in the National Contingency Plan Section 300.415(b)(2), conditions at the Site may present an imminent risk to public health, welfare, and the environment. Selected factors that are applicable to this determination include the following:

1. Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants
    - No active operations are conducted in the vicinity of exposed MGP residuals. Typical security measures, including fencing, are employed to limit access to exposure.
    - A potential exposure risk exists from MGP residuals at ground surface as shown on Figure 2. Subsurface contaminant migration is a potential threat to additional receptors.
2. Elevated levels of hazardous substances or pollutants or contaminants in soils at or near the surface that may migrate
    - MGP residuals meeting the classification of source material were identified at the ground surface. The MGP residuals exhibit elevated concentrations of PAHs and VOCs.

Given the site conditions, the nature of known and suspected hazardous substances, and the potential exposure pathways, actual or threatened releases of hazardous substances, pollutants, or contaminants are evident. ISS and excavation of MGP source materials will mitigate the direct contact exposure pathway and reduce the potential for migration to soil, groundwater, or surface water. If not addressed by implementing this removal action, the site conditions will continue to be a risk to public health, welfare, or the environment.

3 BASIS FOR REMOVAL ACTION

3.1 Removal Action Objectives and Strategy

The objectives for the removal action include the following:

1. Immobilize and/or remove identified MGP source material within the defined removal action areas and eliminate residual MGP residuals at the surface and associated direct contact concerns to the extent practicable.
2. Immobilize and remove other materials from the Site that may be impacted by MGP residuals, but are not considered source material, on a selective basis to support long-term site management within the Multi-Site Framework and avoid future remediation below or immediately surrounding the removal areas.
3. Restore the Site by replacing removed material with clean fill and construction of a clean soil cover over the stabilized material.

The removal action was developed with the following strategy:

- Select a removal strategy that can be feasibly and economically implemented within a short timeframe.
- Use a planning and design process that addresses MGP source material defined by prior investigations and verified by pre-removal site characterization.
- Limit the removal action scope to areas of the Site where immediate implementation is feasible considering issues such as property ownership, access constraints, and practical considerations.

The selected removal action strategy includes a combination of ISS, shallow soil excavation and landfill disposal, including removal of historical structures. In the event that obvious non-MGP contamination is evident during the removal action (e.g., buried drums, previously unidentified underground storage tanks, or other types of impacts that are visually distinct from the MGP source material) appropriate procedures will be employed to address the contamination in accordance with federal, state, and local requirements. As appropriate, the USEPA On-Scene Coordinator will be promptly notified. If the type of contamination encountered is not consistent with site investigation data or the site waste profile, supplemental sampling and waste characterization may be performed to ensure proper management, handling, and/or disposal of the material.

3.2 MGP Source Material Definition

As a time-critical removal action, the proposed work is proceeding without a complete RI/FS or quantitative risk assessment. To accomplish project objectives, the removal action relies on investigative visual assessment methods supplemented with soil sampling and analysis. This is consistent with USEPA-approved approaches at other sites in Region 5 such as the time-critical removal action at Crawford Station Parcels A, B, and O, Chicago, Illinois. The removal action at Crawford Station is being performed in general accordance with *Removal Action Work Plan Revision 1*, prepared by NRT and dated September 6, 2011. Soils exhibiting visual NAPL conditions described below and/or having TPH concentrations exceeding the default value of 2,000 mg/kg in accordance with Illinois TACO regulations for determination of soil attenuation capacity (Illinois TACO: 35 IAC 742, Section 742.215) are considered source material. Areas exhibiting lesser degrees of NAPL that do not meet the source definition (e.g., tar or oil staining in clay fractures) will not be considered MGP source material.

MGP source material that will be addressed and has been visually identified is defined as follows:

MGP Source Material Description

Descriptive Term	Soil boring log descriptions from prior investigation work	Definition
Tar at ground surface	Tar at surface	Areas where tar is visible at the ground surface
Oil Wetted	Tar saturated Free product	Visible brown or black oil wetting the soil sample. Oil appears as a liquid and is not held by soil grains.
Oil Coated	Tar coated, Oily, Hard tar	Visible brown or black oil coating soil particles. Typically associated with coarse-grained soil such as coarse sand, gravel, and cobbles.

3.3 Removal Action Decision Criteria

The following decision criteria will be applied to the removal action:

- Removal/ISS of MGP source material from 0 to 4 feet bgs to mitigate the direct contact exposure pathway. If groundwater is encountered, soil excavation may be terminated prior to reaching a depth of 4 feet bgs. Soil excavation may extend deeper than 4 ft and laterally outside of removal areas to remove subsurface MGP structures (e.g., foundations and piping) as shown on Figure 6.

- ISS of MGP source material to depths of up to 10 feet bgs to mitigate potential exposure to future construction workers and migration to soil and groundwater.
- ISS of MGP source material to depths greater than 10 feet bgs to support long-term site management within the Multi-Site Framework and avoid future remediation below or immediately surrounding the removal action areas. Based on available data, the greatest planned depth of the removal action is approximately 25 ft bgs.

Following shallow soil excavation and removal of subsurface MGP structures (e.g., foundations and piping), MGP source material within the delineated removal action areas will be solidified by ISS. Completed ISS will be sampled for verification that specifications and design parameters are achieved. Construction quality assurance (CQA) details are described in Sections 4 and 6.

3.4 Estimated Removal Action Volume

The approximate lateral and vertical excavation extents of MGP source material removal action areas and volumes associated with each are presented on Figures 6 and 7. Removal action areas include the following:

- Area A: Includes portions of Parcels 1 and 2, an area delineated with tar at the surface near the former tar pit area, and the eastern portion is within the footprint of the former MGP and will likely include subsurface MGP structures. Source material impacts are generally considered to be at or near ground surface and extend to near the clay surface at approximately 20-25 feet bgs. Removal action in Area A is planned to include the following:
    - Excavation (Area A): Excavation will include removal and off-site disposal of the top 4 feet of soil including all subsurface foundations and structures. Excavation will be extended to depths beyond 4 feet bgs as necessary to remove subsurface structures and debris. The volume of material estimated for excavation and off-site disposal is **25,760 cubic yards**.
    - Tar at Surface (Area A1): MGP source material in this area will be excavated and relocated for management on site with ISS. Excavation will include relocation of the top 4 feet of soil. The volume of material estimated for excavation, relocation, and management with ISS is **3,725 cubic yards**.
    - ISS (Area A): ISS will include solidification/stabilization of MGP source material from 4 feet bgs to the clay surface at approximately 25 feet bgs. The volume of material estimated for ISS is **154,780 cubic yards**.
- Area B: Includes portions of Parcels 1 and 2. Source material impacts are generally considered to be at or near ground surface and extend to a depth of approximately10 feet bgs. Limited areas include source material deeper than 10 feet. Removal action in Area B is planned to include the following:

  - Excavation (Areas B, B1, B2): Excavation will include removal and off-site disposal of the top 4 feet of soil including any subsurface foundations and structures. Excavation will be extended to depths beyond 4 feet bgs as necessary to remove subsurface structures and debris. The volume of material estimated for excavation and off-site disposal is **17,040 cubic yards.**
  - ISS (Area B): ISS will include solidification/stabilization of MGP source material from 4 feet bgs to 12 feet bgs. As described in Section 4.4.5.1, ISS will be extended 2 feet below identified source material in areas where source material impacts do not extend to the clay surface. The volume of material estimated for ISS is **30,200 cubic yards.**
  - ISS (Area B1): ISS will include solidification/stabilization of MGP source material from 4 feet bgs to the clay surface at approximately 24 feet bgs. The volume of material estimated for ISS is **1,185 cubic yards.**
  - ISS (Area B2): ISS will include solidification/stabilization of MGP source material from 4 feet bgs to the clay surface at approximately 24 feet bgs. As described in Section 4.4.5.1, ISS will be extended to the clay surface at the perimeter of areas not targeted for ISS to the clay surface. The volume of material estimated for ISS is **8,510 cubic yards.**

- Area C: Located on Parcel 1 within the footprint of the former MGP and will likely include subsurface MGP structure. Source material impacts are generally considered to be near ground surface and extend to and average depth of approximately 13 feet bgs. Limited areas include source material deeper than 13 feet. Removal action in Area C is planned to include the following:
  - Excavation (Areas C, C1, C2, C3): Excavation will include removal and off-site disposal of the top 4 feet of soil including any subsurface foundations and structures. Area C1 includes excavation only of the top 5 feet of soil. Excavation will be extended to depths beyond 4 or 5 feet bgs as necessary to remove subsurface structures and debris. The volume of material estimated for excavation and off-site disposal is **4,510 cubic yards.**
  - ISS (Area C): ISS will include solidification/stabilization of MGP source material from 4 feet bgs to 15 feet bgs. As described in Section 4.4.5.1, ISS will be extended 2 feet below identified source material in areas where source material impacts do not extend to the clay surface. The volume of material estimated for ISS is **8,285 cubic yards.**
  - ISS (Area C2): ISS will include solidification/stabilization of MGP source material from 4 feet bgs to the clay surface at approximately 24 feet bgs. The volume of material estimated for ISS is **1,430 cubic yards.**
  - ISS (Area C3): ISS will include solidification/stabilization of MGP source material from 4 feet bgs to the clay surface at approximately 24 feet bgs. As described in Section 4.4.5.1, ISS will be extended to the clay surface at the perimeter of areas not targeted for ISS to the clay surface. The volume of material estimated for ISS is **4,675 cubic yards.**

The total volume of material to be addressed during the removal action is to be **260,100 cubic yards**; including **212,790 cubic yards** of ISS and **47,310 cubic yards** of excavation and off-site disposal. The volume of material excavated and disposed off site may be increased if subsurface MGP structures extend beyond the delineated removal area limits, as described in Section 4.4.1.1.

3.5 In Situ Solidification/Stabilization Treatability Study

A bench scale/treatability study for ISS, initiated in June 2012, is currently being performed by Timely Engineering Soil Tests LLC (T.E.S.T.) to develop a basis for design of ISS as the remedial technology. Results of the study available to date are presented in Appendix B. A Final ISS Treatability Study Report will be submitted under separate cover when the test is complete in October 2012.

Objectives for the study include the following:

- Develop an ISS mix design capable of stabilizing/solidifying MGP residuals, and designed to enhance protection of human health and the environment
- Develop an economical mix design for implementing ISS using locally available reagents
- Assess the physical and chemical properties of stabilized/solidified materials
- Assess the volumetric expansion associated with ISS
- Demonstrate the solidified monolith will provide suitable geotechnical conditions for future property development

3.5.1 ISS Design Goals

Physical and chemical ISS design goals for the treatability study include the following:

- Unconfined Compressive Strength (UCS) (ASTM D1633): $\geq$ 50 psi
- Hydraulic Conductivity (ASTM D5084): $\leq 1 \times 10^{-6}$ cm/s
- Durability (Freeze/Thaw) (ASTM D4842): Weight loss < 15%
- Durability (Wet/Dry) (ASTM D4843): Weight loss < 15%
- Slake (Submergence Testing): Minimal deterioration, minimal discoloration of water (No Phase Separated Tar or Oil)
- Volumetric Expansion: < 30% of targeted treatment zone if possible
- Leach Testing (ANSI/ANS 16.1): Less than the design goals established in Table 3. Design goals are established for site COCs and are based on USEPA maximum contaminant level (MCL), IEPA TACO Tier 1, or USEPA regional screening level (RSL) as established by multi-site screening levels (June 2012) based on the May 2012 update to the EPA RSLs.

Full-scale ISS implementation will create a stable and relatively impermeable monolith by reducing the hydraulic conductivity of the subsurface relative to the surrounding soil to ultimately preventing leaching. Slug tests performed during past investigations indicate the hydraulic conductivity of the silty sand unit at the Site is 5.66 x 10^{-3} cm/s. The established design goal of 1 x 10^{-6} cm/s will provide orders of magnitude difference in hydraulic conductivity between the monolith and surrounding soils, reducing the flow of groundwater through the monolith and reducing leaching of contaminant from the stabilized/solidified source material. Design goals were developed with reference to the USEPA's *Technology Performance Review: Selecting and Using Solidification/Stabilization Treatment for Site Remediation* (EPA/600/R-09/148 November 2009) and ITRC's Technical/Regulatory Guidance *Development of Performance Specifications for Solidification/ Stabilization*, prepared by the Interstate Technology & Regulatory Council Solidification/Stabilization Team, July 2011. The methodology for evaluating the physical design goals is based on appropriate ASTM standards or qualitative analysis (e.g., slake testing).

To evaluate leach test design goals, concentrations of COCs are evaluated from leachate samples. Since the application of ISS will result in a solid mass, a leach test that submerges an undisturbed monolithic column in demineralized water will be performed during the treatability study. American Nuclear Society (ANSI/ANS) Method 16.1 leachability test method will be used to evaluate leachate at the intervals presented in Table 3 for each mix design selected for leach testing.

3.5.2 Design of ISS Treatability Study

Based on industry and NRT's experience with ISS treatability studies and remediation at similar MGP sites, three mix designs containing the following reagent regimens (percentage by dry mass of soil) were developed for testing:

Cement/Ground Granulated Blast Furnace Slag (GGBFS) Mixes

- Mix 1 - 6% Total Cement-based Reagents – Cement: 1.5% and GGBFS: 4.5%
- Mix 2 - 8% Total Cement-based Reagents – Cement: 2% and GGBFS: 6%.
- Mix 3 - 10% Total Cement-based Reagents – Cement: 2.5% and GGBFS: 7.5%.

Cement/Bentonite Mixes

- Mix 4 - 8% Total Cement-based Reagents – Cement: 8% and Bentonite: 0.5%.
- Mix 5 - 10% Total Cement-based Reagents – Cement: 10% and Bentonite: 0.5%.

- Mix 6 - 8% Total Cement-based Reagents – Cement: 8% and Bentonite: 1.0%.
- Mix 7 - 10% Total Cement-based Reagents – Cement: 10% and Bentonite: 1.0%.

Cement/GGBFS/Bentonite Mixes

- Mix 8 - 6% Total Cement-based Reagents – Cement: 1.5%; GGBFS: 4.5%; Bentonite: 0.5%.
- Mix 9 - 8% Total Cement-based Reagents – Cement: 2%; GGBFS: 6%; Bentonite: 0.5%.
- Mix 10 - 10% Total Cement-based Reagents – Cement 2.5%; GGBFS: 7.5%; Bentonite: 0.5%.

Laboratory batch worksheets for each of the mixes prepared are provided in Appendix B1. Material data sheets and mill test reports for the cement and GGBFS (LaFarge) and bentonite (Bara-Kade® 30 Mesh) are provided in Appendix B2.

To evaluate the mix designs for performance versus the ISS design goals, the ISS treatability study was completed in accordance with the following procedures:

- Soil Collection: NRT collected soil samples from four test pits excavated in each of the proposed removal action areas on June 8, 2012. The samples were collected to be characteristic of soil conditions that will require ISS the removal action. Collected samples were composited into eight 5-gallon buckets for ISS treatability testing and were shipped to T.E.S.T.
- Initial Characterization: Upon arrival at the T.E.S.T., the soil types in each bucket were classified (ASTM Method D2487) to verify relative consistency of soil type. The soils were composited into one representative sample for chemical and physical testing prior to mixing for the ISS study. Physical testing parameters included moisture content, modified bulk density, particle size analysis, and Atterberg Limits. A summary of the treatability study physical tests is provided in Table 2. Chemical analysis was performed for the site COCs. Analytical and geotechnical testing reports are provided in Appendix B3 and B4.
- Initial Mix Design Testing: ISS sample molds were created for all tests, including initial testing and final mix design testing, for each reagent regimen (Mix 1 through 10). Each mix was tested for moisture content prior to sample curing.
    - Phase I Testing: Mixes 2, 5, 7, and 9 were tested as baseline reagent percentage additions for UCS, hydraulic conductivity, and moisture content after curing intervals of 7 days, 14 days, and 28 days. Pocket penetrometer readings were also performed each day after the third day of curing until the maximum reading was reached.
    - Results Analysis: NRT evaluated the Phase I UCS and hydraulic conductivity test results to optimize mix selection for Phase II Testing. Phase II Testing was designed to evaluate a mix design's ability to achieve the permeability design goal while controlling strength to allow for possible future excavation.

- Phase II Testing: Mixes 2 and 9 achieved the design goals for UCS and hydraulic conductivity in Phase I testing. To evaluate and optimize the mixes, Mixes 1 and 8 were selected for Phase II Testing for UCS and hydraulic conductivity. Mixes 1 and 8 are comprised of same components as Mixes 2 and 9, respectively, but at lower percentages.

- Final Mix Design Testing: Phase II Testing results indicated that both Mixes 1 and 8 achieved the design goals for UCS and hydraulic conductivity. Mixes 1 and 2 were selected for final testing since these mixes achieved the design goals and had fewer material components (i.e., do not include bentonite) than Mixes 8 and 9. Final testing includes wet/dry durability, freeze/thaw durability, slake, ANSI/ANS 16.1 leach testing, and volume expansion.

Initial characterization and initial mix design testing (Phases I and II) are complete. Final mix design testing results will be compiled and included under separate cover with a Final ISS Treatability Study Report upon test completion in the fall 2012.

3.5.3 Summary of ISS Treatability Study Results

Mix design components for each of the initial Phase I testing mixes consisted of the following:

Mix Design Component	Mix Design (% by dry mass of soil)			
	Mix 2	Mix 5	Mix 7	Mix 9
MGP Impacted Soil	100	100	100	100
GGBFS Addition	6	0	0	6
Cement Addition	2	10	10	2
Bentonite Addition	0	0.5	1	0.5
Water Addition	Varies	Varies	Varies	Varies

The amount of water required to make an effective mix design varies depending on soil moisture content and soil type. For the treatability study, the water to reagent ratio used for preparation of the ISS grout for all mixes was 0.8 to 1. The amount of water required during full-scale implementation will be verified during the ISS pilot testing. Performance data for each mix designs tested during Phase I are summarized below (Appendix B4):

Mix Design	Unconfined Compressive Strength (psi)			Hydraulic Conductivity (cm/s)		
	7 days	14 days	28 days	7 days	14 days	28 days
Mix 2	112	229	313	1.1×10^{-7}	4.6×10^{-8}	2.2×10^{-8}
Mix 5	49	56	72	7.6×10^{-6}	5.0×10^{-6}	2.9×10^{-6}
Mix 7	45	55	67	5.1×10^{-6}	3.3×10^{-6}	2.0×10^{-6}
Mix 9	129	216	296	9.0×10^{-8}	2.5×10^{-8}	1.5×10^{-8}

The results of Phase I testing indicate that Mixes 2 and 9 achieve the design goals listed in Section 3.5.1. To further evaluate achieving the permeability design goal while controlling strength to allow for feasible excavation in the future, Mixes 1 and 8, which include a lower percentage of reagent addition in comparison to Mixes 2 and 9, were selected for Phase II testing. The results of Phase II testing are summarized below:

Mix Design	UCS Curing Age: Approx. 30 days (psi)	Hydraulic Conductivity Curing Age: Approx. 30 days (cm/s)
Mix 1	257	5.6×10^{-8}
Mix 8	237	2.0×10^{-8}

Phase I and Phase II testing indicated that Mixes 1, 2, 8, and 9 all were suited to meet the design goals listed in Section 3.5.1 and can achieve strengths that allow for future property redevelopment or excavation. Mixes 1 and 2 were selected for final testing because these mixes achieved the design goals and had fewer material components (i.e., do not include bentonite) than Mixes 8 and 9, making Mixes 1 and 2 the more economic and implementable mixes. Final mix design testing including ANSI/ANS 16.1 leach testing, slake, freeze/thaw and wet/dry durability, and volume expansion testing for Mixes 1 and 2 is currently underway. Leach testing analytical parameters, intervals, and design goals are provided in Table 3. Results of final testing will be included in the Final ISS Treatability Study Report.

Laboratory testing results and reports from Phase I and Phase II testing are provided in Appendix B5.

3.5.4 Basis for ISS Mix Design Selection

The Phase I and II test results of the treatability study have confirmed that ISS can effectively solidify/stabilize MGP residuals. Specifically, results to date demonstrate that solidified MGP-impacted soils can achieve UCS greater than 50 psi and hydraulic conductivity less than 1 x 10^{-6} cm/s. A mix design that is designed to achieve these physical parameters can meet the removal action objectives for MGP-impacted soil and groundwater discussed in Section 3.1.

The mix design for full-scale implementation is anticipated to be either Mix 1 or Mix 2, pending receipt final testing data and comparison to design goals.

As the ISS treatability study progresses, additional data will become available to complete the final design for ISS construction. The final testing parameters include:

- Leach Testing: ANSI/ANS 16.1 leach test data for Mix 1 and Mix 2 (all leach intervals)
- Slake (submergence testing) observations for subsequent leach test
- Wet/Dry Durability testing (complete data set)
- Freeze/Thaw Durability testing (complete data set)
- Volume expansion calculations (Mix 1and Mix 2)

3.5.5 Completion of the ISS Study and Future Submittals

Pursuant to the current ISS treatability study schedule, final data should be available in October/November 2012 to confirm the preliminary basis for ISS design. The full dataset and all testing results will be compiled into a final report that will include the following:

- Description of all sample handling and compositing procedures and methodologies, chemical analyses, and physical analyses used to initially characterize samples
- Description of mix design development and handling procedures (e.g., cure times and methods), selection for testing procedures, and quality assurance/quality control procedures
- Summary tables of all testing data
- Copies of all raw testing data, lab reports, and chain of custody forms
- Conclusions drawn from the study including recommendations for the mix design(s) that economically achieve the study objectives and ISS design goals
- Preliminary recommendations for full scale construction implementation

The Final ISS Treatability Study Report will be submitted to the USEPA as an addendum to this Removal Action Work Plan.

3.5.6 ISS Pilot Scale Evaluation

Within a month prior to full scale ISS implementation, a pilot-scale evaluation will be performed to field verify that the selected ISS mix design(s) will meet the established ISS design goals. A minimum of one pilot test location, each including two ISS columns, will be completed in each of the designated removal action areas. Pilot evaluation quality assurance/quality control samples (QA/QC) will be collected from the columns for testing. A preliminary CQA plan for the pilot scale evaluation is provided in Table 4. The plan will be revised, if necessary, following treatability study test completion and provided in an addendum to this work plan to be submitted in fall 2012. During the pilot test, samples will be collected for hydraulic conductivity and UCS. Upon confirmation that the pilot column samples meet the design performance goals based on the 7-day cure test results for the selected mix design(s), ISS will proceed to full-scale construction. The pilot scale evaluation and UCS and permeability results will be used to refine the field application of the ISS mix design(s) including reagent addition and water-to-reagent ratios for ISS grout application.

4 REMOVAL ACTION IMPLEMENTATION

4.1 Preliminary Activities

4.1.1 Site Security and Controls

The Site is secured with an existing chain link fence that surrounds Parcels 1, 2, and 4. NSG currently maintains gated and secured entrances to the Site at 849 Pershing Road, Waukegan, Illinois and an additional gate is located on Dahringer Road. The gates will serve as the access and exit points during the removal action. Each gate will be locked when no workers are present. A visual barrier may be added to the existing fence and gates surrounding the Site.

All visitors will be required to sign a visitor's log when entering and exiting the Site. Access to removal action areas will be limited to authorized personnel approved by IBS and will be required to participate in a site-specific health and safety briefing by the site supervisor or health and safety officer prior to entry.

4.1.2 Surveying

At a minimum, the following items will be surveyed at the Site:

- Stake out of the proposed removal action areas
- ISS column locations and top and bottom elevations
- Lateral extents of shallow soil excavations
- Locations and elevation of former MGP pipes and/or foundations left in-place at the removal extents, if applicable
- Location and elevation of ISS swell material
- Final lateral and vertical surface contours of areas disturbed during construction
- Final site improvements and surface elevations
- Property boundaries
- Current and remaining wetlands (if applicable)
- Existing and new utilities

4.2 Site Preparation

Site preparation will include protection, removal, or relocation of utilities if needed, installation of erosion controls, clearing and grubbing of vegetation, abandonment of monitoring wells located in removal action areas, construction of a temporary on-site truck access road, and establishment of truck routes. Trees that do not interfere with removal actions will be protected from construction activities to the extent practical. Concrete barricades or steel traffic bearing plates will be placed around or on monitoring wells that will remain. Site preparation plans are shown on Figure 8.

4.2.1 Protection of Utilities and Construction Utilities

As discussed in Section 2.3.1, no active underground utilities have been identified that will interfere with proposed removal action areas. Overhead utilities exist along the EJ&E Railroad east of the Site and in Parcels 4 and 2. Overhead utilities that exist in Parcel 2 may require coordination with the utility provider to support, relocate, or remove the utility prior to or during removal action activities. This utility crosses the planned removal action area on Parcel 2.

If utility modifications are necessary, IBS will coordinate with the utility provider. Additionally, coordination with utility providers will occur to facilitate installation of utility services as necessary for construction operations. Construction operations will require, at a minimum, electrical and/or communication services for office trailers, air monitoring equipment, and the ISS batch plant. In addition, the contractor's site superintendent will be specifically tasked with ensuring all utility conflicts are cleared as construction progress.

4.2.2 Runoff and Erosion Control

Runoff and erosion control measures will be implemented in accordance with Title 35 IAC Subtitle C, Chapter I and City of Waukegan requirements. Prior to beginning site work, the following minimum erosion control activities will be performed:

- A tracking pad of open graded stone will be placed at truck entrances/exits to minimize off-site tracking of material from truck tires.
- Silt fence will be placed around removal action areas or around the site perimeter, as appropriate.
- Material management and decontamination areas will be bermed on all sides to prevent sediment run-off.

- Filter fabric will be placed above existing storm sewer catch basins, if any exist near the Site, to prevent sediment from entering state waterways.
- Street sweeping will be used, as necessary, to promptly remove potentially tracked materials on public right-of-ways.
- If necessary, additional measures will be taken to prevent run-on of surface water, particularly to prevent surface water contact with the removal action areas.

Installation methods and maintenance procedures for silt fence and inlet protection will follow best management practices. Trucks, grading equipment, and other construction vehicles will use constructed tracking pads to minimize tracking of soil off site. Erosion control measures will be maintained throughout construction activities until permanent erosion control measures are in place.

The contractor will be responsible for implementing an adequate erosion control plan and complying with all applicable requirements including conducting site inspections. At a minimum, inspections will satisfy the following requirements:

- Document the conditions and/or repair of silt fences and/or catch basin filter fabric
- Document sediment accumulation amounts adjacent to fences and/or on catch basin filter fabric
- Evaluate eroded or potentially unstable soils

Inspections will be made weekly and within 24-hours after rainfall events of 0.5 inches or greater, or as directed by the oversight engineer. Maintenance activities may include removal of sediment from fences and/or catch basin filter fabric, and repair as needed. Weekly inspection logs will be maintained at the Site.

This erosion control plan will be further documented within the Storm Water Pollution Prevention Plan (SWPPP) to be prepared in accordance with the requirements of the National Pollution Discharge Elimination System (NPDES) General Permit for construction activities.

4.2.3 Clearing and Grubbing

Clearing and grubbing will be performed following placement of temporary erosion control measures and will include the removal of trees, shrubs, stumps, and roots from within the removal action and operational areas. Roots and root balls removed during clearing and grubbing will be transported off site for disposal. Trees and shrubs removed during clearing and grubbing may be chipped and stockpiled on site for potential use during construction, if required. Alternately, trees and shrubs will be transported off site for disposal.

4.2.4 Route of Ingress and Egress for Construction

Construction ingress and egress points will be through the existing gates on Pershing and Dahringer Roads as shown on Figure 8.

A temporary truck access road will be constructed that may consist of placement of an 8-oz non-woven geotextile (if needed) and a 6 to 12-inch layer of stone or base course material. To the extent practical, the existing gravel surface near the gate on Dahringer Road will be left in place and reused for construction traffic.

During construction activities, trucks will enter and exit the Site at gated entrances, where appropriate signage will be posted to identify the construction entrance and exit. All trucks will be covered and securely fastened before leaving the Site.

4.2.5 Monitoring Well Abandonment

Existing monitoring wells within proposed removal action areas will be abandoned prior to construction. The following wells shown on Figure 2 are targeted for abandonment:

- MW3D and MW3S on Parcel 1
- MW4D and MW4S on Parcel 2
- MW5D and MW5S on Parcel 2
- MW9D and MW9S on Parcel 2
- Barr-MW-1 and Barr-MW-2 on Parcel 1

The following wells are near proposed excavation areas and may require abandonment if removal action limits are expanded laterally:

- MW6D and MW6S on Parcel 1
- MW8D and MW8S on Parcel 1
- MW11D and MW11S on Parcel 1

Monitoring wells will be abandoned in accordance with the *Multi-Site Field Sampling Plan Revision 4*, dated September 8, 2008, and in accordance with Title 77: Public Health; Chapter I: Department of Public Health Subchapter r: Water and Sewage Part 920 Illinois Water Well Construction Code; Section 920.120 Abandoned Wells.

4.3 Fugitive Emission Control

Site activities could generate fugitive emissions including vapor, dust, odor, and noise. A standard level of care will be taken to minimize fugitive emissions. Fugitive emission control measures may include the use of sheet plastic and/or water or foam-based vapor suppression agents. Sheet plastic may be used to provide a physical barrier to fugitive vapor and dust emissions specifically on inactive stockpiles or open excavations. Soil wetting using potable water with or without additives may be sufficient to control fugitive dust emissions from stockpiles, excavated areas, and access roads. A vapor suppression agent (e.g. Rusmar™ Foam or similar) will be applied to open excavations, completed ISS areas, and stockpiles of MGP impacted materials when necessary to mitigate odors. Fugitive emission controls will be applied in accordance with the fugitive emissions management plan.

4.4 Removal Action Operations

Removal action operations will consist of the following elements:

- Pre-excavation and Excavation
- Management and Disposal of Excavated Materials
- In situ Solidification/Stabilization
- On-site Materials Management
- Excavation Dewatering
- Equipment Decontamination

4.4.1 Pre-Excavation and Excavation

Pre-excavation and excavation within the removal action areas will be conducted to remove and demolish subsurface structures/foundations and debris, to excavate shallow soil for construction of an ISS work platform, and to accommodate ISS swell generated from ISS treatment. Pre-excavation and excavation activities will be performed in each removal action area prior to ISS construction.

Oversized debris and materials excavated, removed, and generated during demolition of subsurface MGP structures will be managed within removal action areas or material management areas and taken off site for landfill disposal in conjunction with disposal of excavated shallow soils.

Three main tasks during this phase of the removal action include shallow soil excavation, pre-excavation, and construction of ISS platform.

4.4.1.1 Shallow Soil Excavation

Shallow unsaturated (top 4 feet) soils will be removed within delineated removal action areas shown on Figure 6. Shallow excavation will stop at the groundwater table if shallower than 4 feet. An exception will be made in areas where subsurface MGP structures and foundations require demolition and removal. In these cases, soil excavation and structure removal will extend as deep as necessary to remove the debris. Excavated soils will either be used to fill voids following structure and debris removal within removal action areas and managed with ISS or will be transported off site for landfill disposal. As presented in Section 3.4, approximately 47,310 cubic yards of soil and debris are proposed for excavation and disposal.

During shallow soil excavation, soils will be inspected for MGP residuals and additional MGP related structures/foundations at the delineated limits. If MGP residuals or subsurface structures are present beyond the proposed removal action area, the shallow excavation may be expanded to remove remaining MGP-related materials.

The excavation process will occur in a staged progression to minimize the duration of open excavations and allow for adequate access to removal action areas for completing ISS construction. Soil excavation will be performed with conventional hydraulic excavators. To the extent practical, excavators will load soil directly from the excavation into conventional quad-axle or semi dump trucks for transport and landfill disposal. Temporary stockpiling of these soils is discouraged but may be necessary. Phasing and work sequencing will be further developed during the final design phase.

4.4.1.2 Pre-Excavation for ISS

Pre-excavation will be conducted within removal action areas to depths greater than required for shallow soil removal to verify removal of all subsurface structures, obstructions, and oversized debris. All subsurface structures and obstructions are expected to be removed within the removal action areas. Additionally, subsurface structures that extend beyond the removal action limits may be removed depending on contractor and equipment capabilities and structural considerations for surrounding roads and infrastructure, if applicable.

If encountered, remnant MGP piping will be investigated for MGP residuals. If MGP residuals are present in the piping, they will be removed to the extent practicable and treated or disposed following characterization. At the removal action limit, pipes will be abandoned in place and capped.

Following debris removal, excavations may be backfilled with the excavated MGP impacted soils within the removal action areas in preparation for ISS construction.

4.4.1.3 ISS Platform Construction

Following shallow soil excavation and pre-excavation, an ISS working platform will be constructed to an elevation approximately 4 feet bgs. The constructed elevation may vary to maintain a stable working platform above the groundwater table. The purpose of the ISS construction platform is to:

- Provide a level working platform for the ISS equipment
- Provide area to manage ISS swell material
- Provide surface water run-off control from the removal action areas

4.4.2 Management and Disposal of Excavated Materials

During the pre-excavation and excavation activities, materials will be visually inspected for MGP residuals and segregated into the following categories:

- Non-MGP impacted construction debris
- MGP impacted construction debris
- MGP impacted soil/source material
- MGP impacted soil/source material at or above Subtitle D landfill permit levels

Segregation and management of excavated materials will include the following activities:

- Non-impacted construction debris will be temporarily stockpiled on site in a designated clean stockpile area prior to loading and transport to a recycling facility or disposal facility as construction debris.
- MGP impacted construction debris will be loaded and transported in covered trucks to the landfill for disposal. MGP impacted construction debris that is not directly loaded for immediate disposal will be temporarily stockpiled within the removal action area limits or within the appropriate material management area. MGP impacted construction debris that is too large for transport will be mechanically demolished prior to transport. Fugitive emission controls will be employed for stockpiles that remain after work hours.
- Remnant MGP piping will be cut or broken into manageable sections for loading and transport in covered trucks to the landfill for disposal. MGP residuals will be removed from the piping to the extent practicable and characterized prior to treatment or disposal. The piping may be temporarily stored either within the removal action area or in the appropriate material management area.

- MGP impacted soil/source material may be placed within the removal action areas for ISS treatment or transported in covered trucks for landfill disposal. Soil that is not directly loaded for immediate disposal or placed for ISS treatment will be temporarily stockpiled within the removal action area limits. Fugitive emission controls will be employed to stockpiles as necessary.
- MGP impacted soil/source material that exceeds Subtitle D landfill permit limits will remain on site and managed with ISS. Based on existing analytical data, potential MGP source material above the Subtitle D landfill acceptance criteria could be encountered in isolated sections of the removal areas. These locations will be identified based on existing analytical data and materials within these areas will remain on site for management with ISS.

4.4.3 On-site Materials Management

To facilitate proper on-site segregation and staging of materials during the removal action, the following staging areas will be set up as illustrated on Figure 8:

- Material Management Area: MGP source material and MGP impacted debris that requires stockpiling prior to transport for disposal may be stockpiled within this area. The area will be constructed with a low permeability working surface (e.g., asphalt pavement or polyethylene lined pad), a sump, and berms.
- Decontamination Area: This area will be used to decontaminate construction equipment. The area will be constructed with a low permeability working surface, a sump, and berms. Liquids generated during decontamination activities will be managed similarly to the excavation dewatering treatment discussed in Section 4.4.4.
- Clean Staging Area: Clean, imported fill materials will be stockpiled in this area. The Clean Stockpile Area will consist of silt fence or berms around the perimeter to minimize potential storm water run-off.
- Water Treatment Pad: If required, a mobile pre-treatment system will be staged here. Water collected from excavation dewatering will be treated prior to discharge to the sanitary sewer system, as described in Section 4.4.4.

4.4.4 Excavation Dewatering

If required, excavations and removal action areas will be dewatered to facilitate removal activities. Dewatering will be performed via a trench along the bottom of the excavation or via down-hole sumps equipped with pumps of adequate capacity. Water will be pumped to frac tanks for solids settling. The water may either be directly discharged to an NSSD sewer on site, pumped through a mobile pre-treatment system and then discharged to the sewer (as approved by NSSD), or reused in the production of ISS grout at the batch plant. If a pre-treatment system is required, it will likely consist of bag filters and granular activated carbon units.

Residuals resulting from the groundwater pretreatment system may include:

- Granular Activated Carbon
- Bag or cartridge filters
- Solids from frac tanks

Bag or cartridge filters and solids will be transported for landfill disposal. Granular activated carbon may either be regenerated at a dedicated facility or transported for landfill disposal.

4.4.5 *In Situ* Solidification/Stabilization Construction

Following completion of shallow excavation and pre-excavation, ISS will be performed to solidify/stabilize MGP source material within the removal action areas to the depths indicated on Figure 7. ISS construction will be completed as described below.

4.4.5.1 ISS Layout and Design

The layout of the ISS construction activities including the designed limits, depths, and alignment of the ISS treatment is provided on Figure 7.

A layout of the ISS column locations will be provided by the ISS contractor prior to construction for review and approval. Typical ISS column diameters range from 8 to 12 feet. Various diameter columns may be used depending on the subsurface soil conditions, site constraints or layout, or project schedule. Columns will be spaced based on a "neat line" overlap shown on Figure 7 (i.e., 0 feet of overlap where three columns intersect). This pattern of overlap represents the industry standard design of ISS remediation projects.

Each ISS column will include continuous application from the ISS platform surface to the depths designated on Figure 7. Each ISS column will have a unique lateral location (northing, easting) and top and bottom treatment elevations. Each column is survey located prior to construction.

ISS columns completed in removal action Area A will be constructed to a depth of at least 6 inches below the top elevation of the confining clay layer. Top of clay elevation contours will be provided to the selected remediation contractor for precise design of each ISS column. The final bottom ISS column elevation may be adjusted in the field based on the actual depth to the clay surface if determined different based on field conditions. ISS columns completed in removal action Areas B and C will be constructed to a depth that extends approximately 2 feet below the identified MGP source material, or at least 6 inches below the top elevation of the confining clay layer as shown on Figure 7. Additionally, the perimeter of Areas B and C will be extended to the clay surface to prevent potential migration of any residual impacts beneath the completed ISS in these areas.

Based on the removal action areas and depths the planned ISS construction, the quantity of MGP impacted soil/source material that will be stabilized/solidified is approximately 212,790 cubic yards, as indicated in Section 3.4 and shown on Figure 7.

4.4.5.2 ISS Operations

Final ISS equipment requirements will be evaluated and confirmed following selection of the ISS contractor. Typically, the following equipment will be required to complete ISS construction:

- Earth Moving Equipment: Conventional earth moving equipment including bulldozers and hydraulic excavators will be used during ISS construction to manage materials including soil and ISS swell. Ancillary equipment needed for daily operations and construction will include front-end loaders, fork lifts, man lifts, vibratory compaction equipment, and quad-axle or semi dump trucks.
- ISS Batch Plant: ISS grout will be prepared using an on-site batch plant. Grout plants operate by mixing known quantities of reagents and water to form an ISS grout of predetermined proportions in accordance with the mix designs specified from the ISS treatability study. Grout is then pumped from the mixing plant to the point of use. Typically, the grout plant will consist of, at a minimum: a storage silo, mixing tank, storage tank, and grout pump (e.g., moyno pump, a type of progressive cavity pump). A secondary bulk dry reagent storage vessel, sometimes called a "pig" is typically added to the system as additional on-site storage for reagent, which prevents delivery trucks from having to supply reagents directly to the overhead silo. The storage vessel can hold approximately six truckloads of reagents as opposed to the storage silo that can hold approximately one truckload. This setup will aid in scheduling reagent deliveries and minimize operational downtime.
- Vertical Rotary Mixing System (ISS rig): Vertical rotary mixing systems utilize a Kelly-bar drive system either attached to a track-type crawler crane or a hydraulic type unit (e.g., Delmag) that includes the following key components:
  - Power Unit: Supplies power that turns the Kelly bar. Systems can be diesel, electric, hydraulic, or a combination of these. The power unit can be a drill table attached to a crawler type crane or a hydraulic unit (e.g., Delmag).
  - Kelly: The rod that mixing tools are attached to and grout is conveyed through to the mixing tool. The Kelly can be modified depending on the required treatment depth.
  - Tool: Augers that are advanced through the subsurface while mixing the soil and grout. Tools sizes can be modified depending on required mixing area. For this project, mixing tools are anticipated to be 8 to 10 feet in diameter.

Typical ISS construction uses vertical rotary mixing systems to stabilize soil in place by mixing a cementitious grout and impacted soil. Grout is pumped to the top of the hollow Kelly. Grout flows through a secondary pipe inside the Kelly and exits through ports on a multi-blade mixing tool attached to the bottom end. The tool loosens the soil while a grout is pumped into the loosened soil as the tool advances from the ground surface to a target depth. Since a mixing tool loosens but does not remove soil, a drilling fluid is needed to lubricate the tool as it turns and advances through the subsurface. For this application the lubricant is typically the ISS grout itself.

Once the appropriate ISS mix design is prepared at the ISS batch plant, the ISS rig is lined up over an ISS column location and ISS treatment of the targeted soils can commence. A typical sequence of activities for installation of each ISS column is as follows:

1. The ISS rig positions the auger over the column and the location is confirmed via total station survey. This ensures each ISS column is placed in the correct location and ensures the integrity of the column overlap with adjacent columns.
2. The appropriate mix design is prepared in the batch plant and the ISS grout is transferred to the ISS rig.
3. The ISS rig begins advancing the auger into the targeted soils. As the auger is advanced, the flow of the mix design slurry is started and is injected into the soils through orifices in the mixing paddles on the auger. The mixing paddles blend the mix design slurry with the soil as the auger continues to advance until the target depth is reached. In general, the majority of the mix design slurry is mixed with the soils as the auger penetrates downward.
4. Once the auger reaches the column target depth, the remainder of the mix design slurry is injected as the auger is withdrawn from the ISS column so that the blending process is repeated.
5. The auger may make repeated up and down passes as necessary to adequately blend each ISS column. Often, a minimum of three passes are performed at each column location.
6. Upon completion of the ISS column, the ISS rig is moved to the next column location.

ISS performance will be monitored with an ISS CQA Plan as described in Section 6.5 and will be primarily based on the established design goals for UCS and hydraulic conductivity as presented in Section 3.5.1.

4.4.5.3 ISS Swell Management

Full-scale ISS construction will result in expansion of the treated soil. The expansion, often referred to as "swell," is a result of blending reagent mixtures with the soil. Depending on the soil type, the swell can range from 10% (sandy materials) to 40% (clayey materials) of the original treatment volume. Final testing during the ISS treatability study and the ISS pilot test will provide an estimate of ISS swell expected for this application. An ISS swell management plan will be developed during final design and is anticipated to be based on the following parameters:

- To minimize off-site disposal of contaminated materials, ISS swell material will be managed on site and within the removal action area limits to the extent practical.
- ISS swell will be managed in place following ISS column completion when appropriate. If necessary ISS swell could be transported for management in other removal action areas and graded to the elevation contours developed during final design.
- Elevation contours developed during final design will promote positive drainage of surface water and infiltration of surface water at the edges of removal action areas.

4.4.6 Equipment Decontamination

Decontamination of equipment and management of generated decontamination wastes will be performed in accordance with the site-specific Health & Safety Plan. All equipment will be decontaminated within the designated decontamination area. Final equipment decontamination, prior to demobilization, will consist of dry mechanical removal (i.e., scraping or brushing) of any loose material followed by pressure washing.

Road trucks will not be allowed within the removal action limits to prevent off-site tracking of excavated materials. A tracking pad will be located at the truck entrances and exits as an additional measure to prevent off-site tracking of excavated materials.

Excavation and ISS equipment visibly containing MGP-impacted materials will be decontaminated prior to being moved from one location to another, as necessary to control cross-contamination between removal areas and areas not being removed.

Additional equipment decontamination procedures are described in the *Multi-Site Health and Safety Plan* (NRT 2007).

4.5 Site Restoration

Imported clean fill will be used as backfill. Backfill material will be imported from a clean borrow source and may include stone, coarse aggregate, or fine-grained material depending on local availability and future site use.

A clean soil cover will be constructed over the removal action areas following ISS construction and ISS swell management. The soil cover will consist of clean imported fill and topsoil and will be constructed with the intent to meet the requirements of Illinois TACO: 35 IAC 742, Section 742.1105 for engineered barrier construction.

To the extent practical, the final ground surface will be restored to match preconstruction conditions. Final ground surface in select areas will either be vegetated or consist of coarse aggregate. For vegetated areas, topsoil, with appropriate seeding and mulch, will be placed on top of the clean backfill. For gravel areas, such as access roads, a layer of gravel will be placed on top of the clean backfill.

All erosion controls used during construction activities will be removed at the completion of the removal action. Post-construction erosion controls will be installed along the downgradient edge of the disturbed areas and as needed until vegetation is established.

5 STATE AND LOCAL REQUIREMENTS

5.1 Storm Water Discharge

The proposed removal action is expected to disturb an area exceeding one acre; therefore, the proposed construction activity is subject to NPDES requirements under the jurisdiction of the Illinois IEPA, Division of Water Pollution Control. The following storm water related permitting will be completed to ensure compliance with the IEPA's construction site storm water program:

- A Notice of Intent for General Permit to discharge storm water associated with construction site activities (IEPA Form IL 532 2104) will be prepared and submitted to IEPA. The notice will include the following elements: identify NSG as the site owner, provide contact information for the Contractor, provide construction site information and description of the proposed work, and identify the receiving water body for storm water run-off.
- A SWPPP will be developed and submitted to IEPA. The SWPPP will include the following elements: provide a detailed site description, outline planned erosion and sediment controls, and planned storm water management controls. The SWPPP will be in place prior to the start of construction activity and will be maintained on site throughout the removal action.
- A Notice of Termination will be prepared and submitted to IEPA once site conditions are fully stabilized following the completion of construction activities.

5.2 Wetlands

As described in Section 2.1.1, previous wetland delineation and associated permitting and approvals were no longer valid for the Site. Consequently, Site wetlands were re-delineated in May 2012 by Hey and Associates, Inc. (HEY) in accordance with the Lake County Watershed Development Ordinance (WDO). Following delineation, HEY and NRT prepared and submitted a *Request for Preliminary Wetland Jurisdictional Determination and Isolated Wetland Boundary Verification* on May 23, 2012 including the following:

- Request for Preliminary Wetland Jurisdictional Determination and/or Isolated Wetland Boundary Verification Form
- Wetland Determination Data Forms
- Aerial Exhibit depicting the surveyed wetland boundaries for 3 wetlands and data point locations

LCSMC provided jurisdictional determination and boundary verification concurrence in correspondence dated June 11, 2012. LCSMC found that delineated wetlands 1, 2, and 3 were "Isolated Waters of Lake County" as defined in the Lake County WDO and concurred with the wetland boundaries as flagged in the field. Jurisdictional determination and boundary verification correspondence are provided in Appendix C.

Following jurisdictional determination and boundary verification, review of historical site data by HEY and NRT suggested that the site wetlands were delineated in areas where historic site grading and filling had taken place, and available maps and aerial photographs suggested that wetlands did not exist historically on the property prior to the filling activities. To present these findings to LCSMC, HEY and NRT compiled maps, aerial photographs, boring logs, and other supporting documentation and submitted the data to LCSMC on July 12, 2012. On July 16, 2012, LCSMC, NRT, HEY, and IBS met to review the compiled data and discuss the site wetlands. In email correspondence on July 17, 2012, LCSMC confirmed that wetlands 1 and 2 met the exclusion criterion a.(2) under the definition of Isolated Waters of Lake County in WDO Appendix A, thereby excluding them from regulatory status under the WDO. LCSMC issued a formal letter excluding wetlands 1 and 2 on August 6, 2012. Correspondence regarding exclusion of wetlands 1 and 2 is provided in Appendix C.

Wetland 3 in the southwest area of the site, as shown on Figure 2, does not meet any of the exclusion criteria. This small wetland appears to be a remnant wetland on the Site based on the information reviewed. Therefore, this small wetland remains regulated under LCSMC's jurisdiction. If the wetland is or were to be impacted, written authorization from LCSMC would be required. Because of the wetlands size, less than 0.1 acres, impacts to this non-high quality wetland would qualify for LCSMC's General Permit #2, and no subsequent mitigation would be required. At this time, the proposed removal action will not impact this wetland as shown on Figures 6 and 7.

5.3 Additional Coordination and Permitting

Coordination with governmental agencies and utility providers will be required for the following project elements:

List of Coordination Points

Item	Governmental Agency/Utility
Applicable construction related permitting may include a Watershed Development Permit (WDP), erosion control, building, and demolition.	City of Waukegan
Overhead electric line relocate, removal, or rerouting.	ComED

Item	Governmental Agency/Utility
Authorization to discharge possible MGP impacted groundwater or surface water as part of the removal activities to the local sewer system.	North Shore Sanitary Sewer District
Storm Water Discharge Authorization.	Illinois Environmental Protection Agency, Division of Water Pollution Control

Additional approvals will be secured by the affected contractors, as needed during construction.

5.4 Off-Site Disposal

Excavated MGP-impacted debris and soil will be disposed at Countryside Landfill, located in Grayslake, IL, a Subtitle D landfill. Countryside is approved by the USEPA with respect to the Off-Site Rule as set forth in the National Contingency Plan in 40 CFR 300.440. Soil and debris disposal will be in accordance with the existing Waste Management Profile Number EF 1496. Waste profile documentation is provided in Appendix E.

5.5 Beneficial Use of Ground Granulated Blast Furnace Slag

Use GGBFS as one of the reagents used in an ISS mix will be in accordance with Illinois regulations (Title 35, Subtitle G: Waste Disposal, Chapter I: Pollution Control Board, Subchapter i: Solid Waste and Special Waste Hauling, Part 817, Subparts A and B). Specifically, beneficial use of GGBFS will be in accordance with Part 817, Subpart B, Sections 817.201 through 817.204; the generator of the GGBFS will certify that the waste sent to an offsite beneficial use meets the Subpart A requirements for beneficial waste prior to use.

5.6 Class V Injection Well Inventory

If required by IEPA Bureau of Land and as applicable, a Class V Injection Well Inventory will be completed prior to beginning ISS construction. The owner of a Class V well is not required to obtain a permit prior to beginning injection; the Inventory is completed to identify the type of Class V well and the nature of the injection activity.

6 CONSTRUCTION QUALITY ASSURANCE MEASURES

This section describes the following construction quality assurance measures that will be employed during the removal action.

- Air Monitoring
- Fugitive Emissions Management
- Health and safety
- Sampling and analysis

6.1 Air Monitoring Plan

Removal action activities have the potential to generate emissions, including odor, fugitive respirable particulate matter less than 10 µm in diameter (PM_{10}), and vapor phase COCs. Potential emission sources include the following:

- Soil Excavation: Potential emissions consist of VOC vapors and fugitive dust during soil excavation and loading into trucks.
- In Situ Solidification/Stabilization: Potential emissions consist of non-MGP related fugitive dust (i.e., dry reagent) and MGP-related vapor/odor emissions as the soil is disturbed by mixing.
- Excavated Material Management: Potential emissions consist of fugitive dust and/or vapor/odor emissions from stockpiles and during material handling.

Pre-construction air monitoring will be performed to document background levels of particulates and vapor phase COCs at the Site. Air monitoring will be conducted at the Site perimeter during removal action activities to ensure engineering measures are being protective of public health and the environment and to determine when response actions are warranted. Specific air monitoring elements are likely to include the following:

- Establishing a dedicated continuously operated weather station at the Site to monitor meteorological conditions.
- Collecting pre-construction background air samples to establish baseline ambient air concentrations.

- Continuously monitoring TVOCs and PM_{10} with fixed air monitoring (FAM) stations at the Site perimeter.
- Supplemental periodic handheld operational air monitoring for TVOCs, benzene, and PM_{10} during active work periods using portable and handheld equipment for comparison with established Action Levels.
- Collecting 24-hour time-weighted SUMMA canister samples along the Site perimeter during active construction. SUMMA canisters will be used to collect 24-hour time-weighted average samples for VOC analysis. Results will be compared to the site-specific risk-based acceptable air concentrations (AAC) presented in Appendix D.
- Collecting 24-hour time-weighted polyurethane foam (PUF) samples along the Site perimeter during active construction. PUF samples will be used to collect 24-hour time-weighted average samples for PAH analysis. Results will be compared to the site-specific risk-based AACs presented in Appendix D.

Air monitoring activities will be conducted by a qualified air monitoring contractor. The air monitoring contractor will support planning, implementation, and documentation of a comprehensive perimeter air monitoring program during removal action activities. The air monitoring contractor will work with the removal action contractor and the engineer through all phases of the removal action to ensure appropriate control and mitigation of vapor phase, fugitive dust, and odor emissions.

6.1.1 Real-Time Perimeter Air Monitoring

Real-time air monitoring for TVOCs and PM_{10} will be conducted along the Site perimeter continuously at FAM stations. The intent of the real-time monitoring program is to provide an early detection of short-term emissions and potential off-site migration of removal action related TVOCs and PM_{10}. Real-time FAM stations will operate 24-hours per day, 7-days per week, during periods of removal action activity. The real-time perimeter air monitoring system consists of FAM stations that are supported by a central computer and an alarm notification system.

The FAM stations are typically programmed to measure 15-minute average TVOC and PM_{10} concentrations. Each station will include a gas chromatograph programed to differentiate individual BTEX compounds if the 15-minute TVOC average exceeds the Action Levels described in Section 6.1.5. The FAM stations will transmit data in real-time to a central computer via wireless radio telemetry. The central computer will be programed to compare the TVOC and PM_{10} 15-minute averages to the Action Level. If an Action Level is exceeded, an alarm will display on the central computer and predetermined individual(s) will be notified.

6.1.2 Time Weighted Average (24-Hour) Perimeter Air Monitoring

The proposed air sampling strategy is divided into three categories: background monitoring, full-scale startup, and full-scale operations. Each category has distinct sampling frequencies and quantity requirements. Frequencies and quantities may be revised during construction. Sampling requirements include the following:

- Background: Prior to startup of full-scale operations, background air sampling and monitoring will be conducted to establish baseline concentrations for comparison with AACs. In addition to continuous real-time monitoring with the FAMs, 24-hour SUMMA and PUF sampling will be performed at upwind and downwind locations along Site perimeter. The SUMMA samples will be analyzed for VOCs including naphthalene (USEPA Method TO-15). The PUF samples will be analyzed for PAHs (USEPA Method TO-13A).
- Full Scale Startup: During approximately the first two months of full-scale operation, 24-hour SUMMA samples will be collected at upwind and downwind locations along the Site perimeter three times per week. 24-hour PUF samples will be collected at upwind and downwind locations along the Site perimeter a minimum of once per week. Priority (3-day) laboratory turnaround will be requested for rapid assessment of the analytical results. The duration of the Full Scale Startup period may be extended based on site-specific conditions that could include weather and work activities.
- Full Scale: During the remaining duration of full-scale operations, 24-hour SUMMA samples will be collected twice per week at upwind and downwind locations along the Site perimeter. PAH data will be collected with 24-hour PUF samples at upwind and downwind locations along the Site perimeter once per week or may be monitored indirectly by measuring the PM10 concentration (i.e., using real-time monitor), rather than using PUF samplers as described in Appendix D.
- With the exception of full scale startup, samples will be analyzed within the 14-day holding time unless real-time monitoring results indicate that the sample analysis should be expedited to evaluate potential on-site exceedances of AACs.
- Upwind and downwind samples will be located along the Site perimeter based on removal action activities, accessibility, receptors, and weather conditions.
- Field duplicates for the SUMMA canisters and PUF samples will be collected at a frequency of one per 20 samples. Duplicates will be obtained by collecting two concurrent samples from a single location and having both analyzed by the laboratory.

6.1.3 Real-Time Handheld and Observational Monitoring

Periodic real-time air monitoring using portable and handheld devices will be conducted along the Site perimeter prior to and during the removal action operations. The frequency and locations for monitoring will be based on site-specific conditions encountered during the removal operations and potential sensitivity of off-site receptors. Key requirements include of the following:

- TVOCs will be monitored at least once daily along the Site perimeter during active work periods using a handheld photoionization detector (PID) at upwind and downwind locations.
- Benzene will be monitored at upwind and downwind locations using a handheld PID with a vapor-specific separation tube that analyzes specifically for benzene only when sustained concentrations of TVOCs are observed at or above the Action Level.
- PM_{10} will be monitored at least once daily during active work periods using portable DustTrak™ aerosol monitoring equipment, or similar.
- Odor will be periodically assessed along the Site perimeter during active work periods.
- Fugitive dust will be continuously monitored by visual assessment during construction operations.

6.1.4 Assessment of Meteorological Conditions

An on-site meteorological station will be used to measure wind speed, wind direction, relative humidity, ambient air temperature, and barometric pressure. Data will be relayed to a dedicated computer that will receive continuous meteorological data and compute a 5-minute running average of the wind speed and direction. The 5-minute running average wind direction will be used to identify upwind and downwind sample locations and to monitor off-site receptors. The information will be stored electronically and included in daily reports. Average daily temperatures and barometric pressures will be used to calculate 24-hour time-weighted average air sample volumes for the SUMMA canisters and PUF samples. Meteorological data may also be obtained from the National Data Buoy Center (Waukegan Station WHR12) in the event of a malfunction of the on-site station.

6.1.5 Action Levels

Action Levels will be used as a screening tool to manage construction activities to minimize the potential for off-site emissions. Action levels are selected at appropriate levels to avoid exceeding an action level from ambient air concentrations (e.g., exhaust from nearby parked cars) versus concerns that could be resulting from removal action operations. Exceedance of an Action Level at the Site perimeter will require a response action for vapor phase, particulate, and/or odor mitigation based on the conditions presented in Section 6.2.1. The effectiveness of the Action Levels to maintain off-site vapor phase emissions below the AACs will be assessed during the full-scale startup and may be adjusted, as appropriate. Proposed Action Levels for periodic real-time perimeter monitoring are summarized in the table below:

Action Levels

Parameter	Action Level
TVOCs	0.5 ppm greater than background (15-minute average concentration)
Benzene	0.5 ppm
Toluene	30 ppm
Ethylbenzene	12 ppm
Xylenes	15 ppm
PM_{10}	0.15 mg/m^3 greater than background (15-minute average concentration)

These action levels are based on the following:

- The proposed action levels for TVOCs and BTEX have been used at other MGP sites to effectively predict compliance with AACs and what can be reliably measured the proposed equipment.
- The proposed action level for benzene is based on the on the California EPA Reference Exposure Level for acute 6-hour exposure of 0.4 ppm.
- The proposed action level for PM_{10} is based on previously demonstrated performance at other MGP sites.

6.2 Fugitive Emissions Management Plan

Action Levels for fugitive air emissions will be used in a tiered approach to determine necessary response actions to different exposure conditions. In addition to the Action Levels provided in Section 6.1.5, a qualitative assessment will be performed for odor at the Site perimeter. An odor Action Level will be defined as conditions perceived to present a public nuisance or if a public complaint is received. Dust will also be assessed qualitatively based on observed off-site migration.

6.2.1 Emission Conditions

Three Emission Conditions have been developed based on the type and duration of an Action Level exceendace. The three conditions are depicted on Figure 9 and have the following definitions:

- **Emission Condition 1**: Air conditions for either TVOCs or particulates exceed the Action Level at the Site perimeter. Emission Condition 1 may also be triggered by odor at the Site perimeter that could pose a public nuisance and/or sustained off-site migration of visible dust. This condition initiates a yellow flag.

- **Emission Condition 2:** BTEX concentrations exceed the Action Level or particulates continue to exceed the Action Level longer than 15 minutes. Emission Condition 2 will also be triggered if mitigation measures for an Emission Condition 1 are ineffective in reducing odors or visible off-site dust migration. This condition initiates a red flag.
- **Emission Condition 3:** Concentrations of BTEX or particulates continue to exceed an Action Level for an additional 15 minutes after Emission Condition 2 is initiated. Emission Condition 3 will also be triggered if mitigation measures for an Emission Condition 2 are ineffective in reducing odors or visible off-site dust migration or if a public complaint is received. This condition continues the red flag.

Site Condition information will be conveyed to the air monitoring contractor via visual confirmation on the base computer monitor paired with an automated cell phone notification to the air monitoring contractor's field technician. Following the receipt of the information, verbal notification will be made directly to the engineer by the air monitoring contractor's field technician.

In addition to monitoring Action Levels, monitoring of AACs at the perimeter will be conducted using 24-hour time-weighted sampling methods for target compounds. The objective for monitoring AACs is to confirm that any off-site fugitive emissions are below levels that would pose an exposure concern. If exceedances of the AACs are identified, modifications to the fugitive emissions response strategy may be required that could include more aggressive application of fugitive emission controls/measures and/or reducing Action Level concentrations for Site Condition response.

6.2.2 Notification, Communication and Response Procedures

Clear lines of communication and understanding of roles and responsibilities is critical to effectively responding to and implementing appropriate mitigation measures. Notification, communication, and response procedures will be in accordance with the following general procedure:

- **Identification and Verification of an Emission Condition Alarm:** The air monitoring contractor identifies and verifies the condition from an on-site activity.
- **Notification and Communication:** The air monitoring contractor notifies the engineer and contractor for a collaborative determination of the appropriate mitigation measures.
- **Response Implementation:** The contractor implements the mitigation measures.
- **Assessment and Confirmation:** The engineer and air monitoring contractor determine if the mitigation measures implemented were effective in reducing perimeter emissions.

Communication of an Emission Condition Alarm will be initiated by the air monitoring contractor to the engineer who will then coordinate and communicate with the remediation contractor to implement the appropriate mitigation measures. During initial notification to the engineer, the air monitoring contractor will verify that the alarm is not due to off-site emission sources. Following verification, the notification will be confirmed with the engineer and the air monitoring contractor, engineer, and remediation contractor will discuss the Site Condition and appropriate mitigation measures. Following implementation, the engineer will assess the effectiveness of the mitigation measures by communication with the air monitoring contractor who will continue to monitor changes to Action Level parameter concentrations. Changes in concentrations will be reported directly to the engineer by the air monitoring contractor. If mitigation measures are not effective, the engineer, air monitoring contractor, and the remediation contractor will meet to discuss and implement appropriate additional and/or modified mitigation measures.

Following implementation of the appropriate mitigation measures the engineer will assess the effectiveness of the mitigation measures by communicating with the air monitoring contactor and the remediation contractor. Following demonstration that the perimeter concentrations have been effectively reduced below, the engineer will confirm with the remediation contractor a return to an operational condition.

6.2.3 Mitigation Measures

Mitigation measures for fugitive emissions are divided into the following categories:

- Physical Controls: Physical controls are the primary mitigation measures and incorporate a variety of activities (e.g., good housekeeping practices, maintaining exclusion zones, and covering stockpiles). If Emission Condition 2 or 3 mitigation measures are required, modifications to the physical controls may include more aggressive activities such as daily covering of stockpiles or continuous use of water for dust suppression.

- Work Sequencing: Sequencing the work will limit emissions from freshly exposed soil and the amount of material that may require stockpiling pending further management. Other sequencing aspects include planning the operations to avoid double-handling of impacted materials and scheduling loading and off-site hauling to minimize the duration that staged materials will need to be maintained. If Emission Condition 2 or 3 mitigation measures are required, work sequencing may be modified.

- Site Layout: Requirements for site layout include planning by the contractor to locate proposed stockpile and material management areas away from potentially sensitive receptors to the extent practicable. These requirements will also include reassessment of site layout as necessary throughout construction.

- Engineering Controls: Required during Emission Condition 2. Engineering controls will consist primarily of the use of Rusmar™ Long Duration Foam (AC-645) or an equal product approved by the Field Engineer. Application produces thick viscous foam for immediate suppression of fugitive emissions. Foam application is not required under Emission Condition 1 but may be used for control of localized emissions in the removal action areas. The use of Rusmar AC-900 series may only be required under Emission Condition 3. This foam provides an extended duration and higher level of suppression effectiveness than the Rusmar AC-645.

6.3 Health and Safety Plan

IBS, contractors, and NRT personnel will be qualified and knowledgeable with respect to health and safety requirements relating to the removal action. A site-specific Health & Safety Plan has been developed for IBS and oversight personnel working at the Site during all field activities in general accordance with the USEPA-approved *Multi-Site Health and Safety Plan Revision 2* (Prepared for Integrys, 2007). This plan will be a separate document and will be available upon request for review. A copy of the Health & Safety Plan is included in Appendix F. Project team members will read and be familiar with the plan prior to beginning field work.

Contractors retained to conduct the removal action will be required to have a written Health & Safety Plan prior to the start of field activities and will maintain a copy at the Site at all times during work activities. The Contractors' Health & Safety Plan will comply with all applicable OSHA regulations including 29 CFR 1910: Occupational Safety and Health Standards and 29 CFR 1926: Health and Safety Regulations for Construction. The plan will, at a minimum, address the following elements:

- Key Personnel
- Air Monitoring
- Health and Safety Risks
- Site Control
- Training Documentation
- Decontamination
- Protective Equipment
- Emergency Response
- Medical Surveillance

Contractor's employees and subcontractors performing work on this project involving excavation, movement, or treatment of solid waste or contaminated media will be required to have appropriate training as specified in the OSHA standards, including HAZWOPER Standard 29 CFR 1910.120. All work is to be performed in Level D personal protective equipment, but the contractor will have capability to upgrade to Level C.

6.4 Sampling and Analysis Plan

If soil and wastewater samples need to be collected, the following criteria will be followed:

- Analysis of environmental media samples will be performed by an analytical laboratory included in the USEPA-approved RI/FS Multi-Site QAPP – Revision 2 (Submitted to the USEPA in 2007). The approved laboratories anticipated for use are STAT Analysis, Pace Analytical, and Test America.
- All samples for laboratory analysis will be collected in laboratory-supplied containers.
- Each cooler of samples will contain a temperature blank and trip blank for BTEX (as appropriate) to demonstrate proper sample preservation and handling.
- All QA/QC required by the analytical method will be completed. Lab QA/QC summary and chain of custody documentation will be submitted with analytical results.

Soil and water sampling procedures and analytical methods will be in accordance with the USEPA-approved RI/FS Multi-Site QAPP – Revision 2 (Submitted to the USEPA in 2007).

6.4.1 Pre-Disposal Sampling

If required by Waste Management, pre-disposal samples of excavated soils will be collected prior to disposal to verify that MGP source material soils are not above the Subtitle D landfill requirements. If soils are above landfill requirements and require amendment, the soils will either be managed onsite with ISS or samples will be collected following amendment to document that landfill requirements are met. These samples will be submitted to a laboratory for TCLP of total benzene analysis.

6.4.2 Wastewater

If wastewater is generated, wastewater samples will be collected in accordance with NSSD requirements prior to discharge to the sanitary sewer. Samples will be analyzed for the parameters specified by NSSD to confirm concentrations are below the discharge limits required by the permit.

6.5 ISS Construction Quality Assurance Plan

During ISS construction, a CQA plan will be implemented to ensure the ISS columns are constructed to meet the design performance goals. A preliminary CQA Plan is provided in Table 4. This plan will be revised, if necessary, following ISS treatability study completion and provided as a report addendum submitted in fall 2012. Since the treatability study will correlate leaching performance to the physical parameters of the mix design (UCS and hydraulic conductivity), the CQA program will evaluate the physical parameters and no leach testing or durability tests will be performed during the removal action.

The CQA plan implemented during full-scale ISS construction will likely include collection of one CQA sample for every 1,000 cubic yards treated or once each day of ISS treatment, and collection of one CQA sample for every 200 linear feet along the treatment area perimeter to ensure compliance with the design parameters. Any ISS columns that do not meet the mix design parameters will be documented and retreated if necessary.

7 SCHEDULE

7.1 Schedule for Construction

Construction activities are tentatively scheduled to begin in winter 2012-2013 subject to review and approval of this RAWP by the USEPA, issuance of a final Administrative Order on Consent, and governmental approvals. Property access and contractor availability are not expected to be constraints with respect to the project schedule; however, weather conditions may influence the production rate of the work.

The table below summarizes the estimate construction schedule based on the planned scope of work.

Preliminary Construction Schedule

Activity	Duration (Weeks)
Target Project Start Date	**Winter 2012-2013**
Mobilization / Site Preparation	**4**
ISS and Shallow Excavation	**52**
ISS Swell Management	**4**
Site Restoration/Close Out	**4**
Contingency	**4**
Total Estimated Project Duration	**68 (1.30 Years)**
Target Completion	**Winter 2013**

Assumptions: A prudent estimate for typical ISS/excavation construction assumes approximately 1,000 cubic yards/day; which was utilized for this schedule. Additional production can be achieved by utilizing 2 ISS rigs, this size of this site makes it a candidate for 2 operations. An estimate of 260,100 cubic yards of remediation is assumed.

7.2 Completion Report

A Removal Action Completion Report will be submitted to USEPA within 90 days following restoration of the Site.

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FIGURES

SOURCE NOTE:
THIS DRAWING WAS DEVELOPED FROM THE FOLLOWING BURNS-McDONNELL DIGITAL FILE:
FIGURE 1 SITE LOCATION.DWG

NATURAL
RESOURCE
TECHNOLOGY

SITE LOCATION MAP

FORMER NORTH PLANT
NORTH SHORE GAS COMPANY
849 PERSHING ROAD
WAUKEGAN, ILLINOIS

PROJECT NO.
2088/3

DRAWING NO.
2088-3-A01C

FIGURE NO.
1

DRAWN: RLH DATE: 07/27/12 CHK'D: AMM DATE: 07/27/12 APP'D: GRL DATE: 08/14/12

Aug 14, 2012 1:03pm PLOTTED BY: ndraskovich SAVED BY: ndraskovich
Y:\ACADData\Projects\20\2088\3\2088-3-A01C.dwg FIG_1
IMAGES: Y:\ACADData\Projects\19\1988\2\XREF\NORTH PLANT TOPOMAP.bmp;
XREFS:

— · · — · · —	PARCEL LINE
———	FORMER MGP BOUNDARY
▨	PONDED WATER (FORMER TAR PIT)
	WETLAND (2012 DELINEATION)
▨	TAR AT SURFACE
—— W ——	WATER MAIN
—— SAN ——	SANITARY SEWER
— FM —— FM —	SANITARY FORCE MAIN
—— STM ——	STORM SEWER
—— OHE ——	OVERHEAD ELECTRIC
—— G ——	GAS LINE
—— x ——	CHAIN LINK FENCE
●	MANHOLE
⌖	GROUNDWATER MONITORING WELL
● BM#1	BENCH MARK

BENCH MARKS:

NGS MONUMENT LOCATED AT BOWEN PARK AND DESIGNATED WK 105
ELEV. 667.00

BM #1 PK NAIL	N-2079736.5643 E-1122645.9923 ELEV. 586.64
BM #2 PK NAIL	N-2079751.1065 E-1121608.3328 ELEV. 587.82
BM #3 PK NAIL	N-2078622.4791 E-1121375.3421 ELEV. 588.55

N

0 100' 200'
SCALE IN FEET

SOURCE NOTES:

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3. COORDINATE SYSTEM IS NAD83, IL STATE PLANE EAST, US FOOT.
4. ALL ELEVATIONS REFERENCE NAVD 88.

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APPROVED BY:	GRL	DATE:	08/14/12

DRAWING NO: 2088-3-B02C

REFERENCE: SEE INFO BLOCK

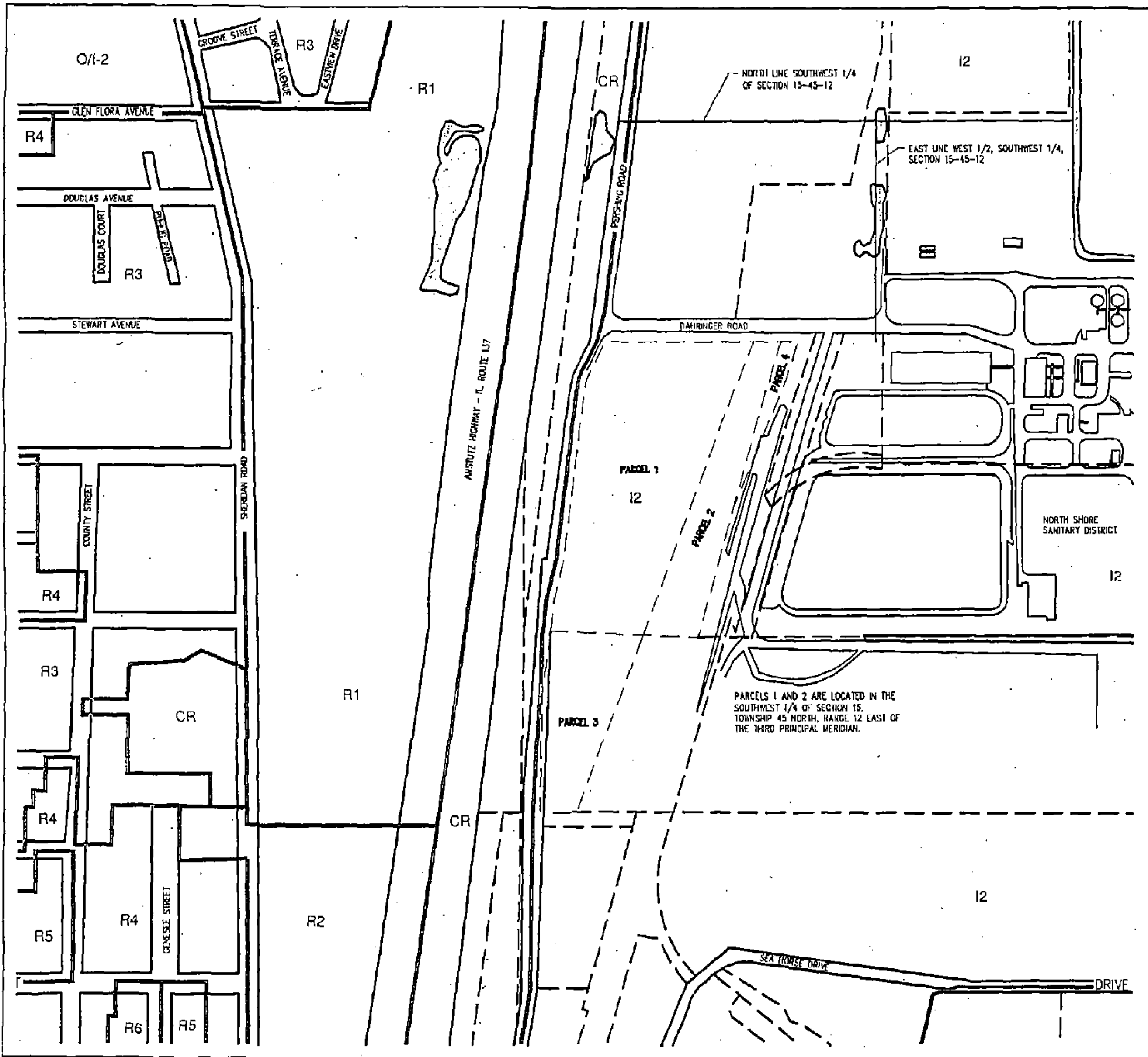
SITE LAYOUT

REMOVAL ACTION WORK PLAN
FORMER NORTH PLANT
NORTH SHORE GAS COMPANY
WAUKEGAN, ILLINOIS

NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO.
2088/3

FIGURE NO.
2



CR, R3	ZONING CODES
━━━━	ZONING BORDERS
— — —	SITE LOCATION
– – – –	PARCEL LINE
— — —	ADJACENT PROPERTIES
▭	WATER BODIES

ZONING DISTRICTS

CR	CONSERVATION/RECREATION
I2	GENERAL INDUSTRIAL
O/I-2	OFFICE/INSTITUTIONAL
R1	SINGLE-FAMILY RESIDENCE
R2	SINGLE-FAMILY RESIDENCE
R3	SINGLE-FAMILY RESIDENCE
R4	TWO-FAMILY RESIDENCE
R5	LIMITED GENERAL RESIDENCE

NOTES:

ZONING INFORMATION OBTAINED FROM MAY 2007
CITY OF WAUKEGAN ZONING DISTRICT MAP
AT: WWW.WAUKEGANWEB.NET IN NOVEMBER, 2008.

ALL OF THE LAND EAST OF PERSHING ROAD
IS ZONED I2 - GENERAL INDUSTRIAL.

N

0 200 400
SCALE IN FEET

SOURCE NOTES:

1. THIS DRAWING WAS DEVELOPED FROM THE FOLLOWING · BURNS-McDONNELL DIGITAL FILE DATED 10-21-05: FIG 14 SURROUNDING AREA.DWG
2. PARCEL BOUNDARIES DEVELOPED FROM MCCLURE ENGINEERING & ASSOCIATES, INC. PLAT OF SURVEY, SHEET 1 OF 1, JOB NO. 02-13-12-070, DRAWING NAME 12070PERSHING.DWG, DATED 06/27/2012.
3. *COORDINATE SYSTEM IS NAD83, IL STATE PLANE EAST, US FOOT.*

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DRAWING NO: 2088-3-B03C	
REFERENCE: SEE INFO BLOCK	

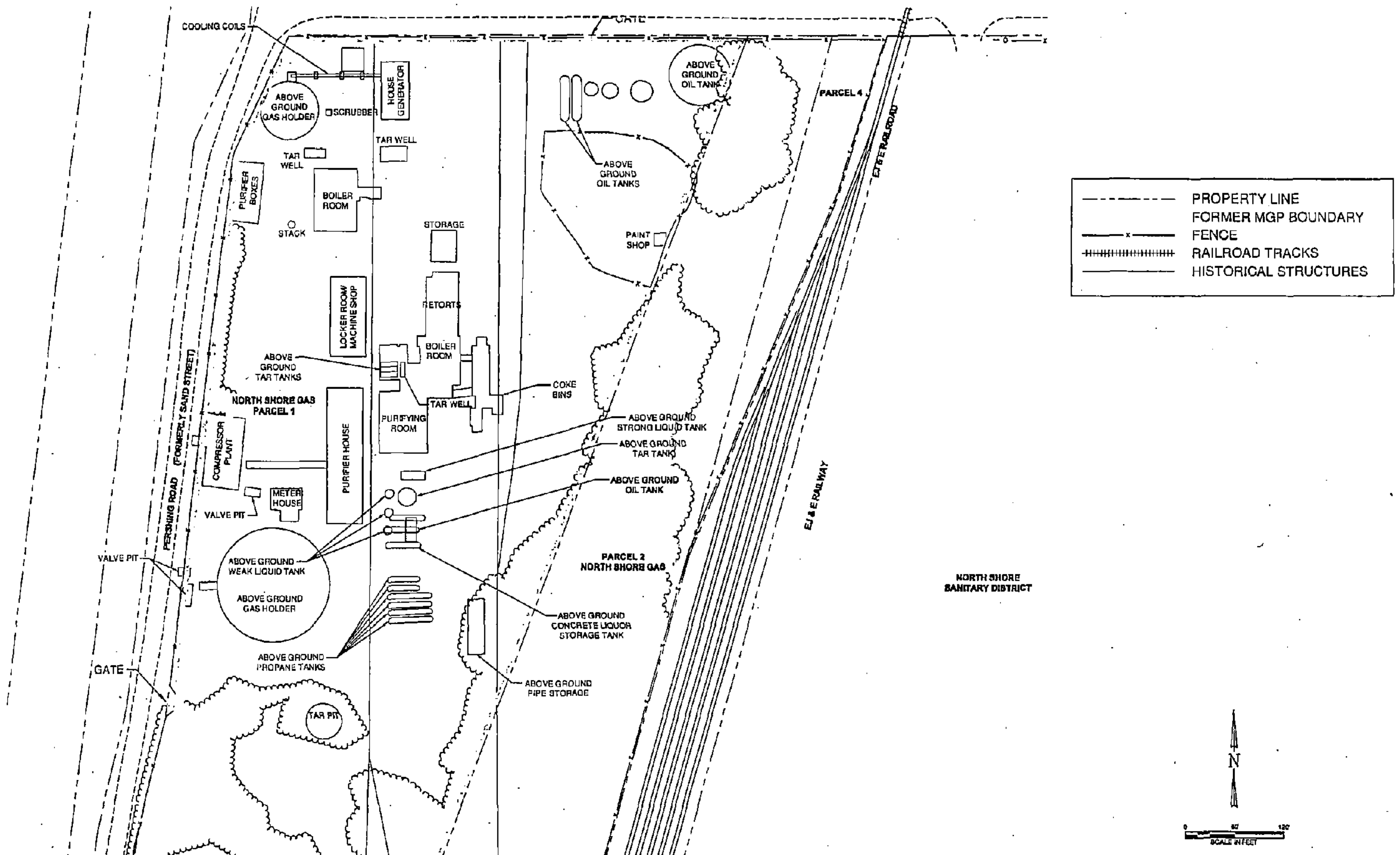
SURROUNDING LAND USE

REMOVAL ACTION WORK PLAN
FORMER NORTH PLANT
NORTH SHORE GAS COMPANY
WAUKEGAN, ILLINOIS

NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO.
2088/3

FIGURE NO.
3



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2. LOCATIONS OF HISTORICAL STRUCTURES WERE TAKEN FROM HISTORIC SANBORNS AND AERIAL PHOTOS. THE HISTORIC DITCH WAS APPROXIMATI FROM THE 1958 & 1964 AERIAL PHOTOGRAPHY.
3. COORDINATE SYSTEM IS NAD83, IL STATE PLANE EAST, US FOOT.

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REFERENCE: SEE INFO BLOCK

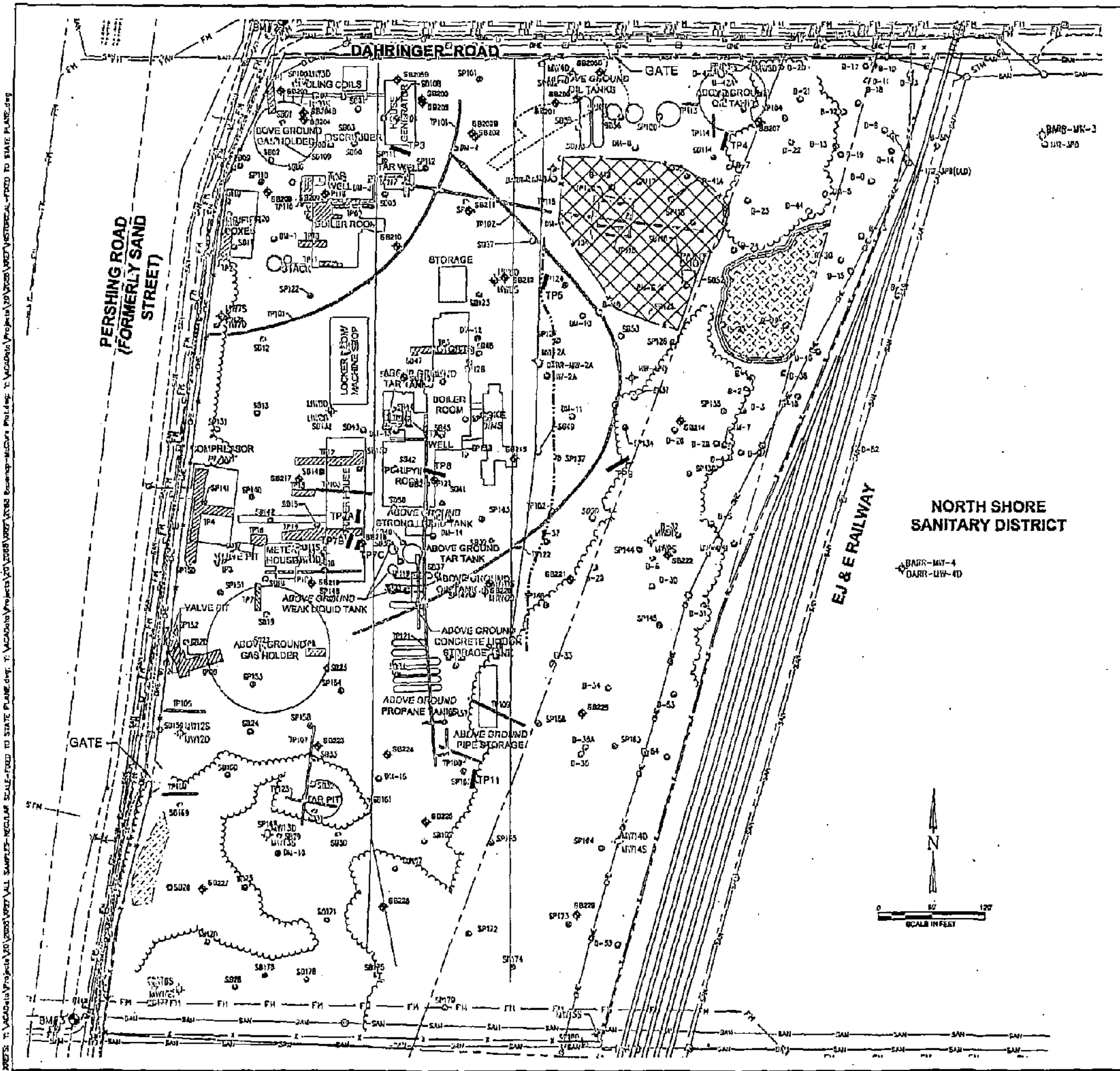
HISTORICAL SITE LAYOUT

REMOVAL ACTION WORK PLAN
FORMER NORTH PLANT
NORTH SHORE GAS COMPANY
WAUKEGAN, ILLINOIS

NATURAL RESOURCE TECHNOLOGY

PROJECT NO.
2088/3

FIGURE NO.
4



FENCE

PARCEL LINE

RAILROAD TRACKS

HISTORICAL STRUCTURES

WATER MAIN

SANITARY SEWER

SANITARY FORCE MAIN

STORM SEWER

OVERHEAD ELECTRIC

GAS LINE

EDGE OF TREES & BRUSH

PONDED WATER (FORMER TAR PIT)

WETLAND (2012 DELINEATION)

TAR AT SURFACE

MANHOLE

DM-11 SOIL BORING LOCATION INSTALLED BY DAMES & MOORE

B-35 SOIL BORING LOCATION INSTALLED BY BARR

S0118 SOIL BORING LOCATION INSTALLED BY BURNS & MCDONNELL

SP115 SOIL PROBE LOCATION INSTALLED BY BURNS & MCDONNELL

MW10S MW10D GROUNDWATER MONITORING WELL

TEST PIT LOCATION

HISTORIC DITCH LOCATION

SB201 SOIL BORING LOCATION INSTALLED BY NRT APRIL/JUNE/JULY 2012

TP3 TEST PIT LOCATION INSTALLED BY NRT APRIL 2012

BM#3 BENCH MARK

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4. COORDINATE SYSTEM IS NAD83, IL STATE PLANE EAST, US FOOT.

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DRAWING NO: 2088-3-B05
REFERENCE: SEE INFO BLOCK

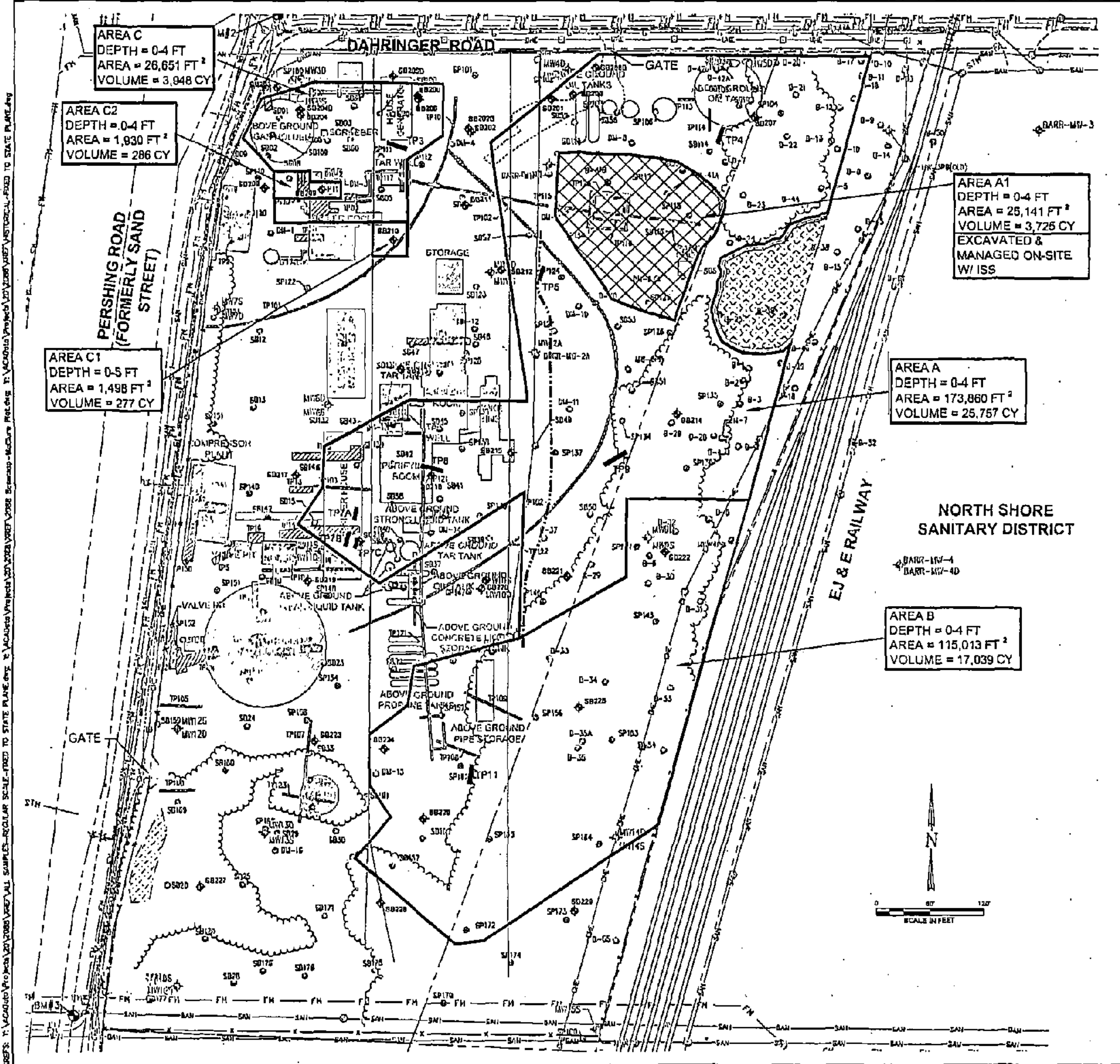
SOIL BORING/TEST PIT LOCATIONS

REMOVAL ACTION WORK PLAN
FORMER NORTH PLANT
NORTH SHORE GAS COMPANY
WAUKEGAN, ILLINOIS

NATURAL RESOURCE TECHNOLOGY

PROJECT NO.
2088/3

FIGURE NO.
5



x	FENCE
	PARCEL LINE
	RAILROAD TRACKS
	HISTORICAL STRUCTURES
W	WATER MAIN
SAN	SANITARY SEWER
FM	SANITARY FORCE MAIN
STM	STORM SEWER
OHE	OVERHEAD ELECTRIC
G	GAS LINE
	EDGE OF TREES & BRUSH
▨	PONDED WATER (FORMER TAR PIT)
▨	WETLAND (2012 DELINEATION)
☒	TAR AT SURFACE
▨	HISTORIC MGP STRUCTURE TARGETED FOR REMOVAL (NOTE 1)
●	MANHOLE
DM-11	SOIL BORING LOCATION INSTALLED BY DAMES & MOORE
B-35	SOIL BORING LOCATION INSTALLED BY BARR
SD116	SOIL BORING LOCATION INSTALLED BY BURNS & MCDONNELL
SP115	SOIL PROBE LOCATION INSTALLED BY BURNS & MCDONNELL
MW10S MW10D	GROUNDWATER MONITORING WELL
▨	TEST PIT LOCATION
	HISTORIC DITCH LOCATION
	PROPOSED REMOVAL AREAS
SB201	SOIL BORING LOCATION INSTALLED BY NRT APRIL/JUNE/JULY 2012
TP3	TEST PIT LOCATION INSTALLED BY NRT APRIL 2012
BM#3	BENCH MARK

NOTES:

1. HISTORIC MGP STRUCTURES THAT EXTEND OUTSIDE OF THE REMOVAL ACTION AREAS WILL BE DEMOLISHED AND EXCAVATED DURING THE REMOVAL ACTION. ADDITIONAL HISTORIC STRUCTURES OUTSIDE OR NEAR THE REMOVAL ACTION AREAS WILL BE REMOVED IF PRESENT.

SOURCE NOTES:

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APPROVED BY:	GRL	DATE:	09/06/12
DRAWING NO:	2088-3-B06		
REFERENCE: SEE INFO BLOCK			

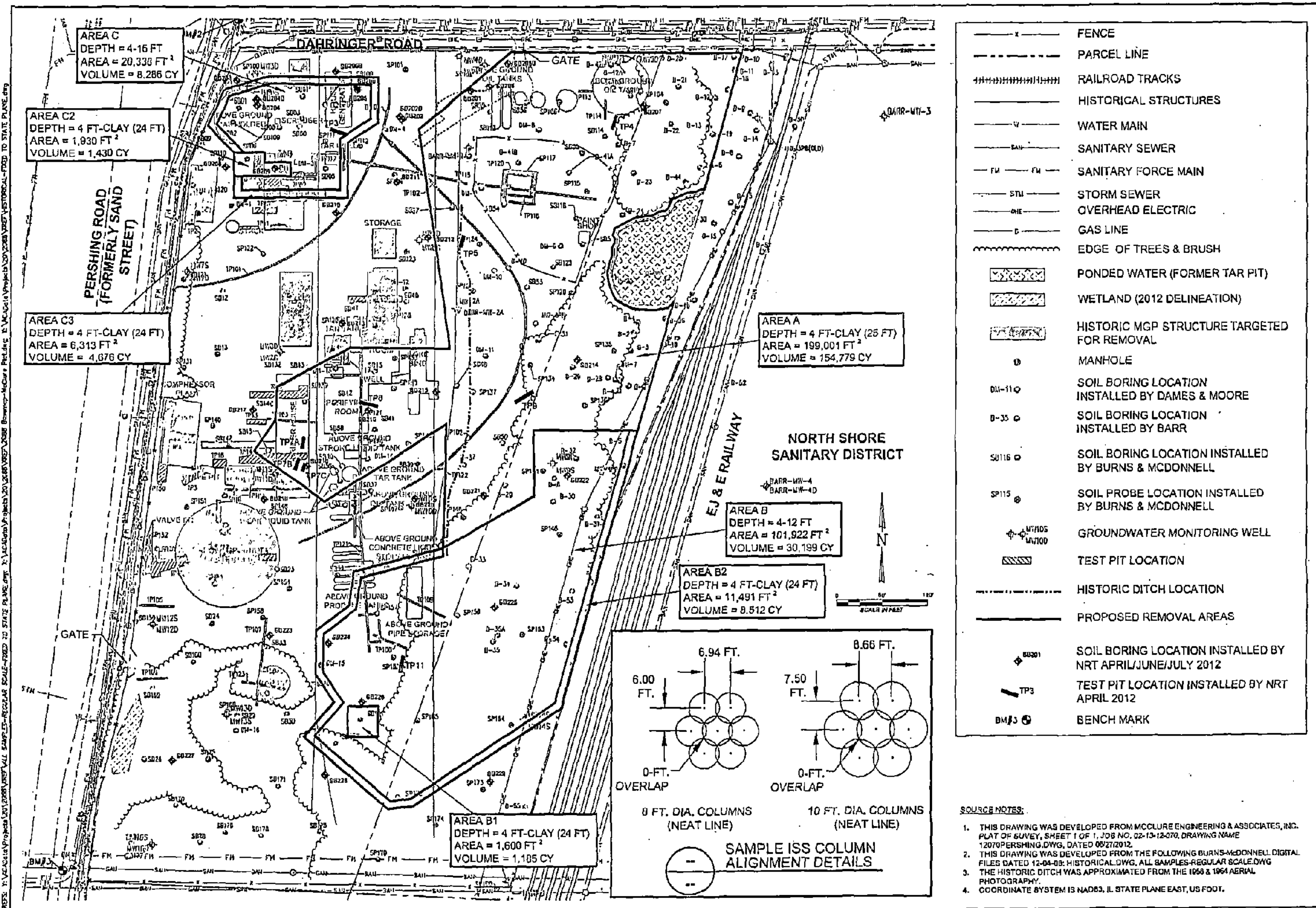
REMOVAL ACTION AREA EXTENTS-EXCAVATION

REMOVAL ACTION WORK PLAN
FORMER NORTH PLANT
NORTH SHORE GAS COMPANY
WAUKEGAN, ILLINOIS

NATURAL RESOURCE TECHNOLOGY

PROJECT NO.
2088/3

FIGURE NO.
0



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4. COORDINATE SYSTEM IS NAD83, IL STATE PLANE EAST, US FOOT.

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APPROVED BY: GRL DATE: 09/06/12
DRAWING NO: 2088-3-B07
REFERENCE: SEE INFO BLOCK

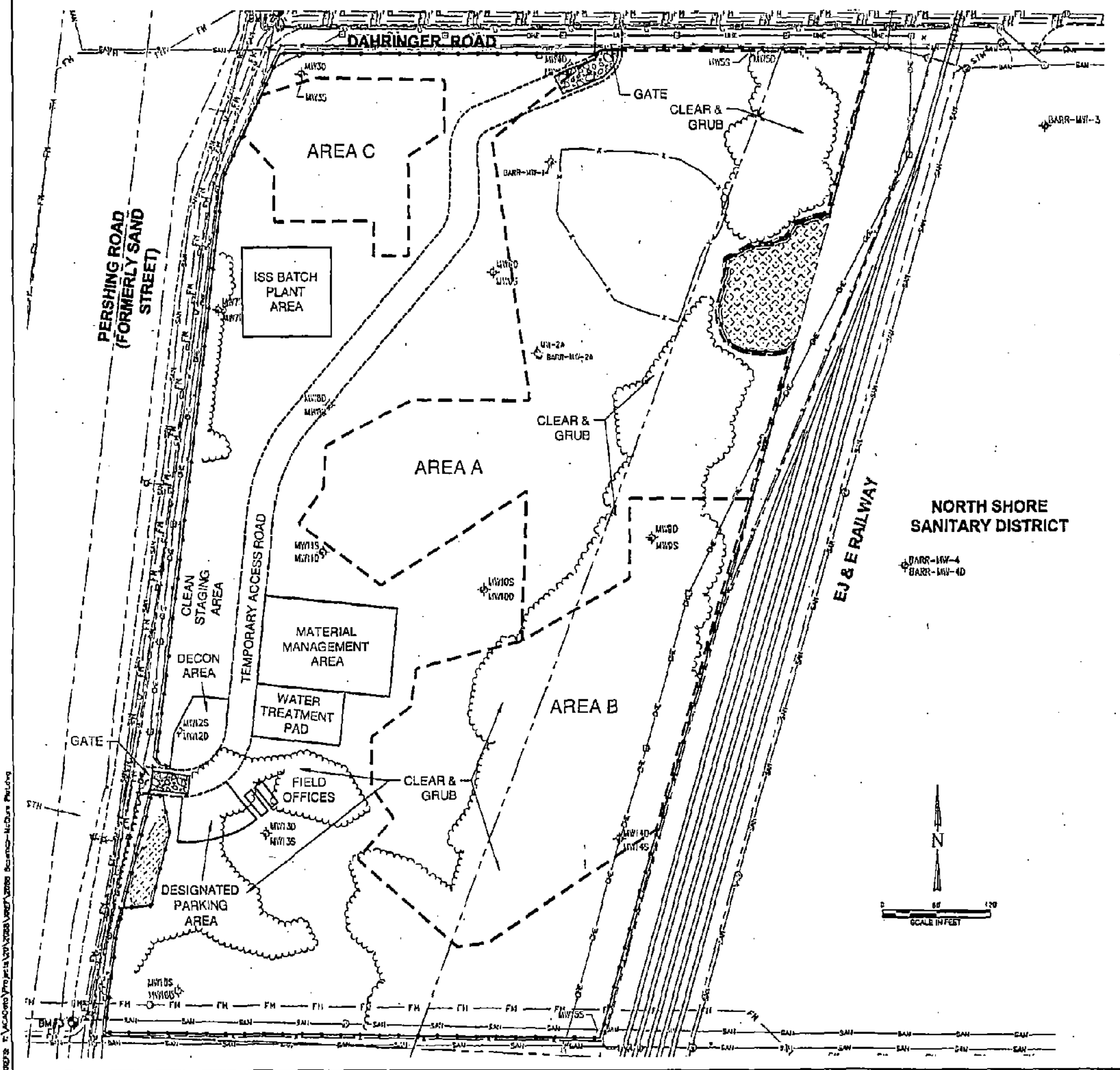
REMOVAL ACTION AREA EXTENTS-ISS

REMOVAL ACTION WORK PLAN
FORMER NORTH PLANT
NORTH SHORE GAS COMPANY
WAUKEGAN, ILLINOIS

NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO.
2088/3

FIGURE NO.
7



FENCE
PARCEL LINE
RAILROAD TRACKS
WATER MAIN
SANITARY SEWER
SANITARY FORCE MAIN
STORM SEWER
OVERHEAD ELECTRIC
GAS LINE
EDGE OF TREES & BRUSH
PONDED WATER (FORMER TAR PIT)
WETLAND (2012 DELINEATION)
TRACKING PAD
MANHOLE
GROUNDWATER MONITORING WELL
PROPOSED REMOVAL AREAS
PROPOSED SILT FENCE
TEMPORARY GRAVEL ACCESS ROAD
BENCH MARK

SOURCE NOTES:

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2. THIS DRAWING WAS DEVELOPED FROM THE FOLLOWING BURNS-McDONNELL DIGITAL FILES DATED 12-04-08; HISTORICAL.DWG, ALL SAMPLES-REGULAR SCALE.DWG
3. THE HISTORIC DITCH WAS APPROXIMATED FROM THE 1956 & 1964 AERIAL PHOTOGRAPHY.
4. COORDINATE SYSTEM IS NAD83, IL STATE PLANE EAST, US FOOT.

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CHECKED BY: AMM DATE: 07/30/12
APPROVED BY: GRL DATE: 08/14/12
DRAWING NO: 2088-3-B08
REFERENCE: SEE INFO BLOCK

REMOVAL ACTION SITE LAYOUT PLAN

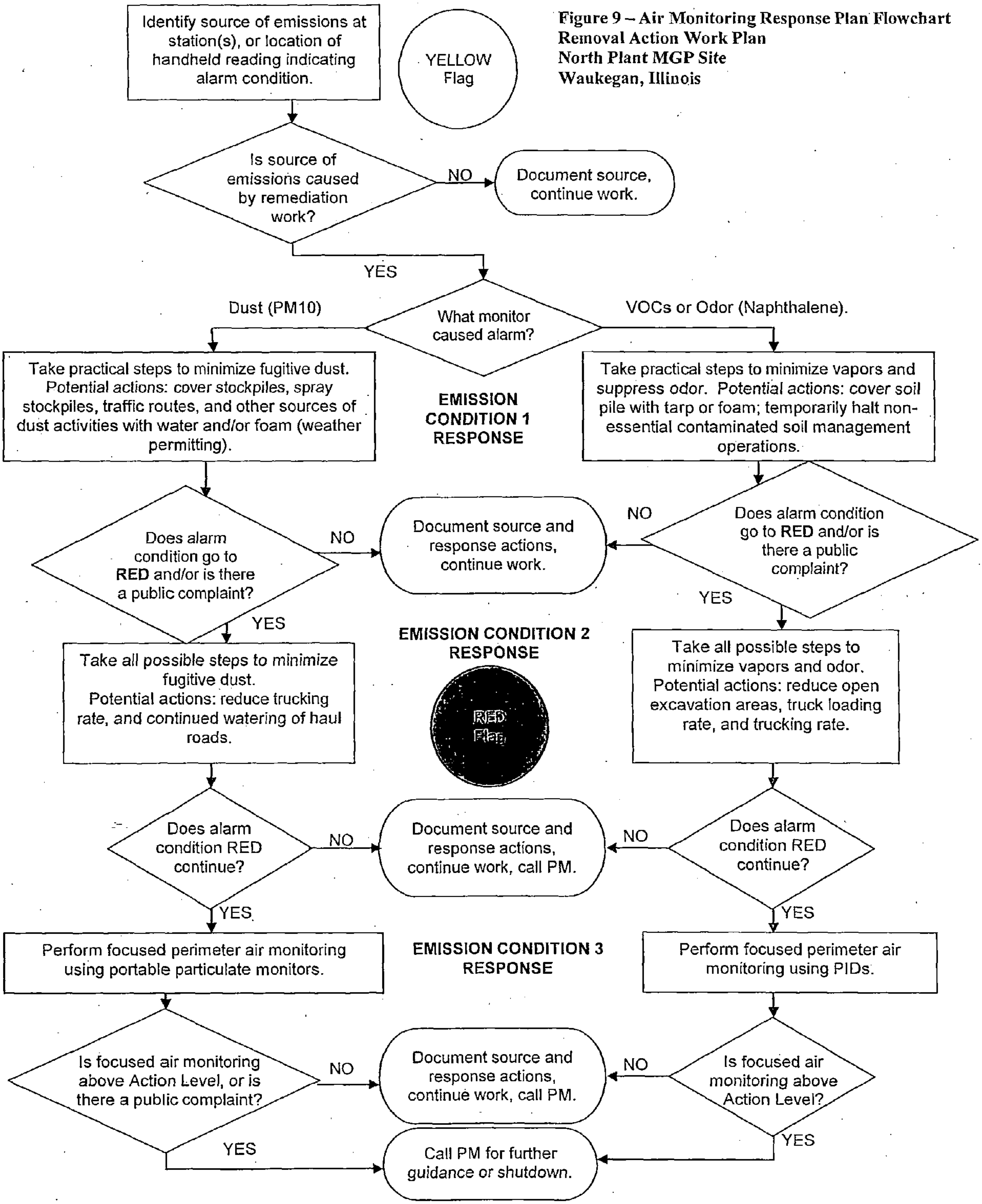
REMOVAL ACTION WORK PLAN
FORMER NORTH PLANT
NORTH SHORE GAS COMPANY
WAUKEGAN, ILLINOIS

NATURAL RESOURCE TECHNOLOGY

PROJECT NO.
2088/3

FIGURE NO.
8

Figure 9 – Air Monitoring Response Plan Flowchart
Removal Action Work Plan
North Plant MGP Site
Waukegan, Illinois



TABLES

Table 1. Pre-Removal Site Characterization Data
Removal Action Work Plan
North Plant MGP Site
Waukegan, Illinois

Sample Location	Sample Depth (ft)	Sample Date	Diesel Range Organics[1] (mg/kg)	Gasoline Range Organic[1] (mg/kg)	Total Petroleum Hydrocarbons[2] (mg/kg)
SB201	10-12	04/23/12	997	< 37.5	997
SB200	10-12	04/23/12	3,650	15.4	**3,665**
SB206	13-14	06/20/12	125	< 4.8	125
SB206B	6-8	06/20/12	6,600	< 41.5	**6,600**
SB202B	6-8	06/21/12	1,070	13.2	1,083
SB205	8-10	06/21/12	1460	< 4.6	1,460
SB205B	5-6	06/21/12	861	< 4.8	861
SB209	8-9	06/22/12	144	< 4.8	144
SB208	11-12	06/22/12	444	< 4.8	444
SB210	2-3	06/25/12	119,000	< 304	**119,000**
SB207	23-24	06/25/12	90.9	< 5	90.9
SB220	13-14	06/28/12	5.2	< 4.8	5.2
SB224	6-8	06/28/12	70,100	< 6160	**70,100**
SB223	6-8	06/29/12	4.1	< 5.1	4.1
SB226	11-12	06/29/12	7.8	< 5	7.8

(O-AMM 7/25/12; C-GRL 7/30/12)

Notes:

1. DRO and GRO analyzed by EPA Method 8015B Modified.
2. TPH is reported as the sum of DRO and GRO.
3. < 37.5 *indicates concentrations are below the reported limit of dectection.*
4. **3,665** indicates concentrations above the default value of 2,000 mg/kg for soil attenuation capacity in accordance with Illinois TACO: 35 IAC 742.215.

Table 2. ISS Treatability Study Physical Testing Summary
Removal Action Work Plan
North Plant MGP Site
Waukegan, Illinois

Activity	Category	Test Description	QTY of Mixes Tested	QTY (Tests/Molds /Procedures)	Number of Soil Types
As Received Soil	Testing	ASTM D2216 Moisture Content	--	1	1.
		ASTM D2937 Modified Bulk Density *(1 point Proctor @ as-received Moisture Content)*	--	1	1
Bulk Soil Material (Prior To Screening)	Testing	ASTM D2487 USCS	--	1	1
		ASTM D422 Particle Size Analysis (with Hydrometer)	--	1	1
		ASTM D4318 Atterberg Limits	--	1	1
Soil Composite Sample Preparation	Preparation	Screening & Compositing Soil Samples Buckets	--	8	1
		Screening & Compositing Samples	--	*0*	1
Cement/GGBFS Mixes (Mix 1-3)	*Preparation*	Mix Design Preparation	3	1	1
		Specimen Preparation (3 UCS/3 Perm, 1 ANS 16.1, 1 Penetrometer, 2 Spare)	3	10	1
		Specimen Preparation (Durability) 2 test, 2 control, 1 Moisture Content per each test D4842/D4843	3	10	1
	Phase I Testing	ASTM D1633 Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders	1	3	1
		ASTM D5084 Hydraulic Conductivity	1	3	1
		ASTM D2216 Moisture Content	3	1	1
		Pocket Penetrometer Measurements after 3 days of curing	3	4	
	Phase II Testing	ASTM D1633 Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders	1	1	1
		ASTM D5084 Hydraulic Conductivity	1	1	1
Cement/Bentonite Mixes (Mix 4-7)	Preparation	Mix Design Preparation	4	1	1
		Specimen Preparation (3 UCS/3 Perm, 1 ANS 16.1, 1 Penetrometer, 2 Spare)	4	10	1
		Specimen Preparation (Durability) 2 test, 2 control, 1 Moisture Content per each test D4842/D4843	4	10	1
	Phase I Testing	ASTM D1633 Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders	2	3	1
		ASTM D5084 Hydraulic Conductivity	2	3	1
		ASTM D2216 Moisture Content	4	4	
		Pocket Penetrometer Measurements after 3 days of curing	4	1	1
	Phase II Testing	ASTM D1633 Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders	1	1	1
		ASTM D5084 Hydraulic Conductivity	1	1	1
Cement/GGBFS/Bentonite Mixes (Mix 8-10)	Preparation	Mix Design Preparation	3	1	1
		Specimen Preparation (3 UCS/3 Perm, 1 ANS 16.1, 1 Penetrometer, 2 Spare)	3	10	1
		Specimen Preparation (Durability) 2 test, 2 control, 1 Moisture Content per each test D4842/D4843	3	10	1
	Phase I Testing	ASTM D1633 Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders	1	3	1
		ASTM D5084 Hydraulic Conductivity	1	3	1
		ASTM D2216 Moisture Content	3	4	
		Pocket Penetrometer Measurements after 3 days of curing	3	1	1
	Phase II Testing	ASTM D1633 Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders	1	1	1
		ASTM D5084 Hydraulic Conductivity	1	1	1
Final Testing (Mix 1 and 2)	Testing	ANSI/ANS-16.1: Preparation of leachate and slake observation	2	10	1
		ISS Leachate Testing	2	10	1
		ASTM D4843M Standard Test Method for Wetting and Drying Test of Solid Wastes	2	1	1
		ASTM D4842M Standard Test Method for Determining the Resistance of Solid Wastes to Freezing and Thawing	2	1	1
		Volume Expansion Calculation	2	1	1

Table 3. ISS Treatability Study Leachate Data Summary
Removal Action Work Plan
North Plant MGP Site
Waukegan, Illinois

Leach Start: July 31, 2012
Leach Interval Complete:

Parameter	Analytical Method	Design Goals[1] (ug/L)	Pace MDL	Pace RL	*Time (Days)*									
					0.08	0.3	1	2	3	4	5	19	47	90
Inorganics (ug/L)														
Arsenic, Total	6020A	10	0.1170	1.0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Chromium, Total	6020A	100	0.1060	1.0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Copper, Total	6020A	650	0.1900	1.0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Lead, Total	6020A	7.5	0.1320	1.0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Mercury, Total	*7470A*	*2*	*0.1000*	*0.2*	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*
Nickel, Total	6020A	100	0.1130	1.0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Zinc, Total	6020A	5,000	1.5660	10.0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Cyanide, Total	9010B/9012A	NS	4.2600	20.0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Cyanide, Amenable	9010B/9012A	200	4.2600	20.0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Volatile Organic Compounds (ug/L)														
Benzene	8260B	5	0.41	1.0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
cis-1,2-Dichloroethene	8260B	70	0.83	1.0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
1,1-Dichloroethane	*8260B*	*700*	*0.75*	*1.0*	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*
Ethylbenzene	8260B	700	0.54	1.0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Toluene	8260B	1,000	0.67	1.0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Vinyl Chloride	8260B	2	0.18	1.0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Xylenes, Total	8260B	10,000	2.60	3.0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Semi-Volatile Organic Compounds, Excluding PAHs (ug/L)														
Bis(2-ethylhexyl)phthalate	8270C	6	2.5970	5.0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Carbazole	8270C	NS	0.6949	5.0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Dibenzofuran	*8270C*	*5.8*	*1.0579*	*5.0*	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*
2,4-Dimethylphenol	8270C	140	1.1275	5.0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
4-Methylphenol	8270C	NS	0.7674	5.0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Phenol	8270C	100	1.0343	5.0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Polycyclic Aromatic Hydrocarbons (ug/L)														
Acenaphthene	8270 by HVI	420	0.00480	0.05	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Acenaphthylene	8270 by HVI	420	0.00382	0.05	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Anthracene	8270 by HVI	2,100	0.00608	0.05	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Benzo(a)anthracene	*8270 by HVI*	*0.13*	*0.00384*	*0.05*	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*
Benzo(a)pyrene	8270 by HVI	0.20	0.00303	0.05	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Benzo(b)fluoranthene	8270 by HVI	0.18	0.00300	0.05	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Benzo(ghi)perylene	8270 by HVI	210	0.00360	0.05	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Benzo(k)fluoranthene	8270 by HVI	0.17	0.00463	0.05	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Chrysene	8270 by HVI	1.5	0.00369	0.05	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Dibenz(a,h)anthracene	8270 by HVI	0.30	0.00339	0.05	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Fuoranthene	8270 by HVI	280	0.00467	0.05	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Fluorene	8270 by HVI	280	0.00508	0.05	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Indeno(1,2,3-cd)pyrene	8270 by HVI	0.43	0.00496	0.05	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
2-Methylnaphthalene	8270 by HVI	27	0.00409	0.05	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Naphthalene	8270 by HVI	140	0.00514	0.05	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Phenanthrene	8270 by HVI	2,100	0.00858	0.05	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Pyrene	8270 by HVI	210	0.00503	0.05	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

<u>Notes</u>

TBD - Concentration to be determined following leach testing interval sampling and analysis.

1. Design Goals based on USEPA MCL, IEPA Taco Tier 1, or USEPA RSL as established by multi-site screening levels (June 2012) based on the May 2012 update to the EPA RSLs.

Table 4. ISS Performance Goals and Preliminary Construction Quality Assurance Plan
Removal Action Work Plan
North Plant MGP Site
Waukegan, Illinois

Work	Test Description	Test Standard[1]	Field Sampling Frequency	Estimated Total Number of CQA Samples[2]	ISS Performance Goal[3]	QA Acceptance Criteria[4]
Pilot Scale ISS Evaluation	Hydraulic Conductivity	ASTM D5084	1 sample per Pilot Scale Evaluation (Three pilot scale areas with a minimum of two columns at each to be performed. Additional samples may be collected from additional columns if they are needed based on significant changes in mix design or site soils.)	3	$\leq 1 \times 10^{-6}$ cm/s @ 7 days	$\leq 1 \times 10^{-6}$ cm/s @ 28 days
	Unconfined Compressive Strength (UCS)	ASTM D1633	1 sample per Pilot Scale Evaluation (Three pilot scale areas with a minimum of two columns at each to be performed. Additional samples may be collected from additional columns if they are needed based on significant changes in mix design or site soils.)	3	≥50 psi @ 7 days	≥50 psi @ 28 days
Full Scale ISS Operations	Hydraulic Conductivity	ASTM D5084	1 sample every 1,000 cubic yards or once per day for standard cure @ 7 days (213 samples) 1 sample every 200 linear feet around the perimeter of ISS area for standard cure @ 28 days (20 additional sample). - Approximately half may be analyzed following 28 day cure, even if passing results are indicated after 7 day cure.	233	Evaluated @ 7 days $\leq 1 \times 10^{-6}$ cm/s @ 28 days	Geometric mean of hydraulic conductivity $\leq 1 \times 10^{-6}$ cm/s with no single sample greater than 5×10^{-6} cm/s
	Unconfined Compressive Strength (UCS)	ASTM D1633	1 sample every 1,000 cubic yards or once per day for standard cure @ 7 days (213 samples) 1 sample every 200 linear feet around the perimeter of ISS area for standard cure @ 28 days (20 additional sample). - Approximately half may be analyzed following 28 day cure, even if passing results are indicated after 7 day cure.	233	Evaluated @ 7 days ≥50 psi @ 28 days	Average UCS ≥ 50 psi with no single sample less than 40 psi

Notes:

1. Prior to testing, all mold specimens will be cured following ASTM 2632, Standard 7-day and 28-day cure.
2. Sample quantity collected shall be adequate to perform the listed ASTM standard tests plus additional spare molds.
3. ISS performance goals apply prior to completion of 50% of ISS columns.
4. QA acceptance criteria apply after 50% completion of ISS columns.

APPENDIX A

PRE-REMOVAL SITE CHARACTERIZATION DATA

APPENDIX A1

LABORATORY ANALYTICAL REPORTS

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, Inc.
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

May 11, 2012

Glenn Luke
Natural Resource Technologies
23713 W Park Rd
Pewaukee, WI 53072

RE: Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

Dear Glenn Luke:

Enclosed are the analytical results for sample(s) received by the laboratory on April 27, 2012. 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,

Brian Basten

brian.basten@pacelabs.com
Project Manager

Enclosures

cc: Brian Hennings, NATURAL RESOURCE TECHNOLOGY

Pace Analytical Services, Inc.
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

CERTIFICATIONS

Project:	2088 NORTH PLANT MGP
Pace Project No.:	4059458

Green Bay Certification IDs

1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888
North Carolina Certification #: 503
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750

SAMPLE SUMMARY

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4059458001	**042312001**	Solid	04/23/12 08:50	04/27/12 09:25
4059458002	**042312002**	Solid	04/23/12 13:30	04/27/12 09:25
4059458003	**042512001**	Water	04/25/12 14:30	04/27/12 09:25
4059458004	**TRIP042512**	Water	04/25/12 14:30	04/27/12 09:25

SAMPLE ANALYTE COUNT

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4059458001	**042312001**	EPA 8015B Modified	HMH	2
		EPA 8015B Modified	PMS	1
		ASTM D2974-87	LTI	1
4059458002	**042312002**	EPA 8015B Modified	HMH	2
		EPA 8015B Modified	PMS	1
		ASTM D2974-87	LTI	1
4059458003	**042512001**	EPA 8082	BDS	10
		EPA 6010	DLB	12
		EPA 7470	CMS	1
		EPA 8270	RJN	70
		EPA 8260	SMT	38
		EPA 351.2	DAW	1
		EPA 365.4	DAW	1
4059458004	**TRIP042512**	EPA 8260	SMT	38

PROJECT NARRATIVE

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

Method: **EPA 8015B Modified**
Description: 8015 GCS THC-Diesel
Client: Natural Resources Technologies
Date: May 11, 2012

General Information:
2 samples were analyzed for EPA 8015B Modified. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3546 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

QC Batch: OEXT/14392

S4: Surrogate recovery not evaluated against control limits due to sample dilution.
- 042312001 (Lab ID: 4059458001)
  - o-Terphenyl (S)
- 042312002 (Lab ID: 4059458002)
  - o-Terphenyl (S)

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

Batch Comments:

The default spike range of the standard used for QC evaluation is C10-C28. All other carbon ranges may recover outside of spike limits because they may not cover the range of the spike used.
- QC Batch: GCSV / 7578

PROJECT NARRATIVE

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

Method: EPA 8082
Description: 8082 GCS PCB
Client: Natural Resources Technologies
Date: May 11, 2012

General Information:
1 sample was analyzed for EPA 8082. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3510 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

Batch Comments:

The continuing calibration is outside of method acceptance limits. Analyte presence below reporting limits in associated samples. Results unaffected by high bias. Any samples with the presence of analytes above reporting limits were re-analyzed in a valid window.

- QC Batch: GCSV / 7594

PROJECT NARRATIVE

Project:	2088 NORTH PLANT MGP
Pace Project No.:	4059458

Method: **EPA 8015B Modified**
Description: Gasoline Range Organics
Client: Natural Resources Technologies
Date: May 11, 2012

General Information:
2 samples were analyzed for EPA 8015B Modified. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 5035A/5030B with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: GCV/8314

A matrix spike/matrix spike duplicate was not performed due to insufficient sample volume.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

Analyte Comments:

QC Batch: GCV/8311

D3: Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
- 042312001 (Lab ID: 4059458001)
  - TPH (C06-C10)

PROJECT NARRATIVE

Project:	2088 NORTH PLANT MGP
Pace Project No.:	4059458

Method: **EPA 6010**
Description: 6010 MET ICP, Dissolved
Client: Natural Resources Technologies
Date: May 11, 2012

General Information:
1 sample was analyzed for EPA 6010. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

PROJECT NARRATIVE

Project:	2088 NORTH PLANT MGP
Pace Project No.:	4059458

Method: EPA 7470
Description: 7470 Mercury, Dissolved
Client: Natural Resources Technologies
Date: May 11, 2012

General Information:
1 sample was analyzed for EPA 7470. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 7470 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

PROJECT NARRATIVE

Project:	2088 NORTH PLANT MGP
Pace Project No.:	4059458

Method: EPA 8270
Description: 8270 MSSV Semivolatile Organic
Client: Natural Resources Technologies
Date: May 11, 2012

General Information:
1 sample was analyzed for EPA 8270. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3510 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

QC Batch: OEXT/14368

S4: Surrogate recovery not evaluated against control limits due to sample dilution.

- 042512001 (Lab ID: 4059458003)
  - 2,4,6-Tribromophenol (S)
  - 2-Fluorobiphenyl (S)
  - 2-Fluorophenol (S)
  - Nitrobenzene-d5 (S)
  - Phenol-d6 (S)
  - Terphenyl-d14 (S)

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

PROJECT NARRATIVE

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

Method: EPA 8270
Description: 8270 MSSV Semivolatile Organic
Client: Natural Resources Technologies
Date: May 11, 2012

Additional Comments:

PROJECT NARRATIVE

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

Method: EPA 8260
Description: 8260 MSV
Client: Natural Resources Technologies
Date: May 11, 2012

General Information:
2 samples were analyzed for EPA 8260. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

Analyte Comments:

QC Batch: MSV/15014

D3: Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
- 042512001 (Lab ID: 4059458003)
  - Dibromofluoromethane (S)

PROJECT NARRATIVE

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

Method: EPA 351.2
Description: 351.2 Diss. Kjeldahl Nitrogen
Client: Natural Resources Technologies
Date: May 11, 2012

General Information:
1 sample was analyzed for EPA 351.2. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 351.2 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

PROJECT NARRATIVE

Project:	2088 NORTH PLANT MGP
Pace Project No.:	4059458

Method: EPA 365.4
Description: 365.4 Total Phosphorus
Client: Natural Resources Technologies
Date: May 11, 2012

General Information:
1 sample was analyzed for EPA 365.4. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 365.4 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

ANALYTICAL RESULTS

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

Sample: 042312001 **Lab ID: 4059458001** Collected: 04/23/12 08:50 Received: 04/27/12 09:25 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8015 GCS THC-Diesel	Analytical Method: EPA 8015B Modified Preparation Method: EPA 3546							
TPH - Diesel (C10-C28)	**997**	mg/kg	39.0	20	05/02/12 10:57	05/07/12 13:43		
Surrogates								
o-Terphenyl (S)	0	%.	39-130	20	05/02/12 10:57	05/07/12 13:43	84-15-1	S4
Gasoline Range Organics	Analytical Method: EPA 8015B Modified Preparation Method: EPA 5035A/5030B							
TPH (C06-C10)	ND	mg/kg	93.5	8	04/30/12 11:56	05/01/12 02:12		D3
Percent Moisture	Analytical Method: ASTM D2974-87							
Percent Moisture	**14.4**	%	0.10	1		05/10/12 08:07		

Sample: 042312002 **Lab ID: 4059458002** Collected: 04/23/12 13:30 Received: 04/27/12 09:25 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8015 GCS THC-Diesel	Analytical Method: EPA 8015B Modified Preparation Method: EPA 3546							
TPH - Diesel (C10-C28)	**3650**	mg/kg	116	60	05/02/12 10:57	05/07/12 14:29		
Surrogates								
o-Terphenyl (S)	0	%.	39-130	60	05/02/12 10:57	05/07/12 14:29	84-15-1	S4
Gasoline Range Organics	Analytical Method: EPA 8015B Modified Preparation Method: EPA 5035A/5030B							
TPH (C06-C10)	**15.4**	mg/kg	11.6	1	04/30/12 11:56	05/01/12 02:38		
Percent Moisture	Analytical Method: ASTM D2974-87							
Percent Moisture	**13.5**	%	0.10	1		05/10/12 08:07		

Sample: 042512001 **Lab ID: 4059458003** Collected: 04/25/12 14:30 Received: 04/27/12 09:25 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8082 GCS PCB	Analytical Method: EPA 8082 Preparation Method: EPA 3510							
PCB-1016 (Aroclor 1016)	ND	ug/L	0.94	1	05/07/12 12:00	05/09/12 02:59	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	ug/L	0.94	1	05/07/12 12:00	05/09/12 02:59	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	ug/L	0.94	1	05/07/12 12:00	05/09/12 02:59	11141-16-5	
PCB-1242 (Aroclor 1242)	ND	ug/L	0.94	1	05/07/12 12:00	05/09/12 02:59	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	ug/L	0.94	1	05/07/12 12:00	05/09/12 02:59	12672-29-6	
PCB-1254 (Aroclor 1254)	ND	ug/L	0.94	1	05/07/12 12:00	05/09/12 02:59	11097-69-1	
PCB-1260 (Aroclor 1260)	ND	ug/L	0.94	1	05/07/12 12:00	05/09/12 02:59	11096-82-5	
PCB, Total	ND	ug/L	0.94	1	05/07/12 12:00	05/09/12 02:59	1336-36-3	
Surrogates								
Tetrachloro-m-xylene (S)	67	%.	10-173	1	05/07/12 12:00	05/09/12 02:59	877-09-8	
Decachlorobiphenyl (S)	54	%.	31-130	1	05/07/12 12:00	05/09/12 02:59	2051-24-3	

ANALYTICAL RESULTS

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

Sample: 042512001 Lab ID: 4059458003 Collected: 04/25/12 14:30 Received: 04/27/12 09:25 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010							
Antimony, Dissolved	ND	ug/L	20.0	1		05/03/12 12:21	7440-36-0	
Arsenic, Dissolved	ND	ug/L	20.0	1		05/03/12 12:21	7440-38-2	
Beryllium, Dissolved	ND	ug/L	4.0	1		05/03/12 12:21	7440-41-7	
Cadmium, Dissolved	ND	ug/L	5.0	1		05/03/12 12:21	7440-43-9	
Chromium, Dissolved	ND	ug/L	5.0	1		05/03/12 12:21	7440-47-3	
Copper, Dissolved	ND	ug/L	10.0	1		05/03/12 12:21	7440-50-8	
Lead, Dissolved	ND	ug/L	7.5	1		05/03/12 12:21	7439-92-1	
Nickel, Dissolved	ND	ug/L	10.0	1		05/03/12 12:21	7440-02-0	
Selenium, Dissolved	ND	ug/L	20.0	1		05/03/12 12:21	7782-49-2	
Silver, Dissolved	ND	ug/L	10.0	1		05/03/12 12:21	7440-22-4	
Thallium, Dissolved	ND	ug/L	40.0	1		05/03/12 12:21	7440-28-0	
Zinc, Dissolved	ND	ug/L	40.0	1		05/03/12 12:21	7440-66-6	
7470 Mercury, Dissolved	Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury, Dissolved	ND	ug/L	0.20	1	05/02/12 18:47	05/03/12 15:55	7439-97-6	
8270 MSSV Semivolatile Organic	Analytical Method: EPA 8270 Preparation Method: EPA 3510							
Acenaphthene	**591**	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	83-32-9	
Acenaphthylene	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	208-96-8	
Anthracene	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	120-12-7	
Benzo(a)anthracene	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	56-55-3	
Benzo(a)pyrene	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	50-32-8	
Benzo(b)fluoranthene	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	205-99-2	
Benzo(g,h,i)perylene	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	191-24-2	
Benzo(k)fluoranthene	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	207-08-9	
4-Bromophenylphenyl ether	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	101-55-3	
Butylbenzylphthalate	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	85-68-7	
Carbazole	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	86-74-8	
4-Chloro-3-methylphenol	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	59-50-7	
4-Chloroaniline	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	106-47-8	
bis(2-Chloroethoxy)methane	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	111-91-1	
bis(2-Chloroethyl) ether	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	111-44-4	
2-Chloronaphthalene	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	91-58-7	
2-Chlorophenol	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	95-57-8	
4-Chlorophenylphenyl ether	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	7005-72-3	
Chrysene	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	218-01-9	
Dibenz(a,h)anthracene	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	53-70-3	
Dibenzofuran	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	132-64-9	
1,2-Dichlorobenzene	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	95-50-1	
1,3-Dichlorobenzene	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	541-73-1	
1,4-Dichlorobenzene	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	106-46-7	
3,3'-Dichlorobenzidine	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	91-94-1	
2,4-Dichlorophenol	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	120-83-2	
Diethylphthalate	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	84-66-2	
2,4-Dimethylphenol	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	105-67-9	
Dimethylphthalate	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	131-11-3	

ANALYTICAL RESULTS

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

Sample: 042512001 **Lab ID: 4059458003** Collected: 04/25/12 14:30 Received: 04/27/12 09:25 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV Semivolatile Organic	Analytical Method: EPA 8270 Preparation Method: EPA 3510							
Di-n-butylphthalate	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	84-74-2	
4,6-Dinitro-2-methylphenol	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	534-52-1	
2,4-Dinitrophenol	ND	ug/L	943	100	05/01/12 12:00	05/02/12 14:43	51-28-5	
2,4-Dinitrotoluene	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	121-14-2	
2,6-Dinitrotoluene	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	606-20-2	
Di-n-octylphthalate	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	117-84-0	
bis(2-Ethylhexyl)phthalate	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	117-81-7	
Fluoranthene	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	206-44-0	
Fluorene	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	86-73-7	
Hexachloro-1,3-butadiene	ND	ug/L	943	100	05/01/12 12:00	05/02/12 14:43	87-68-3	
Hexachlorobenzene	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	118-74-1	
Hexachlorocyclopentadiene	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	77-47-4	
Hexachloroethane	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	67-72-1	
Indeno(1,2,3-cd)pyrene	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	193-39-5	
Isophorone	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	78-59-1	
2-Methylnaphthalene	**1100**	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	91-57-6	
2-Methylphenol(o-Cresol)	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43		
Naphthalene	**5150**	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	91-20-3	
2-Nitroaniline	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	88-74-4	
3-Nitroaniline	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	99-09-2	
4-Nitroaniline	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	100-01-6	
Nitrobenzene	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	98-95-3	
2-Nitrophenol	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	88-75-5	
4-Nitrophenol	ND	ug/L	943	100	05/01/12 12:00	05/02/12 14:43	100-02-7	
N-Nitroso-di-n-propylamine	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	621-64-7	
N-Nitrosodiphenylamine	ND	ug/L	943	100	05/01/12 12:00	05/02/12 14:43	86-30-6	
2,2'-Oxybis(1-chloropropane)	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	108-60-1	
Pentachlorophenol	ND	ug/L	943	100	05/01/12 12:00	05/02/12 14:43	87-86-5	
Phenanthrene	**609**	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	85-01-8	
Phenol	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	108-95-2	
Pyrene	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	129-00-0	
1,2,4-Trichlorobenzene	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	120-82-1	
2,4,5-Trichlorophenol	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	95-95-4	
2,4,6-Trichlorophenol	ND	ug/L	472	100	05/01/12 12:00	05/02/12 14:43	88-06-2	
Surrogates								
Nitrobenzene-d5 (S)	0	%.	41-130	100	05/01/12 12:00	05/02/12 14:43	4165-60-0	S4
2-Fluorobiphenyl (S)	0	%.	51-130	100	05/01/12 12:00	05/02/12 14:43	321-60-8	S4
Terphenyl-d14 (S)	0	%.	38-130	100	05/01/12 12:00	05/02/12 14:43	1718-51-0	S4
Phenol-d6 (S)	0	%.	13-130	100	05/01/12 12:00	05/02/12 14:43	13127-88-3	S4
2-Fluorophenol (S)	0	%.	24-130	100	05/01/12 12:00	05/02/12 14:43	367-12-4	S4
2,4,6-Tribromophenol (S)	0	%.	38-130	100	05/01/12 12:00	05/02/12 14:43	118-79-6	S4
8260 MSV	Analytical Method: EPA 8260							
Acetone	ND	ug/L	1000	50		04/30/12 15:55	67-64-1	
Benzene	**163**	ug/L	50.0	50		04/30/12 15:55	71-43-2	
Bromodichloromethane	ND	ug/L	50.0	50		04/30/12 15:55	75-27-4	

ANALYTICAL RESULTS

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

Sample: 042512001 **Lab ID: 4059458003** Collected: 04/25/12 14:30 Received: 04/27/12 09:25 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260 MSV	Analytical Method: EPA 8260							
Bromoform	ND	ug/L	50.0	50		04/30/12 15:55	75-25-2	
Bromomethane	ND	ug/L	50.0	50		04/30/12 15:55	74-83-9	
2-Butanone (MEK)	ND	ug/L	1000	50		04/30/12 15:55	78-93-3	
Carbon disulfide	ND	ug/L	50.0	50		04/30/12 15:55	75-15-0	
Carbon tetrachloride	ND	ug/L	50.0	50		04/30/12 15:55	56-23-5	
Chlorobenzene	ND	ug/L	50.0	50		04/30/12 15:55	108-90-7	
Chloroethane	ND	ug/L	50.0	50		04/30/12 15:55	75-00-3	
Chloroform	ND	ug/L	250	50		04/30/12 15:55	67-66-3	
Chloromethane	ND	ug/L	50.0	50		04/30/12 15:55	74-87-3	
Dibromochloromethane	ND	ug/L	50.0	50		04/30/12 15:55	124-48-1	
1,1-Dichloroethane	ND	ug/L	50.0	50		04/30/12 15:55	75-34-3	
1,2-Dichloroethane	ND	ug/L	50.0	50		04/30/12 15:55	107-06-2	
1,1-Dichloroethene	ND	ug/L	50.0	50		04/30/12 15:55	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	50.0	50		04/30/12 15:55	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	50.0	50		04/30/12 15:55	156-60-5	
1,2-Dichloropropane	ND	ug/L	50.0	50		04/30/12 15:55	78-87-5	
cis-1,3-Dichloropropene	ND	ug/L	50.0	50		04/30/12 15:55	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/L	50.0	50		04/30/12 15:55	10061-02-6	
Ethylbenzene	**833**	ug/L	50.0	50		04/30/12 15:55	100-41-4	
2-Hexanone	ND	ug/L	250	50		04/30/12 15:55	591-78-6	
Methylene Chloride	ND	ug/L	50.0	50		04/30/12 15:55	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	250	50		04/30/12 15:55	108-10-1	
Methyl-tert-butyl ether	ND	ug/L	50.0	50		04/30/12 15:55	1634-04-4	
Styrene	ND	ug/L	50.0	50		04/30/12 15:55	100-42-5	
1,1,2,2-Tetrachloroethane	ND	ug/L	50.0	50		04/30/12 15:55	79-34-5	
Tetrachloroethene	ND	ug/L	50.0	50		04/30/12 15:55	127-18-4	
Toluene	ND	ug/L	50.0	50		04/30/12 15:55	108-88-3	
1,1,1-Trichloroethane	ND	ug/L	50.0	50		04/30/12 15:55	71-55-6	
1,1,2-Trichloroethane	ND	ug/L	50.0	50		04/30/12 15:55	79-00-5	
Trichloroethene	ND	ug/L	50.0	50		04/30/12 15:55	79-01-6	
Vinyl chloride	ND	ug/L	50.0	50		04/30/12 15:55	75-01-4	
Xylene (Total)	**432**	ug/L	150	50		04/30/12 15:55	1330-20-7	
Surrogates								
4-Bromofluorobenzene (S)	81	%.	70-130	50		04/30/12 15:55	460-00-4	
Dibromofluoromethane (S)	100	%.	70-130	50		04/30/12 15:55	1868-53-7	D3
Toluene-d8 (S)	89	%.	70-130	50		04/30/12 15:55	2037-26-5	
351.2 Diss. Kjeldahl Nitrogen	Analytical Method: EPA 351.2 Preparation Method: EPA 351.2							
Nitrogen, Kjeldahl, Total, Dissolved	**2.6**	mg/L	1.0	1	05/07/12 10:00	05/07/12 14:40	7727-37-9	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4							
Phosphorus	ND	mg/L	0.40	1	05/09/12 07:30	05/09/12 14:09	7723-14-0	

ANALYTICAL RESULTS

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

Sample: TRIP042512 **Lab ID: 4059458004** Collected: 04/25/12 14:30 Received: 04/27/12 09:25 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260 MSV	Analytical Method: EPA 8260							
Acetone	ND	ug/L	20.0	1		04/30/12 12:30	67-64-1	
Benzene	ND	ug/L	1.0	1		04/30/12 12:30	71-43-2	
Bromodichloromethane	ND	ug/L	1.0	1		04/30/12 12:30	75-27-4	
Bromoform	ND	ug/L	1.0	1		04/30/12 12:30	75-25-2	
Bromomethane	ND	ug/L	1.0	1		04/30/12 12:30	74-83-9	
2-Butanone (MEK)	ND	ug/L	20.0	1		04/30/12 12:30	78-93-3	
Carbon disulfide	ND	ug/L	1.0	1		04/30/12 12:30	75-15-0	
Carbon tetrachloride	ND	ug/L	1.0	1		04/30/12 12:30	56-23-5	
Chlorobenzene	ND	ug/L	1.0	1		04/30/12 12:30	108-90-7	
Chloroethane	ND	ug/L	1.0	1		04/30/12 12:30	75-00-3	
Chloroform	ND	ug/L	5.0	1		04/30/12 12:30	67-66-3	
Chloromethane	ND	ug/L	1.0	1		04/30/12 12:30	74-87-3	
Dibromochloromethane	ND	ug/L	1.0	1		04/30/12 12:30	124-48-1	
1,1-Dichloroethane	ND	ug/L	1.0	1		04/30/12 12:30	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	1		04/30/12 12:30	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	1		04/30/12 12:30	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	1		04/30/12 12:30	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	1		04/30/12 12:30	156-60-5	
1,2-Dichloropropane	ND	ug/L	1.0	1		04/30/12 12:30	78-87-5	
cis-1,3-Dichloropropene	ND	ug/L	1.0	1		04/30/12 12:30	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/L	1.0	1		04/30/12 12:30	10061-02-6	
Ethylbenzene	ND	ug/L	1.0	1		04/30/12 12:30	100-41-4	
2-Hexanone	ND	ug/L	5.0	1		04/30/12 12:30	591-78-6	
Methylene Chloride	ND	ug/L	1.0	1		04/30/12 12:30	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	1		04/30/12 12:30	108-10-1	
Methyl-tert-butyl ether	ND	ug/L	1.0	1		04/30/12 12:30	1634-04-4	
Styrene	ND	ug/L	1.0	1		04/30/12 12:30	100-42-5	
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0	1		04/30/12 12:30	79-34-5	
Tetrachloroethene	ND	ug/L	1.0	1		04/30/12 12:30	127-18-4	
Toluene	ND	ug/L	1.0	1		04/30/12 12:30	108-88-3	
1,1,1-Trichloroethane	ND	ug/L	1.0	1		04/30/12 12:30	71-55-6	
1,1,2-Trichloroethane	ND	ug/L	1.0	1		04/30/12 12:30	79-00-5	
Trichloroethene	ND	ug/L	1.0	1		04/30/12 12:30	79-01-6	
Vinyl chloride	ND	ug/L	1.0	1		04/30/12 12:30	75-01-4	
Xylene (Total)	ND	ug/L	3.0	1		04/30/12 12:30	1330-20-7	
Surrogates								
4-Bromofluorobenzene (S)	75	%.	70-130	1		04/30/12 12:30	460-00-4	
Dibromofluoromethane (S)	99	%.	70-130	1		04/30/12 12:30	1868-53-7	
Toluene-d8 (S)	87	%.	70-130	1		04/30/12 12:30	2037-26-5	

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

QC Batch: GCV/8311
QC Batch Method: EPA 5035A/5030B
Analysis Method: EPA 8015B Modified
Analysis Description: Gasoline Range Organics
Associated Lab Samples: 4059458001, 4059458002

METHOD BLANK: 598558 Matrix: Solid
Associated Lab Samples: 4059458001, 4059458002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
TPH (C06-C10)	mg/kg	ND	10.0	04/30/12 21:30	

LABORATORY CONTROL SAMPLE & LCSD: 598559 598560

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
TPH (C06-C10)	mg/kg	50	48.6	50.6	97	101	79-120	4	20	

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

QC Batch: ICP/5882 Analysis Method: EPA 6010
QC Batch Method: EPA 6010 Analysis Description: ICP Metals, Trace, Dissolved
Associated Lab Samples: 4059458003

METHOD BLANK: 600288 Matrix: Water
Associated Lab Samples: 4059458003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony, Dissolved	ug/L	ND	20.0	05/03/12 12:17	
Arsenic, Dissolved	ug/L	ND	20.0	05/03/12 12:17	
Beryllium, Dissolved	ug/L	ND	4.0	05/03/12 12:17	
Cadmium, Dissolved	ug/L	ND	5.0	05/03/12 12:17	
Chromium, Dissolved	ug/L	ND	5.0	05/03/12 12:17	
Copper, Dissolved	ug/L	ND	10.0	05/03/12 12:17	
Lead, Dissolved	ug/L	ND	7.5	05/03/12 12:17	
Nickel, Dissolved	ug/L	ND	10.0	05/03/12 12:17	
Selenium, Dissolved	ug/L	ND	20.0	05/03/12 12:17	
Silver, Dissolved	ug/L	ND	10.0	05/03/12 12:17	
Thallium, Dissolved	ug/L	ND	40.0	05/03/12 12:17	
Zinc, Dissolved	ug/L	ND	40.0	05/03/12 12:17	

LABORATORY CONTROL SAMPLE: 600289

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony, Dissolved	ug/L	500	485	97	80-120	
Arsenic, Dissolved	ug/L	500	477	95	80-120	
Beryllium, Dissolved	ug/L	500	487	97	80-120	
Cadmium, Dissolved	ug/L	500	483	97	80-120	
Chromium, Dissolved	ug/L	500	475	95	80-120	
Copper, Dissolved	ug/L	500	474	95	80-120	
Lead, Dissolved	ug/L	500	490	98	80-120	
Nickel, Dissolved	ug/L	500	491	98	80-120	
Selenium, Dissolved	ug/L	500	488	98	80-120	
Silver, Dissolved	ug/L	250	231	93	80-120	
Thallium, Dissolved	ug/L	500	479	96	80-120	
Zinc, Dissolved	ug/L	500	485	97	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 600290 600291

Parameter	Units	4059458003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony, Dissolved	ug/L	ND	500	500	484	479	97	96	75-125	1	20	
Arsenic, Dissolved	ug/L	ND	500	500	495	491	99	98	75-125	1	20	
Beryllium, Dissolved	ug/L	ND	500	500	494	490	99	98	75-125	1	20	
Cadmium, Dissolved	ug/L	ND	500	500	493	486	99	97	75-125	1	20	
Chromium, Dissolved	ug/L	ND	500	500	480	476	96	95	75-125	1	20	
Copper, Dissolved	ug/L	ND	500	500	494	491	99	98	75-125	1	20	
Lead, Dissolved	ug/L	ND	500	500	490	487	98	97	75-125	1	20	

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 600290 600291

Parameter	Units	4059458003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Nickel, Dissolved	ug/L	ND	500	500	490	483	98	96	75-125	1	20	
Selenium, Dissolved	ug/L	ND	500	500	513	507	102	101	75-125	1	20	
Silver, Dissolved	ug/L	ND	250	250	228	226	91	90	75-125	1	20	
Thallium, Dissolved	ug/L	ND	500	500	480	478	95	95	75-125	0	20	
Zinc, Dissolved	ug/L	ND	500	500	491	487	98	97	75-125	1	20	

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

QC Batch: MERP/3057
QC Batch Method: EPA 7470
Associated Lab Samples: 4059458003

Analysis Method: EPA 7470
Analysis Description: 7470 Mercury Dissolved

METHOD BLANK: 600074
Matrix: Water
Associated Lab Samples: 4059458003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury, Dissolved	ug/L	ND	0.20	05/03/12 15:50	

LABORATORY CONTROL SAMPLE: 600075

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury, Dissolved	ug/L	5	5.0	99	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 600076 600077

Parameter	Units	4059458003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury, Dissolved	ug/L	ND	5	5	5.0	5.1	100	101	85-115	1	20	

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

QC Batch: MSV/15014 Analysis Method: EPA 8260
QC Batch Method: EPA 8260 Analysis Description: 8260 MSV
Associated Lab Samples: 4059458003, 4059458004

METHOD BLANK: 598427 Matrix: Water
Associated Lab Samples: 4059458003, 4059458004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,1-Trichloroethane	ug/L	ND	1.0	04/30/12 07:42	
1,1,2,2-Tetrachloroethane	ug/L	ND	1.0	04/30/12 07:42	
1,1,2-Trichloroethane	ug/L	ND	1.0	04/30/12 07:42	
1,1-Dichloroethane	ug/L	ND	1.0	04/30/12 07:42	
1,1-Dichloroethene	ug/L	ND	1.0	04/30/12 07:42	
1,2-Dichloroethane	ug/L	ND	1.0	04/30/12 07:42	
1,2-Dichloropropane	ug/L	ND	1.0	04/30/12 07:42	
2-Butanone (MEK)	ug/L	ND	20.0	04/30/12 07:42	
2-Hexanone	ug/L	ND	5.0	04/30/12 07:42	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	5.0	04/30/12 07:42	
Acetone	ug/L	ND	20.0	04/30/12 07:42	
Benzene	ug/L	ND	1.0	04/30/12 07:42	
Bromodichloromethane	ug/L	ND	1.0	04/30/12 07:42	
Bromoform	ug/L	ND	1.0	04/30/12 07:42	
Bromomethane	ug/L	ND	1.0	04/30/12 07:42	
Carbon disulfide	ug/L	ND	1.0	04/30/12 07:42	
Carbon tetrachloride	ug/L	ND	1.0	04/30/12 07:42	
Chlorobenzene	ug/L	ND	1.0	04/30/12 07:42	
Chloroethane	ug/L	ND	1.0	04/30/12 07:42	
Chloroform	ug/L	ND	5.0	04/30/12 07:42	
Chloromethane	ug/L	ND	1.0	04/30/12 07:42	
cis-1,2-Dichloroethene	ug/L	ND	1.0	04/30/12 07:42	
cis-1,3-Dichloropropene	ug/L	ND	1.0	04/30/12 07:42	
Dibromochloromethane	ug/L	ND	1.0	04/30/12 07:42	
Ethylbenzene	ug/L	ND	1.0	04/30/12 07:42	
Methyl-tert-butyl ether	ug/L	ND	1.0	04/30/12 07:42	
Methylene Chloride	ug/L	ND	1.0	04/30/12 07:42	
Styrene	ug/L	ND	1.0	04/30/12 07:42	
Tetrachloroethene	ug/L	ND	1.0	04/30/12 07:42	
Toluene	ug/L	ND	1.0	04/30/12 07:42	
trans-1,2-Dichloroethene	ug/L	ND	1.0	04/30/12 07:42	
trans-1,3-Dichloropropene	ug/L	ND	1.0	04/30/12 07:42	
Trichloroethene	ug/L	ND	1.0	04/30/12 07:42	
Vinyl chloride	ug/L	ND	1.0	04/30/12 07:42	
Xylene (Total)	ug/L	ND	3.0	04/30/12 07:42	
4-Bromofluorobenzene (S)	%.	76	70-130	04/30/12 07:42	
Dibromofluoromethane (S)	%.	95	70-130	04/30/12 07:42	
Toluene-d8 (S)	%.	90	70-130	04/30/12 07:42	

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

LABORATORY CONTROL SAMPLE & LCSD: 598428 598429

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
1,1,1-Trichloroethane	ug/L	50	63.0	62.5	126	125	70-133	1	20	
1,1,2,2-Tetrachloroethane	ug/L	50	50.7	51.0	101	102	70-130	1	20	
1,1,2-Trichloroethane	ug/L	50	53.6	53.9	107	108	70-130	1	20	
1,1-Dichloroethane	ug/L	50	63.8	65.2	128	130	70-130	2	20	
1,1-Dichloroethene	ug/L	50	50.1	52.8	100	106	70-130	5	20	
1,2-Dichloroethane	ug/L	50	60.6	60.7	121	121	70-145	0	20	
1,2-Dichloropropane	ug/L	50	61.4	62.1	123	124	70-130	1	20	
2-Butanone (MEK)	ug/L	50	57.3	58.9	115	118	50-150	3	20	
2-Hexanone	ug/L	50	51.8	51.5	104	103	50-150	1	20	
4-Methyl-2-pentanone (MIBK)	ug/L	50	50.9	51.6	102	103	50-150	1	20	
Acetone	ug/L	50	64.8	68.3	130	137	50-150	5	20	
Benzene	ug/L	50	62.1	63.3	124	127	70-130	2	20	
Bromodichloromethane	ug/L	50	58.1	56.6	116	113	70-130	3	20	
Bromoform	ug/L	50	45.0	43.9	90	88	70-130	3	20	
Bromomethane	ug/L	50	48.9	49.9	98	100	52-155	2	20	
Carbon disulfide	ug/L	50	52.0	55.6	104	111	70-130	7	20	
Carbon tetrachloride	ug/L	50	70.7	70.7	141	141	70-153	0	20	
Chlorobenzene	ug/L	50	54.1	50.2	108	100	70-130	7	20	
Chloroethane	ug/L	50	58.3	55.6	117	111	70-130	5	20	
Chloroform	ug/L	50	59.8	59.8	120	120	70-130	0	20	
Chloromethane	ug/L	50	54.6	51.0	109	102	50-130	7	20	
cis-1,2-Dichloroethene	ug/L	50	57.2	57.3	114	115	70-130	0	20	
cis-1,3-Dichloropropene	ug/L	50	61.3	62.3	123	125	70-130	2	20	
Dibromochloromethane	ug/L	50	52.2	49.5	104	99	70-130	5	20	
Ethylbenzene	ug/L	50	58.2	57.1	116	114	70-130	2	20	
Methyl-tert-butyl ether	ug/L	50	58.4	59.9	117	120	70-130	3	20	
Methylene Chloride	ug/L	50	50.3	53.2	101	106	70-130	6	20	
Styrene	ug/L	50	53.9	49.4	108	99	70-130	9	20	
Tetrachloroethene	ug/L	50	50.8	49.6	102	99	70-130	2	20	
Toluene	ug/L	50	55.6	55.0	111	110	70-130	1	20	
trans-1,2-Dichloroethene	ug/L	50	59.0	60.3	118	121	70-130	2	20	
trans-1,3-Dichloropropene	ug/L	50	53.7	52.9	107	106	70-130	1	20	
Trichloroethene	ug/L	50	56.6	56.2	113	112	70-130	1	20	
Vinyl chloride	ug/L	50	58.7	51.6	117	103	66-130	13	20	
Xylene (Total)	ug/L	150	165	162	110	108	70-130	2	20	
4-Bromofluorobenzene (S)	%.				82	81	70-130			
Dibromofluoromethane (S)	%.				93	92	70-130			
Toluene-d8 (S)	%.				92	89	70-130			

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 598528 598529

Parameter	Units	4059502001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,1,1-Trichloroethane	ug/L	<0.90	50	50	60.9	61.2	122	122	70-133	0	20	
1,1,2,2-Tetrachloroethane	ug/L	<0.20	50	50	48.7	54.2	97	108	70-130	11	20	
1,1,2-Trichloroethane	ug/L	<0.42	50	50	51.6	55.1	103	110	70-130	7	20	
1,1-Dichloroethane	ug/L	<0.75	50	50	65.0	64.9	130	130	70-133	0	20	

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 598528 598529

Parameter	Units	4059502001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,1-Dichloroethene	ug/L	<0.57	50	50	52.4	51.2	105	102	70-130	2	20	
1,2-Dichloroethane	ug/L	0.45J	50	50	60.4	61.0	120	121	70-145	1	20	
1,2-Dichloropropane	ug/L	<0.49	50	50	61.6	61.8	123	124	70-130	0	20	
2-Butanone (MEK)	ug/L	<4.3	50	50	47.5	54.0	95	108	50-150	13	20	
2-Hexanone	ug/L	<2.0	50	50	42.8	51.7	86	103	50-150	19	20	
4-Methyl-2-pentanone (MIBK)	ug/L	<1.2	50	50	45.8	54.9	92	110	50-150	18	20	
Acetone	ug/L	<5.0	50	50	46.2	51.3	92	103	50-150	11	20	
Benzene	ug/L	<0.41	50	50	62.0	61.8	124	124	70-130	0	20	
Bromodichloromethane	ug/L	<0.56	50	50	55.9	55.8	112	112	70-130	0	20	
Bromoform	ug/L	<0.94	50	50	42.3	43.3	85	87	70-130	2	20	
Bromomethane	ug/L	<0.91	50	50	38.7	42.6	77	85	52-155	9	20	
Carbon disulfide	ug/L	<0.66	50	50	49.5	43.8	99	88	61-131	12	24	
Carbon tetrachloride	ug/L	<0.49	50	50	68.2	65.7	136	131	70-158	4	20	
Chlorobenzene	ug/L	<0.41	50	50	54.8	54.6	110	109	70-130	0	20	
Chloroethane	ug/L	<0.97	50	50	53.9	53.1	108	106	70-130	2	20	
Chloroform	ug/L	<1.3	50	50	60.0	58.8	120	118	70-130	2	20	
Chloromethane	ug/L	<0.24	50	50	46.9	46.8	94	94	46-130	0	20	
cis-1,2-Dichloroethene	ug/L	<0.83	50	50	57.1	57.3	114	115	70-130	0	20	
cis-1,3-Dichloropropene	ug/L	<0.20	50	50	55.1	53.8	110	108	70-130	2	20	
Dibromochloromethane	ug/L	<0.81	50	50	49.9	51.0	100	102	70-130	2	20	
Ethylbenzene	ug/L	<0.54	50	50	57.8	57.7	115	115	70-130	0	20	
Methyl-tert-butyl ether	ug/L	<0.61	50	50	56.2	61.1	112	122	70-130	8	20	
Methylene Chloride	ug/L	<0.43	50	50	53.7	51.6	107	103	70-130	4	20	
Styrene	ug/L	<0.86	50	50	52.6	52.3	105	105	19-157	1	20	
Tetrachloroethene	ug/L	<0.45	50	50	50.7	50.2	101	100	70-130	1	20	
Toluene	ug/L	<0.67	50	50	56.6	56.0	113	112	70-130	1	20	
trans-1,2-Dichloroethene	ug/L	<0.89	50	50	61.4	60.9	123	122	70-130	1	20	
trans-1,3-Dichloropropene	ug/L	<0.19	50	50	47.6	46.8	95	94	70-130	2	20	
Trichloroethene	ug/L	<0.48	50	50	55.6	55.7	111	111	70-130	0	20	
Vinyl chloride	ug/L	<0.18	50	50	49.2	48.1	98	96	62-130	2	20	
Xylene (Total)	ug/L	<2.6	150	150	168	166	112	111	70-130	1	20	
4-Bromofluorobenzene (S)	%.						81	81	70-130			
Dibromofluoromethane (S)	%.						94	93	70-130			
Toluene-d8 (S)	%.						91	90	70-130			

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

QC Batch: OEXT/14392
Analysis Method: EPA 8015B Modified
QC Batch Method: EPA 3546
Analysis Description: 8015 Solid GCSV
Associated Lab Samples: 4059458001, 4059458002

METHOD BLANK: 599641
Matrix: Solid
Associated Lab Samples: 4059458001, 4059458002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
TPH - Diesel (C10-C28)	mg/kg	ND	1.7	05/07/12 09:45	
o-Terphenyl (S)	%.	69	39-130	05/07/12 09:45	

LABORATORY CONTROL SAMPLE: 599642

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
TPH - Diesel (C10-C28)	mg/kg	16.7	13.3	80	53-130	
o-Terphenyl (S)	%.			92	39-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 599643 599644

Parameter	Units	4059408001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
TPH - Diesel (C10-C28)	mg/kg	2.1	18.1	18.1	14.9	15.4	71	74	10-190	4	50	
o-Terphenyl (S)	%.						88	88	39-130			

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

QC Batch: OEXT/14415
QC Batch Method: EPA 3510
Associated Lab Samples: 4059458003
Analysis Method: EPA 8082
Analysis Description: 8082 GCS PCB

METHOD BLANK: 601743
Matrix: Water
Associated Lab Samples: 4059458003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
PCB-1016 (Aroclor 1016)	ug/L	ND	0.50	05/09/12 02:06	
PCB-1221 (Aroclor 1221)	ug/L	ND	0.50	05/09/12 02:06	
PCB-1232 (Aroclor 1232)	ug/L	ND	0.50	05/09/12 02:06	
PCB-1242 (Aroclor 1242)	ug/L	ND	0.50	05/09/12 02:06	
PCB-1248 (Aroclor 1248)	ug/L	ND	0.50	05/09/12 02:06	
PCB-1254 (Aroclor 1254)	ug/L	ND	0.50	05/09/12 02:06	
PCB-1260 (Aroclor 1260)	ug/L	ND	0.50	05/09/12 02:06	
Decachlorobiphenyl (S)	%.	61	31-130	05/09/12 02:06	
Tetrachloro-m-xylene (S)	%.	87	10-173	05/09/12 02:06	

LABORATORY CONTROL SAMPLE & LCSD: 601744 601745

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
PCB-1016 (Aroclor 1016)	ug/L		ND	ND					29	
PCB-1221 (Aroclor 1221)	ug/L		ND	ND					29	
PCB-1232 (Aroclor 1232)	ug/L		ND	ND					29	
PCB-1242 (Aroclor 1242)	ug/L		ND	ND					29	
PCB-1248 (Aroclor 1248)	ug/L		ND	ND					29	
PCB-1254 (Aroclor 1254)	ug/L		ND	ND					29	
PCB-1260 (Aroclor 1260)	ug/L	2.5	2.2	2.4	87	96	51-142	10	29	
Decachlorobiphenyl (S)	%.				51	64	31-130			
Tetrachloro-m-xylene (S)	%.				71	66	10-173			

MATRIX SPIKE SAMPLE: 601746

Parameter	Units	4059513001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
PCB-1016 (Aroclor 1016)	ug/L	<1.5		ND			
PCB-1221 (Aroclor 1221)	ug/L	<1.5		ND			
PCB-1232 (Aroclor 1232)	ug/L	<1.5		ND			
PCB-1242 (Aroclor 1242)	ug/L	<1.5		ND			
PCB-1248 (Aroclor 1248)	ug/L	<1.5		ND			
PCB-1254 (Aroclor 1254)	ug/L	<1.5		ND			
PCB-1260 (Aroclor 1260)	ug/L	<1.5	25	24.9	100	10-156	
Decachlorobiphenyl (S)	%.				101	31-130	
Tetrachloro-m-xylene (S)	%.				63	10-173	

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

QC Batch: OEXT/14368 Analysis Method: EPA 8270
QC Batch Method: EPA 3510 Analysis Description: 8270 Water MSSV
Associated Lab Samples: 4059458003

METHOD BLANK: 598687 Matrix: Water
Associated Lab Samples: 4059458003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,2,4-Trichlorobenzene	ug/L	ND	5.0	05/02/12 10:55	
1,2-Dichlorobenzene	ug/L	ND	5.0	05/02/12 10:55	
1,3-Dichlorobenzene	ug/L	ND	5.0	05/02/12 10:55	
1,4-Dichlorobenzene	ug/L	ND	5.0	05/02/12 10:55	
2,2'-Oxybis(1-chloropropane)	ug/L	ND	5.0	05/02/12 10:55	
2,4,5-Trichlorophenol	ug/L	ND	5.0	05/02/12 10:55	
2,4,6-Trichlorophenol	ug/L	ND	5.0	05/02/12 10:55	
2,4-Dichlorophenol	ug/L	ND	5.0	05/02/12 10:55	
2,4-Dimethylphenol	ug/L	ND	5.0	05/02/12 10:55	
2,4-Dinitrophenol	ug/L	ND	10.0	05/02/12 10:55	
2,4-Dinitrotoluene	ug/L	ND	5.0	05/02/12 10:55	
2,6-Dinitrotoluene	ug/L	ND	5.0	05/02/12 10:55	
2-Chloronaphthalene	ug/L	ND	5.0	05/02/12 10:55	
2-Chlorophenol	ug/L	ND	5.0	05/02/12 10:55	
2-Methylnaphthalene	ug/L	ND	5.0	05/02/12 10:55	
2-Methylphenol(o-Cresol)	ug/L	ND	5.0	05/02/12 10:55	
2-Nitroaniline	ug/L	ND	5.0	05/02/12 10:55	
2-Nitrophenol	ug/L	ND	5.0	05/02/12 10:55	
3&4-Methylphenol(m&p Cresol)	ug/L	ND	5.0	05/02/12 10:55	
3,3'-Dichlorobenzidine	ug/L	ND	5.0	05/02/12 10:55	
3-Nitroaniline	ug/L	ND	5.0	05/02/12 10:55	
4,6-Dinitro-2-methylphenol	ug/L	ND	5.0	05/02/12 10:55	
4-Bromophenylphenyl ether	ug/L	ND	5.0	05/02/12 10:55	
4-Chloro-3-methylphenol	ug/L	ND	5.0	05/02/12 10:55	
4-Chloroaniline	ug/L	ND	5.0	05/02/12 10:55	
4-Chlorophenylphenyl ether	ug/L	ND	5.0	05/02/12 10:55	
4-Nitroaniline	ug/L	ND	5.0	05/02/12 10:55	
4-Nitrophenol	ug/L	ND	10.0	05/02/12 10:55	
Acenaphthene	ug/L	ND	5.0	05/02/12 10:55	
Acenaphthylene	ug/L	ND	5.0	05/02/12 10:55	
Anthracene	ug/L	ND	5.0	05/02/12 10:55	
Benzo(a)anthracene	ug/L	ND	5.0	05/02/12 10:55	
Benzo(a)pyrene	ug/L	ND	5.0	05/02/12 10:55	
Benzo(b)fluoranthene	ug/L	ND	5.0	05/02/12 10:55	
Benzo(g,h,i)perylene	ug/L	ND	5.0	05/02/12 10:55	
Benzo(k)fluoranthene	ug/L	ND	5.0	05/02/12 10:55	
bis(2-Chloroethoxy)methane	ug/L	ND	5.0	05/02/12 10:55	
bis(2-Chloroethyl) ether	ug/L	ND	5.0	05/02/12 10:55	
bis(2-Ethylhexyl)phthalate	ug/L	ND	5.0	05/02/12 10:55	
Butylbenzylphthalate	ug/L	ND	5.0	05/02/12 10:55	
Carbazole	ug/L	ND	5.0	05/02/12 10:55	
Chrysene	ug/L	ND	5.0	05/02/12 10:55	
Di-n-butylphthalate	ug/L	ND	5.0	05/02/12 10:55	

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

METHOD BLANK: 598687 Matrix: Water

Associated Lab Samples: 4059458003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Di-n-octylphthalate	ug/L	ND	5.0	05/02/12 10:55	
Dibenz(a,h)anthracene	ug/L	ND	5.0	05/02/12 10:55	
Dibenzofuran	ug/L	ND	5.0	05/02/12 10:55	
Diethylphthalate	ug/L	ND	5.0	05/02/12 10:55	
Dimethylphthalate	ug/L	ND	5.0	05/02/12 10:55	
Fluoranthene	ug/L	ND	5.0	05/02/12 10:55	
Fluorene	ug/L	ND	5.0	05/02/12 10:55	
Hexachloro-1,3-butadiene	ug/L	ND	10.0	05/02/12 10:55	
Hexachlorobenzene	ug/L	ND	5.0	05/02/12 10:55	
Hexachlorocyclopentadiene	ug/L	ND	5.0	05/02/12 10:55	
Hexachloroethane	ug/L	ND	5.0	05/02/12 10:55	
Indeno(1,2,3-cd)pyrene	ug/L	ND	5.0	05/02/12 10:55	
Isophorone	ug/L	ND	5.0	05/02/12 10:55	
N-Nitroso-di-n-propylamine	ug/L	ND	5.0	05/02/12 10:55	
N-Nitrosodiphenylamine	ug/L	ND	10.0	05/02/12 10:55	
Naphthalene	ug/L	ND	5.0	05/02/12 10:55	
Nitrobenzene	ug/L	ND	5.0	05/02/12 10:55	
Pentachlorophenol	ug/L	ND	10.0	05/02/12 10:55	
Phenanthrene	ug/L	ND	5.0	05/02/12 10:55	
Phenol	ug/L	ND	5.0	05/02/12 10:55	
Pyrene	ug/L	ND	5.0	05/02/12 10:55	
2,4,6-Tribromophenol (S)	%.	72	38-130	05/02/12 10:55	
2-Fluorobiphenyl (S)	%.	77	51-130	05/02/12 10:55	
2-Fluorophenol (S)	%.	42	24-130	05/02/12 10:55	
Nitrobenzene-d5 (S)	%.	69	41-130	05/02/12 10:55	
Phenol-d6 (S)	%.	27	13-130	05/02/12 10:55	
Terphenyl-d14 (S)	%.	70	38-130	05/02/12 10:55	

LABORATORY CONTROL SAMPLE: 598688

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2,4-Trichlorobenzene	ug/L	50	40.0	80	53-130	
1,2-Dichlorobenzene	ug/L	50	40.4	81	41-130	
1,3-Dichlorobenzene	ug/L	50	39.2	78	35-130	
1,4-Dichlorobenzene	ug/L	50	39.5	79	36-130	
2,2'-Oxybis(1-chloropropane)	ug/L	50	41.5	83	54-130	
2,4,5-Trichlorophenol	ug/L	50	43.8	88	65-130	
2,4,6-Trichlorophenol	ug/L	50	43.7	87	60-130	
2,4-Dichlorophenol	ug/L	50	40.4	81	63-130	
2,4-Dimethylphenol	ug/L	50	26.3	53	17-130	
2,4-Dinitrophenol	ug/L	50	39.6	79	23-130	
2,4-Dinitrotoluene	ug/L	50	45.2	90	58-131	
2,6-Dinitrotoluene	ug/L	50	44.8	90	65-130	
2-Chloronaphthalene	ug/L	50	43.0	86	64-130	
2-Chlorophenol	ug/L	50	35.2	70	49-130	

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

LABORATORY CONTROL SAMPLE: 598688

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
2-Methylnaphthalene	ug/L	50	43.7	87	66-130	
2-Methylphenol(o-Cresol)	ug/L	50	30.9	62	36-130	
2-Nitroaniline	ug/L	50	50.1	100	66-130	
2-Nitrophenol	ug/L	50	42.2	84	48-130	
3&4-Methylphenol(m&p Cresol)	ug/L	50	27.9	56	34-130	
3,3'-Dichlorobenzidine	ug/L	50	44.9	90	43-130	
3-Nitroaniline	ug/L	50	48.2	96	53-130	
4,6-Dinitro-2-methylphenol	ug/L	50	37.0	74	41-133	
4-Bromophenylphenyl ether	ug/L	50	44.4	89	70-130	
4-Chloro-3-methylphenol	ug/L	50	37.9	76	42-130	
4-Chloroaniline	ug/L	50	44.1	88	48-130	
4-Chlorophenylphenyl ether	ug/L	50	43.4	87	67-130	
4-Nitroaniline	ug/L	50	52.6	105	46-130	
4-Nitrophenol	ug/L	50	22.2	44	14-130	
Acenaphthene	ug/L	50	43.1	86	70-130	
Acenaphthylene	ug/L	50	42.9	86	70-130	
Anthracene	ug/L	50	44.2	88	70-130	
Benzo(a)anthracene	ug/L	50	44.6	89	70-130	
Benzo(a)pyrene	ug/L	50	37.6	75	65-130	
Benzo(b)fluoranthene	ug/L	50	35.8	72	56-130	
Benzo(g,h,i)perylene	ug/L	50	46.5	93	49-136	
Benzo(k)fluoranthene	ug/L	50	46.6	93	62-130	
bis(2-Chloroethoxy)methane	ug/L	50	44.7	89	66-130	
bis(2-Chloroethyl) ether	ug/L	50	42.8	86	58-130	
bis(2-Ethylhexyl)phthalate	ug/L	50	45.4	91	58-138	
Butylbenzylphthalate	ug/L	50	44.4	89	44-152	
Carbazole	ug/L	50	47.5	95	68-130	
Chrysene	ug/L	50	44.2	88	70-130	
Di-n-butylphthalate	ug/L	50	43.3	87	68-130	
Di-n-octylphthalate	ug/L	50	49.5	99	64-134	
Dibenz(a,h)anthracene	ug/L	50	48.4	97	50-131	
Dibenzofuran	ug/L	50	45.2	90	67-130	
Diethylphthalate	ug/L	50	42.2	84	61-130	
Dimethylphthalate	ug/L	50	42.5	85	61-130	
Fluoranthene	ug/L	50	46.2	92	59-130	
Fluorene	ug/L	50	45.4	91	70-130	
Hexachloro-1,3-butadiene	ug/L	50	38.9	78	40-130	
Hexachlorobenzene	ug/L	50	39.8	80	67-130	
Hexachlorocyclopentadiene	ug/L	50	21.1	42	10-130	
Hexachloroethane	ug/L	50	36.9	74	28-130	
Indeno(1,2,3-cd)pyrene	ug/L	50	42.4	85	41-132	
Isophorone	ug/L	50	39.3	79	40-130	
N-Nitroso-di-n-propylamine	ug/L	50	43.4	87	57-130	
N-Nitrosodiphenylamine	ug/L	50	53.9	108	59-144	
Naphthalene	ug/L	50	43.8	88	64-130	
Nitrobenzene	ug/L	50	41.8	84	59-130	
Pentachlorophenol	ug/L	50	37.6	75	45-130	
Phenanthrene	ug/L	50	44.3	89	70-130	

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

LABORATORY CONTROL SAMPLE: 598688

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phenol	ug/L	50	22.2	44	26-130	
Pyrene	ug/L	50	43.9	88	51-130	
2,4,6-Tribromophenol (S)	%.			81	38-130	
2-Fluorobiphenyl (S)	%.			84	51-130	
2-Fluorophenol (S)	%.			50	24-130	
Nitrobenzene-d5 (S)	%.			87	41-130	
Phenol-d6 (S)	%.			38	13-130	
Terphenyl-d14 (S)	%.			75	38-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 598689 598690

Parameter	Units	4059463007 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,2,4-Trichlorobenzene	ug/L	<0.84	47.6	47.6	38.2	38.2	80	80	45-130	0	22	
1,2-Dichlorobenzene	ug/L	<0.68	47.6	47.6	39.1	39.1	82	82	39-130	0	34	
1,3-Dichlorobenzene	ug/L	<0.79	47.6	47.6	38.3	38.1	80	80	34-130	1	40	
1,4-Dichlorobenzene	ug/L	<0.83	47.6	47.6	39.0	37.8	82	79	33-130	3	38	
2,2'-Oxybis(1-chloropropane)	ug/L	<0.79	47.6	47.6	39.6	39.7	83	83	44-130	0	20	
2,4,5-Trichlorophenol	ug/L	<0.96	47.6	47.6	45.2	43.6	95	92	65-130	3	20	
2,4,6-Trichlorophenol	ug/L	<1.0	47.6	47.6	44.1	43.7	93	92	60-130	1	20	
2,4-Dichlorophenol	ug/L	<1.1	47.6	47.6	44.5	43.5	94	91	57-130	2	20	
2,4-Dimethylphenol	ug/L	<1.1	47.6	47.6	34.6	32.7	73	69	10-145	6	27	
2,4-Dinitrophenol	ug/L	<2.0	47.6	47.6	46.8	46.1	98	97	10-153	2	33	
2,4-Dinitrotoluene	ug/L	<0.77	47.6	47.6	44.8	44.5	94	93	35-139	1	20	
2,6-Dinitrotoluene	ug/L	<1.0	47.6	47.6	42.9	43.4	90	91	40-138	1	20	
2-Chloronaphthalene	ug/L	<0.81	47.6	47.6	39.9	41.5	84	87	64-130	4	20	
2-Chlorophenol	ug/L	<0.67	47.6	47.6	40.4	39.8	85	84	49-130	1	20	
2-Methylnaphthalene	ug/L	<1.3	47.6	47.6	41.3	41.4	87	87	42-136	0	20	
2-Methylphenol(o-Cresol)	ug/L	<0.94	47.6	47.6	36.8	36.1	77	76	28-130	2	21	
2-Nitroaniline	ug/L	<0.80	47.6	47.6	48.3	49.2	101	103	46-132	2	20	
2-Nitrophenol	ug/L	<1.3	47.6	47.6	43.0	42.6	90	89	48-130	1	20	
3&4-Methylphenol(m&p Cresol)	ug/L	<0.74	47.6	47.6	32.6	32.2	69	68	34-130	1	20	
3,3'-Dichlorobenzidine	ug/L	<1.1	47.6	47.6	45.3	40.5	95	85	10-136	11	28	
3-Nitroaniline	ug/L	<0.93	47.6	47.6	49.3	47.7	103	100	20-132	3	21	
4,6-Dinitro-2-methylphenol	ug/L	<0.72	47.6	47.6	38.4	38.3	81	80	29-145	0	21	
4-Bromophenylphenyl ether	ug/L	<1.3	47.6	47.6	43.2	41.4	91	87	66-130	4	20	
4-Chloro-3-methylphenol	ug/L	<0.97	47.6	47.6	44.3	42.9	93	90	42-130	3	20	
4-Chloroaniline	ug/L	<0.78	47.6	47.6	48.2	43.3	101	91	10-130	11	29	
4-Chlorophenylphenyl ether	ug/L	<1.1	47.6	47.6	42.2	41.1	89	86	63-130	2	20	
4-Nitroaniline	ug/L	<1.1	47.6	47.6	55.5	51.7	117	109	10-154	7	21	
4-Nitrophenol	ug/L	<0.84	47.6	47.6	22.0	22.1	46	46	10-130	0	38	
Acenaphthene	ug/L	<0.92	47.6	47.6	41.0	41.6	86	87	58-130	2	20	
Acenaphthylene	ug/L	<0.96	47.6	47.6	40.9	41.1	86	86	62-130	1	20	
Anthracene	ug/L	<0.60	47.6	47.6	43.7	43.3	92	91	62-130	1	20	
Benzo(a)anthracene	ug/L	<0.59	47.6	47.6	43.2	41.1	91	86	64-130	5	20	
Benzo(a)pyrene	ug/L	<0.93	47.6	47.6	37.7	36.9	79	78	46-130	2	20	

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 598689 598690

Parameter	Units	4059463007 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Benzo(b)fluoranthene	ug/L	<1.4	47.6	47.6	38.8	39.3	81	83	51-130	1	20	
Benzo(g,h,i)perylene	ug/L	<0.74	47.6	47.6	45.3	44.0	95	92	47-136	3	36	
Benzo(k)fluoranthene	ug/L	<0.99	47.6	47.6	40.4	39.8	85	83	45-140	1	23	
bis(2-Chloroethoxy)methane	ug/L	<1.1	47.6	47.6	42.6	42.2	89	89	64-130	1	20	
bis(2-Chloroethyl) ether	ug/L	<0.63	47.6	47.6	40.7	42.6	85	89	57-130	5	20	
bis(2-Ethylhexyl)phthalate	ug/L	<2.5	47.6	47.6	44.9	42.7	94	90	28-173	5	20	
Butylbenzylphthalate	ug/L	<1.0	47.6	47.6	42.5	41.0	89	86	32-152	4	20	
Carbazole	ug/L	<0.67	47.6	47.6	46.8	45.8	98	96	56-130	2	20	
Chrysene	ug/L	<0.75	47.6	47.6	42.5	41.2	89	87	65-130	3	20	
Di-n-butylphthalate	ug/L	<0.86	47.6	47.6	42.9	41.9	90	88	51-141	2	20	
Di-n-octylphthalate	ug/L	<1.5	47.6	47.6	49.0	46.7	103	98	29-176	5	20	
Dibenz(a,h)anthracene	ug/L	<1.3	47.6	47.6	46.9	43.9	99	92	44-131	7	33	
Dibenzofuran	ug/L	<1.0	47.6	47.6	43.0	43.4	90	91	57-136	1	20	
Diethylphthalate	ug/L	<1.3	47.6	47.6	40.9	41.0	86	86	61-130	0	20	
Dimethylphthalate	ug/L	<1.0	47.6	47.6	42.2	41.2	89	87	61-130	2	20	
Fluoranthene	ug/L	<0.88	47.6	47.6	46.9	45.8	99	96	55-130	3	20	
Fluorene	ug/L	<1.1	47.6	47.6	44.4	44.3	93	93	51-131	0	20	
Hexachloro-1,3-butadiene	ug/L	<0.63	47.6	47.6	37.6	35.4	79	74	29-130	6	38	
Hexachlorobenzene	ug/L	<1.1	47.6	47.6	38.2	37.9	80	80	46-152	1	20	
Hexachlorocyclopentadiene	ug/L	<1.1	47.6	47.6	27.3	25.6	57	54	10-130	6	50	
Hexachloroethane	ug/L	<0.56	47.6	47.6	37.6	36.6	79	77	24-130	3	47	
Indeno(1,2,3-cd)pyrene	ug/L	<0.64	47.6	47.6	41.4	40.8	87	86	41-132	1	36	
Isophorone	ug/L	<1.3	47.6	47.6	38.1	36.9	80	77	40-130	3	20	
N-Nitroso-di-n-propylamine	ug/L	<1.0	47.6	47.6	42.8	43.4	90	91	57-134	1	20	
N-Nitrosodiphenylamine	ug/L	<2.4	47.6	47.6	47.1	45.8	99	96	50-145	3	42	
Naphthalene	ug/L	<0.68	47.6	47.6	42.1	41.1	88	86	55-130	2	20	
Nitrobenzene	ug/L	<1.3	47.6	47.6	39.6	39.2	83	82	59-130	1	20	
Pentachlorophenol	ug/L	<1.0	47.6	47.6	40.8	39.2	85	82	10-164	4	27	
Phenanthrene	ug/L	<0.61	47.6	47.6	43.4	42.4	91	89	63-130	2	20	
Phenol	ug/L	<0.99	47.6	47.6	21.3	21.3	45	45	22-130	0	22	
Pyrene	ug/L	<1.5	47.6	47.6	42.1	40.3	88	85	51-130	4	23	
2,4,6-Tribromophenol (S)	%.						87	87	38-130			
2-Fluorobiphenyl (S)	%.						77	82	51-130			
2-Fluorophenol (S)	%.						51	54	24-130			
Nitrobenzene-d5 (S)	%.						83	83	41-130			
Phenol-d6 (S)	%.						36	37	13-130			
Terphenyl-d14 (S)	%.						76	72	38-130			

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

QC Batch: PMST/7019
Analysis Method: ASTM D2974-87
QC Batch Method: ASTM D2974-87
Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 4059458001, 4059458002

SAMPLE DUPLICATE: 603244

Parameter	Units	4059760008 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	12.7	12.5	2	10	

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

QC Batch: WETA/12235
QC Batch Method: EPA 351.2
Associated Lab Samples: 4059458003

Analysis Method: EPA 351.2
Analysis Description: 351.2 TKN Dissolved

METHOD BLANK: 601763 Matrix: Water
Associated Lab Samples: 4059458003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Kjeldahl, Total, Dissolved	mg/L	ND	1.0	05/07/12 14:38	

LABORATORY CONTROL SAMPLE: 601764

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Kjeldahl, Total, Dissolved	mg/L	5	5.1	101	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 601765 601766

Parameter	Units	4059533004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Nitrogen, Kjeldahl, Total, Dissolved	mg/L	<0.35	5	5	5.0	4.6	99	91	90-110	9		

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

QC Batch: WETA/12273
QC Batch Method: EPA 365.4
Associated Lab Samples: 4059458003

Analysis Method: EPA 365.4
Analysis Description: 365.4 Phosphorus

METHOD BLANK: 602395
Matrix: Water
Associated Lab Samples: 4059458003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phosphorus	mg/L	ND	0.40	05/09/12 14:04	

LABORATORY CONTROL SAMPLE: 602396

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	5	5.1	103	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 602397 602398

Parameter	Units	4059809006 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Phosphorus	mg/L	8.8	20	20	28.4	29.6	98	104	90-110	4	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 602399 602400

Parameter	Units	4059647002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Phosphorus	mg/L	<0.20	5	5	5.3	5.3	103	102	90-110	1	20	

QUALIFIERS

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

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.

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.

BATCH QUALIFIERS

Batch: GCV/8314

[M5] A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

Batch: GCSV/7578

[1] The default spike range of the standard used for QC evaluation is C10-C28. All other carbon ranges may recover outside of spike limits because they may not cover the range of the spike used.

Batch: GCSV/7594

[1] The continuing calibration is outside of method acceptance limits. Analyte presence below reporting limits in associated samples. Results unaffected by high bias. Any samples with the presence of analytes above reporting limits were re-analyzed in a valid window.

ANALYTE QUALIFIERS

D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
S4	Surrogate recovery not evaluated against control limits due to sample dilution.

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4059458

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4059458001	**042312001**	EPA 3546	OEXT/14392	EPA 8015B Modified	GCSV/7578
4059458002	**042312002**	EPA 3546	OEXT/14392	EPA 8015B Modified	GCSV/7578
4059458003	**042512001**	EPA 3510	OEXT/14415	EPA 8082	GCSV/7594
4059458001	**042312001**	EPA 5035A/5030B	GCV/8311	EPA 8015B Modified	GCV/8314
4059458002	**042312002**	EPA 5035A/5030B	GCV/8311	EPA 8015B Modified	GCV/8314
4059458003	**042512001**	EPA 6010	ICP/5882		
4059458003	**042512001**	EPA 7470	MERP/3057	EPA 7470	MERC/3471
4059458003	**042512001**	EPA 3510	OEXT/14368	EPA 8270	MSSV/4556
4059458003	**042512001**	EPA 8260	MSV/15014		
4059458004	**TRIP042512**	EPA 8260	MSV/15014		
4059458001	**042312001**	ASTM D2974-87	PMST/7019		
4059458002	**042312002**	ASTM D2974-87	PMST/7019		
4059458003	**042512001**	EPA 351.2	WETA/12235	EPA 351.2	WETA/12251
4059458003	**042512001**	EPA 365.4	WETA/12273	EPA 365.4	WETA/12278

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July 11, 2012

Glenn Luke
Natural Resource Technologies
23713 W Park Rd
Pewaukee, WI 53072

RE: Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062415

Dear Glenn Luke:

Enclosed are the analytical results for sample(s) received by the laboratory on June 26, 2012. 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,

Brian Basten

brian.basten@pacelabs.com
Project Manager

Enclosures

cc: Brian Hennings, NATURAL RESOURCE TECHNOLOGY

CERTIFICATIONS

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062415

Green Bay Certification IDs
1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888
North Carolina Certification #: 503
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750

SAMPLE SUMMARY

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062415

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4062415001	**062012001**	Solid	06/20/12 11:18	06/26/12 08:50
4062415002	**062012002**	Solid	06/20/12 13:50	06/26/12 08:50
4062415003	**062112003**	Solid	06/21/12 09:05	06/26/12 08:50
4062415004	**062112004**	Solid	06/21/12 12:00	06/26/12 08:50
4062415005	**062112005**	Solid	06/21/12 14:15	06/26/12 08:50
4062415006	**062212006**	Solid	06/22/12 12:00	06/26/12 08:50
4062415007	**062212007**	Solid	06/22/12 15:05	06/26/12 08:50

SAMPLE ANALYTE COUNT

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062415

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4062415001	**062012001**	EPA 8015B Modified	HMH	2
		EPA 8015B Modified	LCM	1
		ASTM D2974-87	SKW	1
4062415002	**062012002**	EPA 8015B Modified	HMH	2
		EPA 8015B Modified	LCM	1
		ASTM D2974-87	SKW	1
4062415003	**062112003**	EPA 8015B Modified	HMH	2
		EPA 8015B Modified	LCM	1
		ASTM D2974-87	SKW	1
4062415004	**062112004**	EPA 8015B Modified	HMH	2
		EPA 8015B Modified	LCM	1
		ASTM D2974-87	SKW	1
4062415005	**062112005**	EPA 8015B Modified	HMH	2
		EPA 8015B Modified	LCM	1
		ASTM D2974-87	SKW	1
4062415006	**062212006**	EPA 8015B Modified	HMH	2
		EPA 8015B Modified	LCM	1
		ASTM D2974-87	SKW	1
4062415007	**062212007**	EPA 8015B Modified	HMH	2
		EPA 8015B Modified	LCM	1
		ASTM D2974-87	SKW	1

PROJECT NARRATIVE

Project:	2088 NORTH PLANT MGP
Pace Project No.:	4062415

Method: **EPA 8015B Modified**
Description: 8015 GCS THC-Diesel
Client: Natural Resources Technologies
Date: July 11, 2012

General Information:
7 samples were analyzed for EPA 8015B Modified. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3546 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

QC Batch: OEXT/14988

S4: Surrogate recovery not evaluated against control limits due to sample dilution.

- 062012001 (Lab ID: 4062415001)
  - o-Terphenyl (S)
- 062012002 (Lab ID: 4062415002)
  - o-Terphenyl (S)
- 062112003 (Lab ID: 4062415003)
  - o-Terphenyl (S)
- 062112004 (Lab ID: 4062415004)
  - o-Terphenyl (S)
- 062112005 (Lab ID: 4062415005)
  - o-Terphenyl (S)
- 062212006 (Lab ID: 4062415006)
  - o-Terphenyl (S)
- 062212007 (Lab ID: 4062415007)
  - o-Terphenyl (S)
- MS (Lab ID: 627260)
  - o-Terphenyl (S)
- MSD (Lab ID: 627261)
  - o-Terphenyl (S)

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

PROJECT NARRATIVE

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062415

Method: **EPA 8015B Modified**
Description: 8015 GCS THC-Diesel
Client: Natural Resources Technologies
Date: July 11, 2012

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: OEXT/14988

A matrix spike and matrix spike duplicate (MS/MSD) were performed on the following sample(s): 4061964005

M0: Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.

- MSD (Lab ID: 627261)
    - TPH - Diesel (C10-C28)

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

Batch Comments:

The default spike range of the standard used for QC evaluation is C10-C28. All other carbon ranges may recover outside of spike limits because they may not cover the range of the spike used.

- QC Batch: GCSV / 7879

PROJECT NARRATIVE

Project:	2088 NORTH PLANT MGP
Pace Project No.:	4062415

Method: **EPA 8015B Modified**
Description: Gasoline Range Organics
Client: Natural Resources Technologies
Date: July 11, 2012

General Information:
7 samples were analyzed for EPA 8015B Modified. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 5035A/5030B with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

Analyte Comments:

QC Batch: GCV/8585

D3: Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
- 062012002 (Lab ID: 4062415002)
  - TPH (C06-C10)

This data package has been reviewed for quality and completeness and is approved for release.

ANALYTICAL RESULTS

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062415

Sample: 062012001 **Lab ID: 4062415001** Collected: 06/20/12 11:18 Received: 06/26/12 08:50 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8015 GCS THC-Diesel	Analytical Method: EPA 8015B Modified Preparation Method: EPA 3546							
TPH - Diesel (C10-C28)	**125**	mg/kg	4.0	2	06/27/12 06:55	06/27/12 13:44		
Surrogates								
o-Terphenyl (S)	0	%.	39-130	2	06/27/12 06:55	06/27/12 13:44	84-15-1	S4
Gasoline Range Organics	Analytical Method: EPA 8015B Modified Preparation Method: EPA 5035A/5030B							
TPH (C06-C10)	ND	mg/kg	11.9	1	06/28/12 07:50	06/28/12 15:14		
Percent Moisture	Analytical Method: ASTM D2974-87							
Percent Moisture	**16.3**	%	0.10	1		07/10/12 13:10		

Sample: 062012002 **Lab ID: 4062415002** Collected: 06/20/12 13:50 Received: 06/26/12 08:50 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8015 GCS THC-Diesel	Analytical Method: EPA 8015B Modified Preparation Method: EPA 3546							
TPH - Diesel (C10-C28)	**6600**	mg/kg	259	20	06/27/12 06:55	06/27/12 13:56		
Surrogates								
o-Terphenyl (S)	0	%.	39-130	20	06/27/12 06:55	06/27/12 13:56	84-15-1	S4
Gasoline Range Organics	Analytical Method: EPA 8015B Modified Preparation Method: EPA 5035A/5030B							
TPH (C06-C10)	ND	mg/kg	103	8	06/28/12 07:50	06/28/12 14:48		D3
Percent Moisture	Analytical Method: ASTM D2974-87							
Percent Moisture	**22.6**	%	0.10	1		07/10/12 13:10		

Sample: 062112003 **Lab ID: 4062415003** Collected: 06/21/12 09:05 Received: 06/26/12 08:50 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8015 GCS THC-Diesel	Analytical Method: EPA 8015B Modified Preparation Method: EPA 3546							
TPH - Diesel (C10-C28)	**1070**	mg/kg	39.8	20	06/27/12 06:55	06/27/12 14:08		
Surrogates								
o-Terphenyl (S)	0	%.	39-130	20	06/27/12 06:55	06/27/12 14:08	84-15-1	S4
Gasoline Range Organics	Analytical Method: EPA 8015B Modified Preparation Method: EPA 5035A/5030B							
TPH (C06-C10)	**13.2**	mg/kg	11.9	1	06/28/12 07:50	06/28/12 15:39		
Percent Moisture	Analytical Method: ASTM D2974-87							
Percent Moisture	**16.1**	%	0.10	1		07/10/12 13:10		

ANALYTICAL RESULTS

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062415

Sample: 062112004 **Lab ID: 4062415004** Collected: 06/21/12 12:00 Received: 06/26/12 08:50 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8015 GCS THC-Diesel	Analytical Method: EPA 8015B Modified Preparation Method: EPA 3546							
TPH - Diesel (C10-C28)	**1460**	mg/kg	46.1	4	06/27/12 06:55	06/27/12 14:20		
Surrogates								
o-Terphenyl (S)	0	%.	39-130	4	06/27/12 06:55	06/27/12 14:20	84-15-1	S4
Gasoline Range Organics	Analytical Method: EPA 8015B Modified Preparation Method: EPA 5035A/5030B							
TPH (C06-C10)	ND	mg/kg	11.5	1	06/28/12 07:50	06/28/12 19:05		
Percent Moisture	Analytical Method: ASTM D2974-87							
Percent Moisture	**13.1**	%	0.10	1		07/10/12 13:10		

Sample: 062112005 **Lab ID: 4062415005** Collected: 06/21/12 14:15 Received: 06/26/12 08:50 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8015 GCS THC-Diesel	Analytical Method: EPA 8015B Modified Preparation Method: EPA 3546							
TPH - Diesel (C10-C28)	**861**	mg/kg	40.4	20	06/27/12 06:55	06/27/12 14:32		
Surrogates								
o-Terphenyl (S)	0	%.	39-130	20	06/27/12 06:55	06/27/12 14:32	84-15-1	S4
Gasoline Range Organics	Analytical Method: EPA 8015B Modified Preparation Method: EPA 5035A/5030B							
TPH (C06-C10)	ND	mg/kg	12.1	1	06/28/12 07:50	06/28/12 13:56		
Percent Moisture	Analytical Method: ASTM D2974-87							
Percent Moisture	**17.2**	%	0.10	1		07/10/12 13:10		

Sample: 062212006 **Lab ID: 4062415006** Collected: 06/22/12 12:00 Received: 06/26/12 08:50 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8015 GCS THC-Diesel	Analytical Method: EPA 8015B Modified Preparation Method: EPA 3546							
TPH - Diesel (C10-C28)	**144**	mg/kg	4.0	2	06/27/12 06:55	06/27/12 14:44		
Surrogates								
o-Terphenyl (S)	0	%.	39-130	2	06/27/12 06:55	06/27/12 14:44	84-15-1	S4
Gasoline Range Organics	Analytical Method: EPA 8015B Modified Preparation Method: EPA 5035A/5030B							
TPH (C06-C10)	ND	mg/kg	11.8	1	06/28/12 07:50	06/28/12 18:13		
Percent Moisture	Analytical Method: ASTM D2974-87							
Percent Moisture	**15.6**	%	0.10	1		07/10/12 13:10		

ANALYTICAL RESULTS

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062415

Sample: 062212007 **Lab ID: 4062415007** Collected: 06/22/12 15:05 Received: 06/26/12 08:50 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8015 GCS THC-Diesel	Analytical Method: EPA 8015B Modified Preparation Method: EPA 3546							
TPH - Diesel (C10-C28)	**444**	mg/kg	20.1	10	06/27/12 06:55	06/27/12 14:57		
Surrogates								
o-Terphenyl (S)	0	%.	39-130	10	06/27/12 06:55	06/27/12 14:57	84-15-1	S4
Gasoline Range Organics	Analytical Method: EPA 8015B Modified Preparation Method: EPA 5035A/5030B							
TPH (C06-C10)	ND	mg/kg	12.1	1	06/28/12 07:50	06/28/12 14:22		
Percent Moisture	Analytical Method: ASTM D2974-87							
Percent Moisture	**17.0**	%	0.10	1		07/10/12 15:56		

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062415

QC Batch: GCV/8585 Analysis Method: EPA 8015B Modified
QC Batch Method: EPA 5035A/5030B Analysis Description: Gasoline Range Organics
Associated Lab Samples: 4062415001, 4062415002, 4062415003, 4062415004, 4062415005, 4062415006, 4062415007

METHOD BLANK: 627983 Matrix: Solid

Associated Lab Samples: 4062415001, 4062415002, 4062415003, 4062415004, 4062415005, 4062415006, 4062415007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
TPH (C06-C10)	mg/kg	ND	10.0	06/28/12 08:48	

LABORATORY CONTROL SAMPLE & LCSD: 627984 627985

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
TPH (C06-C10)	mg/kg	50	44.7	44.0	89	88	79-120	1	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 627986 627987

Parameter	Units	4062457001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
TPH (C06-C10)	mg/kg	<6.3	78.8	78.8	65.2	63.6	83	81	67-120	2	20	

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062415

QC Batch: OEXT/14988
Analysis Method: EPA 8015B Modified
QC Batch Method: EPA 3546
Analysis Description: 8015 Solid GCSV
Associated Lab Samples: 4062415001, 4062415002, 4062415003, 4062415004, 4062415005, 4062415006, 4062415007

METHOD BLANK: 627258
Matrix: Solid
Associated Lab Samples: 4062415001, 4062415002, 4062415003, 4062415004, 4062415005, 4062415006, 4062415007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
TPH - Diesel (C10-C28)	mg/kg	ND	1.7	06/27/12 09:31	
o-Terphenyl (S)	%.	77	39-130	06/27/12 09:31	

LABORATORY CONTROL SAMPLE: 627259

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
TPH - Diesel (C10-C28)	mg/kg	16.7	13.3	80	53-130	
o-Terphenyl (S)	%.			87	39-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 627260 627261

Parameter	Units	4061964005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
TPH - Diesel (C10-C28)	mg/kg	89.8	18	18	91.8	86.2	11	-20	10-190	6	50	M0
o-Terphenyl (S)	%.						0	0	39-130			S4

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062415

QC Batch: PMST/7264
Analysis Method: ASTM D2974-87
QC Batch Method: ASTM D2974-87
Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 4062415001, 4062415002, 4062415003, 4062415004, 4062415005, 4062415006

SAMPLE DUPLICATE: 633189

Parameter	Units	4063062002 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	5.8	5.8	0	10	

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062415

QC Batch: PMST/7269
QC Batch Method: ASTM D2974-87
Associated Lab Samples: 4062415007

Analysis Method: ASTM D2974-87
Analysis Description: Dry Weight/Percent Moisture

SAMPLE DUPLICATE: 633479

Parameter	Units	4063012001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	7.5	7.5	0	10	

QUALIFIERS

Project:	2088 NORTH PLANT MGP
Pace Project No.:	4062415

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.

PRL - Pace Reporting 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.

BATCH QUALIFIERS

Batch: GCSV/7879

[1]	The default spike range of the standard used for QC evaluation is C10-C28. All other carbon ranges may recover outside of spike limits because they may not cover the range of the spike used.

ANALYTE QUALIFIERS

D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
M0	Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.
S4	Surrogate recovery not evaluated against control limits due to sample dilution.

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062415

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4062415001	**062012001**	EPA 3546	OEXT/14988	EPA 8015B Modified	GCSV/7879
4062415002	**062012002**	EPA 3546	OEXT/14988	EPA 8015B Modified	GCSV/7879
4062415003	**062112003**	EPA 3546	OEXT/14988	EPA 8015B Modified	GCSV/7879
4062415004	**062112004**	EPA 3546	OEXT/14988	EPA 8015B Modified	GCSV/7879
4062415005	**062112005**	EPA 3546	OEXT/14988	EPA 8015B Modified	GCSV/7879
4062415006	**062212006**	EPA 3546	OEXT/14988	EPA 8015B Modified	GCSV/7879
4062415007	**062212007**	EPA 3546	OEXT/14988	EPA 8015B Modified	GCSV/7879
4062415001	**062012001**	EPA 5035A/5030B	GCV/8585	EPA 8015B Modified	GCV/8590
4062415002	**062012002**	EPA 5035A/5030B	GCV/8585	EPA 8015B Modified	GCV/8590
4062415003	**062112003**	EPA 5035A/5030B	GCV/8585	EPA 8015B Modified	GCV/8590
4062415004	**062112004**	EPA 5035A/5030B	GCV/8585	EPA 8015B Modified	GCV/8590
4062415005	**062112005**	EPA 5035A/5030B	GCV/8585	EPA 8015B Modified	GCV/8590
4062415006	**062212006**	EPA 5035A/5030B	GCV/8585	EPA 8015B Modified	GCV/8590
4062415007	**062212007**	EPA 5035A/5030B	GCV/8585	EPA 8015B Modified	GCV/8590
4062415001	**062012001**	ASTM D2974-87	PMST/7264		
4062415002	**062012002**	ASTM D2974-87	PMST/7264		
4062415003	**062112003**	ASTM D2974-87	PMST/7264		
4062415004	**062112004**	ASTM D2974-87	PMST/7264		
4062415005	**062112005**	ASTM D2974-87	PMST/7264		
4062415006	**062212006**	ASTM D2974-87	PMST/7264		
4062415007	**062212007**	ASTM D2974-87	PMST/7269		

Pace Analytical®
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1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

July 19, 2012

Glenn Luke
Natural Resource Technologies
23713 W Park Rd
Pewaukee, WI 53072

RE: Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062930

Dear Glenn Luke:

Enclosed are the analytical results for sample(s) received by the laboratory on July 06, 2012. 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,

Brian Basten

brian.basten@pacelabs.com
Project Manager

Enclosures

cc: Brian Hennings, NATURAL RESOURCE TECHNOLOGY

CERTIFICATIONS

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062930

Green Bay Certification IDs
1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888
North Carolina Certification #: 503
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750

SAMPLE SUMMARY

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062930

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4062930001	062512008	Solid	06/25/12 10:10	07/06/12 09:50
4062930002	062512009	Solid	06/25/12 16:30	07/06/12 09:50
4062930003	062812010	Solid	06/28/12 11:10	07/06/12 09:50
4062930004	062812011	Solid	06/28/12 14:00	07/06/12 09:50
4062930005	062912012	Solid	06/29/12 14:40	07/06/12 09:50
4062930006	062912013	Solid	06/29/12 15:25	07/06/12 09:50

SAMPLE ANALYTE COUNT

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062930

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4062930001	**062512008**	EPA 8015B Modified	HMH	2
		EPA 8015B Modified	PMS	1
		ASTM D2974-87	SKW	1
4062930002	**062512009**	EPA 8015B Modified	HMH	2
		EPA 8015B Modified	PMS	1
		ASTM D2974-87	SKW	1
4062930003	**062812010**	EPA 8015B Modified	HMH	2
		EPA 8015B Modified	PMS	1
		ASTM D2974-87	SKW	1
4062930004	**062812011**	EPA 8015B Modified	HMH	2
		EPA 8015B Modified	PMS	1
		ASTM D2974-87	SKW	1
4062930005	**062912012**	EPA 8015B Modified	HMH	2
		EPA 8015B Modified	PMS	1
		ASTM D2974-87	SKW	1
4062930006	**062912013**	EPA 8015B Modified	HMH	2
		EPA 8015B Modified	PMS	1
		ASTM D2974-87	SKW	1

PROJECT NARRATIVE

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062930

Method: **EPA 8015B Modified**
Description: 8015 GCS THC-Diesel
Client: Natural Resources Technologies
Date: July 19, 2012

General Information:
6 samples were analyzed for EPA 8015B Modified. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3546 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

QC Batch: OEXT/15103

S4: Surrogate recovery not evaluated against control limits due to sample dilution.
- 062512008 (Lab ID: 4062930001)
  - o-Terphenyl (S)
- 062512009 (Lab ID: 4062930002)
  - o-Terphenyl (S)
- 062812011 (Lab ID: 4062930004)
  - o-Terphenyl (S)
- MSD (Lab ID: 632476)
  - o-Terphenyl (S)

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: OEXT/15103

A matrix spike and matrix spike duplicate (MS/MSD) were performed on the following sample(s): 4062930002

D6: The relative percent difference (RPD) between the sample and sample duplicate exceeded laboratory control limits.
- MSD (Lab ID: 632476)
  - TPH - Diesel (C10-C28)

PROJECT NARRATIVE

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062930

Method: **EPA 8015B Modified**
Description: 8015 GCS THC-Diesel
Client: Natural Resources Technologies
Date: July 19, 2012

QC Batch: OEXT/15103

A matrix spike and matrix spike duplicate (MS/MSD) were performed on the following sample(s): 4062930002

M0: Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.

- MS (Lab ID: 632475)
  - TPH - Diesel (C10-C28)

Additional Comments:

PROJECT NARRATIVE

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062930

Method: **EPA 8015B Modified**
Description: Gasoline Range Organics
Client: Natural Resources Technologies
Date: July 19, 2012

General Information:
6 samples were analyzed for EPA 8015B Modified. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 5035A/5030B with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: GCV/8633

A matrix spike/matrix spike duplicate was not performed due to insufficient sample volume.

Additional Comments:

Analyte Comments:

QC Batch: GCV/8628

D3: Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
- 062512008 (Lab ID: 4062930001)
  - TPH (C06-C10)
- 062812011 (Lab ID: 4062930004)
  - TPH (C06-C10)

This data package has been reviewed for quality and completeness and is approved for release.

ANALYTICAL RESULTS

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062930

Sample: 062512008 **Lab ID: 4062930001** Collected: 06/25/12 10:10 Received: 07/06/12 09:50 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8015 GCS THC-Diesel	Analytical Method: EPA 8015B Modified Preparation Method: EPA 3546							
TPH - Diesel (C10-C28)	**119000**	mg/kg	3950	100	07/09/12 06:58	07/16/12 12:06		
Surrogates								
o-Terphenyl (S)	0	%.	39-130	100	07/09/12 06:58	07/16/12 12:06	84-15-1	S4
Gasoline Range Organics	Analytical Method: EPA 8015B Modified Preparation Method: EPA 5035A/5030B							
TPH (C06-C10)	ND	mg/kg	758	50	07/09/12 07:36	07/09/12 17:41		D3
Percent Moisture	Analytical Method: ASTM D2974-87							
Percent Moisture	**15.5**	%	0.10	1		07/18/12 14:26		

Sample: 062512009 **Lab ID: 4062930002** Collected: 06/25/12 16:30 Received: 07/06/12 09:50 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8015 GCS THC-Diesel	Analytical Method: EPA 8015B Modified Preparation Method: EPA 3546							
TPH - Diesel (C10-C28)	**90.9**	mg/kg	4.1	2	07/09/12 06:58	07/16/12 11:54		M1
Surrogates								
o-Terphenyl (S)	0	%.	39-130	2	07/09/12 06:58	07/16/12 11:54	84-15-1	S4
Gasoline Range Organics	Analytical Method: EPA 8015B Modified Preparation Method: EPA 5035A/5030B							
TPH (C06-C10)	ND	mg/kg	12.3	1	07/09/12 07:36	07/09/12 17:15		
Percent Moisture	Analytical Method: ASTM D2974-87							
Percent Moisture	**19.0**	%	0.10	1		07/18/12 14:26		

Sample: 062812010 **Lab ID: 4062930003** Collected: 06/28/12 11:10 Received: 07/06/12 09:50 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8015 GCS THC-Diesel	Analytical Method: EPA 8015B Modified Preparation Method: EPA 3546							
TPH - Diesel (C10-C28)	**5.2**	mg/kg	2.0	1	07/09/12 06:58	07/16/12 11:29		
Surrogates								
o-Terphenyl (S)	69	%.	39-130	1	07/09/12 06:58	07/16/12 11:29	84-15-1	
Gasoline Range Organics	Analytical Method: EPA 8015B Modified Preparation Method: EPA 5035A/5030B							
TPH (C06-C10)	ND	mg/kg	12.1	1	07/09/12 07:36	07/09/12 16:24		
Percent Moisture	Analytical Method: ASTM D2974-87							
Percent Moisture	**17.1**	%	0.10	1		07/18/12 14:27		

ANALYTICAL RESULTS

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062930

Sample: 062812011 **Lab ID: 4062930004** Collected: 06/28/12 14:00 Received: 07/06/12 09:50 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8015 GCS THC-Diesel	Analytical Method: EPA 8015B Modified Preparation Method: EPA 3546							
TPH - Diesel (C10-C28)	**70100**	mg/kg	2560	100	07/09/12 06:58	07/16/12 12:30		
Surrogates								
o-Terphenyl (S)	0	%.	39-130	100	07/09/12 06:58	07/16/12 12:30	84-15-1	S4
Gasoline Range Organics	Analytical Method: EPA 8015B Modified Preparation Method: EPA 5035A/5030B							
TPH (C06-C10)	ND	mg/kg	15400	1000	07/09/12 07:36	07/09/12 18:06		D3
Percent Moisture	Analytical Method: ASTM D2974-87							
Percent Moisture	**34.9**	%	0.10	1		07/18/12 14:27		

Sample: 062912012 **Lab ID: 4062930005** Collected: 06/29/12 14:40 Received: 07/06/12 09:50 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8015 GCS THC-Diesel	Analytical Method: EPA 8015B Modified Preparation Method: EPA 3546							
TPH - Diesel (C10-C28)	**4.1**	mg/kg	2.1	1	07/09/12 06:58	07/16/12 11:05		
Surrogates								
o-Terphenyl (S)	60	%.	39-130	1	07/09/12 06:58	07/16/12 11:05	84-15-1	
Gasoline Range Organics	Analytical Method: EPA 8015B Modified Preparation Method: EPA 5035A/5030B							
TPH (C06-C10)	ND	mg/kg	12.8	1	07/09/12 07:36	07/09/12 16:49		
Percent Moisture	Analytical Method: ASTM D2974-87							
Percent Moisture	**21.6**	%	0.10	1		07/18/12 14:27		

Sample: 062912013 **Lab ID: 4062930006** Collected: 06/29/12 15:25 Received: 07/06/12 09:50 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8015 GCS THC-Diesel	Analytical Method: EPA 8015B Modified Preparation Method: EPA 3546							
TPH - Diesel (C10-C28)	**7.8**	mg/kg	2.1	1	07/09/12 06:58	07/16/12 11:17		
Surrogates								
o-Terphenyl (S)	68	%.	39-130	1	07/09/12 06:58	07/16/12 11:17	84-15-1	
Gasoline Range Organics	Analytical Method: EPA 8015B Modified Preparation Method: EPA 5035A/5030B							
TPH (C06-C10)	ND	mg/kg	12.5	1	07/09/12 07:36	07/09/12 19:49		
Percent Moisture	Analytical Method: ASTM D2974-87							
Percent Moisture	**19.7**	%	0.10	1		07/18/12 14:27		

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062930

QC Batch: GCV/8628
QC Batch Method: EPA 5035A/5030B
Analysis Method: EPA 8015B Modified
Analysis Description: Gasoline Range Organics
Associated Lab Samples: 4062930001, 4062930002, 4062930003, 4062930004, 4062930005, 4062930006

METHOD BLANK: 632487 Matrix: Solid
Associated Lab Samples: 4062930001, 4062930002, 4062930003, 4062930004, 4062930005, 4062930006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
TPH (C06-C10)	mg/kg	ND	10.0	07/09/12 09:32	

LABORATORY CONTROL SAMPLE & LCSD: 632488 632489

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
TPH (C06-C10)	mg/kg	50	46.5	46.6	93	93	79-120	0	20	

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062930

QC Batch: OEXT/15103
QC Batch Method: EPA 3546
Analysis Method: EPA 8015B Modified
Analysis Description: 8015 Solid GCSV
Associated Lab Samples: 4062930001, 4062930002, 4062930003, 4062930004, 4062930005, 4062930006

METHOD BLANK: 632473
Matrix: Solid
Associated Lab Samples: 4062930001, 4062930002, 4062930003, 4062930004, 4062930005, 4062930006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
TPH - Diesel (C10-C28)	mg/kg	ND	1.7	07/16/12 09:40	
o-Terphenyl (S)	%.	71	39-130	07/16/12 09:40	

LABORATORY CONTROL SAMPLE: 632474

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
TPH - Diesel (C10-C28)	mg/kg	16.7	13.0	78	53-130	
o-Terphenyl (S)	%.			83	39-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 632475 632476

Parameter	Units	4062930002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
TPH - Diesel (C10-C28)	mg/kg	90.9	20.6	20.6	71.9	126	-92	171	10-190	55	50	D6,M0
o-Terphenyl (S)	%.						112	0	39-130			S4

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062930

QC Batch: PMST/7300
Analysis Method: ASTM D2974-87
QC Batch Method: ASTM D2974-87
Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 4062930001, 4062930002, 4062930003, 4062930004, 4062930005, 4062930006

SAMPLE DUPLICATE: 637452

Parameter	Units	4062969004 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	18.9	20.0	6	10	

QUALIFIERS

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062930

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.
PRL - Pace Reporting 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.

BATCH QUALIFIERS

Batch: GCV/8633

[M5]	A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

ANALYTE QUALIFIERS

D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
D6	The relative percent difference (RPD) between the sample and sample duplicate exceeded laboratory control limits.
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.
S4	Surrogate recovery not evaluated against control limits due to sample dilution.

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062930

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4062930001	**062512008**	EPA 3546	OEXT/15103	EPA 8015B Modified	GCSV/7936
4062930002	**062512009**	EPA 3546	OEXT/15103	EPA 8015B Modified	GCSV/7936
4062930003	**062812010**	EPA 3546	OEXT/15103	EPA 8015B Modified	GCSV/7936
4062930004	**062812011**	EPA 3546	OEXT/15103	EPA 8015B Modified	GCSV/7936
4062930005	**062912012**	EPA 3546	OEXT/15103	EPA 8015B Modified	GCSV/7936
4062930006	**062912013**	EPA 3546	OEXT/15103	EPA 8015B Modified	GCSV/7936
4062930001	**062512008**	EPA 5035A/5030B	GCV/8628	EPA 8015B Modified	GCV/8633
4062930002	**062512009**	EPA 5035A/5030B	GCV/8628	EPA 8015B Modified	GCV/8633
4062930003	**062812010**	EPA 5035A/5030B	GCV/8628	EPA 8015B Modified	GCV/8633
4062930004	**062812011**	EPA 5035A/5030B	GCV/8628	EPA 8015B Modified	GCV/8633
4062930005	**062912012**	EPA 5035A/5030B	GCV/8628	EPA 8015B Modified	GCV/8633
4062930006	**062912013**	EPA 5035A/5030B	GCV/8628	EPA 8015B Modified	GCV/8633
4062930001	**062512008**	ASTM D2974-87	PMST/7300		
4062930002	**062512009**	ASTM D2974-87	PMST/7300		
4062930003	**062812010**	ASTM D2974-87	PMST/7300		
4062930004	**062812011**	ASTM D2974-87	PMST/7300		
4062930005	**062912012**	ASTM D2974-87	PMST/7300		
4062930006	**062912013**	ASTM D2974-87	PMST/7300		

APPENDIX A2

SOIL BORING LOGS

NATURAL
RESOURCE
TECHNOLOGY

SOIL BORING LOG INFORMATION

Page 1 of 1

Facility/Project Name Former NSG North Plant Removal		License/Permit/Monitoring Number	Boring Number SB200
Boring Drilled By: Name of crew chief (first, last) and Firm Tony Roselow Cabeno Enivornmental Field Services, LLC	Date Drilling Started 4/23/2012	Date Drilling Completed 4/23/2012	Drilling Method GeoProbe
Common Well Name	Final Static Water Level Feet (NAVD)	Surface Elevation Feet (NAVD)	Borehole Diameter 2.0 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐
State Plane N, E S/C/[✓ N]
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location
4691744 Feet ☒ N ☐ S
432126 Feet ☒ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Lake	IL	Waukegan

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	60 36		0	0 - 0.5' **FILL, TOPSOIL:** (FILL), topsoil.	(FILL)									
			0.5	0.5 - 6' **FILL:** (FILL), dark reddish brown (5YR 3/4), 0-4' dry.	(FILL) (FILL)									
2 CS	60 38		5	5' wet.										
			6	6 - 14' **POORLY-GRADED SAND:** SP, dark gray (10YR 4/1), poorly graded, mostly subrounded sand [few fine, mostly medium, trace coarse], no odor to faint odor, no visible impacts.										
3 CS	48 48		10		SP									Free Product sitting on top of interval but no product within thesand sample 10-12 ft.
			12	12' -14' more gravel present.										
			14	14' End of Boring.										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

Firm Natural Resource Technology, Inc.
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Fax: 262.523.9001

Template: SOIL BORING - Project: NORTH PLANT.GPJ

NATURAL
RESOURCE
TECHNOLOGY

SOIL BORING LOG INFORMATION

Facility/Project Name: Former NSG North Plant Removal
License/Permit/Monitoring Number:
Boring Number: SB201

Boring Drilled By: Name of crew chief (first, last) and Firm
Tony Roselow
Cabeno Enivornmental Field Services, LLC
Date Drilling Started: 4/23/2012
Date Drilling Completed: 4/23/2012
Drilling Method: GeoProbe

Common Well Name:
Final Static Water Level: Feet (NAVD)
Surface Elevation: Feet (NAVD)
Borehole Diameter: 2.0 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐
State Plane N, E S/C/[✓ N]
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location
☒ N 4691742 Feet ☐ S
☒ E 432172 Feet ☐ W

Facility ID:
County: Lake
State: IL
Civil Town/City/ or Village: Waukegan

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	60 36			0 - 0.5' **FILL:** (FILL), black (10Y 2/1), dry, large rock fragments.	(FILL)									
			1	0.5 - 2' **FILL:** (FILL), black (10Y 2/1), well graded, mostly subangular sand [little fine, mostly coarse], some gravel [mostly fine], moist, some slag.	(FILL)									
			2 3 4	2 - 5.5' **WELL-GRADED SAND:** SW, dark brown (10YR 3/6), well graded, mostly subangular sand [few medium, some coarse], mostly gravel [mostly fine], odor present, wet, MGP-like odor at 5.5'.	SW									
2 CS	60 40		5											
			6 7 8 9	5.5 - 15' **POORLY-GRADED SAND:** SP, dark gray (10YR 4/1), poorly graded, mostly sand [few fine, mostly medium], no odor, moist, no visual impacts to 11'.	SP									
3 CS	60 42		10											
			11	11' -13' oil coated.										11'-13' sample
			12 13 14 15											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

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NATURAL
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SOIL BORING LOG INFORMATION SUPPLEMENT

Boring Number SB201

Page 2 of 2

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
4 CS	60 36		16 17 18 19 20	15 - 20' **POORLY-GRADED SAND:** SP, gray (10YR 6/1), poorly graded, mostly sand [few fine, mostly medium], odor present, MGP-like odor.	SP									difficulties advancing geoprobe through sand. Cabeno broke two rodsd and may need to bring in alternative equipment. Move to next location to see if problems persist.
				20' End of Boring.										

NATURAL RESOURCE TECHNOLOGY

SOIL BORING LOG INFORMATION

Page 1 of 2

Facility/Project Name Former NSG North Plant Removal	License/Permit/Monitoring Number	Boring Number SB202	
Boring Drilled By: Name of crew chief (first, last) and Firm Tony Roselow Cabeno Enivornmental Field Services, LLC	Date Drilling Started 4/23/2012	Date Drilling Completed 4/23/2012	Drilling Method GeoProbe
Common Well Name	Final Static Water Level Feet (NAVD)	Surface Elevation Feet (NAVD)	Borehole Diameter 2.0 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐

State Plane N, E S/C/[✓ N]

1/4 of 1/4 of Section , T N, R

Lat ° ' "

Long ° ' "

Local Grid Location ☒ N ☒ E

4691731 Feet ☐ S 432144 Feet ☐ W

Facility ID	County Lake	State IL	Civil Town/City/ or Village Waukegan

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	60 33.6		1	0 - 2' **FILL:** (FILL), dry, topsoil and fill.	(FILL)									
2 CS	60 36		2 3 4 5	2 - 6' **POORLY-GRADED SAND:** SP, very dark brown (10YR 2/2), poorly graded, mostly sand [little medium, mostly coarse], wet, no visual impacts.	SP									
3 CS	60 38.4		6 7 8 9 10 11 12 13 14 15	6 - 25' **POORLY-GRADED SAND:** SP, grayish brown (10YR 5/2), poorly graded, mostly sand [few fine, mostly medium], trace rounded gravel [mostly fine], wet.	SP									

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

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SOIL BORING LOG INFORMATION SUPPLEMENT

Boring Number SB202

Page 2 of 2

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
4 CS	60 48		16 17 18 19	6 - 25' **POORLY-GRADED SAND:** SP, grayish brown (10YR 5/2), poorly graded, mostly sand [few fine, mostly medium], trace rounded gravel [mostly fine], wet. *(continued)*		▨								
5 CS	60 33.6		20 21 22 23 24		SP	▨								
			25	25' End of boring.										Gray clay noted at 25'. Attempted to collect interval 25'-30' without success.

NATURAL
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TECHNOLOGY

SOIL BORING LOG INFORMATION

Facility/Project Name: Former NSG North Plant Removal

License/Permit/Monitoring Number:

Boring Number: SB202B

Boring Drilled By: Name of crew chief (first, last) and Firm: Joe Martin, Test Service Corporation

Date Drilling Started: 6/21/2012

Date Drilling Completed: 6/21/2012

Drilling Method: hollow stem auger

Common Well Name:

Final Static Water Level: Feet (NAVD)

Surface Elevation: Feet (NAVD)

Borehole Diameter: 8.3 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐

State Plane N, E S/C/[✓ N]

1/4 of 1/4 of Section , T N, R

Lat ° ' "

Long ° ' "

Local Grid Location: 4691732 Feet ☒ N ☐ S 432143 Feet ☒ E ☐ W

Facility ID:

County: Lake

State: IL

Civil Town/City/ or Village: Waukegan

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
1 SS	24 19	1 7 7 3		**0 - 1' POORLY-GRADED SAND:** (FILL), black (10YR 2/1), dry, few cinders, few slag.	(FILL)									2 in. Split Spoon and 140 lb Hammer.
			1	**1 - 1.5' FILL:** (FILL), yellow, weathered concrete.	(FILL)			0						
2 SS	24 6	2 2 3 2	2	**1.5 - 4' POORLY-GRADED SAND:** (FILL), black (10YR 2/1), dry, few cinders, few slag.	(FILL)			0						Poor Recovery.
			3					0						
3 SS	24 18	2 3 2 3	4	**4 - 5' POORLY-GRADED SAND:** (FILL), black (10YR 2/1), wet, few cinders, few slag, diesel-like odor.	(FILL)			3.5						
			5	**5 - 25' POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [some fine, some medium, few coarse], wet, odor is present to a depth of 9', diesel-like odor, sheen is present to a depth of 7'.				5.5						
4 SS	24 19	4 4 5 7	6					16.2						
			7					1.4						
5 SS	24 21	2 5 6 5	8					16.2						
			9					0.3						
6 SS	24 17	8 7 8 12	10	10' - 11' diesel-like odor.	SP			6.2						
			11					0.4						At approximately 14' start adding mud while drilling to keep sand from clogging augers.
7 SS	24 20	8 11 15 15	12	12' - 14' diesel-like odor.				1.6						
			13					6.2						
8 SS	24 22	11 13 15 17	14	14' -16' no diesel-like odor.				0.1						
			15											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

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NATURAL
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SOIL BORING LOG INFORMATION SUPPLEMENT

Boring Number SB202B

Page 2 of 2

Sample		Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	
				5 - 25' **POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [some fine, some medium, few coarse], wet, odor is present to a depth of 9', diesel-like odor, sheen is present to a depth of 7'. *(continued)*				0.2						
9 SS	24 24	8 13 15 16	16					0						
			17					0						
10 SS	24 20	5 15 16 15	18					0						
			19					0						
11 SS	24 24	10 12 23 30	20	20' - 22' fine grained sand content increases with depth.	SP			0						
			21					0						
12 SS	24 24	6 6 9 20	22					0.1						
			23					0						
13 SS	24 24	6 7 10 20	24					0.1						
			25	24.8' - 25' little (20%) rounded gravel [mostly fine].										
				25 - 26' **LEAN CLAY:** CL, trace gravel [mostly fine], trace silt.	CL			0						>4.5 tsf compressive strength
			26	26' End of Boring.										

NATURAL RESOURCE TECHNOLOGY

SOIL BORING LOG INFORMATION

Page 1 of 2

Facility/Project Name: Former NSG North Plant Removal
License/Permit/Monitoring Number:
Boring Number: SB203

Boring Drilled By: Name of crew chief (first, last) and Firm: Joe Martin, Test Service Corporation
Date Drilling Started: 6/21/2012
Date Drilling Completed: 6/21/2012
Drilling Method: hollow stem auger

Common Well Name:
Final Static Water Level: Feet (NAVD)
Surface Elevation: Feet (NAVD)
Borehole Diameter: 8.3 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐
State Plane N, E S/C/[✓ N]
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location: 4691747 Feet ☒ N ☐ S; 432077 Feet ☒ E ☐ W

Facility ID:
County: Lake
State: IL
Civil Town/City/ or Village: Waukegan

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 SS	24 19	3 6 8 10		0 - 2.2' **POORLY-GRADED SAND WITH SILT:** (FILL), brown (10YR 4/3), mostly sand [mostly fine], few gravel [mostly fine], dry, trace slag at surface.				0						2 in. Split Spoon and 140 lb Hammer.
			1		(FILL)			0						
2 SS	24 18	2 4 6 4	2	2.2 - 3.6' **POORLY-GRADED SAND:** (FILL), light brown (10YR 6/2), mostly sand [some fine, some medium, few coarse], dry, trace wood chips.				0						
			3		(FILL)			0						
3 SS	24 15	4 6 8 4	4	3.6 - 6.8' **WELL-GRADED SAND:** (FILL), dry, black to brown, few cinders, few slag.				0						
			5		(FILL)			0						
4 SS	24 20	12 5 6 8	6	5.8' wet.				0						
			7	6.8 - 24' **POORLY-GRADED SAND:** SP, mostly sand [some fine, some medium, trace coarse], trace gravel [mostly fine], wet, gray (2.5Y 5/1) to grayish brown (2.5Y 5/2), trace wood chips.				0						
5 SS	24 22	5 6 6 8	8					0						
			9					0						
6 SS	24 24	5 7 10 14	10					0						
			11		SP			0						At approximately 14' start adding mud while drilling to keep sand from clogging augers.
7 SS	24 24	7 6 12 18	12					0						
			13					0						
8 SS	24 24	8 11 13 12	14	14' - 15' increased fine grained sand content.				0						
			15											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

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Template: SOIL BORING - Project: NORTH PLANT.GPJ

SOIL BORING LOG INFORMATION SUPPLEMENT

NATURAL
RESOURCE
TECHNOLOGY

Boring Number SB203

Page 2 of 2

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				6.8 - 24' **POORLY-GRADED SAND:** SP, mostly sand [some fine, some medium, trace coarse], trace gravel [mostly fine], wet, gray (2.5Y 5/1) to grayish brown (2.5Y 5/2), trace wood chips. *(continued)*				0						
9 SS	24 24	4 11 15 20	16 17	15' - 24' some fine grained sand, some medium grained sand.				0 0						
10 SS	24 20	4 11 12 13	18 19					0 0						
11 SS	24 18	4 8 9 7	20 21		SP			0 0						
12 SS	24 13	67 15 15 18	22 23	22' cobble.				0 0						67 blows pushed cobble.
13 SS	24 24	13 14 15 17	24 25	24 - 26' **LEAN CLAY:** CL, gray (2.5Y 5/1), trace sand [some fine, some medium], trace gravel [mostly fine], little silt, wet, till.	CL			0 0						
			26	26' End of Boring.										

NATURAL
RESOURCE
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SOIL BORING LOG INFORMATION

Page 1 of 1

Facility/Project Name Former NSG North Plant Removal	License/Permit/Monitoring Number	Boring Number SB204

Boring Drilled By: Name of crew chief (first, last) and Firm Joe Martin Test Service Corporation	Date Drilling Started 6/22/2012	Date Drilling Completed 6/22/2012	Drilling Method hollow stem auger
Common Well Name	Final Static Water Level Feet (NAVD)	Surface Elevation Feet (NAVD)	Borehole Diameter 8.3 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐
State Plane N, E S/C/Ⓝ
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location
4691737 Feet ☒ N ☐ S
432086 Feet ☒ E ☐ W

Facility ID	County Lake	State IL	Civil Town/City/ or Village Waukegan

Sample										Soil Properties				
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 SS	24 16	3 6 18 21	1	0 - 4.3' **FILL, WELL-GRADED SAND:** SW, trace gravel [mostly fine], dry, brown to black, trace slag.				0						2 in. Split Spoon and 140 lb Hammer.
2 SS	24 12	8 7 5 4	2 3 4	2' - 4.3' sand is oil coated and oil wetted, mostly black malleable viscous weathered NAPL, MGP-like odor. dry to moist.	(FILL) SW			0.4 243						
3 SS	24 22	3 2 2 2	5	4.3 - 6' **FILL, POORLY-GRADED SAND:** SP, grayish brown (2.5YR 5/1), mostly sand [mostly fine], moist, oil coated, MGP-like odor, 30% stained black.	(FILL) SP			145						
4 SS	24 17	2 3 4 50(3")	6 7	6 - 8' **FILL, POORLY-GRADED SAND:** SP, grayish brown (2.5YR 5/1), odor present, sheen, wet.	(FILL) SP			8.9 22.9						
			8	7.9' chips of weathered concrete. 8' End of Boring.				14.2						Refusal at 8'. Possible rebar in concrete.

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm Natural Resource Technology, Inc. 23713 W. Paul Road, Suite D, Pewaukee, WI 53072 Tel: 262.523.9000 Fax: 262.523.9001

NATURAL
RESOURCE
TECHNOLOGY

SOIL BORING LOG INFORMATION

Page 1 of 2

Facility/Project Name Former NSG North Plant Removal	License/Permit/Monitoring Number	Boring Number SB204B

Boring Drilled By: Name of crew chief (first, last) and Firm Joe Martin Test Service Corporation	Date Drilling Started 6/22/2012	Date Drilling Completed 6/22/2012	Drilling Method hollow stem auger
Common Well Name	Final Static Water Level Feet (NAVD)	Surface Elevation Feet (NAVD)	Borehole Diameter 8.3 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐
State Plane N, E S/C/[✓ N]
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location
4691739 Feet ☒ N ☐ S
432085 Feet ☒ E ☐ W

Facility ID	County Lake	State IL	Civil Town/City/ or Village Waukegan

Sample		Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	
			1 2 3 4 5 6 7	0 - 8' Blind Drill to 8 feet, see SB204 log.										
5 SS	24 12	2 5 8 8	8 9	**8 - 14' POORLY-GRADED SAND:** SP, dark gray (10YR 4/1), trace gravel [mostly fine], faint MGP-like odor.		▨		3.8 4.6						At approximately 14' start adding mud while drilling to keep sand from clogging augers.
6 SS	24 20	5 8 11 12	10 11	10' no odor, no visual impacts. 10.5' rock fragments with staining and odor.	SP	▨		2.7 0.8						
7 SS	24 16	3 6 6 10	12 13	12.5' yellow brick fragments (1 inch diameter) with staining and MGP-like odor. Sand has no odor.		▨		6.2 0.4						
8 SS	24 18	5 5 18 20	14 15	**14 - 23.7' WELL-GRADED SAND:** SW, grayish brown (2.5Y 5/2), wet, no odor, no visual impacts.	SW	▨		0.1						

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

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SOIL BORING LOG INFORMATION SUPPLEMENT

NATURAL RESOURCE TECHNOLOGY

Boring Number SB204B

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				14 - 23.7' **WELL-GRADED SAND:** SW, grayish brown (2.5Y 5/2), wet, no odor, no visual impacts. *(continued)*				0						
9 SS	24 22	13 18 20 22	16					0						
			17					0						
10 SS	24 23	15 13 19 22	18	18' trace fine gravel.				0						
			19		SW			0						
11 SS	24 23	14 16 17 19	20					0.1						
			21					0.1						
12 SS	24 24	19 12 22 24	22					0						
			23					0						
			24	23.6' Some (40%) fine gravel.										
				23.7 - 24' **LEAN CLAY:** CL, dark gray (10YR 4/1), few sand [mostly fine], dry to moist.	CL									Compressive strength >4.5 tsf.
				24' End of Boring.										

NATURAL
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TECHNOLOGY

SOIL BORING LOG INFORMATION

Page 1 of 2

Facility/Project Name Former NSG North Plant Removal	License/Permit/Monitoring Number	Boring Number SB205	
Boring Drilled By: Name of crew chief (first, last) and Firm Joe Martin Test Service Corporation	Date Drilling Started 6/21/2012	Date Drilling Completed 6/21/2012	Drilling Method hollow stem auger
Common Well Name	Final Static Water Level Feet (NAVD)	Surface Elevation Feet (NAVD)	Borehole Diameter 8.3 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐
State Plane N, E S/C/N
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location
4691742 Feet ☒ N ☐ S
432126 Feet ☒ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Lake	IL	Waukegan

Sample		Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	
1 SS	24 19	2 1 2 2	1	0 - 6.8' **FILL, WELL-GRADED SAND:** SW, black (10YR 2/1), dry, brown mottling, few cinders, few slag.				0 0						2 in. Split Spoon and 140 lb Hammer.
2 SS	24 18	3 3 2 1	2 3		(FILL) SW			0.3 0.1						
3 SS	24 6	8 1 1 1	4 5	3.8' moist to wet. 4' - 6' mostly wood debris, few sand, wet.				0						Poor Recovery.
4 SS	24 20	2 3 8 7	6 7	6' wet, diesel-like odor. 6.8 - 8' **POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), wet, diesel-like odor.	SP			7.1						
5 SS	24 18	6 5 9 9	8 9	8 - 9.5' **WELL-GRADED SAND:** SW, dark gray (2.5Y 4/1), mostly sand [some fine, some medium, some coarse], trace rounded gravel [mostly fine], diesel-like odor. 9.4' - 9.5' oil coated, diesel-like and MGP-like odor.	SW			5.8 3.4						
6 SS	24 15	3 9 14 19	10 11	9.5 - 18' **WELL-GRADED SAND:** SW, grayish brown (2.5Y 5/2).				8.2 0.3						
7 SS	24 10	5 5 8 12	12 13		SW			0.4 0.2						
8 SS	24 21	8 11 11 17	14 15	14' - 17' mostly sand [mostly fine, little medium, little coarse], trace gravel [mostly fine], no odor, no visual				0.2						

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

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SOIL BORING LOG INFORMATION SUPPLEMENT

Boring Number SB205

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Sample									Soil Properties						
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				impacts. 9.5 - 18' **WELL-GRADED SAND:** SW, grayish brown (2.5Y 5/2). *(continued)*				0.2						
9 SS	24 22	9 11 25 25	16		SW			0						
			17	17' - 18' fine sand content increasing with depth, no odor, no visual impacts.				0						
10 SS	24 20	8 12 14 16	18	18 - 23.6' **POORLY-GRADED SAND:** SP.				0						
			19					0						
11 SS	24 23	8 15 20 16	20					0.1						
			21		SP			0						
12 SS	24 18	9 15 13 15	22					0						
			23					0						
				23.5' - 23.6' little (20%) gravel [mostly fine].										
13 SS	24 14	9 11 12 13	24	23.6 - 26' **LEAN CLAY:** CL, dark gray (2.5Y 4/1), dry.										
			25		CL									>4.5 tsf compressive strength >4.5 tsf compressive strength
			26	26' End of Boring.										

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SOIL BORING LOG INFORMATION

Page 1 of 1

Facility/Project Name Former NSG North Plant Removal	License/Permit/Monitoring Number	Boring Number SB205B	
Boring Drilled By: Name of crew chief (first, last) and Firm Joe Martin Test Service Corporation	Date Drilling Started 6/21/2012	Date Drilling Completed 6/21/2012	Drilling Method hollow stem auger
Common Well Name	Final Static Water Level Feet (NAVD)	Surface Elevation Feet (NAVD)	Borehole Diameter 8.3 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐
State Plane N, E S/C/[✓ N]
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location
4691750 Feet ☒ N ☐ S
432118 Feet ☒ E ☐ W

Facility ID	County Lake	State IL	Civil Town/City/ or Village Waukegan

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 SS	24 18	2 3 3 4		0 - 0.8' **FILL, SILTY SAND:** SM, trace gravel [mostly fine], dry, brown.	(FILL) SM			0						2 in. Split Spoon and 140 lb Hammer.
			1	0.8 - 5.8' **FILL, WELL-GRADED SAND:** SW, dry, brown to black, some cinders, some slag.				0						
2 SS	24 9	2 3 3 2	2	2' some silt, moist.				0						
			3		(FILL) SW									
3 SS	24 18	6 7 7 9	4					0						
			5											
4 SS	24 18	5 7 8 6	6	5.8 - 6.2' **POORLY-GRADED SAND:** SP, grayish brown (2.5YR 5/1), mostly sand [mostly fine], moist to wet, faint diesel-like odor.	SP			1						
			7	6.2 - 8' **WELL-GRADED SAND:** SW, grayish brown (2.5YR 5/1), little gravel [mostly fine], wet, no odor.	SW			0						
5 SS	24 20	4 6 6 9	8	8 - 10' **POORLY-GRADED SAND:** SP, grayish brown (2.5YR 5/1), mostly sand [mostly fine], wet, no odor.				0						
			9	9' some gravel [mostly fine].	SP			0						
6 SS	24 20	9 17 24 25	10	10 - 14' **POORLY-GRADED SAND:** SP, mostly sand [some fine, some medium], trace gravel [some fine, some medium], wet.				0						
			11	11' wood chips, gray (2.5Y 5/1).				0						
7 SS	24 24	8 11 13 24	12	12' - 14' trace wood chips, wet.	SP			0						
			13					0						
			14	14' End of Boring.				0						

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

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Template: SOIL BORING - Project: NORTH PLANT.GPJ

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SOIL BORING LOG INFORMATION

Page 1 of 2

Facility/Project Name: Former NSG North Plant Removal

License/Permit/Monitoring Number:

Boring Number: SB206

Boring Drilled By: Name of crew chief (first, last) and Firm: Joe Martin
Test Service Corporation

Date Drilling Started: 6/20/2012

Date Drilling Completed: 6/20/2012

Drilling Method: hollow stem auger

Common Well Name:

Final Static Water Level: Feet (NAVD)

Surface Elevation: Feet (NAVD)

Borehole Diameter: 8.3 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐

State Plane N, E S/C/[✓ N]

1/4 of 1/4 of Section , T N, R

Lat ___ ° ___ ' ___ "

Long ___ ° ___ ' ___ "

Local Grid Location: 4691743 Feet ☒ N ☐ S; 432179 Feet ☒ E ☐ W

Facility ID:

County: Lake

State: IL

Civil Town/City/ or Village: Waukegan

Sample		Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	
1 SS	24 18	7 8 8 7		**0 - 0.5' FILL, WELL-GRADED GRAVEL:** g(OL/OH)s, mostly gravel [some fine, some medium, some coarse].	(FILL) OL/OH									2 in. Split Spoon and 140 lb Hammer.
			1	**0.5 - 6' FILL, POORLY-GRADED SAND:** SP, black (10YR 2/1), mostly sand [some fine, some medium, some coarse], dry, trace cinders, trace slag.				0						
2 SS	24 14	3 2 2 2	2					0						
			3		(FILL) SP			0						
3 SS	24 12	3 1 1 2	4	3.8' wet. 4' stained sand and gravel, MGP-like odor.				0						
			5					18.2						Elevated PID Readings.
4 SS	24 22	4 5 7 5	6	**6 - 9.5' POORLY-GRADED SAND:** SP, black (10YR 2/1), mostly sand [mostly medium], medium sand, black (10YR 2/1), oil coated.				36.1						
			7					1.7						
5 SS	24 17	4 5 12 12	8		SP			258 137						
			9					140						
6 SS	24 21	2 3 9 11	10	**9.5 - 9.9' WELL-GRADED SAND:** SW, black (10YR 2/1), mostly sand [some fine, some medium, some coarse], oil wetted.	SW									
			11	**9.9 - 20' POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [some fine, some medium].				101						
7 SS	24 24	5 10 18 22	12	10.4' - 10.5' oil wetted. 12' - 13' stained, sheen, odor present.	SP			18.2						
			13	13' - 16' sheen, odor is MGP-like.				32						
8 SS	24 22	5 8 8 14	14					28.7						
			15											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

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Template: SOIL BORING - Project: NORTH PLANT.GPJ

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SOIL BORING LOG INFORMATION SUPPLEMENT

Boring Number SB206

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				9.9 - 20' **POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [some fine, some medium]. *(continued)*				39						
9 SS	24 21	7 18 24 28	16	16' - 20' trace sheen.				9.2						at 16' start adding mud while drilling to keep sand from clogging augers.
			17		SP			1.4						
10 SS	24 21	6 9 18 21	18					0.7						
			19					3						
11 SS	24 21	13 15 18 22	20	20 - 24' **POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [mostly fine], trace silt, silt content increases with depth.				1						
			21					0.6						
12 SS	24 14	9 21 30 30	22		SP			0.4						
			23	23' layer of gravel (5" thick). 23.5' no silt.				0.2						
13 SS	24 19	10 10 16 22	24	24 - 25' **WELL-GRADED SAND WITH GRAVEL:** (SW)g, mostly sand [some fine, some medium, some coarse], little gravel [mostly fine].	(SW)g			0.1						
			25	25 - 26' **LEAN CLAY:** CL, dark gray (2.5Y 4/1), dry to moist.	CL			0.1						
			26	26' End of Boring.				0.1						>4.5 tsf compressive strength

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SOIL BORING LOG INFORMATION

Facility/Project Name Former NSG North Plant Removal	License/Permit/Monitoring Number	Boring Number SB206B

Boring Drilled By: Name of crew chief (first, last) and Firm Joe Martin Test Service Corporation	Date Drilling Started 6/20/2012	Date Drilling Completed 6/20/2012	Drilling Method hollow stem auger
Common Well Name	Final Static Water Level Feet (NAVD)	Surface Elevation Feet (NAVD)	Borehole Diameter 8.3 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐
State Plane N, E S/C/N
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location
4691752 Feet ☒ N ☐ S
432187 Feet ☒ E ☐ W

Facility ID	County Lake	State IL	Civil Town/City/ or Village Waukegan

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 SS	24 19	5 8 5 9		0 - 0.5' **FILL, POORLY-GRADED GRAVEL:** GP, mostly gravel [mostly coarse].	(FILL) GP			0						2 in. Split Spoon and 140 lb Hammer.
			1	0.5 - 2' **FILL, POORLY-GRADED SAND:** SP, dry, dark brown, black and red mottling.	(FILL) SP			0						
2 SS	24 0	4 5 5 6	2	2 - 4' No Recovery.										Piece of concrete in shoe.
			3											
3 SS	24 15	6 7 7 10	4	4 - 5' **FILL, POORLY-GRADED SAND:** SP, wet, dark brown, black and red mottling.	(FILL) SP			0.1						
			5	5 - 6.5' **FILL, WELL-GRADED SAND:** SW, mostly sand [some fine, some medium, some coarse], trace gravel [mostly fine], trace cinders, trace slag, faint diesel-like odor.	(FILL) SW			0.3						
4 SS	24 16	20 4 2 4	6					20						
			7	6.5 - 7' **FILL:** (FILL), black (10YR 2/1), weathered concrete chips, MGP-like odor.	(FILL)			11.8						
				7 - 7.8' **POORLY-GRADED SAND WITH GRAVEL:** (SP)g, mostly sand [mostly coarse], some gravel [mostly fine], oil coated, MGP-like odor.	(SP)g									
5 SS	24 15	2 4 9 9	8					0.2						
			9	7.8 - 24' **POORLY-GRADED SAND:** SP, dark grayish brown (2.5Y 4/2), mostly sand [some fine, some medium], faint MGP-like odor. 10' - 24' no odor.	SP			0						
6 SS	24	2 3 10 12	10					0.3						Recovery length not recorded at 14' start adding mud while drilling to keep sand from clogging augers.
			11					0.7						
7 SS	24 18	8 13 20 26	12					1.4						
			13					1.1						
8 SS	24 20	12 13 19 20	14					0						
			15											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

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SOIL BORING LOG INFORMATION SUPPLEMENT

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Boring Number SB206B

Page 2 of 2

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				7.8 - 24' **POORLY-GRADED SAND:** SP, dark grayish brown (2.5Y 4/2), mostly sand [some fine, some medium], faint MGP-like odor. *(continued)*				0.1						
9 SS	24 21	10 14 17 17	16	15' - 15.5' few (10%) coarse sand.				0						
			17					0						
10 SS	24 19	5 11 17 17	18					0						
			19					0						
11 SS	24 21	9 20 25 25	20		SP			0						
			21					0						
12 SS	24 9	23 25 18 18	22	21.5' - 21.9' some (40%) gravel [mostly fine].				0						
			23					0						
13 SS	24 18	4 12 19 30	24	24 - 26' **LEAN CLAY:** CL, dark gray (2.5Y 4/1), no dilatency, medium toughness, medium plasticity, dry.										>4.5 tsf Compressive strength.
			25		CL									
			26	26' End of Boring.										>4.5 tsf Compressive strength.

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SOIL BORING LOG INFORMATION

Facility/Project Name Former NSG North Plant Removal	License/Permit/Monitoring Number	Boring Number SB207

Boring Drilled By: Name of crew chief (first, last) and Firm Joe Martin Test Service Corporation	Date Drilling Started 6/25/2012	Date Drilling Completed 6/25/2012	Drilling Method hollow stem auger
Common Well Name	Final Static Water Level Feet (NAVD)	Surface Elevation Feet (NAVD)	Borehole Diameter 8.3 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐
State Plane N, E S/C/Ⓝ
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location
4691735 Feet ☒ N ☐ S
432241 Feet ☒ E ☐ W

Facility ID	County Lake	State IL	Civil Town/City/ or Village Waukegan

Sample		Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	
1 SS	24 20	6 7 7 7	1	**0 - 4' FILL, WELL-GRADED SAND WITH SILT:** SW-SM, dry, brown to black, organics, cinders, slag.				0						2 in. Split Spoon and 140 lb Hammer.
2 SS	24 2	3 2 3 3	2 3		(FILL) SW-SM			0 0						Poor Recovery. 2" of brown wet sand and silt.
3 SS	24 12	10 5 3 7	4 5	**4 - 6' FILL, SILT WITH SAND:** (ML)s, dark gray (10YR 4/1), moist, few organics.	(FILL) (ML)s			0 1.4						
4 SS	24 16	1 2 1 1	6 7	5.9' - 6' oil coated sand [mostly coarse], odor present, MGP-like odor. **6 - 7.5' FILL, WELL-GRADED GRAVEL WITH SAND:** (GW)s, mostly angular gravel [mostly fine], sheen, oil coated, odor is MGP-like.	(FILL) (GW)s			1.6 20.1						
5 SS	24 24	3 5 6 8	8 9	**7.5 - 25.2' POORLY-GRADED SAND:** SP, grayish brown, oil wetted, stained black, MGP-like odor. 8.3' - 8.5' oil wetted.				102 57.8						
6 SS	24 24	1 2 1 1	10 11	9.7' - 10' oil wetted. 10' - 10.7' sheen, odor present. 10.7' - 11' oil coated. 11' - 11.5' sheen, odor. 11.5' - 12' oil wetted.	SP			26 46.9						
7 SS	24 14	10 12 13 16	12 13	12' - 12.5' oil coated. 12.5' - 13' oil wetted, strong MGP-like odor. 13' - 14' sheen, odor.				74.2 22.4						
8 SS	24 17	7 12 13 17	14 15	14' - 14.5' oil wetted. 14.5' - 15.5' sheen, odor.				23.7						

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm Natural Resource Technology, Inc. 23713 W. Paul Road, Suite D, Pewaukee, WI 53072 Tel: 262.523.9000 Fax: 262.523.9001

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SOIL BORING LOG INFORMATION SUPPLEMENT

Boring Number SB207

Page 2 of 2

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				7.5 - 25.2' **POORLY-GRADED SAND:** SP, grayish brown, oil wetted, stained black, MGP-like odor. *(continued)*				76.2						
9 SS	24 20	10 13 17 19	16	15.5' - 16' oil wetted. 16' - 19.7' oil wetted, strong MGP-like odor.				241						
			17	17' - 17.5' oil follows lamination in sand.				244						
10 SS	24 20	5 7 12 18	18					160						
			19					94.1						
11 SS	24 21	12 15 17 15	20	19.7' grayish brown sand, sheen, odor. 20' - 20.5' oil wetted, black sand. 20.5' - 21' oil coated.	SP			114						
			21	21' - 22' sheen, odor, trace emulsified NAPL (3-4mm droplets).										
12 SS	24 20	5 12 16 17	22	22' - 25.2' grayish brown (2.5Y 2/1) sand, sheen (sheen in sample water, no sheen in soil matrix), odor.				5.2						
			23					5.3						
13 SS	24 19	5 8 26 13	24					1.7						
			25	25.2 - 25.5' **WELL-GRADED GRAVEL:** GW, no sheen, no odor, no visual impacts.	GW			1.1						
			26	25.5 - 26' **LEAN CLAY:** CL, dark gray (10YR 2/1), dry to moist, no odor, no visual impacts.	CL			0						
				26' End of Boring.										

NATURAL RESOURCE TECHNOLOGY

SOIL BORING LOG INFORMATION

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Facility/Project Name Former NSG North Plant Removal	License/Permit/Monitoring Number	Boring Number SB208	
Boring Drilled By: Name of crew chief (first, last) and Firm Joe Martin Test Service Corporation	Date Drilling Started 6/22/2012	Date Drilling Completed 6/22/2012	Drilling Method hollow stem auger
Common Well Name	Final Static Water Level Feet (NAVD)	Surface Elevation Feet (NAVD)	Borehole Diameter 8.3 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐

State Plane N, E S/C/[✓ N]

1/4 of 1/4 of Section , T N, R

Lat ° ' "

Long ° ' "

Local Grid Location

4691712 Feet ☒ N ☐ S

432073 Feet ☒ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Lake	IL	Waukegan

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
1 SS	24 12	5 5 5 2	0 – 1	0 - 6' **FILL, WELL-GRADED SAND:** SW, mostly sand [some fine, some medium], some silt, dry, dark brown, trace cinders.				0						2 in. Split Spoon and 140 lb Hammer.
2 SS	24 10	3 1 1 1	2 – 3	2' - 6' black (10YR 2/1) and orange, moist, mostly sand [some fine, some medium, some coarse], few cinders, slag.	(FILL) SW			0						Poor Recovery.
3 SS	24 11	4 4 6 2	4 – 5	4' - 6' black (10YR 2/1), wet.				0						
4 SS	24 16	5 6 6 4	6 – 7	6 - 13.4' **POORLY-GRADED SAND:** SP, mostly sand [some fine, some medium, little coarse], wet, grades from dark grayish brown (2.5Y 4/2) to dark gray (10Y 4/1) at 7'.				0						
5 SS	24 15	5 5 6 9	8 – 9	8' dark gray (2.5Y 4/2), trace coarse sand, faint MGP-like odor.				0.1						
6 SS	24 23	9 11 12 13	10 – 11		SP			0.2						PID reading from sample in bag 11'-12'
				11.2' - 11.4' stained black, sheen, faint MGP-like odor, wet.				0.3						
7 SS	24 24	7 9 11 13	12 – 13	12' grades from dark gray (10Y 4/1) to dark grayish brown (2.5Y 4/2) with depth, trace gravel [mostly fine], faint MGP-like odor, wet.				0.1						
8 SS	24 24	9 12 29 30	14 – 15	13.4 - 21' **POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [some fine, some medium], wet, faint MGP-like odor. 14.4' trace gravel [mostly fine].	SP			0 0						

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature Troy H Clemens

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SOIL BORING LOG INFORMATION SUPPLEMENT

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Boring Number SB208

Page 2 of 2

Sample		Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	
				13.4 - 21' **POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [some fine, some medium], wet, faint MGP-like odor. *(continued)*				0						
9 SS	24 18	18 21 26 30	16					0						
			17											
				17.5' little gravel [mostly fine].										
10 SS	24 14	17 19 21 23	18	18' increasing fine grained sand content with depth.	SP			0						
			19											
11 SS	24 15	18 22 28 32	20	20' mostly sand [mostly fine, trace coarse], trace gravel [mostly fine].				0						
			21	21 - 22.2' **POORLY-GRADED GRAVEL:** GP.				0						
			22		GP									
12 SS	24	9 12 13 14		22.2 - 24' **LEAN CLAY:** CL, dark gray (10Y 4/1), trace sand [mostly coarse], trace gravel [mostly fine], few silt, wet, till.										Recovery length not recorded
			23		CL			0						
			24	24' End of Boring.										

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SOIL BORING LOG INFORMATION

Page 1 of 2

Facility/Project Name Former NSG North Plant Removal	License/Permit/Monitoring Number	Boring Number SB209

Boring Drilled By: Name of crew chief (first, last) and Firm Joe Martin Test Service Corporation	Date Drilling Started 6/22/2012	Date Drilling Completed 6/22/2012	Drilling Method hollow stem auger
Common Well Name	Final Static Water Level Feet (NAVD)	Surface Elevation Feet (NAVD)	Borehole Diameter 8.3 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐
State Plane N, E S/C/Ⓝ
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location
4691712 Feet ☒ N ☐ S
432092 Feet ☒ E ☐ W

Facility ID	County Lake	State IL	Civil Town/City/ or Village Waukegan

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 SS	24 19	5 5 7 5		0 - 0.5' **TOPSOIL:** OL/OH, topsoil.	OL/OH			0						2 in. Split Spoon and 140 lb Hammer.
			1	0.5 - 6' **WELL-GRADED SAND:** SW, dry, brown to black, brick, cinders, slag.										
2 SS	24 14	1 3 2 1	2					0.1						
			3		SW			0						
3 SS	24 13	4 2 6 8	4					0						
			5	4.5' wet.				0						
4 SS	24 19	5 6 9 12	6	6 - 8.5' **WELL-GRADED SAND:** SW, dark gray (10YR 4/1), few (10%) organic material (roots), faint diesel-like odor. 7' - 8.5' no organic material.				0						
			7		SW			0						
5 SS	24 18	5 6 7 7	8					0						
			9	8.5 - 9' **WELL-GRADED SAND:** SW, mostly sand [mostly coarse], little gravel [mostly fine], trace fluid emulsified NAPL droplets (1-2mm diameter), MGP-like odor.	SW			0.2						
6 SS	24	4 8 10 16	10	9 - 23.5' **WELL-GRADED SAND:** SW, mostly sand [mostly coarse], little gravel [mostly fine], grayish brown, diesel-like odor.				0.1						Recovery length not recorded
			11					0						
7 SS	24 18	9 7 12 14	12	12' faint diesel-like odor.	SW			0.1						
			13					0.1						
8 SS	24 22	6 13 15 14	14	14' no odors.				0.1						
			15											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

Firm Natural Resource Technology, Inc.
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Template: SOIL BORING - Project: NORTH PLANT.GPJ

SOIL BORING LOG INFORMATION SUPPLEMENT

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Boring Number SB209

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Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				9 - 23.5' **WELL-GRADED SAND:** SW, mostly sand [mostly coarse], little gravel [mostly fine], grayish brown, diesel-like odor. *(continued)*				0						
9 SS	24 22	12 23 21 21	16					0						
			17					0						
10 SS	24 19	9 12 17 19	18					0						
			19		SW			0						
11 SS	24 20	13 16 19 22	20					0						
			21					0						
12 SS	24 17	16 19 20 50 (3")	22					0						
			23											Soil sample is not representative.
13 SS	24 0	23 18 24 26	24	23.5 - 24' **WELL-GRADED GRAVEL:** GW, little sand [mostly fine], mostly gravel [some fine, some medium, some coarse], trace emulsified NAPL present (1-3mm droplets), NAPL is in sample water, NAPL does not appear in soil matrix, MGP-like odor.	GW			5.1						
			25	24 - 28' **LEAN CLAY:** CL, No Recovery.										
14 SS	24 0	27 42 43 43	26		CL									
			27											
			28	28 - 29' No Sample.										Sampler pushing a cobble into clay, overdrilled 28-29', no sample taken.
15 SS	18 18	46 49 50 (6")	29	29 - 29.5' **LEAN CLAY:** CL, dark gray (10YR 4/1).	CL									
			30	29.5 - 30.5' **SILT:** ML, dry, fragments of hard silt appear like rock fragments.	ML									
				30.5' End of Boring.										

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SOIL BORING LOG INFORMATION

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Facility/Project Name: Former NSG North Plant Removal
License/Permit/Monitoring Number:
Boring Number: SB210

Boring Drilled By: Name of crew chief (first, last) and Firm: Joe Martin, Test Service Corporation
Date Drilling Started: 6/25/2012
Date Drilling Completed: 6/25/2012
Drilling Method: hollow stem auger

Common Well Name:
Final Static Water Level: Feet (NAVD)
Surface Elevation: Feet (NAVD)
Borehole Diameter: 8.3 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐
State Plane N, E S/C/[✓ N]
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location: 4691694 Feet ☒ N ☐ S 432117 Feet ☒ E ☐ W

Facility ID:
County: Lake
State: IL
Civil Town/City/ or Village: Waukegan

Sample		Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	
1 SS	24 12	8 24 100 (4")	1	0 - 2' FILL, WELL-GRADED SAND: SW, brown to black, material in shoe may contain brick or concrete fragments.	(FILL) SW			0						2 in. Split Spoon and 140 lb Hammer.
2 SS	24 24	13 4 3 3	2 3	2 - 6.5' FILL, POORLY-GRADED SAND: SP, black (10Y 2/1), dry, cinders, mothball-like odor, some fragments have glassy luster like creosote.				8 7						
3 SS	24 10	3 3 2 3	4 5	3.5' - 4' red brick fragments and foundry sand, no odor. 4' - 6' black sand, mothball-like odor, dry to moist.	(FILL) SP			1.4						Poor Recovery.
4 SS	24 22	5 5 6 6	6 7	6' no odor, wet. 6.5 - 16' WELL-GRADED SAND: SW, grayish brown (2.5Y 5/2), mostly subrounded to rounded sand [some fine, some medium, some coarse], trace subrounded to rounded gravel [mostly fine], wet.				0 0						
5 SS	24 16	3 3 5 5	8 9					0 0						
6 SS	24 22	4 5 6 6	10 11		SW			0 0						
7 SS	24 24	1 5 10 14	12 13					0 0						
8 SS	24 20	8 10 12 16	14 15	14' sand is increasingly poorly graded with depth.				0						

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

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SOIL BORING LOG INFORMATION SUPPLEMENT

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Boring Number SB210

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
					SW			0						
9 SS	24 19	11 14 15 16	16	15.9' mostly fine sand. 16 - 23.6' **POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [mostly fine], wet.				0						At approximately 14' start adding mud to keepsand from clogging augers.
			17					0						
10 SS	24 20	9 15 15 17	18	18' - 21' sulfur-like odor.				1.6						
			19											
11 SS	24 22	15 19 18 20	20		SP			2						
			21					0.5						
12 SS	24 21	8 11 23 30	22					0						
			23					0						
			24	23.6 - 23.7' **WELL-GRADED GRAVEL:** GW. 23.7 - 24' **LEAN CLAY:** CL, dark gray (2.5Y 4/1), trace sand [mostly coarse], dry to moist. 24' End of Boring.	GW CL			0						>4.5 tsf compressive strength.

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Facility/Project Name Former NSG North Plant Removal	License/Permit/Monitoring Number	Boring Number SB211	
Boring Drilled By: Name of crew chief (first, last) and Firm Joe Martin Test Service Corporation	Date Drilling Started 6/25/2012	Date Drilling Completed 6/25/2012	Drilling Method hollow stem auger
Common Well Name	Final Static Water Level Feet (NAVD)	Surface Elevation Feet (NAVD)	Borehole Diameter 8.3 inches
Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐ State Plane N, E S/C/[✓ N] 1/4 of 1/4 of Section , T N, R	Lat ___° ___' ___" Long ___° ___' ___"	Local Grid Location 4691705 Feet ☒ N ☐ S	432142 Feet ☒ E ☐ W
Facility ID	County Lake	State IL	Civil Town/City/ or Village Waukegan

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
1 SS	24 17	6 11 5 5		0 - 4.5' **FILL, WELL-GRADED SAND:** SW, dry, brown to black with cinders and slag.										2 in. Split Spoon and 140 lb Hammer.
			1					0						
2 SS	24 4	2 2 3 2	2	2' dry.	(FILL) SW			0						
			3											
3 SS	24 20	3 2 3 3	4					0						
			5	4.5 - 8' **POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), deisel-like odors (wet at 4.5').				0.3						
4 SS	24 21	3 3 5 5	6	6' 6'-8' deisel-like odors and rainbow sheen in water, not on sand grains, at 6' sheen present.	SP			0.7						
			7					0						
5 SS	24 21	4 5 5 7	8	8 - 18' **WELL-GRADED SAND:** SW, mostly sand [some fine, some medium, some coarse], wet, grayish brown (2.5Y 5/2), deisel-like odors, sheen on water between grains.				0						
			9					0.7						
6 SS	24 24	4 7 10 10	10	10' -18 faint deisel-like odor, no sheen.				0.4						
			11		SW			0.1						
7 SS	24 22	6 7 14 15	12					0						
			13					0						
8 SS	24 20	5 12 19 19	14					0.1						
			15											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

Firm Natural Resource Technology, Inc.
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SOIL BORING LOG INFORMATION SUPPLEMENT

Boring Number SB211

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				8 - 18' **WELL-GRADED SAND:** SW, mostly sand [some fine, some medium, some coarse], wet, grayish brown (2.5Y 5/2), deisel-like odors, sheen on water between grains. *(continued)*				0						
9 SS	24 22	12 15 18 20	16		SW			0						
			17					0						
10 SS	24 16	10 11 14 16	18	18 - 23.5' **POORLY-GRADED SAND:** SP, wet, grayish brown (2.5Y 5/2), mostly fine, trace coarse sand.				0						
			19					0						
11 SS	24 20	10 16 20 26	20					0						
			21		SP			0						
12 SS	24 24	22 19 18 10	22					0						
			23					0						
				23.3' -23.5' well graded gravel no odor, no visual.										23.5'-24' >4.5 tsf compressive strength.
			24	23.5 - 24' **LEAN CLAY:** CL, dry to moist, dark gray (10YR 4/1), trace coarse sand.	CL									
				24' End of Boring.										

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SOIL BORING LOG INFORMATION

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Facility/Project Name Former NSG North Plant Removal		License/Permit/Monitoring Number	Boring Number SB212
Boring Drilled By: Name of crew chief (first, last) and Firm Joe Martin Test Service Corporation	Date Drilling Started 6/27/2012	Date Drilling Completed 6/27/2012	Drilling Method hollow stem auger
Common Well Name	Final Static Water Level Feet (NAVD)	Surface Elevation Feet (NAVD)	Borehole Diameter 8.3 inches
Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐ State Plane N, E S/C/[✓ N] 1/4 of 1/4 of Section , T N, R	Lat ° ' " Long ° ' "	Local Grid Location ☒ N ☒ E 4691683 Feet ☐ S 432154 Feet ☐ W	
Facility ID	County Lake	State IL	Civil Town/City/ or Village Waukegan

Sample										Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 SS	24 16	2 2 1 2	0–2	**0 - 6' FILL, WELL-GRADED GRAVEL:** GW, foundary sand, brown to black, dry, with slag and brick fragments.				0 0						2 in. Split Spoon and 140 lb Hammer.
2 SS	24 12	1 1 2 2	2–4		(FILL) GW			0 0						
3 SS	24 18	1 2 2 3	4–6	4' -4.3' wood debris. 5.3' wet.				0 0						
4 SS	24 20	5 5 8 8	6–8	**6 - 16.5' POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [mostly fine], wet.				0 0						
5 SS	24 16	3 5 7 8	8–10					0 0						
6 SS	24 17	6 16 12 14	10–12		SP			0 0						
7 SS	24 17	6 11 16 18	12–14					0 0						
8 SS	24 20	7 11 13 14	14–15					0						

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm Natural Resource Technology, Inc. 23713 W. Paul Road, Suite D, Pewaukee, WI 53072 Tel: 262.523.9000 Fax: 262.523.9001

SOIL BORING LOG INFORMATION SUPPLEMENT

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Boring Number SB212

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				6 - 16.5' **POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [mostly fine], wet. *(continued)*	SP			0						
9 SS	24 20	13 18 24 18	16	16' -16.5' coarsens downward to become a well graded sand.				0						
			17	16.5 - 17.5' **WELL-GRADED SAND:** SW, mostly sand [some fine, some medium, some coarse].	SW			0						
10 SS	24 16	8 11 15 21	18	17.5 - 25' **POORLY-GRADED SAND:** SP, mostly sand [sand], laminations. 18' -25' no laminations, homogenous.				0						
			19					0						
11 SS	24 20	8 8 14 18	20					0						
			21		SP			0						
12 SS	24. 24	9 11 14 17	22					0						
			23					0						
13 SS	24 16	18 24 26 20	24					0						
			25	24.8' 50.8 mm diamter rock fragments.				0						
			26	25 - 26' **LEAN CLAY:** CL, very dark gray (10YR 3/1), trace sand.	CL			0						
				26' End of Boring.										

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Facility/Project Name Former NSG North Plant Removal	License/Permit/Monitoring Number	Boring Number SB213	
Boring Drilled By: Name of crew chief (first, last) and Firm Joe Martin Test Service Corporation	Date Drilling Started 6/27/2012	Date Drilling Completed 6/27/2012	Drilling Method hollow stem auger
Common Well Name	Final Static Water Level Feet (NAVD)	Surface Elevation Feet (NAVD)	Borehole Diameter 8.3 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐
State Plane N, E S/C/[✓ N]
1/4 of 1/4 of Section , T N, R

Lat ° ' "
Long ° ' "

Local Grid Location
4691649 Feet ☒ N ☐ S
432119 Feet ☒ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Lake	IL	Waukegan

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
1 SS	24 4	10 6 6 6	1	0 - 2' FILL, WELL-GRADED GRAVEL: GW, appears to be road bedding, white, poor recovery.	(FILL) GW			0						2 in. Split Spoon and 140 lb Hammer.
2 SS	12 8	5 4 2 3	2 3	2 - 6' FILL, WELL-GRADED SAND: SW, brown to black, some slag and some brick fragments, no odor, no visual impacts.				0 0						
3 SS	24 18	1 1 1 1	4 5	5' wet.	(FILL) SW			0 0						
4 SS	24 19	1 1 5 7	6 7	6 - 7.5' POORLY-GRADED SAND: SP, grayish brown (2.5Y 5/2), mostly sand [mostly fine].	SP			0 0						
5 SS	24 17	5 10 12 14	8 9	7.5 - 12' WELL-GRADED SAND: SW, grayish brown (2.5Y 5/2), mostly sand [some fine, some medium, some coarse].				0 0						At approximately 8' start adding mud while drilling to keep sand from clogging augers.
6 SS	24 18	6 10 13 16	10 11		SW			0 0						
7 SS	24 18	6 10 13 16	12 13	12 - 16' POORLY-GRADED SAND: SP, grayish brown (2.5Y 5/2), mostly sand [mostly fine], homogenous.				0 0						
8 SS	24 20	9 12 15 17	14 15		SP			0						

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

Firm Natural Resource Technology, Inc.
23713 W. Paul Road, Suite D, Pewaukee, WI 53072
Tel: 262.523.9000
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SOIL BORING LOG INFORMATION SUPPLEMENT

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Boring Number SB213

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Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
					SP			0						
9 SS	24 19	8 11 16 16	16	16 - 18' **WELL-GRADED SAND:** SW, grayish brown (2.5Y 5/2), mostly sand [some fine, some medium, some coarse].	SW			0						
			17					0						
10 SS	24 20	8 11 14 17	18	18 - 24' **POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [mostly fine], homogenous, trace gravel [mostly fine].				0						
			19					0						
11 SS	24 22	11 3 13 10	20					0						
			21		SP			0						
12 SS	24 12	2 6 8 18	22					0						
			23					0						
13 SS	24 0	16 30 24 22	24	24 - 26' No Recovery.				0						clay on bottom foot of augers
			25					0						
14 SS	24 6	20 18 18 30	26	26 - 28' **LEAN CLAY:** CL, dark gray (10YR 4/1), trace sand.				0						
			27		CL									
			28	28' End of Boring.										

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SOIL BORING LOG INFORMATION

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Facility/Project Name Former NSG North Plant Removal	License/Permit/Monitoring Number	Boring Number SB214

Boring Drilled By: Name of crew chief (first, last) and Firm Joe Martin Test Service Corporation	Date Drilling Started 6/26/2012	Date Drilling Completed 6/26/2012	Drilling Method hollow stem auger
Common Well Name	Final Static Water Level Feet (NAVD)	Surface Elevation Feet (NAVD)	Borehole Diameter 8.3 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐
State Plane N, E S/C/[✓ N]
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location
4691632 Feet ☒ N ☐ S
432213 Feet ☒ E ☐ W

Facility ID	County Lake	State IL	Civil Town/City/ or Village Waukegan

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 SS	24 6	5 8 50/5	1	0 - 5.5' FILL, POORLY-GRADED SAND WITH SILT: SP-SM, some silt, dry, brown sand and silt with bricks.	(FILL) SP-SM			0						2 in. Split Spoon and 140 lb Hammer. 0-2' PP-0ppm
2 SS	24 14	17 19 13 15	2 3					0 0						
3 SS	24 14	17 12 13 20	4 5					0						
4 SS	24 12	1 1 5 6	6 7	5.5 - 11' POORLY-GRADED SAND: SP, black (10YR 2/1), moist to wet, trace roots and gravel, oil wetted, strong MGP-like odor. 5.5'-6.0' NAPL is weathered, malleable, viscous. 6' -10' oil coated, NAPL is fluid, wet at 6'.	SP			66.1 166						
5 SS	24 16	4 6 7 9	8 9					93						
6 SS	24 20	4 6 9 9	10	10' -11' oil coasted, trace emulsified NAPL (2mm).				248						
7 SS	24 17	7 15 15 17	11 12 13	11 - 14' POORLY-GRADED SAND: SP, grayish brown (2.5Y 5/2), trace gravel [mostly fine], sheen, strong MGP-like odor.	SP			85.5 98.3 30.3						
8 SS	24 20	7 9 11 15	14 15	14 - 14.5' WELL-GRADED SAND: SW, grayish brown (2.5Y 5/2), mostly sand [trace fine, mostly	SW			5 33.1						

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm Natural Resource Technology, Inc. 23713 W. Paul Road, Suite D, Pewaukee, WI 53072 Tel: 262.523.9000 Fax: 262.523.9001

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SOIL BORING LOG INFORMATION SUPPLEMENT

Boring Number SB214

Page 2 of 2

Sample		Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	
				medium, trace coarse], sheen, MGP-like odor. 14.5 - 28' **POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [mostly fine], homogeneous, trace sheen. *(continued)*				17.3						
9 SS	24 24	5 12 13 16	16					8.9						
			17					5.3						
10 SS	24 16	6 10 15 16	18	18' no sheen, no odor.				1.7						
			19					0.8						
11 SS	24 18	14 21 23 26	20	20' no sheen, becomes very poorly graded all fine sand, thinly laminated.				1.5						
			21					0.5						
12 SS	24 17	14 21 23 26	22		SP			1.6						
			23					1						
13 SS	24 18	9 14 19 13	24	24' homogeneous, less poorly graded, trace medium and coarse.				0.7						
			25					0.9						
14 SS	24 9	12 22 24 20	26											
			27					1.2						
15 SS	24 21	9 10 12 10	28	28 - 30' **LEAN CLAY:** CL, dark gray (10YR 4/1), trace sand [mostly fine].										28'-30' >4.5 tsf compressive strength.
			29		CL									
			30	30' End of Boring.										

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Facility/Project Name	License/Permit/Monitoring Number	Boring Number	
Former NSG North Plant Removal		SB215	
Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Joe Martin Test Service Corporation	6/28/2012	6/28/2012	hollow stem auger
Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
	Feet (NAVD)	Feet (NAVD)	8.3 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐
State Plane N, E S/C/(N)
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location
4691620 Feet ☒ N ☐ S
432156 Feet ☒ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Lake	IL	Waukegan

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
1 SS	24 18	4 16 16 12	1	0 - 0.2' **FILL:** (FILL), Crushed Stone. 0.2 - 1' **FILL, ORGANIC SOIL WITH GRAVEL:** (OL/OH)g. 1 - 6' **FILL, WELL-GRADED SAND:** SW, black (10YR 2/1), mostly sand [mostly medium], dry, with slag and cinders.	(FILL) (FILL) (OL/OH)	↓		0						2 in. Split Spoon and 140 lb Hammer.
2 SS	24 22	3 6 5 3	2 3	3.5' gravel sized fragments with glassy luster-(coal?).	(FILL) SW			0 0						
3 SS	24 11	3 3 2 2	4 5	5' -6'sand is mostly coarse, wet at 5'.				0 0						4'-6' PID 0 ppm
4 SS	24 13	2 2 1 2	6 7	6 - 8' **POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [mostly medium], trace roots.	SP									
5 SS	24 13	2 1 1 12	8 9	8 - 11.5' **WELL-GRADED SAND:** SW, mostly sand [some medium, some coarse], trace gravel, very dark gray (10YR 4/1) to black (10YR 2/1).				0						
6 SS	24 14	3 3 2 3	10 11	11' sheen and MGP-like odor. 11.5 - 14' **WELL-GRADED SAND:** SW, grayish brown (2.5Y 5/2), mostly sand [mostly medium], stained black 20%, oil coated, MGP-like odor.	SW			0 0						
7 SS	24 12	3 2 3 5	12 13		SW			2.7						
8 SS	24 12	3 4 4 4	14 15	14 - 24' **POORLY-GRADED SAND:** SP, sheen, oil coated, NAPL is fluid, MGP-like odor.	SP			10.5						

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm	
	Natural Resource Technology, Inc. 23713 W. Paul Road, Suite D, Pewaukee, WI 53072	Tel: 262.523.9000 Fax: 262.523.9001

SOIL BORING LOG INFORMATION SUPPLEMENT

Boring Number SB215

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				14 - 24' **POORLY-GRADED SAND:** SP, sheen, oil coated, NAPL is fluid, MGP-like odor. *(continued)*										
9 SS	24 13	3 3 5 5	16	16' oil wetted, strong MGP-like odor 16'-24', oil is fluid, sand is stained 100% black.				210						
			17											
10 SS	24 18	3 4 5 7	18	18' -22' free phase oil, in top of sampler. Oil wetted sample (18'-20'), NAPL is fluid to viscous, makes sand tacky from 18'-20'.				115						
			19					283						
11 SS	24 21	8 8 13 15	20		SP			245						
			21					178						
12 SS	24 17	7 11 29 15	22	22' oil wetted.				328						
			23					29						
13 SS	24 18	4 9 12 16	24	24 - 26' **LEAN CLAY:** CL, dark gray (10YR 4/1), trace gravel [mostly fine], no odors, no visual impacts, no apparent tar in fractures.				154 0						>4.5 tsf compressive strength
			25		CL			0						
			26	26' End of Boring.										

SOIL BORING LOG INFORMATION

Page 1 of 2

Facility/Project Name Former NSG North Plant Removal	License/Permit/Monitoring Number	Boring Number SB216	
Boring Drilled By: Name of crew chief (first, last) and Firm Joe Martin Test Service Corporation	Date Drilling Started 7/3/2012	Date Drilling Completed 7/3/2012	Drilling Method hollow stem auger
Common Well Name	Final Static Water Level Feet (NAVD)	Surface Elevation Feet (NAVD)	Borehole Diameter 8.3 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐
State Plane N, E S/C/(N)
1/4 of 1/4 of Section , T N, R
Lat ___° ___' ___"
Long ___° ___' ___"
Local Grid Location
4691613 Feet ☒ N ☐ S 432129 Feet ☒ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Lake	IL	Waukegan

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 SS	24 18	2 2 2 2	1	0 - 4' **FILL, POORLY-GRADED SAND:** SP, dry, with trace gravel, trace brick and cinder debris, dark brown, dry.				0						2 in. Split Spoon and 140 lb Hammer.
2 SS	15 12	3 3 50(3")	2 3	2' -4' black, dry to moist, MGP-like odor.	(FILL) SP			74.1						Refusal on slag brick at 3ft. Drilled through to 4ft.
3 SS	24 20	2 2 1 1	4 5	4 - 8' **POORLY-GRADED SAND:** SP, trace gravel, with little slag and brick, Strong MGP-like odor.				0						
				5.5' -6' blueish-black, wet at 5.5'.				107.2						At approximately 5' start adding mud while drilling to keep sand from clogging augers.
4 SS	24 8	WOH 1 1 1	6 7	6' sheen, wet, MGP-like odor.	SP			34.1						
5 SS	24 0	1 1 1 1	8 9	8 - 10' No Recovery.										
6 SS	24 17	WOH WOH WOH 1	10 11	10 - 24' **POORLY-GRADED SAND:** SP, mostly sand [mostly fine], sheen, wet, stained black, oil-wetted, with trace weather NAPL(yellow), sheen, strong MGP-like odor.				98.1						
7 SS	24 19	2 5 7 9	12 13	12' -14' sheen at spoon top (may be draw down).	SP			48.4						
8 SS	24 15	5 13 16 20	14 15	14' -16' faint MGP-like odor.				23.4						

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Signature

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SOIL BORING LOG INFORMATION SUPPLEMENT

Boring Number SB216

Page 2 of 2

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				10 - 24' **POORLY-GRADED SAND:** SP, mostly sand [mostly fine], sheen, wet, stained black, oil-wetted, with trace weather NAPL(yellow), sheen, strong MGP-like odor. *(continued)*				23						
9 SS	24 22	5 9 11 13	16	16' - 18' faint MGP-like odor.				39.9						
			17											
10 SS	24 18	1 5 12 14	18	18' - 20' faint MGP-like odor.				36.4						
			19		SP			45.7						
11 SS	24 22	5 11 16 17	20	20' - 22' oil wetted, NAPL sheen, and trace weathered NAPL, wet, strong MGP-like odor.				47.2						
			21					72.9						
12 SS	24 23	11 17 19 19	22	22' - 24' Some silt (20-30%), oil-coated grains, little free NAPL, weathered, wet, strong MGP-like odor.				1293						
			23					409						
13 SS	24 17	10 12 15 15	24	24 - 26' **LEAN CLAY:** CL, grayish brown (2.5Y 5/2), trace sand [mostly coarse], trace gravel [mostly fine], Residual NAPL sludge at sand/clay contact, black staining with weathered NAPL in fractures near contact (Strong MGP-like odor PID 309 ppm) and faint MGP-like odor in lower portion of clay (PID 25 ppm).				1208						
			25		CL			309						
			26	26' End of Boring.				25						

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SOIL BORING LOG INFORMATION

Facility/Project Name: Former NSG North Plant Removal
License/Permit/Monitoring Number:
Boring Number: SB217
Boring Drilled By: Name of crew chief (first, last) and Firm: Joe Martin, Test Service Corporation
Date Drilling Started: 6/27/2012
Date Drilling Completed: 6/27/2012
Drilling Method: hollow stem auger
Common Well Name:
Final Static Water Level: Feet (NAVD)
Surface Elevation: Feet (NAVD)
Borehole Diameter: 8.3 inches
Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐
State Plane N, E S/C/[✓ N]
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location: 4691614 Feet ☒ N ☐ S 432082 Feet ☒ E ☐ W
Facility ID:
County: Lake
State: IL
Civil Town/City/ or Village: Waukegan

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 SS	24 22	2 4 5 5	1	0 - 0.2' FILL, TOPSOIL: (OL/OH)g, black (10YR 2/1), topsoil. 0.2 - 4' FILL, POORLY-GRADED SAND: SP, dry, brown to black, with slag and brick fragments.	(FILL) (OL/OH)g			0 0						2 in. Split Spoon and 140 lb Hammer.
2 SS	24 14	6 3 2 2	2 3		(FILL) SP			0 0						
3 SS	24 14	3 5 7 9	4 5	3.8' wet. 4 - 6.5' POORLY-GRADED SAND: SP, grayish brown (2.5Y 5/2), mostly sand [mostly fine], no visual impacts.	SP			0 0						
4 SS	24 16	5 8 9 10	6 7	6.5 - 7.5' WELL-GRADED SAND: SW, mostly sand [mostly medium]. 7.5 - 8.5' POORLY-GRADED SAND: SP, grayish brown (2.5Y 5/2), mostly sand [mostly fine].	SW			0						
5 SS	24 16	6 6 5 4	8 9	8.5 - 9.5' WELL-GRADED SAND: SW, mostly sand [mostly coarse]. 9.5 - 12' POORLY-GRADED SAND: SP, grayish brown (2.5Y 5/2), mostly sand [mostly medium].	SP SW			0 0						
6 SS	24 17	11 12 13 12	10 11		SP			0 0						
7 SS	24 18	6 11 11 16	12 13	12 - 15' WELL-GRADED SAND: SW, mostly sand [some fine, some medium, some coarse], trace rounded gravel [mostly fine].	SW			0 0						
8 SS	24 17	6 9 13 14	14 15					0						

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Signature

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SOIL BORING LOG INFORMATION SUPPLEMENT

Boring Number SB217

Page 2 of 2

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				15 - 19' **POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [mostly fine].				0						
9 SS	24 16	12 17 22 20	16					0						
			17		SP			0						
10 SS	24 19	11 12 11 16	18					0						
			19	19 - 19.5' **WELL-GRADED SAND:** SW, mostly sand [some fine, some medium, some coarse].	SW			0						
11 SS	24 4	9 9 10 11	20	19.5 - 22' **POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [mostly fine].										
			21		SP			0						
12 SS	24 20	5 7 8 8	22	22 - 24' **LEAN CLAY:** CL, dark gray (10YR 4/1), few gravel [mostly].										
			23		CL			0						>4.5 tsf compressive strength
			24	24' End of Boring.				0						

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SOIL BORING LOG INFORMATION

Page 1 of 2

Facility/Project Name Former NSG North Plant Removal	License/Permit/Monitoring Number	Boring Number SB218

Boring Drilled By: Name of crew chief (first, last) and Firm Joe Martin Test Service Corporation	Date Drilling Started 7/2/2012	Date Drilling Completed 7/2/2012	Drilling Method hollow stem auger
Common Well Name	Final Static Water Level Feet (NAVD)	Surface Elevation Feet (NAVD)	Borehole Diameter 8.3 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐
State Plane N, E S/C/[✓ N]
1/4 of 1/4 of Section , T N, R
Lat ___ ° ___ ' ___ "
Long ___ ° ___ ' ___ "
Local Grid Location
4691591 Feet ☒ N ☐ S
432104 Feet ☒ E ☐ W

Facility ID	County Lake	State IL	Civil Town/City/ or Village Waukegan

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 SS	24 16	2 3 3 3		0 - 0.5' **FILL, SILTY SAND:** SM, poorly graded, brown, dry.	(FILL) SM			0						2 in. Split Spoon and 140 lb Hammer.
			1	0.5 - 6' **FILL, WELL-GRADED SAND:** SW, brown and black, 25-50% Cinders, dry.				0.5						
2 SS	24 12	3 3 2 2	2					0						
			3		(FILL) SW									
3 SS	24 22	2 1 2 2	4					0						
			5	5' wet, some brick debris, greater than 50% cinders.										
4 SS	24 14	2 3 5 5	6	6 - 23.9' **POORLY-GRADED SAND:** SP, mostly sand [some fine, some medium], stained gray/black, wet, MGP-lke odor.				1.3						At approximately 6' start adding mud while drilling to keep sand from clogging augers.
			7											
5 SS	24 24	1 5 7 7	8					56.9						
			9											
6 SS	24 18	6 11 11 15	10	10' -11' sheen. 10.4' -10.5 oil wetted, trace NAPL.	SP			100.2						
			11					30.2						
7 SS	24 16	5 9 11 13	12	12' stained gray/black sand, faint MGP-like odor.				7						
			13					0						
8 SS	24 19	7 11 12 15	14					0						
			15											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

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SOIL BORING LOG INFORMATION SUPPLEMENT

Boring Number SB218

Page 2 of 2

Sample										Soil Properties				
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				6 - 23.9' POORLY-GRADED SAND: SP, mostly sand [some fine, some medium], stained gray/black, wet, MGP-lke odor. *(continued)* 16' wet, faint MGP-like odor, trace gravel [mostly fine].				0.2						
9 SS	24 23	9 12 26 24	16					0						
			17					2						
10 SS	24 21	12 17 18 18	18					0						
			19					0						
11 SS	24 20	9 14 16 15	20		SP			0						
			21					0						
12 SS	24 11	8 18 12 12	22					0						
			23											
13 SS	24 22	7 11 13 15	24	**23.9 - 26' LEAN CLAY:** to **SILT:** CL, trace gravel [mostly fine], wet, grayish brown (2.5Y 5/2) to gray (2.5Y 5/1), no odor, (Till).				0						
			25		CL			0						
			26	26' End of Boring.										

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SOIL BORING LOG INFORMATION

Page 1 of 2

Facility/Project Name: Former NSG North Plant Removal
License/Permit/Monitoring Number:
Boring Number: SB219

Boring Drilled By: Name of crew chief (first, last) and Firm: Joe Martin
Test Service Corporation
Date Drilling Started: 6/27/2012
Date Drilling Completed: 6/27/2012
Drilling Method: hollow stem auger

Common Well Name:
Final Static Water Level: Feet (NAVD)
Surface Elevation: Feet (NAVD)
Borehole Diameter: 8.3 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐
State Plane N, E S/C/N [✓ N]
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location ☒ N ☒ E
4691577 Feet ☐ S 432086 Feet ☐ W

Facility ID:
County: Lake
State: IL
Civil Town/City/ or Village: Waukegan

Sample		Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	
1 SS	24 20	2 2 1 2		0 - 0.3' FILL, TOPSOIL: OL/OH, Topsoil.	(FILL) OL/OH			0						2 in. Split Spoon and 140 lb Hammer.
			1	0.3 - 6' FILL, WELL-GRADED SAND: SW, dry, brown to black sand with slag brick fragments and cinders.				0						
2 SS	24 6	1 1 1 1	2					0						
			3		(FILL) SW									
3 SS	24 12	1 1 1 1	4					0						
			5	5' wet. 5'-6' sulfur like odor.										
4 SS	24 20	5 8 9 9	6	6 - 6.2' PEAT (AMORPHOUS): PT, black (10YR 2/1), peat with sulfur-like odor.	PT			0						
			7	6.2 - 8' POORLY-GRADED SAND: SP, grayish brown (2.5Y 5/2), wet, 6.2-6.5 mottled 10% orange with roots.	SP			0						
5 SS	24 15	6 9 10 10	8	8 - 12.5' WELL-GRADED SAND: SW, very dark gray (2.5Y 3/1), mostly sand [some fine, some medium, some coarse], wet.				0						
			9					0						
6 SS	24 17	9 11 20 22	10		SW			0						
			11					0						
7 SS	24 20	9 12 22 20	12					0						
			13	12.5 - 18' POORLY-GRADED SAND: SP, grayish brown (2.5Y 5/2), mostly sand [mostly fine], wet.				0						
8 SS	24 17	15 20 20 23	14		SP			0						
			15											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

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SOIL BORING LOG INFORMATION SUPPLEMENT

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Boring Number SB219

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				12.5 - 18' **POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [mostly fine], wet. *(continued)*		░		0						
9 SS	24 20	8 11 17 17	16		SP	░		0						
			17			░		0						
10 SS	24 20	10 10 13 17	18	18 - 19.7' **WELL-GRADED SAND:** SW, grayish brown (2.5Y 5/2), mostly sand [mostly medium].		░		0						
			19		SW	░		0						
11 SS	24 16	11 14 23 9	20	19.7 - 21.5' **POORLY-GRADED SAND:** SP, mostly sand [mostly fine].		░		0						>4.5 tsf compressive strength
			21	21.3' -21.5' coarse gravel, no visual impacts.	SP	░								
			22	21.5 - 22' **LEAN CLAY:** CL, dark gray (2.5Y 5/2), trace sand [mostly coarse].	CL	▨								
				22' End of Boring.										

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SOIL BORING LOG INFORMATION

Page 1 of 2

Facility/Project Name Former NSG North Plant Removal	License/Permit/Monitoring Number	Boring Number SB220

Boring Drilled By: Name of crew chief (first, last) and Firm Joe Martin Test Service Corporation	Date Drilling Started 6/28/2012	Date Drilling Completed 6/28/2012	Drilling Method hollow stem auger
Common Well Name	Final Static Water Level Feet (NAVD)	Surface Elevation Feet (NAVD)	Borehole Diameter 8.3 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐
State Plane N, E S/C/[✓ N]
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location
4691576 Feet ☒ N ☐ S
432147 Feet ☒ E ☐ W

Facility ID	County Lake	State IL	Civil Town/City/ or Village Waukegan

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties Compressive Strength (tsf)	Soil Properties Moisture Content	Soil Properties Liquid Limit	Soil Properties Plasticity Index	Soil Properties P 200	RQD/ Comments
1 SS	24 20	11 5 5 9	1	0 - 1.5' **FILL, WELL-GRADED SAND:** SW, mostly sand [mostly fine], little gravel [mostly fine], dry, brown, no visual impacts.	(FILL) SW			0						2 in. Split Spoon and 140 lb Hammer.
2 SS	24 12	2 4 4 2	2	1.5 - 3' **FILL, WELL-GRADED SAND:** SW, dry, with cinders and slag.	(FILL) SW			0						
3 SS	24 14	1 1 1 2	3 4	3 - 5' **FILL:** (FILL), moist, red brick, faint MGP-like odor. 4.5' wet.	(FILL)			13.2 0.9						
			5	5 - 6' **FILL, WELL-GRADED SAND:** SW, black (10YR 2/1), mostly sand [some fine, some medium, some coarse], wet, few cinders, few slag, diesel-like odor.	(FILL) SW									
4 SS	24 17	4 6 8 8	6 7	6 - 10' **POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [mostly fine], wet.	SP			1.2 0.1						
5 SS	24 16	4 6 6 8	8 9					0 0						
6 SS	24 17	2 4 9 11	10 11	10 - 15.5' **WELL-GRADED SAND:** SW, mostly sand [some fine, some medium], dark gray (10YR 4/1). 11' -12' trace sheen in water.	SW			0 0						
7 SS	24 18	9 10 12 13	12 13	12' -13'no sheen. 13' -15.5' faint diesel-like odor, color change to grayish brown (2.5 5/2).				0.8 1						
8 SS	24 20	9 16 18 18	14 15					0.1						

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

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SOIL BORING LOG INFORMATION SUPPLEMENT

Boring Number SB220

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
								0.1						
9 SS	24 16	17 7 7 14	16	15.5 - 25' **POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [mostly fine], faint diesel-like odor.				0						
			17					0						
10 SS	24 19	5 9 13 17	18	18' sand becomes dark gray, no odors.				0 0						
			19					0						
11 SS	24 21	9 11 13 16	20	20' sand becomes grayish brown, no sheen and no odor.	SP			0						
			21					0						
12 SS	24 21	13 17 14 17	22	22' very poorly graded sand, mostly sand [mostly fine].				0						
			23					0						
13 SS	24 24	9 13 13 17	24					0						
			25	24.9' fine gravel.				0						>4.5 tsf compressive strength
				25 - 26' **LEAN CLAY:** CL, dark gray (10YR 4/1), trace sand [mostly fine], trace gravel [mostly fine], dry.	CL									
			26	26' End of boring.										

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SOIL BORING LOG INFORMATION

Facility/Project Name: Former NSG North Plant Removal
License/Permit/Monitoring Number:
Boring Number: SB221

Boring Drilled By: Name of crew chief (first, last) and Firm: Joe Martin, Test Service Corporation
Date Drilling Started: 7/2/2012
Date Drilling Completed: 7/2/2012
Drilling Method: hollow stem auger

Common Well Name:
Final Static Water Level: Feet (NAVD)
Surface Elevation: Feet (NAVD)
Borehole Diameter: 8.3 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐
State Plane N, E S/C/[✓ N]
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location: 4691577 Feet ☒ N ☐ S 432174 Feet ☒ E ☐ W

Facility ID:
County: Lake
State: IL
Civil Town/City/ or Village: Waukegan

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 SS	24 24	4 3 3 2	1	0 - 1' **FILL, POORLY-GRADED SAND WITH SILT:** SW-SM; mostly sand [mostly fine], some silt, dry, brown.	(FILL) SW-SM									2 in. Split Spoon and 140 lb Hammer.
2 SS	24 20	13 11 8 6	2	1 - 3' **FILL, POORLY-GRADED SAND:** SP, mostly sand [mostly fine], dry, grayish-black very fine sand, with cinders.	(FILL) SP			0 0						
			3	3 - 4' **FILL, WELL-GRADED SAND:** SW, black (10YR 2/1), dry, cinders and well graded sand slag, trace brick debris, black ,dry, faint MGP-like odor.	(FILL) SW			3.1						
3 SS	24 12	4 8 6 4	4 5	4 - 6' **POORLY-GRADED GRAVEL WITH SAND:** (GP)s, black (10YR 2/1), mostly gravel [mostly fine], wet, Cinders and slag, at 4' oil wetted, faint MGP-like odor, well graded sand, sheen.	(GP)s			6						
4 SS	24 10	1 WOH 1 3	6 7	6 - 25' **POORLY-GRADED SAND:** SP, black (10YR 2/1), mostly sand [mostly fine], wet, MGP-liked odor, sheen.				20.8 51.6						
5 SS	24 18	5 5 6 10	8 9	8' -10' stained black, wet with multiple layered sheens (yellow and gray), no visible free NAPL, MGP-like odor.				56.9 206.9						
6 SS	24 18	5 8 5 6	10 11	10' -12' with sheens and zones of weathered NAPL sheen (zones of brown stained sand), less staining at approximately 11.5'.	SP			370.9						
				11.5' -12' sand is now grayish brown (2.5Y 5/2) with sheen.				110.1						
7 SS	24 18	4 7 12 14	12 13	12' -14' NAPL sheen with layers of weathered NAPL sheen, MGP-like odor, wet.				59.6						PID measurement from 12'-13' bag: 320.3 ppm
8 SS	24 18	6 9 10 16	14 15	14' -16' NAPL sheen become less concentrated with depth. fine sand grayish brown, wet, MGP-like odor.				26.7						

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

Firm: Natural Resource Technology, Inc.
23713 W. Paul Road, Suite D, Pewaukee, WI 53072
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NATURAL
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SOIL BORING LOG INFORMATION SUPPLEMENT

Boring Number SB221

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Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				6 - 25' **POORLY-GRADED SAND:** SP, black (10YR 2/1), *mostly* sand [mostly fine], wet, MGP-liked odor, sheen. *(continued)*				14.6						Each spoon following has some weathered NAPL in slough return at top of spoon
9 SS	24 24	9 9 14 13	16	16' -18' becoming more fine grained, no sheen at spoon bottom, grayish-brown, wet.				22.1						
			17					23.4						
10 SS	24 24	4 9 14 15	18	18' -20 slight sheen at top half of spoon (likely drag down), bottom half-no sheen, faint MGP-like odor, wet.				28.5						
			19					3.1						
11 SS	24 24	6 9 12 21	20	20' -22' sand fining with depth, becoming dark grayish brown, faint MGP-like odor at spoon bottom, wet, no sheen.	SP			1.4						
			21					1.2						
12 SS	24 24	10 15 18 18	22	22' -24' faint MGP-like odor (sheen very slight, likely drag down).				9.6						
			23					8.6						
13 SS	24 24	15 13 16 13	24					3.6						
			25	25 - 26' **LEAN CLAY:** CL, little gravel [mostly fine], some silt, wet, at top of clay (dolomite with pyrite), gray to dark gray, wet.	CL			0.3						
			26	26' End of Boring.										

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SOIL BORING LOG INFORMATION

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Facility/Project Name: Former NSG North Plant Removal
License/Permit/Monitoring Number:
Boring Number: SB222

Boring Drilled By: Name of crew chief (first, last) and Firm: Joe Martin, Test Service Corporation
Date Drilling Started: 6/26/2012
Date Drilling Completed: 6/26/2012
Drilling Method: hollow stem auger

Common Well Name:
Final Static Water Level: Feet (NAVD)
Surface Elevation: Feet (NAVD)
Borehole Diameter: 8.3 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐
State Plane N, E S/C/(N)
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location: 4691585 Feet ☒ N ☐ S; 432208 Feet ☒ E ☐ W

Facility ID:
County: Lake
State: IL
Civil Town/City/ or Village: Waukegan

Sample		Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	
1 SS	24 14	3 4 6 4	1	0 - 0.3' **FILL, SILT**: ML, light gray, (gypsum?). 0.3 - 4' **FILL, WELL-GRADED SAND**: SW, mostly sand [some fine, some medium, some coarse], moist to wet, brown to black, with cinders and slag.	(FILL) ML			0 0						2 in. Split Spoon and 140 lb Hammer.
2 SS	24 8	8 1 1 1	2 3		(FILL) SW			1.4						
3 SS	24 16	3 4 3 4	4 5	4 - 6' **POORLY-GRADED SAND**: SP, black (2.5Y 2.5/1), mostly sand [mostly fine], wet, sulfur-like odor, very dark gray to black.	SP			11.6						
4 SS	24 17	4 8 10 10	6 7	6 - 7' **WELL-GRADED SAND**: SW, black (2.5Y 2.5/1), mostly sand [some fine, some medium, some coarse], sulfur-like odor. 7 - 13' **POORLY-GRADED SAND**: SP, black (2.5Y 2.5/1), mostly sand [mostly fine], wet, sulfur-like odor, very dark gray to black.	SW			2.9 4.6						
5 SS	24 15	4 6 10 12	8 9					2.4 0.7						
6 SS	24 20	6 8 11 11	10 11	10' sulfur-like odor, sand is starting to turn grayish brown.	SP			2.2 1.3						
7 SS	24 17	5 12 13 16	12					1						
			13	13 - 18' **WELL-GRADED SAND**: SW, black (2.5Y 2.5/1), sulfur-like odor.				1.4 0.6						
8 SS	24 20	7 11 12 10	14 15		SW			2.1						

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

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NATURAL RESOURCE TECHNOLOGY

SOIL BORING LOG INFORMATION SUPPLEMENT

Boring Number SB222

Page 2 of 2

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				13 - 18' **WELL-GRADED SAND:** SW, black (2.5Y 2.5/1), sulfur-like odor. *(continued)*				0.2						
9 SS	24 16	4 7 12 17	16		SW			0.7						
			17					0.6						
10 SS	24 18	8 16 14 15	18	18 - 23.5' **POORLY-GRADED SAND:** SP, black (2.5Y 2.5/1), mostly sand [mostly fine], faint sulfur-like odor.				3.8						
11 SS	24 20	8 12 14 14	19					2.4						
			20											
			21		SP			3						
12 SS	24 18	8 12 27 18	22					2.3						
			23					2.1						
				23.3' -23.5' large angular gravel fragments.										
13 SS	24 24	6 7 10 20	24	23.5 - 24' **LEAN CLAY:** CL, dark gray (2.5Y 4/1).	CL			0						
				24' End of Boring.										

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SOIL BORING LOG INFORMATION

Page 1 of 2

Facility/Project Name: Former NSG North Plant Removal

License/Permit/Monitoring Number:

Boring Number: SB223

Boring Drilled By: Name of crew chief (first, last) and Firm: Joe Martin, Test Service Corporation

Date Drilling Started: 6/29/2012

Date Drilling Completed: 6/29/2012

Drilling Method: hollow stem auger

Common Well Name:

Final Static Water Level: Feet (NAVD)

Surface Elevation: Feet (NAVD)

Borehole Diameter: 8.3 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐

State Plane N, E S/C/[✓ N]

1/4 of 1/4 of Section , T N, R

Lat ° ' "

Long ° ' "

Local Grid Location: 4691522 Feet ☒ N ☐ S 432087 Feet ☒ E ☐ W

Facility ID:

County: Lake

State: IL

Civil Town/City/ or Village: Waukegan

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
1 SS	24 12	3 3 3 3		0 - 6' **FILL, WELL-GRADED SAND:** SW, brown, with bricks and slag.										
			1					0						
2 SS	24 8	4 2 2 2	2					0						
			3		(FILL) SW			0.1						
3 SS	24 6	2 3 3 3	4	4' poor recovery, brick fragments and fine gravel.				0						
			5	5' wet.										
4 SS	24 18	2 4 6 6	6	6 - 6.8' **POORLY-GRADED SAND:** SP, mottled black 30%,.	SP			0						
			7	6.8 - 16.8' **WELL-GRADED SAND:** SW, dark gray (10YR 4/1), mostly sand [some fine, some medium, some coarse].				0						
5 SS	24 15	6 7 12 10	8	8' -10' grayish brown (2.5Y 5/2).				0						
			9					0						
6 SS	24 16	6 10 17 18	10					0						
			11		SW			0						
7 SS	24 20	6 9 12 13	12	12' -14' grayish brown (2.5Y 5/2).				0						
			13					0						
8 SS	24 16	6 9 10 10	14					0						
			15											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

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SOIL BORING LOG INFORMATION SUPPLEMENT

Boring Number SB223

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
9 SS	24 16	2 8 15 15	16	6.8 - 16.8' **WELL-GRADED SAND:** SW, dark gray (10YR 4/1), mostly sand [some fine, some medium, some coarse]. *(continued)*	SW			0 0						
			17	16.8 - 21' **POORLY-GRADED SAND:** SP, mostly sand [mostly fine], trace gravel [mostly fine], brownish gray (2.5Y 5/2).				0						
10 SS	24 24	8 10 12 15	18					0						
			19		SP			0						
11 SS	24	4 16 20 12	20					0						length recovered not recorded. >4.5 tsf compressive strength
			21	20.8' -21' rock fragments (coarse gravel). 21 - 22' **LEAN CLAY:** CL, dark gray (10YR 4/1).	CL			0						
			22	22' End of Boring.										

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SOIL BORING LOG INFORMATION

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Facility/Project Name Former NSG North Plant Removal		License/Permit/Monitoring Number		Boring Number SB224
Boring Drilled By: Name of crew chief (first, last) and Firm Joe Martin Test Service Corporation		Date Drilling Started 6/28/2012	Date Drilling Completed 6/28/2012	Drilling Method hollow stem auger
Common Well Name		Final Static Water Level Feet (NAVD)	Surface Elevation Feet (NAVD)	Borehole Diameter 8.3 inches
Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐ State Plane N, E S/C/[✓ N] 1/4 of 1/4 of Section , T N, R		Lat ° ' " Long ° ' "	Local Grid Location ☒ N ☒ E 4691519 Feet ☐ S 432111 Feet ☐ W	
Facility ID	County Lake	State IL	Civil Town/City/ or Village Waukegan	

Sample										Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 SS	24 21	7 9 11 11	1	0 - 3' **FILL, LEAN CLAY:** to **SILT:** CL, dry.	(FILL) CL	▨		0 0						2 in. Split Spoon and 140 lb Hammer.
2 SS	24 16	6 8 7 8	2			▨		0						
			3	3 - 5.5' **FILL, WELL-GRADED SAND:** SW, dry to moist, black sand with cinders and slag, no odor, no visual impacts.	(FILL) SW	░		0.3						
3 SS	24 22	2 2 2 8	4 5	4' -5.5' MGP-like odor.		░		10.1						
			6	5.5 - 8.5' **FILL, SILT:** ML, organic fibers, brown silt, poor recovery-wet MGP-like odor, stained black 100%.	(FILL) ML	▥		87.1						
4 SS	24 8	2 1 2 3	7	7.5' -8.5' lots of woody debris and solvent-like odor.		▥		168						
5 SS	24 18	2 2 3 5	8			▥		6						
			9	8.5 - 16' **POORLY-GRADED SAND:** SP, dark gray (10YR 4/1), wet, no odor, no visual impact.	SP	░		5.2						
6 SS	24 22	3 4 7 9	10 11			░		1						
7 SS	24 19	6 9 11 11	12 13			░		0.9 2.2						
8 SS	24 18	4 9 17 21	14 15			░		0.7						

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm Natural Resource Technology, Inc. Tel: 262.523.9000 23713 W. Paul Road, Suite D, Pewaukee, WI 53072 Fax: 262.523.9001

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SOIL BORING LOG INFORMATION SUPPLEMENT

Boring Number SB224

Page 2 of 2

Sample		Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	
				8.5 - 16' **POORLY-GRADED SAND:** SP, dark gray (10YR 4/1), wet, no odor, no visual impact. *(continued)*	SP			0.5						
9 SS	24 24	10 11 15 14	16 17	16 - 20' **WELL-GRADED SAND:** SW, grayish brown (2.5Y 5/2), mostly sand [some fine, some medium, some coarse], trace gravel [mostly fine].	SW			0 0.6						
10 SS	24 20	6 9 11 13	18 19					0 0.4						
11 SS	24 18	7 13 22 22	20 21	20 - 24' **POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [mostly fine].	SP			0 0						
12 SS	24 18	7 9 16 40	22 23					0 0						
13 SS	24 23	10 16 20 25	24 25	23.9' -24' fine gravel, large rock fragments in shoe. 24 - 26' **LEAN CLAY:** CL, dark gray (10YR 4/1), trace sand [mostly fine], trace gravel [mostly fine].	CL			0						>4.5 tsf compressive strength
			26	26' End of Boring.										

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SOIL BORING LOG INFORMATION

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Facility/Project Name Former NSG North Plant Removal	License/Permit/Monitoring Number	Boring Number SB225

Boring Drilled By: Name of crew chief (first, last) and Firm Joe Martin Test Service Corporation	Date Drilling Started 6/26/2012	Date Drilling Completed 6/26/2012	Drilling Method hollow stem auger
Common Well Name	Final Static Water Level Feet (NAVD)	Surface Elevation Feet (NAVD)	Borehole Diameter 8.3 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐
State Plane N, E S/C/[✓ N]
1/4 of 1/4 of Section , T N, R

Lat ° ' "
Long ° ' "

Local Grid Location
4691532 Feet ☒ N ☐ S
432178 Feet ☒ E ☐ W

Facility ID	County Lake	State IL	Civil Town/City/ or Village Waukegan

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
1 SS 2 SS	24 18 24 16	2 1 1 5 6 6 5 3	1 2	**0 - 3' FILL, POORLY-GRADED SAND:** SP, and gypsum, previous logs identified it as wall board, found some fragments could be wall board, trace slag, brick, dry, mostly gypsum.	(FILL) SP			0 0 0						2 in. Split Spoon and 140 lb Hammer.
3 SS	24 9	2 2 2 2	3 4	**3 - 5' FILL, WELL-GRADED SAND:** SW, black to brown, with slag, dry, no odor, no visual impacts. 4' wet.	(FILL) SW			1.7 0 2.6						
4 SS	24 19	4 5 5 7	5 6	**5 - 6.8' POORLY-GRADED SAND:** SP, mostly sand [mostly fine], with roots, MGP-like odor, oil coated. 6' oil wetted, MGP-like odor.	SP			7.2						
			7	**6.8 - 8' POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [mostly fine], MGP-like odor.	SP			12.7						
5 SS 6 SS 7 SS	24 12 24 18 24 20	4 5 7 7 3 4 4 4 5 7 9 9	8 9 10 11 12	**8 - 12.5' WELL-GRADED SAND:** SW, grayish brown (2.5Y 5/2), mostly sand [some fine, some medium, some coarse], no odor, no visual impcats. 10' trace fine gravel.	SW			0.1 0 0.1 0.1						
8 SS	24 20	8 11 13 16	13 14 15	**12.5 - 24' POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [mostly fine].	SP			0 0 0.8						

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm Natural Resource Technology, Inc. 23713 W. Paul Road, Suite D, Pewaukee, WI 53072 Tel: 262.523.9000 Fax: 262.523.9001

SOIL BORING LOG INFORMATION SUPPLEMENT

Boring Number SB225

Page 2 of 2

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				12.5 - 24' **POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [mostly fine]. *(continued)*				0.1						
9 SS	24 18	6 8 12 16	16	16' -18' trace fine gravel (16'-18').				0						
			17					0						
10 SS	24 22	10 13 12 14	18					0						
			19		SP			0						
11 SS	24 19	12 13 22 20	20	20' becoming more poorly graded (all fine sand).				0.3						
			21					0.2						
12 SS	24 14	8 12 50(4")	22					0						
			23					0						
13 SS	24 17	10 12 16 19	24	23.9' -24' rock chips in the shoe. 24 - 26' **LEAN CLAY:** CL, dark gray (10YR 4/1), trace sand [mostly medium].				0						
			25		CL			0						>4.5 tsf compressive strength
			26	26' End of Boring.				0						

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SOIL BORING LOG INFORMATION

Page 1 of 2

Facility/Project Name: Former NSG North Plant Removal
License/Permit/Monitoring Number:
Boring Number: SB226
Boring Drilled By: Name of crew chief (first, last) and Firm: Joe Martin, Test Service Corporation
Date Drilling Started: 6/29/2012
Date Drilling Completed: 6/29/2012
Drilling Method: hollow stem auger
Common Well Name:
Final Static Water Level: Feet (NAVD)
Surface Elevation: Feet (NAVD)
Borehole Diameter: 8.3 inches
Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐
State Plane N, E S/C/[✓ N]
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location: 4691495 Feet ☒ N ☐ S; 432124 Feet ☒ E ☐ W
Facility ID:
County: Lake
State: IL
Civil Town/City/ or Village: Waukegan

Sample									Soil Properties						
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 SS	24 24	7 40 21 6		0 - 1' **FILL, LEAN CLAY:** CL, dry, brown, with roots, no odor, no visual impacts.	(FILL) CL			0						2 in. Split Spoon and 140 lb Hammer.
			1	1 - 4' **FILL, WELL-GRADED SAND:** SW, black (10YR 2/1), dry, with cinders and slag.	(FILL) SW									
2 SS	24 18	2 1 2 2	2					0						
			3					0						
3 SS	24 10	1 2 1 2	4	3.9' moist. 4 - 6' **FILL, SILT WITH SAND:** (ML)s, black (10YR 2/1), wet, MGP-like odor, oil stained, sheen.	(FILL) (ML)s			0 41.3						
			5											
4 SS	24 16	4 5 7 6	6	6 - 11' **POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), stained approximately 80%, strong MGP-like odor, sheen, trace oil coating.	SP			21.2						
			7					39.4						
5 SS	24 16	6 7 8 6	8					109						
			9					132						
6 SS	24 23	8 9 13 16	10	9.8' -10' oil coated. 10' -11' MGP-like odor, sheen, dark gray sand (10YR 4/1).				3.3						
			11	11 - 12' **WELL-GRADED SAND:** SW, grayish brown (2.5Y 5/2), faint MGP-like odor, no odor, no visual impact.	SW			1.6						
7 SS	24 18	9 12 12 16	12	12 - 18' **POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [mostly fine], no odor, no visual impacts.	SP			0						
			13					0						
8 SS	24 20	7 9 11 13	14					0						
			15											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

Firm Natural Resource Technology, Inc.
23713 W. Paul Road, Suite D, Pewaukee, WI 53072
Tel: 262.523.9000
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Template: SOIL BORING - Project: NORTH PLANT.GPJ

SOIL BORING LOG INFORMATION SUPPLEMENT

NATURAL
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Boring Number SB226

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Sample		Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	
				12 - 18' **POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [mostly fine], no odor, no visual impacts. *(continued)*				0						
9 SS	24 14	8 8 13 16	16		SP			0						
			17					0						
10 SS	24 24	8 11 13 15	18	18 - 21' **WELL-GRADED SAND:** SW, grayish brown (2.5Y 5/2), wet.				0						
			19					0						
11 SS	24 18	15 12 12 15	20		SW			0						
			21	21 - 24' **POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [mostly fine], rock chips in shoe.				0						
12 SS	24 10	30 23 11 14	22					0						
			23		SP			0						
13 SS	24 16	7 17 21 15	24	24 - 26' **LEAN CLAY:** CL, dark gray (10YR 4/1), trace sand [mostly fine], trace gravel [mostly fine].				0						
			25		CL			0						
			26	26' End of Boring.										

NATURAL
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SOIL BORING LOG INFORMATION

Page 1 of 2

Facility/Project Name Former NSG North Plant Removal	License/Permit/Monitoring Number	Boring Number SB227	
Boring Drilled By: Name of crew chief (first, last) and Firm Joe Martin Test Service Corporation	Date Drilling Started 7/2/2012	Date Drilling Completed 7/2/2012	Drilling Method hollow stem auger
Common Well Name	Final Static Water Level Feet (NAVD)	Surface Elevation Feet (NAVD)	Borehole Diameter 8.3 inches

Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐
State Plane N, E S/C/(N)
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location
4691473 Feet ☒ N ☐ S
432047 Feet ☒ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Lake	IL	Waukegan

Sample		Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	
1 SS	24 6	10 10 6 3	1	**0 - 4' POORLY-GRADED SAND WITH SILT:** SP-SM, mostly sand [mostly coarse], some silt, trace cinders, few slag.				0						2 in. Split Spoon and 140 lb Hammer.
2 SS	24 9	3 2 2 1	2 3	2' wet, trace cinders and glass debris, also wood chips (probably tree roots), brown, trace ceramic debris.	SP-SM			0						
3 SS	24 13	1 0 3 4	4	**4 - 18' POORLY-GRADED SAND:** SP, dark grayish brown (2.5Y 4/2), mostly sand [some fine, some medium], wet, no odor.				0						
			5					0						At approximately 5' start adding mud while drilling to keep sand from clogging augers.
4 SS	24 17	5 5 5 7	6 7					0						
5 SS	24 17	4 6 10 11	8 9					0						
6 SS	24 20	7 12 15 7	10 11		SP			0						
7 SS	24 20	5 7 13 13	12 13	12' trace fine gravel.				0						
8 SS	24 19	6 8 9 6	14 15					0						

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature Troy H Clous

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SOIL BORING LOG INFORMATION SUPPLEMENT

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Boring Number SB227

Page 2 of 2

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			16	4 - 18' **POORLY-GRADED SAND:** SP, dark grayish brown (2.5Y 4/2), mostly sand [some fine, some medium], wet, no odor. *(continued)*										
9 SS	24 23	7 13 16 30			SP			0						
			17	17.2' -18' some coarse sand, trace fine gravel.										
10 SS	24 16	15 13 17 11	18	18 - 18.9' **WELL-GRADED SAND WITH GRAVEL:** (SW)g, some sand [mostly fine], some gravel [mostly fine], wet, sub-rounded to sub-angular.	(SW)g									
			19	18.9 - 20' **LEAN CLAY: to SILT:** CL, gray (2.5Y 5/1), little gravel [some fine, some medium, some coarse], some silt, wet.	CL			0						
			20	20' End of Boring.				0						

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SOIL BORING LOG INFORMATION

Page 1 of 2

Facility/Project Name Former NSG North Plant Removal		License/Permit/Monitoring Number	Boring Number SB228	
Boring Drilled By: Name of crew chief (first, last) and Firm Joe Martin Test Service Corporation		Date Drilling Started 6/29/2012	Date Drilling Completed 6/29/2012	Drilling Method hollow stem auger
Common Well Name		Final Static Water Level Feet (NAVD)	Surface Elevation Feet (NAVD)	Borehole Diameter 8.3 inches
Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐ State Plane N, E S/C/[✓ N] 1/4 of 1/4 of Section , T N, R		Lat ° ' " Long ° ' "	Local Grid Location 4691466 Feet ☒ N ☐ S	432109 Feet ☒ E ☐ W
Facility ID	County Lake	State IL	Civil Town/City/ or Village Waukegan	

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 SS	24 19	4 4 4 4	1	0 - 0.2' **FILL, POORLY-GRADED SAND WITH SILT:** SP-SM, mostly sand [mostly fine], some silt, light brown. 0.2 - 4.5' **FILL, WELL-GRADED SAND:** SW, dry, brown to black with brick fragments, slag.	(FILL) SP-SM			0						2 in. Split Spoon and 140 lb Hammer.
2 SS	24 15	1 1 2 2	2 3	3.5' moist.	(FILL) SW			0						
3 SS	24 15	1 5 11 6	4 5	4' wet. 4.5 - 18' **POORLY-GRADED SAND:** SP, olive brown (2.5Y 5/3), mostly sand [mostly medium].				0 0 0						
4 SS	24 16	2 3 3 4	6 7	6' -8' color changes to grayish brown (2.5Y 5/2).				0 0						
5 SS	24 15	1 4 8 9	8 9	8' -10' grayish brown (2.5Y 5/2).				0 0						
6 SS	24 18	6 7 10 10	10 11	10.4' -10.5' lens of black well graded sand.	SP			0 0						
7 SS	24 21	5 14 21 21	12 13	12' -14' grayish brown (2.5Y 5/2), poorly graded sand, mostly fine grained.				0						
8 SS	24 18	7 11 11 13	14 15					0						

I hereby certify that the information on this form is true and correct to the best of my knowledge.

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SOIL BORING LOG INFORMATION SUPPLEMENT

Boring Number SB228

Sample		Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	
				4.5 - 18' **POORLY-GRADED SAND:** SP, olive brown (2.5Y 5/3), mostly sand [mostly medium]. *(continued)* 16.				0						
9 SS	24 24	6 10 10 12	16		SP			0						
			17					0						
10 SS	24 24	4 5 5 8	18	18 - 21' **WELL-GRADED SAND:** SW, mostly sand [some fine, some medium, some coarse], wet.				0						
			19		SW			0						
11 SS	24 16	6 12 17 17	20					0						
			21	21 - 22' **POORLY-GRADED SAND:** SP, grayish brown (2.5Y 5/2), mostly sand [mostly fine], trace gravel [mostly fine].	SP			0						
12 SS	24 12	7 11 12 12	22	22 - 26' **LEAN CLAY:** CL, dark gray (10YR 4/1), trace sand [mostly fine].				0						
			23					0						Compression Strength >4.5 tsf.
13 SS	24 18	8 11 13 16	24		CL									
			25											Compression Strength >4.5 tsf.
			26	26' End of Boring.										

NATURAL RESOURCE TECHNOLOGY

SOIL BORING LOG INFORMATION

Page 1 of 2

Facility/Project Name Former NSG North Plant Removal	License/Permit/Monitoring Number		Boring Number SB229	
Boring Drilled By: Name of crew chief (first, last) and Firm Joe Martin Test Service Corporation	Date Drilling Started 6/29/2012	Date Drilling Completed 6/29/2012	Drilling Method hollow stem auger	
Common Well Name	Final Static Water Level Feet (NAVD)	Surface Elevation Feet (NAVD)	Borehole Diameter 8.3 inches	
Local Grid Origin ☒ (estimated: ☒) or Boring Location ☐ State Plane N, E S/C/[✓ N] 1/4 of 1/4 of Section , T N, R	Lat ° ' " Long ° ' "	Local Grid Location 4691462 Feet ☒ N ☐ S 432175 Feet ☒ E ☐ W		
Facility ID	County Lake	State IL	Civil Town/City/ or Village Waukegan	

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
1 SS	24 20	2 2 3 4	0-2	0 - 4.3' **FILL:** (FILL), Gypsum wall board, white, approximately 20% mottled orange, trace roots and sand.				0 0						2 in. Split Spoon and 140 lb Hammer.
2 SS	24 16	3 1 1 2	2-4	2' wet with sulfur-like odor, trace wood debris.	(FILL)			0 0						
3 SS	24 19	2 2 3 2	4-6	4.3 - 8' **POORLY-GRADED SAND:** SP, dark gray (10YR 4/1), mostly sand [mostly medium], sulfur-like odor.				0 0						
4 SS	24 8	1 1 1 12	6-8	6' -8' no sulfur-like odor.	SP			0						
5 SS	24 12	2 2 1 2	8-10	8 - 10.4' **WELL-GRADED SAND:** SW, dark gray (10YR 4/1), mostly sand [some fine, some medium, some coarse], no odor and no visual impacts.	SW			0						
6 SS	24 19	6 10 11 13	10-12	10.4 - 23.5' **POORLY-GRADED SAND:** SP, dark gray (10YR 4/1), mostly sand [mostly fine].				0 0						
7 SS	24 18	1 5 8 8	12-14	12' color changing to grayish brown (2.5Y 5/2).	SP			0 0						
8 SS	24 18	3 7 4 8	14-15	14' trace fine gravel.				0						

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

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SOIL BORING LOG INFORMATION SUPPLEMENT

Boring Number SB229

Sample		Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	
				10.4 - 23.5' **POORLY-GRADED SAND:** SP, dark gray (10YR 4/1), mostly sand [mostly fine]. *(continued)*				0						
9 SS	24 20	9 11 13 17	16					0						
			17					0						
10 SS	24 21	7 9 15 16	18	18' mostly fine grained sand.				0						
			19		SP			0						
11 SS	24 20	8 11 11 13	20	20' trace fine gravel.				0						
			21					0						
12 SS	24 18	4 8 9 12	22					0						
			23											
			24	23.5 - 24' **LEAN CLAY:** CL, dark gray (10YR 4/1), trace sand [mostly fine], trace gravel [trace fine].	CL			0						Compressive strength >4.5 tsf.
				24' End of Boring.										

APPENDIX B

IN SITU SOLIDIFICATION/STABILIZATION (ISS) TREATABILITY STUDY REPORT DATA

APPENDIX B1

ISS MIX BATCH WORKSHEETS

TIMELY ENGINEERING SOIL TESTS, LLC

1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Batch Worksheet

	BATCH-SAMPLE ID	13794/1-1		BATCH #	1
PR. NUMBER	1230-02-1	LOCATION	Composite Area A,B,C,D	MIXING TECH	RI/AV
PR. NAME	Former North Plant MGP Site	SAMPLE TYPE	Mold	BATCH DATE	6/27/2012

Time Batch Mixing Started	
Total Time Batch was Mixed, min	
Time Batch Completely in Molds	

Soil Moisture Mass, g	**3519.0**
Soil Moisture Content, %	**30.6**
Type of Cement Used	I/II
Grout Water/Cem. Mat (Solids) Ratio*	**0.80**
Mass of Dry Soil, g	**11500.0**
Total Water/Cem. Mat. Ratio	**5.900**

Mix Constituents:

Component ID	Component Name	Amount, % (based on soil dry mass)	Amount, g
13794	**Soil (wet)**	100.0	**15019.0**
13823	GGBFS Grade 100	4.5	**517.5**
13822	Cement type I/II	1.5	**172.5**
10112	Bentonite	0.0	
	Water, mL	552	

Remarks

0 mL of water was added to make soil/grout mixable/moldable

* Cementous Materials (solids) is total mass of GGBFS, bentonite and cement

Sample ID	Required Test	Nominal Mold Size Diam., in.	Nominal Mold Size Height, in.	Tamping Tech	End Preparation Removal Tech	End Preparation Trim Tech	End Preparation Method	Comments
13794-1-1-1	MC	3	6					After Mixing
13794-1-1-2	UCS	3	6					7 days
13794-1-1-3	UCS	3	6					14 days
13794-1-1-4	UCS	3	6					28 days
13794-1-1-5	Perm	3	3					7 days
13794-1-1-6	Perm	3	3					14 days
13794-1-1-7	Perm	3	3					28 days
13794-1-1-8	Penetration	3	3					after 3 days
13794-1-1-9	ANS16-1	2	4					after 28 days ???
13794-1-1-(10-14)	Wet Dur	2	4					5 molds after 28 days???
13794-1-1-(15-19)	Fr. Dur.	2	4					5 molds after 28 days???
13794-1-1-20	Extra	2	4					UCS Spare
13794-1-1-21	Extra	3	3					Perm Spare
13794-1-1-22	Swell	3	6					after 28 days ???
13794-1-1-23	Extra	2	4					Extra UCS
13794-1-1-24	Extra	3	3					Extra Perm
13794-1-1-(25-26)	Extra	-	-					Extra

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Batch Worksheet

	BATCH-SAMPLE ID	13794/2-1		BATCH #	1
PR. NUMBER	1230-02-1	LOCATION	Composite Area A,B,C,D	MIXING TECH	RI/AV
PR. NAME	Former North Plant MGP Site	SAMPLE TYPE	Mold	BATCH DATE	6/27/2012

Time Batch Mixing Started	
Total Time Batch was Mixed, min	
Time Batch Completely in Molds	

Soil Moisture Mass, g	**3519.0**
Soil Moisture Content, %	**30.6**
Type of Cement Used	I/II
Grout Water/Cem. Mat (Solids) Ratio*	**0.80**
Mass of Dry Soil, g	**11500.0**
Total Water/Cem. Mat. Ratio	**4.625**

Mix Constituents:

Component ID	Component Name	Amount, % (based on soil dry mass)	Amount, g
13794	**Soil (wet)**	100.0	**15019.0**
13823	GGBFS Grade 100	6.0	**690.0**
13822	Cement type I/II	2.0	**230.0**
10112	Bentonite	0.0	
	Water, mL	736	

Remarks

0 mL of water was added to make soil/grout mixable/moldable

* Cementous Materials (solids) is total mass of GGBFS, bentonite and cement

Sample ID	Required Test	Nominal Mold Size		Tamping Tech	End Preparation			
		Diam., in.	Height, in.		Removal Tech	Trim Tech	Method	Comments
13794-2-1-1	MC	3	6					After Mixing
13794-2-1-2	UCS	3	6					7 days
13794-2-1-3	UCS	3	6					14 days
13794-2-1-4	UCS	3	6					28 days
13794-2-1-5	Perm	3	3					7 days
13794-2-1-6	Perm	3	3					14 days
13794-2-1-7	Perm	3	3					28 days
13794-2-1-8	Penetration	3	3					after 3 days
13794-2-1-9	ANS16-1	2	4					after 28 days ???
13794-2-1-(10-14)	Wet Dur	2	4					5 molds after 28 days???
13794-2-1-(15-19)	Fr. Dur.	2	4					5 molds after 28 days???
13794-2-1-20	Extra	2	4					UCS Spare -
13794-2-1-21	Extra	3	3					Perm Spare
13794-2-1-22	Swell	3	6					after 28 days ???
13794-2-1-23	Extra	2	4					Extra UCS
13794-2-1-24	Extra	3	3					Extra Perm
13794-2-1-(25-26)	Extra	-	-					Extra

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Batch Worksheet

BATCH-SAMPLE ID	13794/3-1			BATCH #	1
PR. NUMBER	1230-02-1	LOCATION	Composite Area A,B,C,D	MIXING TECH	RI/AV
PR. NAME	Former North Plant MGP Site	SAMPLE TYPE	Mold	BATCH DATE	6/27/2012

Time Batch Mixing Started
Total Time Batch was Mixed, min
Time Batch Completely in Molds

Soil Moisture Mass, g 3519.0
Soil Moisture Content, % 30.6
Type of Cement Used I/II
Grout Water/Cem. Mat (Solids) Ratio* 0.60
Mass of Dry Soil, g 11500.0
Total Water/Cem. Mat. Ratio 3.860

Mix Constituents:

Component ID	Component Name	Amount, % (based on soil dry mass)	Amount, g
13794	**Soil (wet)**	100.0	**15019.0**
13823	GGBFS Grade 100	7.5	**862.5**
13822	Cement type I/II	2.5	**287.5**
10112	Bentonite	0.0	
	Water, mL	920	

Remarks

0 mL of water was added to make soil/grout mixable/moldable

* Cementous Materials (solids) is total mass of GGBFS, bentonite and cement

Sample ID	Required Test	Nominal Mold Size Diam., in.	Nominal Mold Size Height, in.	Tamping Tech	End Preparation Removal Tech	End Preparation Trim Tech	End Preparation Method	End Preparation Comments
13794-3-1-1	MC	3	6					After Mixing
13794-3-1-2	UCS	3	6					7 days
13794-3-1-3	UCS	3	6					14 days
13794-3-1-4	UCS	3	6					28 days
13794-3-1-5	Perm	3	3					7 days
13794-3-1-6	Perm	3	3					14 days
13794-3-1-7	Perm	3	3					28 days
13794-3-1-8	Penetration	3	3					after 3 days
13794-3-1-9	ANS16-1	2	4					after 28 days ???
13794-3-1-(10-14)	Wet Dur	2	4					5 molds after 28 days???
13794-3-1-(15-19)	Fr. Dur.	2	4					5 molds after 28 days???
13794-3-1-20	Extra	2	4					UCS Spare
13794-3-1-21	Extra	3	3					Perm Spare
13794-3-1-22	Swell	3	6					after 28 days ???
13794-3-1-23	Extra	2	4					Extra UCS
13794-3-1-24	Extra	3	3					Extra Perm
13794-3-1-(25-26)	Extra	-	-					Extra

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Batch Worksheet

BATCH-SAMPLE ID	13794/4-1			BATCH #	1
PR. NUMBER	1230-02-1	LOCATION	Composite Area A,B,C,D	MIXING TECH	RI/AV
PR. NAME	Former North Plant MGP Site	SAMPLE TYPE	Mold	BATCH DATE	6/26/2012

Time Batch Mixing Started	
Total Time Batch was Mixed, min	
Time Batch Completely in Molds	

Soil Moisture Mass, g	**3519.0**
Soil Moisture Content, %	**30.6**
Type of Cement Used	I/II
Grout Water/Cem. Mat (Solids) Ratio*	**0.80**
Mass of Dry Soil, g	**11500.0**
Total Water/Cem. Mat. Ratio	**4.675**

Mix Constituents:

Component ID	**Component Name**	**Amount,** % (based on soil dry mass)	g
13794	**Soil (wet)**	100.0	**15019.0**
13823	GGBFS Grade 100	0.0	**0.0**
13822	Cement type I/II	8.0	**920.0**
10112	Bentonite	0.5	**57.5**
	Water, mL	782	

Remarks

0 mL of water was added to make soil/grout mixable/moldable

* Cementous Materials (solids) is total mass of GGBFS, bentonite and cement

Sample ID	**Required Test**	**Nominal Mold Size**		**Tamping Tech**	**End Preparation**			
		Diam., in.	**Height, in.**		**Removal Tech**	**Trim Tech**	**Method**	**Comments**
13794-4-1-1	MC	3	6					After Mixing
13794-4-1-2	UCS	3	6					7 days
13794-4-1-3	UCS	3	6					14 days
13794-4-1-4	UCS	3	6					28 days
13794-4-1-5	Perm	3	3					7 days
13794-4-1-6	Perm	3	3					14 days
13794-4-1-7	Perm	3	3					28 days
13794-4-1-8	Penetration	3	3					after 3 days
13794-4-1-9	ANS16-1	2	4					after 28 days ???
13794-4-1-(10-14)	Wet Dur	2	4					5 molds after 28 days???
13794-4-1-(15-19)	Fr. Dur.	2	4					5 molds after 28 days???
13794-4-1-20	Extra	2	4					UCS Spare
13794-4-1-21	Extra	3	3					Perm Spare
13794-4-1-22	Swell	3	6					after 28 days ???
13794-4-1-23	Extra	2	4					Extra UCS
13794-4-1-24	Extra	3	3					Extra Perm
13794-4-1-(25-26)	Extra	-	-					Extra

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Batch Worksheet

BATCH-SAMPLE ID	13794/5-1			BATCH #	1
PR. NUMBER	1230-02-1	LOCATION	Composite Area A,B,C,D	MIXING TECH	RI/AV
PR. NAME	Former North Plant MGP Site	SAMPLE TYPE	Mold	BATCH DATE	6/26/2012

Time Batch Mixing Started	
Total Time Batch was Mixed, min	
Time Batch Completely in Molds	

Soil Moisture Mass, g	**3519.0**
Soil Moisture Content, %	**30.6**
Type of Cement Used	I/II
Grout Water/Cem. Mat (Solids) Ratio*	**0.80**
Mass of Dry Soil, g	**11500.0**
Total Water/Cem. Mat. Ratio	**3.900**

Mix Constituents:

Component ID	**Component Name**	**Amount,** % (based on soil dry mass)	**Amount,** g
13794	**Soil (wet)**	100.0	**15019.0**
13823	GGBFS Grade 100	0.0	**0.0**
13822	Cement type I/II	10.0	**1150.0**
10112	Bentonite	0.5	**57.5**
	Water, mL	966	

Remarks

0 mL of water was added to make soil/grout mixable/moldable

* Cementous Materials (solids) is total mass of GGBFS, bentonite and cement

Sample ID	**Required Test**	**Nominal Mold Size** Diam., in.	**Nominal Mold Size** Height, in.	**Tamping Tech**	**End Preparation** Removal Tech	**End Preparation** Trim Tech	**End Preparation** Method	**End Preparation** Comments
13794-5-1-1	MC	3	6					After Mixing
13794-5-1-2	UCS	3	6					7 days
13794-5-1-3	UCS	3	6					14 days
13794-5-1-4	UCS	3	6					28 days
13794-5-1-5	Perm	3	3					7 days
13794-5-1-6	Perm	3	3					14 days
13794-5-1-7	Perm	3	3					28 days
13794-5-1-8	Penetration	3	3					after 3 days
13794-5-1-9	ANS16-1	2	4					after 28 days ???
13794-5-1-(10-14)	Wet Dur	2	4					5 molds after 28 days???
13794-5-1-(15-19)	Fr. Dur.	2	4					5 molds after 28 days???
13794-5-1-20	Extra	2	4					UCS Spare
13794-5-1-21	Extra	3	3					Perm Spare
13794-5-1-22	Swell	3	6					after 28 days ???
13794-5-1-23	Extra	2	4					Extra UCS
13794-5-1-24	Extra	3	3					Extra Perm
13794-5-1-(25-26)	Extra	-	-					Extra

T.E.S.T.

Timely Engineering Soil Tests, LLC

1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Batch Worksheet

	BATCH-SAMPLE ID	13794/6-1		BATCH #	1
PR. NUMBER	1230-02-1	LOCATION	Composite Area A,B,C,D	MIXING TECH	RI/AV
PR. NAME	Former North Plant MGP Site	SAMPLE TYPE	Mold	BATCH DATE	6/26/2012

Time Batch Mixing Started	
Total Time Batch was Mixed, min	
Time Batch Completely in Molds	

Soil Moisture Mass, g	**3519.0**
Soil Moisture Content, %	**30.6**
Type of Cement Used	I/II
Grout Water/Cem. Mat (Solids) Ratio*	**0.80**
Mass of Dry Soil, g	**11500.0**
Total Water/Cem. Mat. Ratio	**4.725**

Mix Constituents:

Component ID	**Component Name**	**Amount, % (based on soil dry mass)**	**Amount, g**
13794	**Soil (wet)**	100.0	**15019.0**
13823	GGBFS Grade 100	0.0	**0.0**
13822	Cement type I/II	8.0	**920.0**
10112	Bentonite	1.0	**115.0**
	Water, mL	828	

Remarks

0 mL of water was added to make soil/grout mixable/moldable

* Cementous Materials (solids) is total mass of GGBFS, bentonite and cement

Sample ID	**Required Test**	**Nominal Mold Size Diam., in.**	**Nominal Mold Size Height, in.**	**Tamping Tech**	**End Preparation Removal Tech**	**End Preparation Trim Tech**	**End Preparation Method**	**End Preparation Comments**
13794-6-1-1	MC	3	6					After Mixing
13794-6-1-2	UCS	3	6					7 days
13794-6-1-3	UCS	3	6					14 days
13794-6-1-4	UCS	3	6					28 days
13794-6-1-5	Perm	3	3					7 days
13794-6-1-6	Perm	3	3					14 days
13794-6-1-7	Perm	3	3					28 days
13794-6-1-8	Penetration	3	3					after 3 days
13794-6-1-9	ANS16-1	2	4					after 28 days ???
13794-6-1-(10-14)	Wet Dur	2	4					5 molds after 28 days???
13794-6-1-(15-19)	Fr. Dur.	2	4					5 molds after 28 days???
13794-6-1-20	Extra	2	4					UCS Spare
13794-6-1-21	Extra	3	3					Perm Spare
13794-6-1-22	Swell	3	6					after 28 days ???
13794-6-1-23	Extra	2	4					Extra UCS
13794-6-1-24	Extra	3	3					Extra Perm
13794-6-1-(25-26)	Extra	-	-					Extra

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1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Batch Worksheet

BATCH-SAMPLE ID	13794/7-1			BATCH #	1
PR. NUMBER	1230-02-1	LOCATION	Composite Area A,B,C,D	MIXING TECH	RI/AV
PR. NAME	Former North Plant MGP Site	SAMPLE TYPE	Mold	BATCH DATE	6/26/2012

Time Batch Mixing Started	
Total Time Batch was Mixed, min	
Time Batch Completely in Molds	

Soil Moisture Mass, g	**3519.0**
Soil Moisture Content, %	**30.6**
Type of Cement Used	I/II
Grout Water/Cem. Mat (Solids) Ratio*	**0.80**
Mass of Dry Soil, g	**11500.0**
Total Water/Cem. Mat. Ratio	**3.940**

Mix Constituents:

Component ID	Component Name	Amount, % (based on soil dry mass)	g
13794	**Soil (wet)**	100.0	**15019.0**
13823	GGBFS Grade 100	0.0	**0.0**
13822	Cement type I/II	10.0	**1150.0**
10112	Bentonite	1.0	**115.0**
	Water, mL	1012	

Remarks

0 mL of water was added to make soil/grout mixable/moldable

* Cementous Materials (solids) is total mass of GGBFS, bentonite and cement

Sample ID	Required Test	Nominal Mold Size		Tamping Tech	End Preparation			
		Diam., in.	Height, in.		Removal Tech	Trim Tech	Method	Comments
13794-7-1-1	MC	3	6					After Mixing
13794-7-1-2	UCS	3	6					7 days
13794-7-1-3	UCS	3	6					14 days
13794-7-1-4	UCS	3	6					28 days
13794-7-1-5	Perm	3	3					7 days
13794-7-1-6	Perm	3	3					14 days
13794-7-1-7	Perm	3	3					28 days
13794-7-1-8	Penetration	3	3					after 3 days
13794-7-1-9	ANS16-1	2	4					after 28 days ???
13794-7-1-(10-14)	Wet Dur	2	4					5 molds after 28 days???
13794-7-1-(15-19)	Fr. Dur.	2	4					5 molds after 28 days???
13794-7-1-20	Extra	2	4					UCS Spare
13794-7-1-21	Extra	3	3					Perm Spare
13794-7-1-22	Swell	3	6					after 28 days ???
13794-7-1-23	Extra	2	4					Extra UCS
13794-7-1-24	Extra	3	3					Extra Perm
13794-7-1-(25-26)	Extra	-	-					Extra

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Fax: 770-923-8973
Web: www.test-llc.com

Batch Worksheet

	BATCH-SAMPLE ID	13794/8-1		BATCH #	1
PR. NUMBER	1230-02-1	LOCATION	Composite Area A,B,C,D	MIXING TECH	RI/AV
PR. NAME	Former North Plant MGP Site	SAMPLE TYPE	Mold	BATCH DATE	6/28/2012

Time Batch Mixing Started	
Total Time Batch was Mixed, min	
Time Batch Completely in Molds	

Soil Moisture Mass, g	**3519.0**
Soil Moisture Content, %	30.6
Type of Cement Used	I/II
Grout Water/Cem. Mat (Solids) Ratio*	0.80
Mass of Dry Soil, g	**11500.0**
Total Water/Cem. Mat. Ratio	**5.967**

Mix Constituents:

Component ID	Component Name	Amount, % (based on soil dry mass)	g
13794	**Soil (wet)**	100.0	**15019.0**
13823	GGBFS Grade 100	4.5	**517.5**
13822	Cement type I/II	1.5	**172.5**
10112	Bentonite	0.5	**57.5**
	Water, mL	598	

Remarks

0 mL of water was added to make soil/grout mixable/moldable

* Cementous Materials (solids) is total mass of GGBFS, bentonite and cement

Sample ID	Required Test	Nominal Mold Size		Tamping Tech	End Preparation			
		Diam., in.	Height, in.		Removal Tech	Trim Tech	Method	Comments
13794-8-1-1	MC	3	6					After Mixing
13794-8-1-2	UCS	3	6					7 days
13794-8-1-3	UCS	3	6					14 days
13794-8-1-4	UCS	3	6					28 days
13794-8-1-5	Perm	3	3					7 days
13794-8-1-6	Perm	3	3					14 days
13794-8-1-7	Perm	3	3					28 days
13794-8-1-8	Penetration	3	3					after 3 days
13794-8-1-9	ANS16-1	2	4					after 28 days ???
13794-8-1-(10-14)	Wet Dur	2	4					5 molds after 28 days???
13794-8-1-(15-19)	Fr. Dur.	2	4					5 molds after 28 days???
13794-8-1-20	Extra	2	4					UCS Spare
13794-8-1-21	Extra	3	3					Perm Spare
13794-8-1-22	Swell	3	6					after 28 days ???
13794-8-1-23	Extra	2	4					Extra UCS
13794-8-1-24	Extra	3	3					Extra Perm
13794-8-1-(25-26)	Extra	-	-					Extra

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Timely Engineering Soil Tests, LLC

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Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Batch Worksheet

BATCH-SAMPLE ID 13794/9-1
BATCH # 1
PR. NUMBER 1230-02-1
LOCATION Composite Area,A,B,C,D
MIXING TECH RI/AV
PR. NAME Former North Plant MGP Site
SAMPLE TYPE Mold
BATCH DATE 6/28/2012

Time Batch Mixing Started
Total Time Batch was Mixed, min
Time Batch Completely in Molds

Soil Moisture Mass, g	3519.0
Soil Moisture Content, %	30.6
Type of Cement Used	I/II
Grout Water/Cem. Mat (Solids) Ratio*	0.80
Mass of Dry Soil, g	11500.0
Total Water/Cem. Mat. Ratio	4.675

Mix Constituents:

Component ID	Component Name	Amount, % (based on soil dry mass)	Amount, g
13794	**Soil (wet)**	100.0	**15019.0**
13823	GGBFS Grade 100	6.0	**690.0**
13822	Cement type I/II	2.0	**230.0**
10112	Bentonite	0.5	**57.5**
	Water, mL	782	

Remarks

0 **mL of water was added to make soil/grout mixable/moldable**

* Cementous Materials (solids) is total mass of GGBFS, bentonite and cement

Sample ID	Required Test	Nominal Mold Size		Tamping Tech	End Preparation			
		Diam., in.	Height, in.		Removal Tech	Trim Tech	Method	Comments
13794-9-1-1	MC	3	6					After Mixing
13794-9-1-2	UCS	3	6					7 days
13794-9-1-3	UCS	3	6					14 days
13794-9-1-4	UCS	3	6					28 days
13794-9-1-5	Perm	3	3					7 days
13794-9-1-6	Perm	3	3					14 days
13794-9-1-7	Perm	3	3					28 days
13794-9-1-8	Penetration	3	3					after 3 days
13794-9-1-9	ANS16-1	2	4					after 28 days ???
13794-9-1-(10-14)	Wet Dur	2	4					5 molds after 28 days???
13794-9-1-(15-19)	Fr. Dur.	2	4					5 molds after 28 days???
13794-9-1-20	Extra	2	4					UCS Spare
13794-9-1-21	Extra	3	3					Perm Spare
13794-9-1-22	Swell	3	6					after 28 days ???
13794-9-1-23	Extra	2	4					Extra UCS
13794-9-1-24	Extra	3	3					Extra Perm
13794-9-1-(25-26)	Extra	-	-					Extra

T.E. S.T.

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1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Batch Worksheet

BATCH-SAMPLE ID	13794/10-1			BATCH #	1
PR. NUMBER	1230-02-1	LOCATION	Composite Area A,B,C,D	MIXING TECH	RI/AV
PR. NAME	Former North Plant MGP Site	SAMPLE TYPE	Mold	BATCH DATE	6/28/2012

Time Batch Mixing Started	
Total Time Batch was Mixed, min	
Time Batch Completely in Molds	

Soil Moisture Mass, g	**3519.0**
Soil Moisture Content, %	**30.6**
Type of Cement Used	I/II
Grout Water/Cem. Mat (Solids) Ratio*	**0.80**
Mass of Dry Soil, g	**11500.0**
Total Water/Cem. Mat. Ratio	**3.900**

Mix Constituents:

Component ID	**Component Name**	**Amount, % (based on soil dry mass)**	**g**
13794	**Soil (wet)**	100.0	**15019.0**
13823	GGBFS Grade 100	7.5	**862.5**
13822	Cement type I/II	2.5	**287.5**
10112	Bentonite	0.5	**57.5**
	Water, mL	966	

Remarks

0 mL of water was added to make soil/grout mixable/moldable

* Cementous Materials (solids) is total mass of GGBFS, bentonite and cement

Sample ID	**Required Test**	**Nominal Mold Size**		**Tamping Tech**	**End Preparation**			
		Diam., in.	**Height, in.**		**Removal Tech**	**Trim Tech**	**Method**	**Comments**
13794-10-1-1	MC	3	6					After Mixing
13794-10-1-2	UCS	3	6					7 days
13794-10-1-3	UCS	3	6					14 days
13794-10-1-4	UCS	3	6					28 days
13794-10-1-5	Perm	3	3					7 days
13794-10-1-6	Perm	3	3					14 days
13794-10-1-7	Perm	3	3					28 days
13794-10-1-8	Penetration	3	3					after 3 days
13794-10-1-9	ANS16-1	2	4					after 28 days ???
13794-10-1-(10-14)	Wet Dur	2	4					5 molds after 28 days???
13794-10-1-(15-19)	Fr. Dur.	2	4					5 molds after 28 days???
13794-10-1-20	Extra	2	4					UCS Spare
13794-10-1-21	Extra	3	3					Perm Spare
13794-10-1-22	Swell	3	6					after 28 days ???
13794-10-1-23	Extra	2	4					Extra UCS
13794-10-1-24	Extra	3	3					Extra Perm
13794-10-1-(25-26)	Extra	-	-					Extra

APPENDIX B2

MATERIAL DATA SHEETS AND MILL TEST REPORTS

LAFARGE
NORTH AMERICA

South Chicago Plant
Grade 100 Newcem

MILL TEST CERTIFICATE - **NewCem**

Reference Results

Fineness:
Blaine
(cm^2/g) 3645*
45 micron
retained (%) 6*

Compressive Strength (PSI)

	Actual	Limit
7 Day	4,853	na
28 Day**	5,394	5,000 minimum

CHEMICAL

	Actual	Limit
Na_2O_{EQUIV} (%)	0.83*	0.6 to 0.9

Sample Identification

Sample# na

March 2012
Mill Run Composite

* Predetermined value
** Results for November 2011

Test Results

Fineness:
Blaine
(cm^2/g) 5,215
45 micron
retained (%) 0.5

Compressive Strength (PSI)

7 Day 4,340
28 Day** 6,075

Slag Activity Index (%):

	Actual	Limit
7 Day	89	75 minimum
28 Day**	113	95 minimum

	Actual	Limit
Air Content, (%)	5.5	12

S.G. NewCem 2.98

CHEMICAL

	Actual	Limit
Sulfide Sulfur (S), (%)	1.05	2.5 maximum
SO_3 (%)	0.00	4.0 maximum
Chlorides (%)	0.022	

We hereby certify that the slag represented by the above chemical and physical analysis meets the requirements of ASTM C989, AASHTO M-302 for Grade 100 Ground Granulated Blast-Furnace Slag (GGBFS).

Great Lakes Region
South Chicago Plant
2150 E. 130th St., Chicago, IL 60633
Telephone (773) 646-3150

Quality Control Supervisor

4/16/2012
Date

LAFARGE
NORTH AMERICA

Cement

CEMENT MILL TEST REPORT

NSF
Certified to NSF/ANSI 61

CONSIGNEE:

Date: June '12
Plant: ALPENA
Cement Type: I-II
Manufacture Period: May '12

PHYSICAL DATA	
Specific Surface (Blaine) (C-204)	
(sq. cm./gm.)	3700
(sq. m./kg.)	370
Percent Passing 45 µm (C-430)	97.0
Compressive Strength (psi) (C-109)	
Mortar Cubes	
1 day	2060
3 day	3600
7 day	4400
28 day	5710
Vicat Setting Time (C-191)	
Initial (min.)	120
Final (min.)	235
Air Content (%) (C-185)	6.5
Autoclave Expansion (%) (C-151)	0.020
Heat of Hydration (kJ/kg) 7 days… (Date tested: Apr 6, 2012)	366
LIMESTONE PERCENTAGE	
CO_2 (%) (C-114)	1.7
$CaCO_3$ in Limestone (%)	93
Limestone (%) (C-150)	4.1

CHEMICAL DATA (C-114)	Percent
Silicon Dioxide (SiO_2)	19.7
Aluminum Oxide (Al_2O_3)	4.8
Ferric Oxide (Fe_2O_3)	2.8
Calcium Oxide (CaO)	63.6
Magnesium Oxide (MgO)	2.4
Sulphur Trioxide (SO_3)	2.8
Ignition Loss (%)	2.6
Insoluble Residue (%)	0.42
Free Lime (%)	0.9
Tricalcium Silicate (C_3S)	57
Tricalcium Aluminate (C_3A)	8
Equivalent Alkalis (%)	0.59
$C_3S + 4.75C_3A$	95

CERTIFIED BY: Grant R Hessler

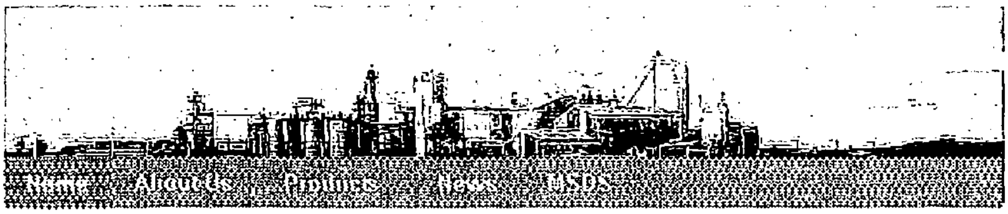
Quality Manager – Alpena

We hereby certify that this cement complies with current ASTM C 150 and AASHTO M 85 specifications.

GREAT LAKES REGION – ALPENA PLANT
1435 Ford Avenue, PO Box 396, Alpena, MI 49707
OFFICE: (989) 354-4171 FAX: (989) 354-2223
Web: www.lafargenorthamerica.com

SEARCH

BENTONITE
Performance Minerals LLC



BPM > Environmental > BARA-KADE® 30 Mesh

Print Contact Us Font

BARA-KADE® 30 Mesh

BARA-KADE® 30 Mesh bentonite is a granular Wyoming sodium bentonite.

Applications/Functions:

For use in manufacturing of Geo-synthetic clay liners (GCL) as a low permeability hydraulic barrier.

Related Information

Data Sheets (1)

BPM

- Agriculture
- Animal Feed
- Asphalt Emulsifiers
- Ceramics
- Construction and Civil Engineering
- Detergents
- Environmental
- Household Products
- Industrial Coatings
- Iron Ore Pelletizing
- Liquid Clarification
- Organophilic Clays
- Paper
- Cat Litter
- Absorbent Pet Products
- Wine and Juice Clarification

Products List

Material Safety Data Sheet Search

Bentonite

BENTONITE
Performance Minerals LLC

BARA-KADE®

30 Bentonite

Description

BARA-KADE® 30 is an untreated high purity Wyoming sodium bentonite. It is used in the manufacturing of geosynthetic clay liners as a low permeability hydraulic barrier.

Applications/Functions

- For use in manufacturing of Geo-synthetic clay liners (GCL) as a low permeability hydraulic barrier
- Soil sealing.
- Other hydraulic barrier applications.

Advantages

- Untreated high purity sodium based bentonite.
- Exhibits high swelling potential and low permeability to create excellent sealing and reduce seepage.
- Yields dense, firm mass and texture.
- Compatible with cement and other construction additivites.

Screen Analysis

	Typical	Specification
Dry screen, percent plus 20 mesh		15 Max
Dry screen, percent minus 200 mesh		10 Max

Properties

	Typical	Specification
Moisture, percent		12 Max
Plate Water Absorption		750 Min
Swell Index		25 Min
Fluid Loss		18 Max
Specific Gravity	2.7	
Bulk Density (lbs/ft^3 compacted)	76	
Bulk Density (lbs/ft^3 uncompacted)	67	

Availability

BARA-KADE® 30 can be purchased through any Bentonite Performance Minerals LLC assigned Reseller. To locate the BPM Reseller nearest you, contact the Customer Service Department in Houston or your area BPM Regional Sales Manager.

Bentonite Performance Minerals LLC
A Halliburton Company
3000 N. Sam Houston Pkwy E.
Houston, TX 77032
www.bentonite.com

Customer Service (281) 871-7900 **Fax** (281) 871-7940

Rev. 02/2011

APPENDIX B3

CHEMICAL SOIL TESTING ANALYTICAL REPORTS

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, Inc.
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

July 09, 2012

Glenn Luke
Natural Resource Technologies
23713 W Park Rd
Pewaukee, WI 53072

RE: Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062310

Dear Glenn Luke:
Enclosed are the analytical results for sample(s) received by the laboratory on June 22, 2012. 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,

Brian Basten

brian.basten@pacelabs.com
Project Manager

Enclosures

CERTIFICATIONS

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062310

Green Bay Certification IDs

1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888
North Carolina Certification #: 503
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750

SAMPLE SUMMARY

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062310

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4062310001	**13794/AREA A,B,C,D**	Solid	06/20/12 19:00	06/22/12 09:40

SAMPLE ANALYTE COUNT

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062310

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4062310001	**13794/AREA A,B,C,D**	EPA 6020	DS1	6
		EPA 8270 by SIM	ARO	19
		EPA 8270	ARO	12
		EPA 8260	SMT	10
		ASTM D2974-87	SMA	1

ANALYTICAL RESULTS

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062310

Sample: 13794/AREA A,B,C,D **Lab ID: 4062310001** Collected: 06/20/12 19:00 Received: 06/22/12 09:40 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3050								
Arsenic	**7.8**	mg/kg	1.2	0.16	10	07/06/12 09:10	07/07/12 09:55	7440-38-2	
Chromium	**6.3**	mg/kg	1.2	0.20	10	07/06/12 09:10	07/07/12 09:55	7440-47-3	
Copper	**16.3**	mg/kg	1.2	0.58	10	07/06/12 09:10	07/07/12 09:55	7440-50-8	
Lead	**29.1**	mg/kg	1.2	0.10	10	07/06/12 09:10	07/07/12 09:55	7439-92-1	
Nickel	**9.0**	mg/kg	1.2	0.56	10	07/06/12 09:10	07/07/12 09:55	7440-02-0	
Zinc	**65.9**	mg/kg	24.7	10.6	10	07/06/12 09:10	07/07/12 09:55	7440-66-6	
8270 MSSV PAH by SIM	Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546								
Acenaphthene	**92000**	ug/kg	16600	8290	400	06/26/12 07:14	06/26/12 17:28	83-32-9	
Acenaphthylene	**35800**	ug/kg	16600	8290	400	06/26/12 07:14	06/26/12 17:28	208-96-8	
Anthracene	**64600**	ug/kg	16600	1700	400	06/26/12 07:14	06/26/12 17:28	120-12-7	
Benzo(a)anthracene	**40800**	ug/kg	16600	8290	400	06/26/12 07:14	06/26/12 17:28	56-55-3	
Benzo(a)pyrene	**31700**	ug/kg	16600	8290	400	06/26/12 07:14	06/26/12 17:28	50-32-8	
Benzo(b)fluoranthene	**15700J**	ug/kg	16600	2390	400	06/26/12 07:14	06/26/12 17:28	205-99-2	
Benzo(g,h,i)perylene	**11100J**	ug/kg	16600	8290	400	06/26/12 07:14	06/26/12 17:28	191-24-2	
Benzo(k)fluoranthene	**24200**	ug/kg	16600	8290	400	06/26/12 07:14	06/26/12 17:28	207-08-9	
Chrysene	**40700**	ug/kg	16600	1880	400	06/26/12 07:14	06/26/12 17:28	218-01-9	
Dibenz(a,h)anthracene	<8290	ug/kg	16600	8290	400	06/26/12 07:14	06/26/12 17:28	53-70-3	
Fluoranthene	**78200**	ug/kg	16600	8290	400	06/26/12 07:14	06/26/12 17:28	206-44-0	
Fluorene	**71800**	ug/kg	16600	8290	400	06/26/12 07:14	06/26/12 17:28	86-73-7	
Indeno(1,2,3-cd)pyrene	**9440J**	ug/kg	16600	8290	400	06/26/12 07:14	06/26/12 17:28	193-39-5	
2-Methylnaphthalene	**134000**	ug/kg	16600	1550	400	06/26/12 07:14	06/26/12 17:28	91-57-6	
Naphthalene	**464000**	ug/kg	16600	3120	400	06/26/12 07:14	06/26/12 17:28	91-20-3	
Phenanthrene	**203000**	ug/kg	16600	2110	400	06/26/12 07:14	06/26/12 17:28	85-01-8	
Pyrene	**99200**	ug/kg	16600	8290	400	06/26/12 07:14	06/26/12 17:28	129-00-0	
Surrogates									
2-Fluorobiphenyl (S)	0	%.	43-130		400	06/26/12 07:14	06/26/12 17:28	321-60-8	S4
Terphenyl-d14 (S)	0	%.	32-130		400	06/26/12 07:14	06/26/12 17:28	1718-51-0	S4
8270 MSSV FULL LIST MICROWAVE	Analytical Method: EPA 8270 Preparation Method: EPA 3546								
Carbazole	**8860J**	ug/kg	31100	3210	25	06/27/12 08:20	06/29/12 18:34	86-74-8	
Dibenzofuran	**26000J**	ug/kg	31100	15500	25	06/27/12 08:20	06/29/12 18:34	132-64-9	
2,4-Dimethylphenol	<15500	ug/kg	31100	15500	25	06/27/12 08:20	06/29/12 18:34	105-67-9	
bis(2-Ethylhexyl)phthalate	<6360	ug/kg	31100	6360	25	06/27/12 08:20	06/29/12 18:34	117-81-7	
3&4-Methylphenol(m&p Cresol)	<3240	ug/kg	31100	3240	25	06/27/12 08:20	06/29/12 18:34		
Phenol	<3690	ug/kg	31100	3690	25	06/27/12 08:20	06/29/12 18:34	108-95-2	D3
Surrogates									
Nitrobenzene-d5 (S)	68	%.	44-130		25	06/27/12 08:20	06/29/12 18:34	4165-60-0	
2-Fluorobiphenyl (S)	76	%.	43-130		25	06/27/12 08:20	06/29/12 18:34	321-60-8	
Terphenyl-d14 (S)	78	%.	10-130		25	06/27/12 08:20	06/29/12 18:34	1718-51-0	D3
Phenol-d6 (S)	68	%.	26-130		25	06/27/12 08:20	06/29/12 18:34	13127-88-3	
2-Fluorophenol (S)	60	%.	20-130		25	06/27/12 08:20	06/29/12 18:34	367-12-4	
2,4,6-Tribromophenol (S)	55	%.	11-130		25	06/27/12 08:20	06/29/12 18:34	118-79-6	

ANALYTICAL RESULTS

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062310

Sample: 13794/AREA A,B,C,D **Lab ID: 4062310001** Collected: 06/20/12 19:00 Received: 06/22/12 09:40 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260 MSV Med Level Full List	Analytical Method: EPA 8260 Preparation Method: EPA 5035/5030B								
Benzene	**8830**	ug/kg	4970	2790	200	06/25/12 12:57	06/26/12 20:12	71-43-2	
1,1-Dichloroethane	**<1630**	ug/kg	12400	1630	200	06/25/12 12:57	06/26/12 20:12	75-34-3	
cis-1,2-Dichloroethene	**<2060**	ug/kg	12400	2060	200	06/25/12 12:57	06/26/12 20:12	156-59-2	
Ethylbenzene	**18600**	ug/kg	6220	2540	200	06/25/12 12:57	06/26/12 20:12	100-41-4	
Toluene	**20600**	ug/kg	12400	1910	200	06/25/12 12:57	06/26/12 20:12	108-88-3	
Vinyl chloride	**<2490**	ug/kg	12400	2490	200	06/25/12 12:57	06/26/12 20:12	75-01-4	
Xylene (Total)	**43500**	ug/kg	18600	6130	200	06/25/12 12:57	06/26/12 20:12	1330-20-7	
Surrogates									
Dibromofluoromethane (S)	0	%.	57-149		200	06/25/12 12:57	06/26/12 20:12	1868-53-7	D3,S4
Toluene-d8 (S)	0	%.	55-152		200	06/25/12 12:57	06/26/12 20:12	2037-26-5	S4
4-Bromofluorobenzene (S)	0	%.	40-139		200	06/25/12 12:57	06/26/12 20:12	460-00-4	S4
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**19.6**	%	0.10	0.10	1		07/05/12 14:59		

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062310

QC Batch: MPRP/7150
Analysis Method: EPA 6020
QC Batch Method: EPA 3050
Analysis Description: 6020 MET
Associated Lab Samples: 4062310001

METHOD BLANK: 631540
Matrix: Solid
Associated Lab Samples: 4062310001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/kg	<0.013	0.10	07/07/12 09:42	
Chromium	mg/kg	0.045J	0.10	07/07/12 09:42	
Copper	mg/kg	<0.047	0.10	07/07/12 09:42	
Lead	mg/kg	0.022J	0.10	07/07/12 09:42	
Nickel	mg/kg	<0.046	0.10	07/07/12 09:42	
Zinc	mg/kg	<0.86	2.0	07/07/12 09:42	

LABORATORY CONTROL SAMPLE: 631541

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/kg	50	52.9	106	80-120	
Chromium	mg/kg	50	48.8	98	80-120	
Copper	mg/kg	50	49.1	98	80-120	
Lead	mg/kg	50	49.8	100	80-120	
Nickel	mg/kg	50	51.6	103	80-120	
Zinc	mg/kg	50	53.5	107	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 631542 631543

Parameter	Units	4062310001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	mg/kg	7.8	62	61.7	67.1	67.2	96	96	75-125	0	20	
Chromium	mg/kg	6.3	62	61.7	68.8	69.1	101	102	75-125	0	20	
Copper	mg/kg	16.3	62	61.7	77.9	78.4	99	101	75-125	1	20	
Lead	mg/kg	29.1	62	61.7	90.5	90.0	99	99	75-125	1	20	
Nickel	mg/kg	9.0	62	61.7	69.1	68.7	97	97	75-125	1	20	
Zinc	mg/kg	65.9	62	61.7	142	135	122	112	75-125	5	20	

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062310

QC Batch: MSV/15646
Analysis Method: EPA 8260
QC Batch Method: EPA 5035/5030B
Analysis Description: 8260 MSV Med Level Full List
Associated Lab Samples: 4062310001

METHOD BLANK: 626358
Matrix: Solid
Associated Lab Samples: 4062310001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1-Dichloroethane	ug/kg	<6.6	50.0	06/26/12 11:49	
Benzene	ug/kg	<11.2	20.0	06/26/12 11:49	
cis-1,2-Dichloroethene	ug/kg	<8.3	50.0	06/26/12 11:49	
Ethylbenzene	ug/kg	<10.2	25.0	06/26/12 11:49	
Toluene	ug/kg	<7.7	50.0	06/26/12 11:49	
Vinyl chloride	ug/kg	<10.0	50.0	06/26/12 11:49	
Xylene (Total)	ug/kg	<24.7	75.0	06/26/12 11:49	
4-Bromofluorobenzene (S)	%.	96	40-139	06/26/12 11:49	
Dibromofluoromethane (S)	%.	97	57-149	06/26/12 11:49	
Toluene-d8 (S)	%.	107	55-152	06/26/12 11:49	

LABORATORY CONTROL SAMPLE & LCSD: 626359 626360

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
1,1-Dichloroethane	ug/kg	2500	2480	2480	99	99	70-131	0	20	
Benzene	ug/kg	2500	2400	2440	96	97	70-130	1	20	
cis-1,2-Dichloroethene	ug/kg	2500	2590	2500	104	100	70-130	4	20	
Ethylbenzene	ug/kg	2500	2620	2540	105	102	70-130	3	20	
Toluene	ug/kg	2500	2640	2560	106	103	70-130	3	20	
Vinyl chloride	ug/kg	2500	2140	2110	86	84	55-130	2	20	
Xylene (Total)	ug/kg	7500	7930	7810	106	104	70-130	1	20	
4-Bromofluorobenzene (S)	%.				102	102	40-139			
Dibromofluoromethane (S)	%.				101	103	57-149			
Toluene-d8 (S)	%.				107	108	55-152			

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062310

QC Batch: OEXT/14975
QC Batch Method: EPA 3546
Analysis Method: EPA 8270 by SIM
Analysis Description: 8270/3546 MSSV PAH by SIM
Associated Lab Samples: 4062310001

METHOD BLANK: 626563
Matrix: Solid
Associated Lab Samples: 4062310001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
2-Methylnaphthalene	ug/kg	<1.6	16.7	06/26/12 11:27	
Acenaphthene	ug/kg	<8.3	16.7	06/26/12 11:27	
Acenaphthylene	ug/kg	<8.3	16.7	06/26/12 11:27	
Anthracene	ug/kg	<1.7	16.7	06/26/12 11:27	
Benzo(a)anthracene	ug/kg	<8.3	16.7	06/26/12 11:27	
Benzo(a)pyrene	ug/kg	<8.3	16.7	06/26/12 11:27	
Benzo(b)fluoranthene	ug/kg	<2.4	16.7	06/26/12 11:27	
Benzo(g,h,i)perylene	ug/kg	<8.3	16.7	06/26/12 11:27	
Benzo(k)fluoranthene	ug/kg	<8.3	16.7	06/26/12 11:27	
Chrysene	ug/kg	<1.9	16.7	06/26/12 11:27	
Dibenz(a,h)anthracene	ug/kg	<8.3	16.7	06/26/12 11:27	
Fluoranthene	ug/kg	<8.3	16.7	06/26/12 11:27	
Fluorene	ug/kg	<8.3	16.7	06/26/12 11:27	
Indeno(1,2,3-cd)pyrene	ug/kg	<8.3	16.7	06/26/12 11:27	
Naphthalene	ug/kg	<3.1	16.7	06/26/12 11:27	
Phenanthrene	ug/kg	<2.1	16.7	06/26/12 11:27	
Pyrene	ug/kg	<8.3	16.7	06/26/12 11:27	
2-Fluorobiphenyl (S)	%.	78	43-130	06/26/12 11:27	
Terphenyl-d14 (S)	%.	82	32-130	06/26/12 11:27	

LABORATORY CONTROL SAMPLE: 626564

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
2-Methylnaphthalene	ug/kg	333	261	78	45-130	
Acenaphthene	ug/kg	333	242	73	51-130	
Acenaphthylene	ug/kg	333	242	73	53-130	
Anthracene	ug/kg	333	249	75	48-130	
Benzo(a)anthracene	ug/kg	333	239	72	55-130	
Benzo(a)pyrene	ug/kg	333	244	73	56-130	
Benzo(b)fluoranthene	ug/kg	333	267	80	53-130	
Benzo(g,h,i)perylene	ug/kg	333	212	64	58-130	
Benzo(k)fluoranthene	ug/kg	333	231	69	55-130	
Chrysene	ug/kg	333	247	74	59-130	
Dibenz(a,h)anthracene	ug/kg	333	235	71	56-130	
Fluoranthene	ug/kg	333	254	76	56-130	
Fluorene	ug/kg	333	257	77	54-130	
Indeno(1,2,3-cd)pyrene	ug/kg	333	222	67	57-130	
Naphthalene	ug/kg	333	235	70	43-130	
Phenanthrene	ug/kg	333	245	74	56-130	
Pyrene	ug/kg	333	262	79	54-130	
2-Fluorobiphenyl (S)	%.			68	43-130	

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062310

LABORATORY CONTROL SAMPLE: 626564

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Terphenyl-d14 (S)	%.			72	32-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 626565 626566

Parameter	Units	4062259002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
2-Methylnaphthalene	ug/kg	<1.6	347	347	274	271	79	78	39-130	1	33	
Acenaphthene	ug/kg	<8.7	347	347	256	250	74	72	40-130	2	20	
Acenaphthylene	ug/kg	<8.7	347	347	257	251	74	72	40-130	3	20	
Anthracene	ug/kg	2.3J	347	347	266	262	76	75	46-130	2	24	
Benzo(a)anthracene	ug/kg	<8.7	347	347	248	240	69	67	42-130	3	25	
Benzo(a)pyrene	ug/kg	10.3J	347	347	264	258	73	71	40-130	2	31	
Benzo(b)fluoranthene	ug/kg	12.6J	347	347	275	280	75	77	45-130	2	29	
Benzo(g,h,i)perylene	ug/kg	11.5J	347	347	205	202	56	55	16-143	2	23	
Benzo(k)fluoranthene	ug/kg	11.2J	347	347	262	254	72	70	38-130	3	33	
Chrysene	ug/kg	13.0J	347	347	257	254	70	69	38-130	1	31	
Dibenz(a,h)anthracene	ug/kg	<8.7	347	347	224	219	64	62	30-135	3	23	
Fluoranthene	ug/kg	19.5	347	347	274	268	73	72	42-133	2	28	
Fluorene	ug/kg	<8.7	347	347	268	264	77	76	43-130	1	22	
Indeno(1,2,3-cd)pyrene	ug/kg	<8.7	347	347	213	207	59	58	15-150	3	27	
Naphthalene	ug/kg	<3.3	347	347	246	238	71	69	24-130	3	33	
Phenanthrene	ug/kg	11.7J	347	347	264	256	73	70	27-135	3	27	
Pyrene	ug/kg	17.1J	347	347	275	268	74	72	36-130	3	23	
2-Fluorobiphenyl (S)	%.						74	75	43-130			
Terphenyl-d14 (S)	%.						73	75	32-130			

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062310

QC Batch: OEXT/14989 Analysis Method: EPA 8270
QC Batch Method: EPA 3546 Analysis Description: 8270 Solid MSSV Microwave
Associated Lab Samples: 4062310001

METHOD BLANK: 627262 Matrix: Solid
Associated Lab Samples: 4062310001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
2,4-Dimethylphenol	ug/kg	<83.3	167	06/27/12 11:08	
3&4-Methylphenol(m&p Cresol)	ug/kg	<17.4	167	06/27/12 11:08	
bis(2-Ethylhexyl)phthalate	ug/kg	<34.1	167	06/27/12 11:08	
Carbazole	ug/kg	<17.2	167	06/27/12 11:08	
Dibenzofuran	ug/kg	<83.3	167	06/27/12 11:08	
Phenol	ug/kg	<19.8	167	06/27/12 11:08	
2,4,6-Tribromophenol (S)	%.	87	11-130	06/27/12 11:08	
2-Fluorobiphenyl (S)	%.	79	43-130	06/27/12 11:08	
2-Fluorophenol (S)	%.	61	20-130	06/27/12 11:08	
Nitrobenzene-d5 (S)	%.	80	44-130	06/27/12 11:08	
Phenol-d6 (S)	%.	72	26-130	06/27/12 11:08	
Terphenyl-d14 (S)	%.	77	10-130	06/27/12 11:08	

LABORATORY CONTROL SAMPLE: 627263

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
2,4-Dimethylphenol	ug/kg	1670	1580	95	57-130	
3&4-Methylphenol(m&p Cresol)	ug/kg	1670	1290	78	56-130	
bis(2-Ethylhexyl)phthalate	ug/kg	1670	1280	77	65-134	
Carbazole	ug/kg	1670	1490	89	70-130	
Dibenzofuran	ug/kg	1670	1430	86	70-130	
Phenol	ug/kg	1670	1350	81	57-130	
2,4,6-Tribromophenol (S)	%.			83	11-130	
2-Fluorobiphenyl (S)	%.			79	43-130	
2-Fluorophenol (S)	%.			71	20-130	
Nitrobenzene-d5 (S)	%.			81	44-130	
Phenol-d6 (S)	%.			76	26-130	
Terphenyl-d14 (S)	%.			78	10-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 627264 627265

Parameter	Units	4062283003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
2,4-Dimethylphenol	ug/kg	<95.8	1920	1920	1800	1590	94	83	19-134	12	38	
3&4-Methylphenol(m&p Cresol)	ug/kg	<20.0	1920	1920	1620	1490	85	78	28-130	8	36	
bis(2-Ethylhexyl)phthalate	ug/kg	<39.2	1920	1920	1350	1210	70	63	25-160	11	33	
Carbazole	ug/kg	<19.8	1920	1920	1680	1560	87	82	26-134	7	31	
Dibenzofuran	ug/kg	<95.8	1920	1920	1560	1450	82	76	40-130	7	27	
Phenol	ug/kg	<22.8	1920	1920	1650	1570	86	82	34-130	5	29	

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062310

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 627264 627265

Parameter	Units	4062283003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
2,4,6-Tribromophenol (S)	%.						90	84	11-130			
2-Fluorobiphenyl (S)	%.						80	79	43-130			
2-Fluorophenol (S)	%.						70	67	20-130			
Nitrobenzene-d5 (S)	%.						83	78	44-130			
Phenol-d6 (S)	%.						77	74	26-130			
Terphenyl-d14 (S)	%.						91	79	10-130			

QUALITY CONTROL DATA

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062310

QC Batch: PMST/7246
QC Batch Method: ASTM D2974-87
Analysis Method: ASTM D2974-87
Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 4062310001

SAMPLE DUPLICATE: 631461

Parameter	Units	4062357001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	12.3	12.6	2	10	

QUALIFIERS

Project:	2088 NORTH PLANT MGP
Pace Project No.:	4062310

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.

PRL - Pace Reporting 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.

BATCH QUALIFIERS

Batch: MSV/15650

[M5]	A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

ANALYTE QUALIFIERS

D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
S4	Surrogate recovery not evaluated against control limits due to sample dilution.

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 2088 NORTH PLANT MGP
Pace Project No.: 4062310

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4062310001	**13794/AREA A,B,C,D**	EPA 3050	MPRP/7150	EPA 6020	ICPM/3195
4062310001	**13794/AREA A,B,C,D**	EPA 3546	OEXT/14975	EPA 8270 by SIM	MSSV/4746
4062310001	**13794/AREA A,B,C,D**	EPA 3546	OEXT/14989	EPA 8270	MSSV/4749
4062310001	**13794/AREA A,B,C,D**	EPA 5035/5030B	MSV/15646	EPA 8260	MSV/15650
4062310001	**13794/AREA A,B,C,D**	ASTM D2974-87	PMST/7246		

APPENDIX B4

PHYSICAL SOIL TESTING REPORTS

TIMELY ENGINEERING SOIL TESTS, LLC

1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233 Fax: 770-923-8973
Cell: 678-612-6534
Web: www.test-llc.com

Summary of Soil Testing

Project Number: 1230-02-1

Client Project Number: 2088/6.0
Project Name: Former North Plant MGP Site

T.E.S.T. Sample Number	Client Sample Number	USCS	Moisture Content (%)	Grain Size Distribution			Atterberg Limits			Unit Weight		Hydraulic Conductivity		
				%Finer #4 Sieve	% Finer #200 Sieve	% Finer 0.005mm	L.L. %	P.L. %	P.I. %	Wet pcf	Dry pcf	Initial M.C. %	Init.Dry Density pcf	Hydraulic Conduct. cm/sec
13794	Comp.(A,B,C,D)	SP-SM	30.6	77	7	1	NP	NP	NP	111.3	85.2	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TIMELY ENGINEERING SOIL TESTS, LLC

1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Tested By	RI
Date	06/20/12
Checked By	LB

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Bulk
Sample ID	13794/Composite Area A, B, C, D)	Depth/Elev.	-
Location	-	Add. Info	North Shore Gas Company

ASTM D 422/AASHTO T 88
Standard Test Method for Particle-Size Analysis of Soils (with Double Separation per ASTM D6913 and Hydrometer Analysis)

As-Received Moisture Content (Total Sample)

Mass of Wet Sample & Tare, g	3618.4
Mass of Dry Sample & Tare, g	2824.6
Mass of Tare, g	228.6
Moisture Content, %	30.6

Moisture Content of FINER PORTION

	1st Subsample	*2nd Subsample*
Mass of Wet Sample & Tare, g	391.9	374.20
Mass of Dry Sample & Tare, g	343.8	329.70
Mass of Tare, g	72.7	74.00
Moisture Content, %	17.7	17.4

Mass of Total Sample before separation on 3/8" sieve & Tare, g	226340
Mass of Tare, g	0.0
Total Mass of Dry Sample, g	173337

	1st Subsample	*2nd Subsample*
Mass of Wet Finer Portion & Tare, g	2070.0	110.40
Mass of Tare	0.0	0.0
Dry Mass, g	1758.1	94.03
% of Total Sample passing Split Sieve	85.3	77.2

SIEVE ANALYSIS

COARSER PORTION OF SAMPLE (RETAINED ON 3/8" SIEVE)

Mass of Tare, g 0.00

Sieve Size		Sample & Tare, g	% RETAINED	% PASSING (of Total)
12"	COBBLES	0.0	0	100
3"	COARSE GRAVEL	740.0	0	100
2.5"		2784.0	2	98
2"		3848.0	2	98
1.5"		5650.0	3	97
1"		8737.0	5	95
.75"	FINE GRAVEL	12903.0	7	93
.5"		20376.0	12	88
.375"		25551.0	15	85
#4	COARSE SAND	165.9	9	77

#4 <First Subsample of Finer Portion<3/8"

2nd Subsample of FINER PORTION OF SAMPLE (PASSING #4 SIEVE:Hydrometer Backsieve)

Sieve Size		Cumulative Mass retained, g	% PASSING (of Total)
#10	MEDIUM SAND	6.30	72
#20		14.80	65
#40	FINE SAND	21.59	59
#60		51.10	35
#100		83.58	9
#200	FINES	85.03	7

Remarks

HYDROMETER ANALYSIS

Length of Dispersion Period	1 Minute
Mechanical Dispersion Device ID #	61
Amount of Dispersing Agent (ml)	125.0
Specific Gravity (assumed)	2.650
Specific Gravity (tested)	
Starting time	10:52

PARTICLE-SIZE ANALYSIS

% COBBLES	0	% MEDIUM SAND	13
% COARSE GRAVEL	7	% FINE SAND	52
% FINE GRAVEL	15	% FINES	7
% COARSE SAND	5	% TOTAL SAMPLE	100
% CLAY(<0.005mm)	1	% CLAY(<0.002mm)	1

Date	Time	Testing time (min)	Reading	Temp (°C)	K	Composite Correction	Actual Reading	Effective Depth (cm)	a	Particle Diam. (mm)	Percent Passing
06/21/12	10:54	2	10.0	29.3	0.01230	4.0	6.0	15.4	1.00	0.0341	4.9
06/21/12	10:57	5	9.0	29.3	0.01230	4.0	5.0	15.6	1.00	0.0217	4.1
06/21/12	11:07	15	8.0	29.3	0.01230	4.0	4.0	15.7	1.00	0.0126	3.3
06/21/12	11:22	30	7.0	29.3	0.01230	4.0	3.0	15.9	1.00	0.0089	2.5
06/21/12	11:52	60	6.0	29.3	0.01230	4.0	2.0	16.0	1.00	0.0064	1.6
06/21/12	15:02	250	5.0	29.3	0.01230	4.0	1.0	16.2	1.00	0.0031	0.8
06/22/12	10:52	1440	5.0	29.3	0.01230	4.0	1.0	16.2	1.00	0.0013	0.8

Hydrometer 152H ID #	451190	Oven ID #	12/13/14/15
Sieve Shaker ID #	54/130	Balance ID#	1/6/7

TIMELY ENGINEERING SOIL TESTS, LLC

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Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

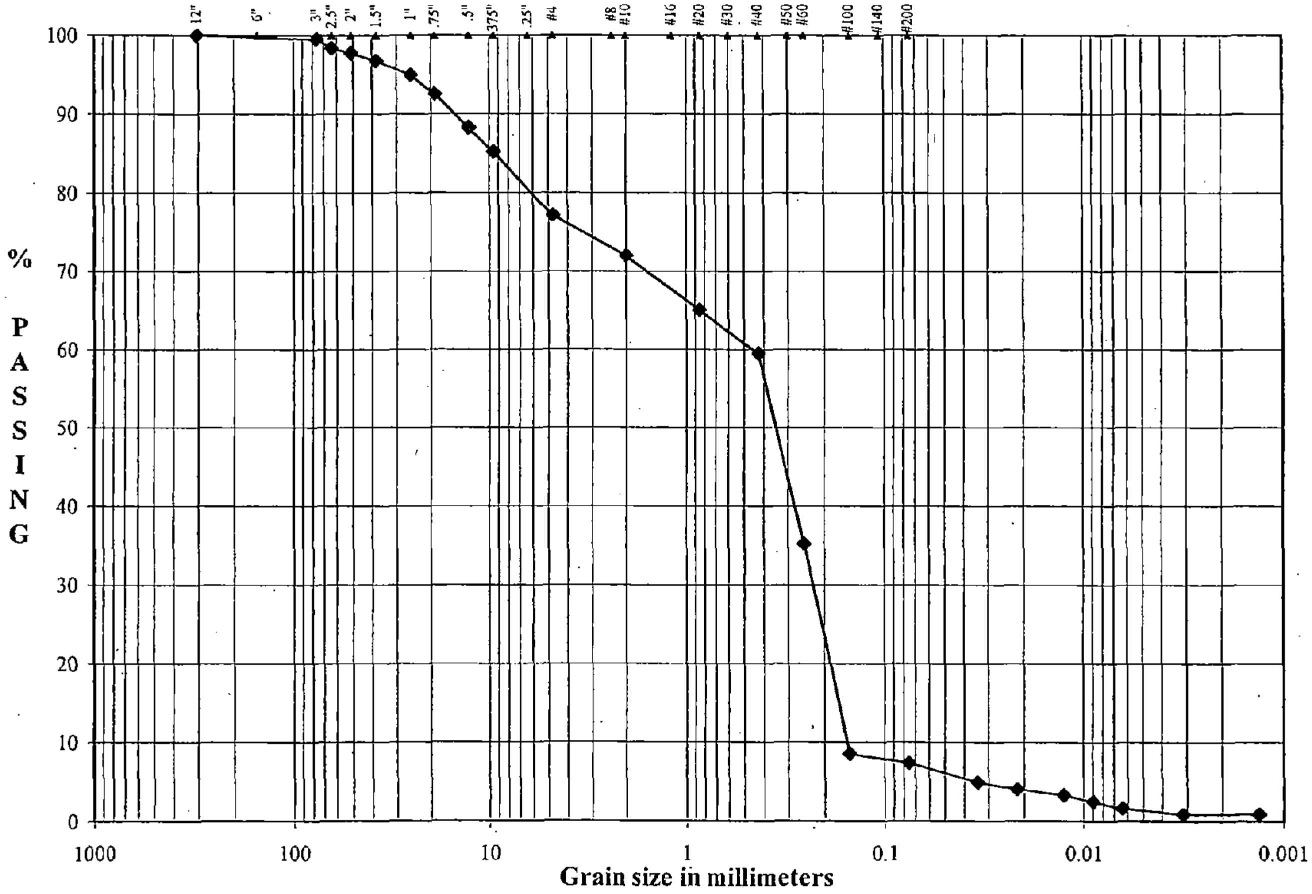
Tested By	RI
Date	06/20/12
Checked By	LB

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Bulk
Sample ID	13794/Composite Area A, B, C, D)	Depth/Elev.	-
Location	-	Add. Info	North Shore Gas Company

ASTM D 422/AASHTO T 88

Standard Test Method for Particle-Size Analysis of Soils (with Double Separation per ASTM D6913 and Hydrometer Analysis)

Particle-Size Analysis



		Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
Boulders	Cobbles	Gravel		Sand			Fines

D_{10}	0.16	mm
D_{30}	0.23	mm
D_{60}	0.46	mm
Cu	3.0	
Cc	0.7	

DESCRIPTION Gray Poorly Graded Sand with Silt and Gravel

USCS (ASTM D2487; D2488) SP-SM

T.E. S.T.

TIMELY ENGINEERING SOIL TESTS, LLC

1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Tested By	EB
Date	06/22/12
Checked By	

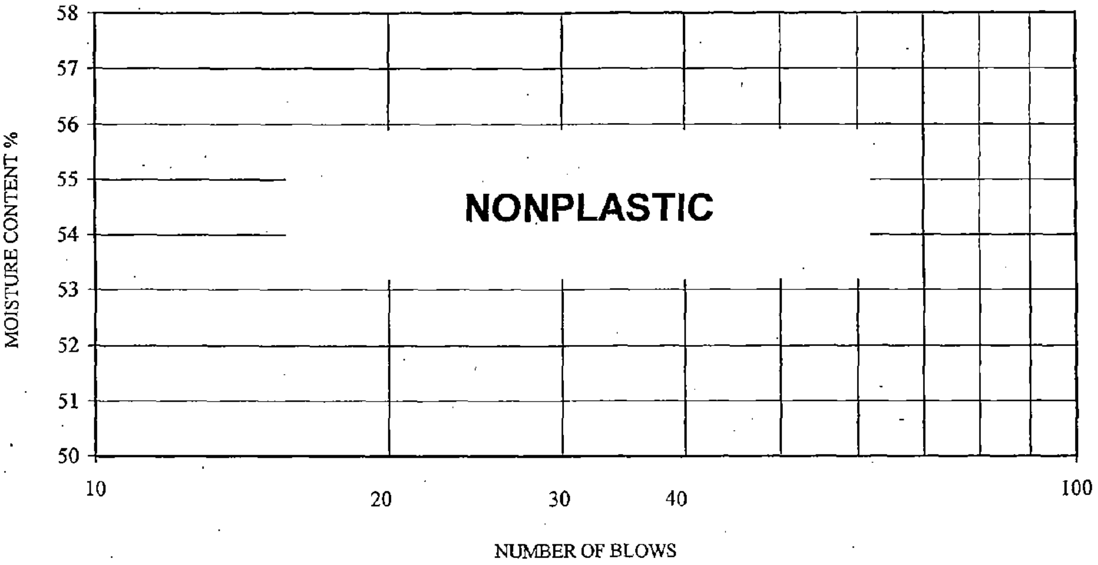
Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Bulk
Sample ID	13794/Composite Area A, B, C, D)	Depth/Elev.	-
Location	-	Add. Info	North Shore Gas Company

ASTM D 4318
Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils (Atterberg Limits)

	LIQUID LIMIT	
Number of Blows	7	7
Weight of Wet Sample & Tare, g	45.64	52.30
Weight of Dry Soil & Tare, g	42.06	48.38
Weight of Tare, g	25.40	29.35
Moisture Content, %	21.49	20.60

Liquid Limit Device ID # 56

NOTES: 1. Material appears to be Nonplastic. (Liquid Limit or Plastic Limit test could not be performed.)
2. Material passing No. 40 sieve was used for test.



	PLASTIC LIMIT	
Weight of Wet Soil & Tare, g	43.78	42.27
Weight of Dry Soil & Tare, g	40.59	38.94
Weight of Tare, g	25.69	23.58
Moisture Content, %	21.41	21.68

PREPARATION PROCEDURE	DRY
Oven ID Number	12/13/14/15
Balance ID Number	2

	NATURAL MOISTURE
Weight of Wet Soil & Tare, g	3618.40
Weight of Dry Soil & Tare, g	2824.60
Weight of Tare, g	228.60
Moisture Content, %	30.58

LIQUID LIMIT (LL)	NP
PLASTIC LIMIT (PL)	NP
PLASTICITY INDEX (PI)	NP
LIQUIDITY INDEX (LI)	-

DESCRIPTION: Gray Poorly Graded Sand with Silt and Gravel

USCS (ASTM D2487;2488): SP-SM

AASHTO (M 145): NA

TIMELY ENGINEERING SOIL TESTS, LLC

1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Tested By	RI
Date	06/22/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Bulk
Sample ID	13794/Composite Area A, B, C, D)	Depth/Elev.	-
Location	-	Add. Info	North Shore Gas Company

WET (BULK*) DENSITY DETERMINATION (ASTM D2937 Mod./D4531/D883)

Sample ID	Moisture Content,%	Mass of Container, g	Mass of Wet Sample & Container, g	Volume of Container, ml	Volume of Container, ft^3	Wet Density, pcf	Dry Density, pcf	Comments
13794/Composite (Area A,B,C,D)	30.6	68.4	1298.5	690.0	0.024	111.3	85.2	Material<3/8"

Comments

*Bulk Density - the mass per unit volume of material, including voids inherent in the material as tested. Mass and volume determined in as-received condition of material.

Balance ID Number	12/13/14/15
Oven ID Number	1/6/7
Caliper ID Number	16

APPENDIX B5

UNCONFINED COMPRESSIVE STREGNTH AND HYDRAULIC CONDUCTIVITY TESTING DATA

TIMELY
ENGINEERING
SOIL
TESTS, LLC

1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

SUMMARY of TESTING

T.E.S.T. Project Number: 1230-02

Project Name: Former North Plant MGP Site

DRAFT

Sample Identification					Admixtures			Dates					Durability		Volume	Unit Weight		Hydraul.
T.E.S.T. Sample No.	Client Base Material No.	Mix Design No.	Batch No.	Spec. No.	GGBFS/ Cem. (3/1) %	Cement %	Benton. %	Mixing	Testing	Curing Age, days	UCS, psi	Moisture Content, %	Cum. Cor. Relative Mass Loss, % Wet/Dry	Fr./Thaw	Change %	Wet Density, pcf	Dry Density, pcf	Conduct. cm/sec
									1230-02-1									
13794	Comp. (A,B,C,D)				-	-	-	-	-	-	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	1	1	1	6	-	-	06/27/12	06/27/12	0	-	32.9	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	1	1	2	6	-	-	06/27/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	1	1	3	6	-	-	06/27/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	1	1	4	6	-	-	06/27/12	07/27/12	30	257	27.8	-	-	-	111.9	87.6	-
13794	Comp. (A,B,C,D)	1	1	5	6	-	-	06/27/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	1	1	6	6	-	-	06/27/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	1	1	7	6	-	-	06/27/12	07/27/12	30	-	26.5	-	-	-	111.6	88.2	5.6E-08
13794	Comp. (A,B,C,D)	1	1	8	6	-	-	06/27/12	06/30/12	3	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	1	1	9	6	-	-	06/27/12	ANS16.1	34	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	1	1	10-14	6	-	-	06/27/12	07/31/12	34	-	-	x	-	-	-	-	-
13794	Comp. (A,B,C,D)	1	1	15-19	6	-	-	06/27/12	07/31/12	34	-	-	-	x	-	-	-	-
13794	Comp. (A,B,C,D)	1	1	20-26	6	-	-	06/27/12	07/31/12	34	-	-	-	-	x	-	-	-
13794	Comp. (A,B,C,D)	2	1	1	8	-	-	06/27/12	06/27/12	0	-	33.8	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	2	1	2	8	-	-	06/27/12	07/04/12	7	112	29.5	-	-	-	112.5	86.9	-
13794	Comp. (A,B,C,D)	2	1	3	8	-	-	06/27/12	07/11/12	14	229	28.2	-	-	-	112.5	87.7	-
13794	Comp. (A,B,C,D)	2	1	4	8	-	-	06/27/12	07/25/12	28	313	28.2	-	-	-	111.8	87.2	-
13794	Comp. (A,B,C,D)	2	1	5	8	-	-	06/27/12	07/04/12	7	-	26.8	-	-	-	113.1	89.2	1.1E-07
13794	Comp. (A,B,C,D)	2	1	6	8	-	-	06/27/12	07/11/12	14	-	26.1	-	-	-	113.4	89.9	4.6E-08
13794	Comp. (A,B,C,D)	2	1	7	8	-	-	06/27/12	07/25/12	28	-	26.2	-	-	-	111.7	88.5	2.2E-08
13794	Comp. (A,B,C,D)	2	1	8	8	-	-	06/27/12	06/30/12	3	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	2	1	9	8	-	-	06/27/12	ANS16.1	34	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	2	1	10-14	8	-	-	06/27/12	07/31/12	34	-	-	x	-	-	-	-	-
13794	Comp. (A,B,C,D)	2	1	15-19	8	-	-	06/27/12	07/31/12	34	-	-	-	x	-	-	-	-

SUMMARY of TESTING

DRAFT

T.E.S.T. Project Number: 1230-02
Project Name: Former North Plant MGP Site

Sample Identification					Admixtures			Dates					Durability		Volume	Unit Weight		Hydraul.
T.E.S.T. Sample No.	Client Base Material No.	Mix Design No.	Batch No.	Spec. No.	GGBFS/ Cem. (3/1) %	Cement %	Benton. %	Mixing	Testing	Curing Age, days	UCS, psi	Moisture Content, %	Cum. Cor. Relative Mass Loss, % Wet/Dry	Fr./Thaw	Change %	Wet Density, pcf	Dry Density, pcf	Conduct. cm/sec
13794	Comp. (A,B,C,D)	2	1	20-26	8	-	-	06/27/12	07/31/12	34	-	-	-	-	x	-	-	-
13794	Comp. (A,B,C,D)	3	1	1	10	-	-	06/27/12	06/27/12	0	-	35.8	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	3	1	2	10	-	-	06/27/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	3	1	3	10	-	-	06/27/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	3	1	4	10	-	-	06/27/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	3	1	5	10	-	-	06/27/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	3	1	6	10	-	-	06/27/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	3	1	7	10	-	-	06/27/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	3	1	8	10	-	-	06/27/12	06/30/12	3	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	3	1	9	10	-	-	06/27/12	ANS16.1	>28?	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	3	1	10-14	10	-	-	06/27/12	???	>28?	-	-	x?	-	-	-	-	-
13794	Comp. (A,B,C,D)	3	1	15-19	10	-	-	06/27/12	???	>28?	-	-	-	x?	-	-	-	-
13794	Comp. (A,B,C,D)	3	1	20-26	10	-	-	06/27/12	07/25/12	28	-	-	-	-	x?	-	-	-
13794	Comp. (A,B,C,D)	4	1	1	-	8	0.5	06/26/12	06/26/12	0	-	36.3	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	4	1	2	-	8	0.5	06/26/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	4	1	3	-	8	0.5	06/26/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	4	1	4	-	8	0.5	06/26/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	4	1	5	-	8	0.5	06/26/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	4	1	6	-	8	0.5	06/26/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	4	1	7	-	8	0.5	06/26/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	4	1	8	-	8	0.5	06/26/12	06/29/12	3	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	4	1	9	-	8	0.5	06/26/12	ANS16.1	>28?	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	4	1	10-14	-	8	0.5	06/26/12	???	>28?	-	-	x?	-	-	-	-	-
13794	Comp. (A,B,C,D)	4	1	15-19	-	8	0.5	06/26/12	???	>28?	-	-	-	x?	-	-	-	-
13794	Comp. (A,B,C,D)	4	1	20-26	-	8	0.5	06/26/12	07/24/12	28	-	-	-	-	x?	-	-	-

SUMMARY of TESTING

T.E.S.T. Project Number: 1230-02

DRAFT

Project Name: Former North Plant MGP Site

Sample Identification					Admixtures			Dates					Durability		Volume	Unit Weight		Hydraul.
T.E.S.T. Sample No.	Client Base Material No.	Mix Design No.	Batch No.	Spec. No.	GGBFS/ Cem. (3/1) %	Cement %	Benton. %	Mixing	Testing	Curing Age, days	UCS, psi	Moisture Content, %	Cum. Cor. Relative Mass Loss, % Wet/Dry	Fr./Thaw	Change %	Wet Density, pcf	Dry Density, pcf	Conduct. cm/sec
13794	Comp. (A,B,C,D)	5	1	1	-	10	0.5	06/26/12	06/26/12	0	-	34.3	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	5	1	2	-	10	0.5	06/26/12	07/03/12	7	49	29.1	-	-	-	111.6	86.4	-
13794	Comp. (A,B,C,D)	5	1	3	-	10	0.5	06/26/12	07/10/12	14	56	29.9	-	-	-	110.4	85.0	-
13794	Comp. (A,B,C,D)	5	1	4	-	10	0.5	06/26/12	07/24/12	28	72	28.8	-	-	-	109.9	85.2	-
13794	Comp. (A,B,C,D)	5	1	5	-	10	0.5	06/26/12	07/03/12	7	-	26.9	-	-	-	110.9	87.4	7.6E-06
13794	Comp. (A,B,C,D)	5	1	6	-	10	0.5	06/26/12	07/10/12	14	-	28.4	-	-	-	112.4	87.5	5.0E-06
13794	Comp. (A,B,C,D)	5	1	7	-	10	0.5	06/26/12	07/24/12	28	-	26.2	-	-	-	113.3	89.8	2.9E-06
13794	Comp. (A,B,C,D)	5	1	8	-	10	0.5	06/26/12	06/29/12	3	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	5	1	9	-	10	0.5	06/26/12	ANS16.1	>28?	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	5	1	10-14	-	10	0.5	06/26/12	???	>28?	-	-	x?	-	-	-	-	-
13794	Comp. (A,B,C,D)	5	1	15-19	-	10	0.5	06/26/12	???	>28?	-	-	-	x?	-	-	-	-
13794	Comp. (A,B,C,D)	5	1	20-26	-	10	0.5	06/26/12	07/24/12	28	-	-	-	-	x?	-	-	-
13794	Comp. (A,B,C,D)	6	1	1	-	8	1	06/26/12	06/26/12	0	-	35.9	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	6	1	2	-	8	1	06/26/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	6	1	3	-	8	1	06/26/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	6	1	4	-	8	1	06/26/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	6	1	5	-	8	1	06/26/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	6	1	6	-	8	1	06/26/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	6	1	7	-	8	1	06/26/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	6	1	8	-	8	1	06/26/12	06/29/12	3	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	6	1	9	-	8	1	06/26/12	ANS16.1	>28?	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	6	1	10-14	-	8	1	06/26/12	???	>28?	-	-	x?	-	-	-	-	-
13794	Comp. (A,B,C,D)	6	1	15-19	-	8	1	06/26/12	???	>28?	-	-	-	x?	-	-	-	-
13794	Comp. (A,B,C,D)	6	1	20-26	-	8	1	06/26/12	07/24/12	28	-	-	-	-	x?	-	-	-
13794	Comp. (A,B,C,D)	7	1	1	-	10	1	06/26/12	06/26/12	0	-	34.1	-	-	-	-	-	-

SUMMARY of TESTING

DRAFT

T.E.S.T. Project Number: 1230-02

Project Name: Former North Plant MGP Site

Sample Identification					Admixtures			Dates					Durability		Volume	Unit Weight		Hydraul.
T.E.S.T. Sample No.	Client Base Material No.	Mix Design No.	Batch No.	Spec. No.	GGBFS/ Cem. (3/1) %	Cement %	Benton. %	Mixing	Testing	Curing Age, days	UCS, psi	Moisture Content, %	Cum. Cor. Relative Mass Loss, % Wet/Dry	Fr./Thaw	Change %	Wet Density, pcf	Dry Density, pcf	Conduct. cm/sec
13794	Comp. (A,B,C,D)	7	1	2	-	10	1	06/26/12	07/03/12	7	45	30.8	-	-	-	110.9	84.7	-
13794	Comp. (A,B,C,D)	7	1	3	-	10	1	06/26/12	07/10/12	14	55	30.4	-	-	-	111.9	85.8	-
13794	Comp. (A,B,C,D)	7	1	4	-	10	1	06/26/12	07/24/12	28	67	29.4	-	-	-	110.1	85.1	-
13794	Comp. (A,B,C,D)	7	1	5	-	10	1	06/26/12	07/03/12	7	-	27.3	-	-	-	111.5	87.6	5.1E-06
13794	Comp. (A,B,C,D)	7	1	6	-	10	1	06/26/12	07/10/12	14	-	28.3	-	-	-	112.4	87.6	3.3E-06
13794	Comp. (A,B,C,D)	7	1	7	-	10	1	06/26/12	07/24/12	28	-	28.0	-	-	-	111.1	86.8	2.0E-06
13794	Comp. (A,B,C,D)	7	1	8	-	10	1	06/26/12	06/29/12	3	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	7	1	9	-	10	1	06/26/12	ANS16.1	>28?	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	7	1	10-14	-	10	1	06/26/12	???	>28?	-	-	x?	-	-	-	-	-
13794	Comp. (A,B,C,D)	7	1	15-19	-	10	1	06/26/12	???	>28?	-	-	-	x?	-	-	-	-
13794	Comp. (A,B,C,D)	7	1	20-26	-	10	1	06/26/12	07/24/12	28	-	-	-	-	x?	-	-	-
13794	Comp. (A,B,C,D)	8	1	1	6	-	0.5	06/28/12	06/28/12	0	-	33.2	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	8	1	2	6	-	0.5	06/28/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	8	1	3	6	-	0.5	06/28/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	8	1	4	6	-	0.5	06/28/12	07/27/12	29	237	29.5	-	-	-	110.4	85.2	-
13794	Comp. (A,B,C,D)	8	1	5	6	-	0.5	06/28/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	8	1	6	6	-	0.5	06/28/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	8	1	7	6	-	0.5	06/28/12	07/27/12	29	-	28.0	-	-	-	110.7	86.5	2.0E-08
13794	Comp. (A,B,C,D)	8	1	8	6	-	0.5	06/28/12	07/01/12	3	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	8	1	9	6	-	0.5	06/28/12	ANS16.1	>28?	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	8	1	10-14	6	-	0.5	06/28/12	???	>28?	-	-	x?	-	-	-	-	-
13794	Comp. (A,B,C,D)	8	1	15-19	6	-	0.5	06/28/12	???	>28?	-	-	-	x?	-	-	-	-
13794	Comp. (A,B,C,D)	8	1	20-26	6	-	0.5	06/28/12	07/26/12	28	-	-	-	-	x?	-	-	-
13794	Comp. (A,B,C,D)	9	1	1	8	-	0.5	06/28/12	06/28/12	0	-	33.5	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	9	1	2	8	-	0.5	06/28/12	07/05/12	7	129	31.5	-	-	-	110.9	84.3	-

SUMMARY of TESTING

T.E.S.T. Project Number: 1230-02

DRAFT

Project Name: Former North Plant MGP Site

Sample Identification					Admixtures			Dates					Durability		Volume	Unit Weight		Hydraul.
T.E.S.T. Sample No.	Client Base Material No.	Mix Design No.	Batch No.	Spec. No.	GGBFS/ Cem. (3/1) %	Cement %	Benton. %	Mixing	Testing	Curing Age, days	UCS, psi	Moisture Content, %	Cum. Cor. Relative Mass Loss, % Wet/Dry	Fr./Thaw	Change %	Wet Density, pcf	Dry Density, pcf	Conduct. cm/sec
13794	Comp. (A,B,C,D)	9	1	3	8	-	0.5	06/28/12	07/12/12	14	216	30.5	-	-	-	111.8	85.7	-
13794	Comp. (A,B,C,D)	9	1	4	8	-	0.5	06/28/12	07/26/12	28	296	29.7	-	-	-	111.0	85.6	-
13794	Comp. (A,B,C,D)	9	1	5	8	-	0.5	06/28/12	07/05/12	7	-	27.0	-	-	-	112.9	88.9	9.0E-08
13794	Comp. (A,B,C,D)	9	1	6	8	-	0.5	06/28/12	07/12/12	14	-	29.4	-	-	-	109.6	84.7	2.5E-08
13794	Comp. (A,B,C,D)	9	1	7	8	-	0.5	06/28/12	07/26/12	28	-	27.4	-	-	-	112.0	87.9	1.5E-08
13794	Comp. (A,B,C,D)	9	1	8	8	-	0.5	06/28/12	07/01/12	3	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	9	1	9	8	-	0.5	06/28/12	ANS16.1	>28?	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	9	1	10-14	8	-	0.5	06/28/12	???	>28?	-	-	x?	-	-	-	-	-
13794	Comp. (A,B,C,D)	9	1	15-19	8	-	0.5	06/28/12	???	>28?	-	-	-	x?	-	-	-	-
13794	Comp. (A,B,C,D)	9	1	20-26	8	-	0.5	06/28/12	07/26/12	28	-	-	-	-	x?	-	-	-
13794	Comp. (A,B,C,D)	10	1	1	10	-	0.5	06/28/12	06/28/12	0	-	35.0	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	10	1	2	10	-	0.5	06/28/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	10	1	3	10	-	0.5	06/28/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	10	1	4	10	-	0.5	06/28/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	10	1	5	10	-	0.5	06/28/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	10	1	6	10	-	0.5	06/28/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	10	1	7	10	-	0.5	06/28/12	NA	NA	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	10	1	8	10	-	0.5	06/28/12	07/01/12	3	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	10	1	9	10	-	0.5	06/28/12	ANS16.1	>28?	-	-	-	-	-	-	-	-
13794	Comp. (A,B,C,D)	10	1	10-14	10	-	0.5	06/28/12	???	>28?	-	-	x?	-	-	-	-	-
13794	Comp. (A,B,C,D)	10	1	15-19	10	-	0.5	06/28/12	???	>28?	-	-	-	x?	-	-	-	-
13794	Comp. (A,B,C,D)	10	1	20-26	10	-	0.5	06/28/12	07/26/12	28	-	-	-	-	x?	-	-	-

TIMELY ENGINEERING SOIL TESTS, LLC

1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Tested By	EB
Date	07/27/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-1-1	Depth/Elev.	-
Subsample	7	Add. Info	Curing Age: 30 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.861	in	7.27	cm
Diameter	3.009	in	7.64	cm
Area	7.11	in^2	45.88	cm^2
Volume	333.39	cm^3	0.0118	ft^3
Mass	596.00	g	1.31	lb
Specific Gravity	2.575	(Assumed)		
Dry Density	88.2	pcf		

Moisture Content

Mass of wet sample & tare	596.00	g
Mass of dry sample & tare	471.30	g
Mass of tare	0.00	g
% Moisture	26.5	

Test Data

Speed	13	
Board Number	10	
Cell Number	17	
Flow Pump Number	2B	
Flow Pump Rate	2.80E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	105.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	15.0	psi
Max Head	68.93	cm
Min Head	66.12	cm
Maximum Gradient	9.50	
Minimum Gradient	9.11	

Final Data (After Test)

Average Height of Sample			2.858	in	7.26	cm
Average Diameter of Sample			3.001	in	7.62	cm
Area	7.07	in^2	45.63	cm^2		
Volume	331.27	cm^3	0.0117	ft^3		
Mass	613.20	g	1.35	lb		

Dry Density	89.0	pcf
Vol. of Voids	147.82	cm^3
Vol. of Solids	183.45	cm^3
Void Ratio	0.81	
Saturation	95.3	%

Moisture Content

Mass of wet sample & tare	702.30	g
Mass of dry sample & tare	561.80	g
Mass of tare	90.50	g
% Moisture	29.8	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(°C)	@ T_x	R_T	@ 20 °C	
07/22/12	10	0	-	0.95	66.82	9.21	27.0	-	-	-	
07/22/12	10	10	600	0.94	66.12	9.11	27.0	6.70E-08	0.850	5.70E-08	
07/22/12	10	20	600	0.95	66.82	9.21	27.0	6.70E-08	0.850	5.70E-08	
07/22/12	10	30	600	0.94	66.12	9.11	27.0	6.70E-08	0.850	5.70E-08	*
07/22/12	10	40	600	0.98	68.93	9.50	27.0	6.60E-08	0.850	5.61E-08	*
07/22/12	10	50	600	0.97	68.23	9.40	27.0	6.49E-08	0.850	5.52E-08	*
07/22/12	11	0	600	0.96	67.53	9.30	27.0	6.56E-08	0.850	5.58E-08	*

Reported Average Hydraulic Conductivity* 5.6E-08 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION

NA

USCS
(ASTM D2487;2488)
NA

REMARKS

Flow pump ID #	244	Balance ID #	1/6/7	Differential Pressure Transducer ID #	263
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	216
Syringe ID #	246			Pore Pressure Transducer ID #	28

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Web: www.test-llc.com

Tested By	RI
Date	07/27/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-1-1	Depth/Elev.	-
Subsample	4	Add. Info	Curing Age: 30 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.589
Initial Diameter, in	3.002
Height-to-Diameter Ratio	1.86
Area, in^2	7.08
Volume, in^3	39.56
Mass of Sample, g	1162.30
Wet Density, pcf	111.9
Dry Density, pcf	87.6
Machine Speed, in/min	0.050
Strain rate, % / min	0.89

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1416.40
Mass of Dry Sample and Tare, g	1164.70
Mass of Tare, g	258.30
Moisture, %	27.8

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

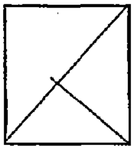
Maximum Load at Failure, lbf	1820
Specimen Cross-sectional Area, in^2	7.08
Compressive Strength at Failure, psi	257
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**257**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

DESCRIPTION

Failure Sketch



Failure Type:
Cone and Shear

USCS (ASTM D2487: D2488)

REMARKS

TIMELY ENGINEERING SOIL TESTS, LLC

1874 Forge Street Tucker, GA 30084
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Fax: 770-923-8973
Web: www.test-llc.com

Tested By	EB
Date	07/04/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-2-1	Depth/Elev.	-
Subsample	5	Add. Info	Curing Age: 7 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.718	in	6.90	cm
Diameter	3.003	in	7.63	cm
Area	7.08	in^2	45.69	cm^2
Volume	315.46	cm^3	0.0111	ft^3
Mass	571.90	g	1.26	lb
Specific Gravity	2.575	(Assumed)		
Dry Density	89.2	pcf		

Moisture Content

Mass of wet sample & tare	571.90	g
Mass of dry sample & tare	450.90	g
Mass of tare	0.00	g
% Moisture	26.8	

Test Data

Speed	12	
Board Number	8	
Cell Number	4	
Flow Pump Number	2A	
Flow Pump Rate	5.60E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	105.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	15.0	psi
Max Head	64.01	cm
Min Head	63.31	cm
Maximum Gradient	9.28	
Minimum Gradient	9.18	

Final Data (After Test)

Average Height of Sample			2.716	in	6.90	cm
Average Diameter of Sample			3.006	in	7.64	cm
Area	7.10	in^2	45.79	cm^2		
Volume	315.86	cm^3	0.0112	ft^3		
Mass	588.10	g	1.30	lb		

Dry Density	89.2	pcf
Vol. of Voids	140.52	cm^3
Vol. of Solids	175.35	cm^3
Void Ratio	0.80	
Saturation	97.2	%

Moisture Content

Mass of wet sample & tare	715.20	g
Mass of dry sample & tare	578.80	g
Mass of tare	127.90	g
% Moisture	30.3	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(°C)	@ T_x	R_T	@ 20 °C	
07/04/12	6	0	-	0.91	64.01	9.28	27.0	-	-	-	
07/04/12	6	10	600	0.90	63.31	9.18	27.0	1.33E-07	0.850	1.13E-07	
07/04/12	6	20	600	0.91	64.01	9.28	27.0	1.33E-07	0.850	1.13E-07	
07/04/12	6	30	600	0.90	63.31	9.18	27.0	1.33E-07	0.850	1.13E-07	*
07/04/12	6	40	600	0.90	63.31	9.18	27.0	1.33E-07	0.850	1.13E-07	*
07/04/12	6	50	600	0.91	64.01	9.28	27.0	1.33E-07	0.850	1.13E-07	*
07/04/12	7	0	600	0.91	64.01	9.28	27.0	1.32E-07	0.850	1.12E-07	*

Reported Average Hydraulic Conductivity* 1.1E-07 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION

NA

USCS
(ASTM D2467;2488)
NA

REMARKS

Flow pump ID #	244	Balance ID #	1/6/7	Differential Pressure Transducer ID #	262
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	215
Syringe ID #	245			Pore Pressure Transducer ID #	28

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Web: www.test-llc.com

Tested By	EB
Date	07/11/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-2-1	Depth/Elev.	-
Subsample	6	Add. Info	Curing Age: 14 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.876	in	7.31	cm
Diameter	2.992	in	7.60	cm
Area	7.03	in^2	45.36	cm^2
Volume	331.36	cm^3	0.0117	ft^3
Mass	601.70	g	1.33	lb
Specific Gravity	2.575	(Assumed)		
Dry Density	89.9	pcf		

Moisture Content

Mass of wet sample & tare	601.70	g
Mass of dry sample & tare	477.20	g
Mass of tare	0.00	g
% Moisture	26.1	

Test Data

Speed	12	
Board Number	7	
Cell Number	12	
Flow Pump Number	2A	
Flow Pump Rate	5.60E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	105.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	15.0	psi
Max Head	167.41	cm
Min Head	166.71	cm
Maximum Gradient	22.89	
Minimum Gradient	22.79	

Final Data (After Test)

Average Height of Sample			2.880	in	7.32	cm
Average Diameter of Sample			2.985	in	7.58	cm
Area	7.00	in^2	45.15	cm^2		
Volume	330.27	cm^3	0.0117	ft^3		
Mass	615.60	g	1.36	lb		

Dry Density	90.4	pcf
Vol. of Voids	144.53	cm^3
Vol. of Solids	185.74	cm^3
Void Ratio	0.78	
Saturation	95.0	%

Moisture Content

Mass of wet sample & tare	674.30	g
Mass of dry sample & tare	537.30	g
Mass of tare	60.10	g
% Moisture	28.7	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(°C)	@ T_x	R_T	@ 20 °C	
07/11/12	7	30	-	2.38	167.41	22.89	27.0	-	-	-	
07/11/12	7	40	600	2.37	166.71	22.79	27.0	5.43E-08	0.850	4.62E-08	
07/11/12	7	50	600	2.38	167.41	22.89	27.0	5.43E-08	0.850	4.62E-08	
07/11/12	8	0	600	2.37	166.71	22.79	27.0	5.43E-08	0.850	4.62E-08	*
07/11/12	8	10	600	2.38	167.41	22.89	27.0	5.43E-08	0.850	4.62E-08	*
07/11/12	8	20	600	2.37	166.71	22.79	27.0	5.43E-08	0.850	4.62E-08	*
07/11/12	8	30	600	2.38	167.41	22.89	27.0	5.43E-08	0.850	4.62E-08	*

Reported Average Hydraulic Conductivity* 4.6E-08 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION: NA

USCS (ASTM D2487;2488): NA

REMARKS:

Flow pump ID #	244	Balance ID #	1/6/7	Differential Pressure Transducer ID #	262
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	215
Syringe ID #	245			Pore Pressure Transducer ID #	28

TIMELY ENGINEERING SOIL TESTS, LLC

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Web: www.test-llc.com

Tested By	EB
Date	07/25/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-2-1	Depth/Elev.	-
Subsample	7	Add. Info	Curing Age: 28 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.759	in	7.01	cm
Diameter	3.000	in	7.62	cm
Area	7.07	in^2	45.60	cm^2
Volume	319.58	cm^3	0.0113	ft^3
Mass	572.20	g	1.26	lb
Specific Gravity	2.575	(Assumed)		
Dry Density	88.5	pcf		

Moisture Content

Mass of wet sample & tare	572.20	g
Mass of dry sample & tare	453.50	g
Mass of tare	0.00	g
% Moisture	26.2	

Test Data

Speed	13	
Board Number	6	
Cell Number	2	
Flow Pump Number	2A	
Flow Pump Rate	2.80E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	105.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	15.0	psi
Max Head	168.11	cm
Min Head	167.41	cm
Maximum Gradient	24.07	
Minimum Gradient	23.97	

Final Data (After Test)

Average Height of Sample			2.750	in	6.99	cm
Average Diameter of Sample			2.985	in	7.58	cm
Area	7.00	in^2	45.15	cm^2		
Volume	315.36	cm^3	0.0111	ft^3		
Mass	587.30	g	1.29	lb		

Dry Density	89.9	pcf
Vol. of Voids	138.86	cm^3
Vol. of Solids	176.51	cm^3
Void Ratio	0.79	
Saturation	95.6	%

Moisture Content

Mass of wet sample & tare	684.70	g
Mass of dry sample & tare	552.20	g
Mass of tare	98.70	g
% Moisture	29.2	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(°C)	@ T_x	R_T	@ 20 °C	
07/25/12	8	0	-	2.39	168.11	24.07	27.0	-	-	-	
07/25/12	8	10	600	2.38	167.41	23.97	27.0	2.58E-08	0.850	2.20E-08	
07/25/12	8	20	600	2.38	167.41	23.97	27.0	2.59E-08	0.850	2.20E-08	
07/25/12	8	30	600	2.39	168.11	24.07	27.0	2.58E-08	0.850	2.20E-08	*
07/25/12	8	40	600	2.38	167.41	23.97	27.0	2.58E-08	0.850	2.20E-08	*
07/25/12	8	50	600	2.39	168.11	24.07	27.0	2.58E-08	0.850	2.20E-08	*
07/25/12	9	0	600	2.39	168.11	24.07	27.0	2.58E-08	0.850	2.19E-08	*

Reported Average Hydraulic Conductivity* 2.2E-08 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION
NA

USCS
(ASTM D2487;2488)
NA

REMARKS

Flow pump ID #	244	Balance ID #	1/6/7	Differential Pressure Transducer ID #	262
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	216
Syringe ID #	245			Pore Pressure Transducer ID #	28

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Web: www.test-llc.com

Tested By	RI
Date	07/04/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-2-1	Depth/Elev.	-
Subsample	2	Add. Info	Curing Age: 7 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.509
Initial Diameter, in	3.001
Height-to-Diameter Ratio	1.84
Area, in^2	7.07
Volume, in^3	38.97
Mass of Sample, g	1150.70
Wet Density, pcf	112.5
Dry Density, pcf	86.9
Machine Speed, in/min	0.050
Strain rate, % / min	0.91

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1357.70
Mass of Dry Sample and Tare, g	1096.00
Mass of Tare, g	208.00
Moisture, %	29.5

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

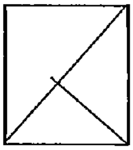
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	790
Specimen Cross-sectional Area, in^2	7.07
Compressive Strength at Failure, psi	112
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**112**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

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Tested By	RI
Date	07/11/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-2-1	Depth/Elev.	-
Subsample	3	Add. Info	Curing Age: 14 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD: B

SAMPLE DATA

Initial Height, in	5.618
Initial Diameter, in	3.010
Height-to-Diameter Ratio	1.87
Area, in^2	7.12
Volume, in^3	39.98
Mass of Sample, g	1180.30
Wet Density, pcf	112.5
Dry Density, pcf	87.7
Machine Speed, in/min	0.050
Strain rate, % / min	0.89

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1385.90
Mass of Dry Sample and Tare, g	1126.80
Mass of Tare, g	206.70
Moisture, %	28.2

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

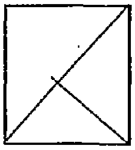
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	1626
Specimen Cross-sectional Area, in^2	7.12
Compressive Strength at Failure, psi	229
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**229**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

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Tested By: RI
Date: 07/25/12
Checked By:

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-2-1	Depth/Elev.	-
Subsample	4	Add. Info	Curing Age: 28 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.600
Initial Diameter, in	3.004
Height-to-Diameter Ratio	1.86
Area, in^2	7.09
Volume, in^3	39.69
Mass of Sample, g	1164.40
Wet Density, pcf	111.8
Dry Density, pcf	87.2
Machine Speed, in/min	0.050
Strain rate, % / min	0.89

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1369.10
Mass of Dry Sample and Tare, g	1113.50
Mass of Tare, g	206.50
Moisture, %	28.2

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

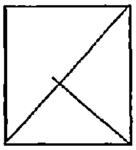
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	2219
Specimen Cross-sectional Area, in^2	7.09
Compressive Strength at Failure, psi	313
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**313**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

T.E.S.T.

TIMELY ENGINEERING SOIL TESTS, LLC

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Tested By	EB
Date	07/03/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-5-1	Depth/Elev.	-
Subsample	5	Add. Info	Curing Age: 7 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.806	in	7.13	cm
Diameter	3.005	in	7.63	cm
Area	7.09	in^2	45.76	cm^2
Volume	326.11	cm^3	0.0115	ft^3
Mass	579.60	g	1.28	lb
Specific Gravity	2.575	(Assumed)		
Dry Density	87.4	pcf		

Moisture Content

Mass of wet sample & tare	579.60	g
Mass of dry sample & tare	456.60	g
Mass of tare	0.00	g
% Moisture	26.9	

Test Data

Speed	7	
Board Number	5	
Cell Number	2	
Flow Pump Number	2B	
Flow Pump Rate	1.79E-03	cm^3/sec
B - Value	0.95	
Cell Pressure	105.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	15.0	psi
Max Head	31.65	cm
Min Head	30.25	cm
Maximum Gradient	4.45	
Minimum Gradient	4.26	

Final Data (After Test)

Average Height of Sample			2.798	in	7.11	cm
Average Diameter of Sample			2.995	in	7.61	cm
Area	7.05	in^2	45.45	cm^2		
Volume	323.02	cm^3	0.0114	ft^3		
Mass	596.10	g	1.31	lb		

Dry Density	88.4	pcf
Vol. of Voids	145.37	cm^3
Vol. of Solids	177.65	cm^3
Void Ratio	0.82	
Saturation	95.4	%

Moisture Content

Mass of wet sample & tare	674.00	g
Mass of dry sample & tare	535.60	g
Mass of tare	79.00	g
% Moisture	30.3	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(°C)	@ T_x	R_T	@ 20 °C	
07/03/12	8	0	-	0.44	30.95	4.35	27.0	-	-	-	
07/03/12	8	10	600	0.43	30.25	4.26	27.0	9.16E-06	0.850	7.79E-06	
07/03/12	8	20	600	0.43	30.25	4.26	27.0	9.26E-06	0.850	7.88E-06	
07/03/12	8	30	600	0.45	31.65	4.45	27.0	9.05E-06	0.850	7.70E-06	*
07/03/12	8	40	600	0.44	30.95	4.35	27.0	8.95E-06	0.850	7.61E-06	*
07/03/12	8	50	600	0.45	31.65	4.45	27.0	8.95E-06	0.850	7.61E-06	*
07/03/12	9	0	600	0.44	30.95	4.35	27.0	8.95E-06	0.850	7.61E-06	*

Reported Average Hydraulic Conductivity* 7.6E-06 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION

NA

USCS
(ASTM D2487;2488)

NA

REMARKS

Flow pump ID #	244	Balance ID #	1/6/7	Differential Pressure Transducer ID #	263
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	216
Syringe ID #	246			Pore Pressure Transducer ID #	28

TIMELY ENGINEERING SOIL TESTS, LLC

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Web: www.test-llc.com

Tested By	EB
Date	07/10/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-5-1	Depth/Elev.	-
Subsample	6	Add. Info	Curing Age: 14 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.747	in	6.98	cm
Diameter	3.003	in	7.63	cm
Area	7.08	in^2	45.69	cm^2
Volume	318.83	cm^3	0.0113	ft^3
Mass	574.40	g	1.27	lb
Specific Gravity	2.575	(Assumed)		
Dry Density	87.5	pcf		

Moisture Content

Mass of wet sample & tare	574.40	g
Mass of dry sample & tare	447.30	g
Mass of tare	0.00	g
% Moisture	28.4	

Test Data

Speed	7	
Board Number	8	
Cell Number	19	
Flow Pump Number	2A	
Flow Pump Rate	1.79E-03	cm^3/sec
B - Value	0.95	
Cell Pressure	105.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	15.0	psi
Max Head	47.83	cm
Min Head	45.02	cm
Maximum Gradient	6.87	
Minimum Gradient	6.47	

Final Data (After Test)

Average Height of Sample	2.740	in	6.96	cm
Average Diameter of Sample	2.998	in	7.61	cm
Area	7.06	in^2	45.54	cm^2
Volume	316.96	cm^3	0.0112	ft^3
Mass	584.50	g	1.29	lb

Dry Density	88.2	pcf
Vol. of Voids	142.89	cm^3
Vol. of Solids	174.07	cm^3
Void Ratio	0.82	
Saturation	95.4	%

Moisture Content

Mass of wet sample & tare	674.50	g
Mass of dry sample & tare	538.50	g
Mass of tare	91.20	g
% Moisture	30.4	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(°C)	@ T_x	R_T	@ 20 °C	
07/10/12	7	0	-	0.65	45.72	6.57	27.0	-	-	-	
07/10/12	7	10	600	0.64	45.02	6.47	27.0	6.04E-06	0.850	5.13E-06	
07/10/12	7	20	600	0.64	45.02	6.47	27.0	6.08E-06	0.850	5.17E-06	
07/10/12	7	30	600	0.67	47.13	6.77	27.0	5.94E-06	0.850	5.05E-06	*
07/10/12	7	40	600	0.64	45.02	6.47	27.0	5.94E-06	0.850	5.05E-06	*
07/10/12	7	50	600	0.66	46.42	6.67	27.0	5.99E-06	0.850	5.09E-06	*
07/10/12	8	0	600	0.68	47.83	6.87	27.0	5.81E-06	0.850	4.94E-06	*

Reported Average Hydraulic Conductivity* 5.0E-06 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION

NA

USCS
(ASTM D2487;2488)
NA

REMARKS

Flow pump ID #	244	Balance ID #	1/6/7	Differential Pressure Transducer ID #	262
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	215
Syringe ID #	245			Pore Pressure Transducer ID #	28

TIMELY ENGINEERING SOIL TESTS, LLC

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Web: www.test-llc.com

Tested By	EB
Date	07/24/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-5-1	Depth/Elev.	-
Subsample	7	Add. Info	Curing Age: 28 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.765	in	7.02	cm
Diameter	3.004	in	7.63	cm
Area	7.09	in^2	45.73	cm^2
Volume	321.13	cm^3	0.0113	ft^3
Mass	583.10	g	1.29	lb
Specific Gravity	2.575	(Assumed)		
Dry Density	89.8	pcf		

Moisture Content

Mass of wet sample & tare	583.10	g
Mass of dry sample & tare	461.90	g
Mass of tare	0.00	g
% Moisture	26.2	

Test Data

Speed	8	
Board Number	7	
Cell Number	2	
Flow Pump Number	2A	
Flow Pump Rate	8.96E-04	cm^3/sec
B - Value	0.95	
Cell Pressure	105.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	15.0	psi
Max Head	40.09	cm
Min Head	39.39	cm
Maximum Gradient	5.72	
Minimum Gradient	5.62	

Final Data (After Test)

Average Height of Sample			2.760	in	7.01	cm
Average Diameter of Sample			2.999	in	7.62	cm
Area	7.06	in^2	45.57	cm^2		
Volume	319.49	cm^3	0.0113	ft^3		
Mass	597.80	g	1.32	lb		

Dry Density	90.4	pcf
Vol. of Voids	139.78	cm^3
Vol. of Solids	179.71	cm^3
Void Ratio	0.78	
Saturation	96.6	%

Moisture Content

Mass of wet sample & tare	693.70	g
Mass of dry sample & tare	558.90	g
Mass of tare	97.00	g
% Moisture	29.2	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(°C)	@ T_x	R_T	@ 20 °C	
07/24/12	7	0	-	0.57	40.09	5.72	27.0	-	-	-	
07/24/12	7	10	600	0.56	39.39	5.62	27.0	3.47E-06	0.850	2.95E-06	
07/24/12	7	20	600	0.56	39.39	5.62	27.0	3.50E-06	0.850	2.97E-06	
07/24/12	7	30	600	0.57	40.09	5.72	27.0	3.47E-06	0.850	2.95E-06	*
07/24/12	7	40	600	0.56	39.39	5.62	27.0	3.47E-06	0.850	2.95E-06	*
07/24/12	7	50	600	0.57	40.09	5.72	27.0	3.47E-06	0.850	2.95E-06	*
07/24/12	8	0	600	0.57	40.09	5.72	27.0	3.44E-06	0.850	2.92E-06	*

Reported Average Hydraulic Conductivity* 2.9E-06 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION

NA

USCS
(ASTM D2487;2488)
NA

REMARKS

Flow pump ID #	244	Balance ID #	1/6/7	Differential Pressure Transducer ID #	262
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	215
Syringe ID #	245			Pore Pressure Transducer ID #	28

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Tested By	RI
Date	07/03/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-5-1	Depth/Elev.	-
Subsample	2	Add. Info	Curing Age: 7 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.579
Initial Diameter, in	3.007
Height-to-Diameter Ratio	1.86
Area, in^2	7.10
Volume, in^3	39.62
Mass of Sample, g	1160.80
Wet Density, pcf	111.6
Dry Density, pcf	86.4
Machine Speed, in/min	0.050
Strain rate, % / min	0.90

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1575.30
Mass of Dry Sample and Tare, g	1314.30
Mass of Tare, g	418.40
Moisture, %	29.1

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

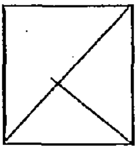
Maximum Load at Failure, lbf	350
Specimen Cross-sectional Area, in^2	7.10
Compressive Strength at Failure, psi	49
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**49**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

DESCRIPTION

Failure Sketch



Failure Type: Cone and Shear

USCS (ASTM D2487: D2488)

REMARKS

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Tested By	RI
Date	07/10/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-5-1	Depth/Elev.	-
Subsample	3	Add. Info	Curing Age: 14 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.593
Initial Diameter, in	3.009
Height-to-Diameter Ratio	1.86
Area, in^2	7.11
Volume, in^3	39.77
Mass of Sample, g	1153.00
Wet Density, pcf	110.4
Dry Density, pcf	85.0
Machine Speed, in/min	0.050
Strain rate, % / min	0.89

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1354.30
Mass of Dry Sample and Tare, g	1089.30
Mass of Tare, g	203.60
Moisture, %	29.9

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

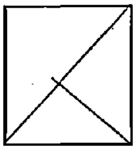
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	401
Specimen Cross-sectional Area, in^2	7.11
Compressive Strength at Failure, psi	56
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**56**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type:
Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

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Tested By	RI
Date	07/24/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-5-1	Depth/Elev.	-
Subsample	4	Add. Info	Curing Age: 28 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.614
Initial Diameter, in	3.010
Height-to-Diameter Ratio	1.87
Area, in^2	7.12
Volume, in^3	39.95
Mass of Sample, g	1152.00
Wet Density, pcf	109.9
Dry Density, pcf	85.2
Machine Speed, in/min	0.050
Strain rate, % / min	0.89

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1352.60
Mass of Dry Sample and Tare, g	1095.50
Mass of Tare, g	203.50
Moisture, %	28.8

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

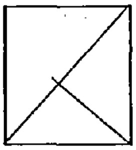
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	511
Specimen Cross-sectional Area, in^2	7.12
Compressive Strength at Failure, psi	72
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**72**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

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Web: www.test-llc.com

Tested By	EB
Date	07/03/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-7-1	Depth/Elev.	-
Subsample	5	Add. Info	Curing Age: 7 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.851	in	7.24	cm
Diameter	3.019	in	7.67	cm
Area	7.16	in^2	46.18	cm^2
Volume	334.44	cm^3	0.0118	ft^3
Mass	597.70	g	1.32	lb
Specific Gravity	2.575	(Assumed)		
Dry Density	87.6	pcf		

Moisture Content

Mass of wet sample & tare	597.70	g
Mass of dry sample & tare	469.50	g
Mass of tare	0.00	g
% Moisture	27.3	

Test Data

Speed	7	
Board Number	7	
Cell Number	12	
Flow Pump Number	2B	
Flow Pump Rate	1.79E-03	cm^3/sec
B - Value	0.95	
Cell Pressure	105.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	15.0	psi
Max Head	47.13	cm
Min Head	45.72	cm
Maximum Gradient	6.52	
Minimum Gradient	6.33	

Final Data (After Test)

Average Height of Sample		2.845	in	7.23	cm
Average Diameter of Sample		3.015	in	7.66	cm
Area	7.14	in^2	46.06	cm^2	
Volume	332.85	cm^3	0.0118	ft^3	
Mass	613.10	g	1.35	lb	

Dry Density	88.2	pcf
Vol. of Voids	150.22	cm^3
Vol. of Solids	182.63	cm^3
Void Ratio	0.82	
Saturation	95.1	%

Moisture Content

Mass of wet sample & tare	680.80	g
Mass of dry sample & tare	538.20	g
Mass of tare	68.70	g
% Moisture	30.4	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(°C)	@ T_x	R_T	@ 20 °C	
07/03/12	6	30	-	0.66	46.42	6.42	27.0	-	-	-	
07/03/12	6	40	600	0.65	45.72	6.33	27.0	6.10E-06	0.850	5.19E-06	
07/03/12	6	50	600	0.65	45.72	6.33	27.0	6.15E-06	0.850	5.23E-06	
07/03/12	7	0	600	0.67	47.13	6.52	27.0	6.06E-06	0.850	5.15E-06	*
07/03/12	7	10	600	0.65	45.72	6.33	27.0	6.06E-06	0.850	5.15E-06	*
07/03/12	7	20	600	0.67	47.13	6.52	27.0	6.06E-06	0.850	5.15E-06	*
07/03/12	7	30	600	0.66	46.42	6.42	27.0	6.01E-06	0.850	5.11E-06	*

Reported Average Hydraulic Conductivity* 5.1E-06 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION

NA

USCS
(ASTM D2487;2488)
NA

REMARKS

Flow pump ID #	244	Balance ID #	1/6/7	Differential Pressure Transducer ID #	263
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	215
Syringe ID #	246			Pore Pressure Transducer ID #	28

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Tested By	EB
Date	07/10/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-7-1	Depth/Elev.	-
Subsample	6	Add. Info	Curing Age: 14 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.750	in	6.99	cm
Diameter	3.002	in	7.63	cm
Area	7.08	in^2	45.66	cm^2
Volume	318.97	cm^3	0.0113	ft^3
Mass	574.40	g	1.27	lb
Specific Gravity	2.575	(Assumed)		
Dry Density	87.6	pcf		

Moisture Content

Mass of wet sample & tare	574.40	g
Mass of dry sample & tare	447.80	g
Mass of tare	0.00	g
% Moisture	28.3	

Test Data

Speed	7	
Board Number	7	
Cell Number	12	
Flow Pump Number	2B	
Flow Pump Rate	1.79E-03	cm^3/sec
B - Value	0.95	
Cell Pressure	105.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	15.0	psi
Max Head	70.34	cm
Min Head	68.23	cm
Maximum Gradient	10.11	
Minimum Gradient	9.80	

Final Data (After Test)

Average Height of Sample			2.740	in	6.96	cm
Average Diameter of Sample			3.012	in	7.65	cm
Area	7.13	in^2	45.97	cm^2		
Volume	319.93	cm^3	0.0113	ft^3		
Mass	587.10	g	1.29	lb		

Dry Density	87.4	pcf
Vol. of Voids	145.85	cm^3
Vol. of Solids	174.08	cm^3
Void Ratio	0.84	
Saturation	95.2	%

Moisture Content

Mass of wet sample & tare	690.70	g
Mass of dry sample & tare	552.00	g
Mass of tare	104.20	g
% Moisture	31.0	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(°C)	@ T_x	R_T	@ 20 °C	
07/10/12	7	0	-	0.98	68.93	9.90	27.0	-	-	-	
07/10/12	7	10	600	0.97	68.23	9.80	27.0	3.96E-06	0.850	3.36E-06	
07/10/12	7	20	600	0.97	68.23	9.80	27.0	3.98E-06	0.850	3.38E-06	
07/10/12	7	30	600	0.98	68.93	9.90	27.0	3.96E-06	0.850	3.36E-06	*
07/10/12	7	40	600	1.00	70.34	10.11	27.0	3.90E-06	0.850	3.31E-06	*
07/10/12	7	50	600	0.99	69.64	10.01	27.0	3.88E-06	0.850	3.30E-06	*
07/10/12	8	0	600	0.98	68.93	9.90	27.0	3.92E-06	0.850	3.33E-06	*

Reported Average Hydraulic Conductivity* 3.3E-06 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION
NA

USCS
(ASTM D2487;2488)
NA

REMARKS

Flow pump ID #	244	Balance ID #	1/6/7	Differential Pressure Transducer ID #	263
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	215
Syringe ID #	246			Pore Pressure Transducer ID #	28

T.E. S.T.

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Tested By	EB
Date	07/24/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-7-1	Depth/Elev.	-
Subsample	7	Add. Info	Curing Age: 28 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.812	in	7.14	cm
Diameter	3.006	in	7.64	cm
Area	7.10	in^2	45.79	cm^2
Volume	327.03	cm^3	0.0115	ft^3
Mass	582.40	g	1.28	lb
Specific Gravity	2.575	(Assumed)		
Dry Density	86.8	pcf		

Moisture Content

Mass of wet sample & tare	582.40	g
Mass of dry sample & tare	455.10	g
Mass of tare	0.00	g
% Moisture	28.0	

Test Data

Speed	8	
Board Number	8	
Cell Number	19	
Flow Pump Number	2B	
Flow Pump Rate	8.96E-04	cm^3/sec
B - Value	0.95	
Cell Pressure	105.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	15.0	psi
Max Head	59.09	cm
Min Head	58.38	cm
Maximum Gradient	8.28	
Minimum Gradient	8.18	

Final Data (After Test)

Average Height of Sample			2.810	in	7.14	cm
Average Diameter of Sample			3.002	in	7.63	cm
Area	7.08	in^2	45.66	cm^2		
Volume	325.93	cm^3	0.0115	ft^3		
Mass	599.00	g	1.32	lb		

Dry Density	87.3	pcf
Vol. of Voids	148.89	cm^3
Vol. of Solids	177.03	cm^3
Void Ratio	0.84	
Saturation	96.1	%

Moisture Content

Mass of wet sample & tare	692.40	g
Mass of dry sample & tare	549.50	g
Mass of tare	94.40	g
% Moisture	31.4	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_X(^oC)	@ T_X	R_T	@ 20 ^oC	
07/24/12	7	0	-	0.84	59.09	8.28	27.0	-	-	-	
07/24/12	7	10	600	0.83	58.38	8.18	27.0	2.38E-06	0.850	2.03E-06	
07/24/12	7	20	600	0.83	58.38	8.18	27.0	2.40E-06	0.850	2.04E-06	
07/24/12	7	30	600	0.84	59.09	8.28	27.0	2.38E-06	0.850	2.03E-06	*
07/24/12	7	40	600	0.84	59.09	8.28	27.0	2.37E-06	0.850	2.02E-06	*
07/24/12	7	50	600	0.84	59.09	8.28	27.0	2.37E-06	0.850	2.02E-06	*
07/24/12	8	0	600	0.84	59.09	8.28	27.0	2.37E-06	0.850	2.02E-06	*

Reported Average Hydraulic Conductivity* 2.0E-06 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION

NA

USCS (ASTM D2487;2488)

NA

REMARKS

Flow pump ID #	244	Balance ID #	1/6/7	Differential Pressure Transducer ID #	263
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	215
Syringe ID #	246			Pore Pressure Transducer ID #	28

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Tested By	RI
Date	07/03/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-7-1	Depth/Elev.	-
Subsample	2	Add. Info	Curing Age: 7 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.627
Initial Diameter, in	3.008
Height-to-Diameter Ratio	1.87
Area, in^2	7.11
Volume, in^3	39.99
Mass of Sample, g	1163.60
Wet Density, pcf	110.9
Dry Density, pcf	84.7
Machine Speed, in/min	0.050
Strain rate, % / min	0.89

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1421.00
Mass of Dry Sample and Tare, g	1148.10
Mass of Tare, g	261.20
Moisture, %	30.8

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

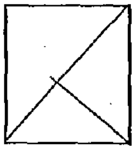
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	317
Specimen Cross-sectional Area, in^2	7.11
Compressive Strength at Failure, psi	45
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**45**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

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Tested By	RI
Date	07/10/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-7-1	Depth/Elev.	-
Subsample	3	Add. Info	Curing Age: 14 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.630
Initial Diameter, in	3.003
Height-to-Diameter Ratio	1.87
Area, in^2	7.08
Volume, in^3	39.88
Mass of Sample, g	1171.60
Wet Density, pcf	111.9
Dry Density, pcf	85.8
Machine Speed, in/min	0.050
Strain rate, % / min	0.89

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1374.40
Mass of Dry Sample and Tare, g	1102.00
Mass of Tare, g	204.80
Moisture, %	30.4

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

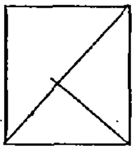
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	387
Specimen Cross-sectional Area, in^2	7.08
Compressive Strength at Failure, psi	55
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**55**

Failure Code 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

TIMELY ENGINEERING SOIL TESTS, LLC

1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Tested By	RI
Date	07/24/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-7-1	Depth/Elev.	-
Subsample	4	Add. Info	Curing Age: 28 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.677
Initial Diameter, in	3.011
Height-to-Diameter Ratio	1.89
Area, in^2	7.12
Volume, in^3	40.42
Mass of Sample, g	1168.80
Wet Density, pcf	110.1
Dry Density, pcf	85.1
Machine Speed, in/min	0.050
Strain rate, % / min	0.88

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1373.00
Mass of Dry Sample and Tare, g	1107.80
Mass of Tare, g	207.10
Moisture, %	29.4

Note 1: Water content was obtained after shear from partial sample.

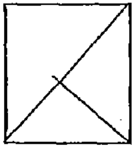
TEST DATA

Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	480
Specimen Cross-sectional Area, in^2	7.12
Compressive Strength at Failure, psi	67
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**67**

Failure Code 3

Failure Sketch



Failure Type: Cone and Shear

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

DESCRIPTION

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Tested By	EB
Date	07/27/12
Checked By	LB

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-8-1	Depth/Elev.	-
Subsample	7	Add. Info	Curing Age: 29 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.909	in	7.39	cm
Diameter	3.015	in	7.66	cm
Area	7.14	in^2	46.06	cm^2
Volume	340.34	cm^3	0.0120	ft^3
Mass	603.50	g	1.33	lb
Specific Gravity	2.575	(Assumed)		
Dry Density	86.5	pcf		

Moisture Content

Mass of wet sample & tare	603.50	g
Mass of dry sample & tare	471.60	g
Mass of tare	0.00	g
% Moisture	28.0	

Test Data

Speed	13	
Board Number	9	
Cell Number	9	
Flow Pump Number	2A	
Flow Pump Rate	2.80E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	105.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	15.0	psi
Max Head	189.92	cm
Min Head	189.21	cm
Maximum Gradient	25.77	
Minimum Gradient	25.68	

Final Data (After Test)

Average Height of Sample			2.901	in	7.37	cm
Average Diameter of Sample			2.998	in	7.61	cm
Area	7.06	in^2	45.54	cm^2		
Volume	335.58	cm^3	0.0119	ft^3		
Mass	617.20	g	1.36	lb		

Dry Density	87.9	pcf
Vol. of Voids	151.99	cm^3
Vol. of Solids	183.59	cm^3
Void Ratio	0.83	
Saturation	95.0	%

Moisture Content

Mass of wet sample & tare	711.80	g
Mass of dry sample & tare	567.70	g
Mass of tare	96.10	g
% Moisture	30.6	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(°C)	@ T_x	R_T	@ 20 °C	
07/27/12	10	0	-	2.70	189.92	25.77	27.0	-	-	-	
07/27/12	10	10	600	2.69	189.21	25.68	27.0	2.39E-08	0.850	2.03E-08	
07/27/12	10	20	600	2.69	189.21	25.68	27.0	2.39E-08	0.850	2.04E-08	
07/27/12	10	30	600	2.70	189.92	25.77	27.0	2.39E-08	0.850	2.03E-08	*
07/27/12	10	40	600	2.69	189.21	25.68	27.0	2.39E-08	0.850	2.03E-08	*
07/27/12	10	50	600	2.70	189.92	25.77	27.0	2.39E-08	0.850	2.03E-08	*
07/27/12	11	0	600	2.70	189.92	25.77	27.0	2.39E-08	0.850	2.03E-08	*

Reported Average Hydraulic Conductivity* 2.0E-08 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION

NA

USCS
(ASTM D2487;2488)

NA

REMARKS

Flow pump ID #	244	Balance ID #	1/6/7	Differential Pressure Transducer ID #	262
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	216
Syringe ID #	245			Pore Pressure Transducer ID #	28

T.E. S.T.
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Tested By	RI
Date	07/27/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-8-1	Depth/Elev.	-
Subsample	4	Add. Info	Curing Age: 29 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.602
Initial Diameter, in	3.012
Height-to-Diameter Ratio	1.86
Area, in^2	7.13
Volume, in^3	39.92
Mass of Sample, g	1156.60
Wet Density, pcf	110.4
Dry Density, pcf	85.2
Machine Speed, in/min	0.050
Strain rate, % / min	0.89

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1484.10
Mass of Dry Sample and Tare, g	1221.40
Mass of Tare, g	331.80
Moisture, %	29.5

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

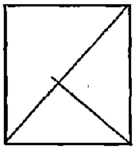
Maximum Load at Failure, lbf	1691
Specimen Cross-sectional Area, in^2	7.13
Compressive Strength at Failure, psi	237
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**237**

Failure Code 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

DESCRIPTION

Failure Sketch



Failure Type:
Cone and Shear

USCS (ASTM D2487: D2488)

REMARKS

TIMELY ENGINEERING SOIL TESTS, LLC

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Tested By	EB
Date	07/05/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-9-1	Depth/Elev.	-
Subsample	5	Add. Info	Curing Age: 7 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.748	in	6.98	cm
Diameter	3.007	in	7.64	cm
Area	7.10	in^2	45.82	cm^2
Volume	319.80	cm^3	0.0113	ft^3
Mass	578.80	g	1.28	lb
Specific Gravity	2.575	(Assumed)		
Dry Density	88.9	pcf		

Moisture Content

Mass of wet sample & tare	578.80	g
Mass of dry sample & tare	455.70	g
Mass of tare	0.00	g
% Moisture	27.0	

Test Data

Speed	12	
Board Number	7	
Cell Number	10	
Flow Pump Number	2B	
Flow Pump Rate	5.60E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	105.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	15.0	psi
Max Head	80.89	cm
Min Head	80.19	cm
Maximum Gradient	11.60	
Minimum Gradient	11.50	

Final Data (After Test)

Average Height of Sample			2.745	in	6.97	cm
Average Diameter of Sample			3.002	in	7.63	cm
Area	7.08	in^2	45.66	cm^2		
Volume	318.39	cm^3	0.0112	ft^3		
Mass	593.50	g	1.31	lb		

Dry Density	89.4	pcf
Vol. of Voids	141.18	cm^3
Vol. of Solids	177.21	cm^3
Void Ratio	0.80	
Saturation	97.2	%

Moisture Content

Mass of wet sample & tare	709.30	g
Mass of dry sample & tare	572.30	g
Mass of tare	116.60	g
% Moisture	30.1	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(°C)	@ T_x	R_T	@ 20 °C	
07/05/12	7	0	-	1.15	80.89	11.60	27.0	-	-	-	
07/05/12	7	10	600	1.14	80.19	11.50	27.0	1.06E-07	0.850	9.03E-08	
07/05/12	7	20	600	1.14	80.19	11.50	27.0	1.07E-07	0.850	9.07E-08	
07/05/12	7	30	600	1.15	80.89	11.60	27.0	1.06E-07	0.850	9.03E-08	*
07/05/12	7	40	600	1.14	80.19	11.50	27.0	1.06E-07	0.850	9.03E-08	*
07/05/12	7	50	600	1.14	80.19	11.50	27.0	1.07E-07	0.850	9.07E-08	*
07/05/12	8	0	600	1.15	80.89	11.60	27.0	1.06E-07	0.850	9.03E-08	*

Reported Average Hydraulic Conductivity* 9.0E-08 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION

NA

USCS
(ASTM D2487;2488)
NA

REMARKS

Flow pump ID #	244	Balance ID #	1/6/7	Differential Pressure Transducer ID #	263
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	215
Syringe ID #	246			Pore Pressure Transducer ID #	28

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Tested By	EB
Date	07/12/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-9-1	Depth/Elev.	-
Subsample	6	Add. Info	Curing Age: 14 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.875	in	7.30	cm
Diameter	3.012	in	7.65	cm
Area	7.13	in^2	45.97	cm^2
Volume	335.69	cm^3	0.0119	ft^3
Mass	589.80	g	1.30	lb
Specific Gravity	2.575	(Assumed)		
Dry Density	84.7	pcf		

Moisture Content

Mass of wet sample & tare	589.80	g
Mass of dry sample & tare	455.80	g
Mass of tare	0.00	g
% Moisture	29.4	

Test Data

Speed	13	
Board Number	2	
Cell Number	12	
Flow Pump Number	1A	
Flow Pump Rate	2.80E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	105.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	15.0	psi
Max Head	151.23	cm
Min Head	150.53	cm
Maximum Gradient	20.89	
Minimum Gradient	20.79	

Final Data (After Test)

Average Height of Sample	2.850	in	7.24	cm
Average Diameter of Sample	3.005	in	7.63	cm
Area	7.09	in^2	45.76	cm^2
Volume	331.23	cm^3	0.0117	ft^3
Mass	603.40	g	1.33	lb

Dry Density	86.0	pcf
Vol. of Voids	153.95	cm^3
Vol. of Solids	177.27	cm^3
Void Ratio	0.87	
Saturation	95.4	%

Moisture Content

Mass of wet sample & tare	669.50	g
Mass of dry sample & tare	522.80	g
Mass of tare	67.00	g
% Moisture	32.2	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(°C)	@ T_x	R_T	@ 20 °C	
07/12/12	7	0	-	2.15	151.23	20.89	27.0	-	-	-	
07/12/12	7	10	600	2.14	150.74	20.82	27.0	2.93E-08	0.850	2.49E-08	
07/12/12	7	20	600	2.14	150.53	20.79	27.0	2.94E-08	0.850	2.50E-08	
07/12/12	7	30	600	2.15	151.23	20.89	27.0	2.94E-08	0.850	2.50E-08	*
07/12/12	7	40	600	2.14	150.53	20.79	27.0	2.94E-08	0.850	2.50E-08	*
07/12/12	7	50	600	2.15	151.23	20.89	27.0	2.94E-08	0.850	2.50E-08	*
07/12/12	8	0	600	2.15	151.23	20.89	27.0	2.93E-08	0.850	2.49E-08	*

Reported Average Hydraulic Conductivity* 2.5E-08 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION: NA

USCS (ASTM D2487;2488): NA

REMARKS:

Flow pump ID #	22	Balance ID #	1/6/7	Differential Pressure Transducer ID #	24/25
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	64
Syringe ID #	140			Pore Pressure Transducer ID #	26/27

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Tested By	EB
Date	07/26/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-9-1	Depth/Elev.	-
Subsample	7	Add. Info	Curing Age: 28 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.835	in	7.20	cm
Diameter	3.008	in	7.64	cm
Area	7.11	in^2	45.85	cm^2
Volume	330.14	cm^3	0.0117	ft^3
Mass	592.50	g	1.31	lb
Specific Gravity	2.575	(Assumed)		
Dry Density	87.9	pcf		

Moisture Content

Mass of wet sample & tare	592.50	g
Mass of dry sample & tare	465.10	g
Mass of tare	0.00	g
% Moisture	27.4	

Test Data

Speed	14	
Board Number	6	
Cell Number	9	
Flow Pump Number	2A	
Flow Pump Rate	1.40E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	105.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	15.0	psi
Max Head	128.72	cm
Min Head	128.02	cm
Maximum Gradient	17.94	
Minimum Gradient	17.84	

Final Data (After Test)

Average Height of Sample			2.825	in	7.18	cm
Average Diameter of Sample			2.995	in	7.61	cm
Area	7.05	in^2	45.45	cm^2		
Volume	326.14	cm^3	0.0115	ft^3		
Mass	603.90	g	1.33	lb		

Dry Density	89.1	pcf
Vol. of Voids	145.34	cm^3
Vol. of Solids	180.80	cm^3
Void Ratio	0.80	
Saturation	95.2	%

Moisture Content

Mass of wet sample & tare	693.80	g
Mass of dry sample & tare	555.60	g
Mass of tare	90.50	g
% Moisture	29.7	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(°C)	@ T_x	R_T	@ 20 °C	
07/26/12	6	0	-	1.83	128.72	17.94	27.0	-	-	-	
07/26/12	6	10	600	1.82	128.02	17.84	27.0	1.72E-08	0.850	1.46E-08	
07/26/12	6	20	600	1.83	128.72	17.94	27.0	1.72E-08	0.850	1.46E-08	
07/26/12	6	30	600	1.82	128.02	17.84	27.0	1.72E-08	0.850	1.46E-08	*
07/26/12	6	40	600	1.82	128.02	17.84	27.0	1.73E-08	0.850	1.47E-08	*
07/26/12	6	50	600	1.83	128.72	17.94	27.0	1.72E-08	0.850	1.46E-08	*
07/26/12	7	0	600	1.83	128.72	17.94	27.0	1.72E-08	0.850	1.46E-08	*

Reported Average Hydraulic Conductivity* 1.5E-08 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION	USCS (ASTM D2487;2488)
NA	NA

REMARKS

Flow pump ID #	244	Balance ID #	1/6/7	Differential Pressure Transducer ID #	262
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	216
Syringe ID #	245			Pore Pressure Transducer ID #	28

T.E.S.T.

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Tested By	RI
Date	07/05/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-9-1	Depth/Elev.	-
Subsample	2	Add. Info	Curing Age: 7 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.584
Initial Diameter, in	3.005
Height-to-Diameter Ratio	1.86
Area, in^2	7.09
Volume, in^3	39.60
Mass of Sample, g	1152.70
Wet Density, pcf	110.9
Dry Density, pcf	84.3
Machine Speed, in/min	0.050
Strain rate, % / min	0.90

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1343.30
Mass of Dry Sample and Tare, g	1067.00
Mass of Tare, g	191.00
Moisture, %	31.5

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

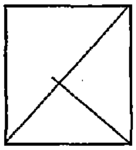
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	914
Specimen Cross-sectional Area, in^2	7.09
Compressive Strength at Failure, psi	129
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**129**

Failure Code 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

T.E. S.T.

TIMELY ENGINEERING SOIL TESTS, LLC

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Phone: 770-938-8233
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Web: www.test-llc.com

Tested By	AV
Date	07/12/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-9-1	Depth/Elev.	-
Subsample	3	Add. Info	Curing Age: 14 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.634
Initial Diameter, in	3.002
Height-to-Diameter Ratio	1.88
Area, in^2	7.08
Volume, in^3	39.88
Mass of Sample, g	1170.80
Wet Density, pcf	111.8
Dry Density, pcf	85.7
Machine Speed, in/min	0.050
Strain rate, % / min	0.89

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1375.10
Mass of Dry Sample and Tare, g	1102.10
Mass of Tare, g	207.00
Moisture, %	30.5

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

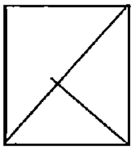
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	1531
Specimen Cross-sectional Area, in^2	7.08
Compressive Strength at Failure, psi	216
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**216**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

TIMELY ENGINEERING SOIL TESTS, LLC

1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Tested By	AV
Date	07/26/12
Checked By	

Client Pr. #	2088/6.0	Lab. PR. #	1230-02-1
Pr. Name	Former North Plant MGP Site -ISS Treatability Study	S. Type	Mold
Sample ID	13794/Composite Area A, B, C, D)-9-1	Depth/Elev.	-
Subsample	4	Add. Info	Curing Age: 28 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.648
Initial Diameter, in	3.017
Height-to-Diameter Ratio	1.87
Area, in^2	7.15
Volume, in^3	40.38
Mass of Sample, g	1177.00
Wet Density, pcf	111.0
Dry Density, pcf	85.6
Machine Speed, in/min	0.050
Strain rate, % / min	0.89

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1383.40
Mass of Dry Sample and Tare, g	1114.70
Mass of Tare, g	208.90
Moisture, %	29.7

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

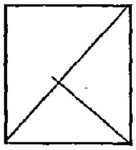
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	2118
Specimen Cross-sectional Area, in^2	7.15
Compressive Strength at Failure, psi	296
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**296**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

APPENDIX C

WETLAND DELINEATION AND PERMITTING

NATURAL
RESOURCE
TECHNOLOGY

ENVIRONMENTAL CONSULTANTS

23713 W. PAUL ROAD, SUITE D
PEWAUKEE, WI 53072
(P) 262.523.9000
(F) 262.523.9001

Mr. Joe Hmieleski
Lake County Stormwater Management Commission
500 Winchester Road
Suite 201
Libertyville, IL 60048-1331

May 23, 2012
(2088/5.0)

RE: Request for Preliminary Wetland Jurisdictional Determination and Isolated Wetland Boundary Verification

Dear Mr. Hmieleski:

Natural Resource Technology, Inc. (NRT) is submitting this request for preliminary wetland jurisdictional determination and isolated wetland boundary verification on behalf of North Shore Gas Company (NSG), a subsidiary of Integrys Energy Group. This request pertains to wetland delineation and permitting at a former manufactured gas plant (MGP) site at 849 Pershing Road, Waukegan, Illinois. Integrys Business Support, LLC (IBS) manages the site for NSG. Hey and Associates, Inc., a subconsultant to NRT, is assisting NRT with wetland delineation and permitting and has prepared the following enclosed documents:

- Request for Preliminary Wetland Jurisdictional Determination and/or Isolated Wetland Boundary Verification Form, signed by IBS on behalf of NSG.
- Wetland Determination Data Forms.
- Aerial Exhibit depicting the surveyed wetland boundaries and data point locations.

Also enclosed is a check for the review fees associated with preliminary jurisdictional determination and boundary verification for the three identified wetlands.

If you have questions, please contact me directly at (262) 522-1210 or Scott Kuykendall with Hey and Associates, Inc at (847) 740-0888.

Sincerely,

NATURAL RESOURCE TECHNOLOGY, INC.

Glenn R Luke

Glenn R. Luke
Environmental Engineer

Enclosures: As Stated

cc: Naren Prasad, Integrys Business Support, LLC (electronic pdf only)
Scott Kuykendall, Hey and Associates, Inc (electronic pdf only)

WWW.NATURALRT.COM

Revised March 7, 2008

STORMWATER MANAGEMENT COMMISSION
333-B PETERSON ROAD, LIBERTYVILLE, IL 60048
Phone 847-918-5260/Fax 847-918-9826

Request for Preliminary Wetland Jurisdictional Determination and/or Isolated Wetland Boundary Verification

Date Requested:	May 17, 2012	**Project Name:**	NSG Former North Plant
Property Address (enclose map, air photo clearly indicating boundaries, street, municipality).		849 N Pershing Rd Waukegan, IL 60085	
Pin(s):	0815300030		

Name & Address of Property Owner		**Name & Address of Requester (if not owner)** [1]	
Property Owner	Naren M. Prasad, P.E.	**Name**	Scott Kuykendall, CWS 027
Address:	130 East Randolph Street, 22nd Floor	**Company Name**	Hey and Associates, Inc.
City/State/Zip:	Chicago, Illinois 60601	**Address**	26575 W. Commerce Drive, Suite 601
Phone/Fax #:	312-240-4569	**City/State/Zip**	Volo, Illinois 60073
Fax	312-240-4725	**Phone**	847-740-0888
Email Address:	nmprasad@integrysgroup.com	**Fax**	847-740-2888
		Email Address	scottk@heyassoc.com

☒ **Preliminary JD Checklist (check items enclosed)**	☒ **Boundary Verification Checklist** [2]**(check items enclosed)**
☒ Air Photo with Wetland Boundaries ***(Required).***	☒ Flagged/Staked Wetland Boundaries ***(Required, except farmed wetlands shall not be flagged/staked).***
☐ For Agricultural Land:[3] NRCS Certified Wetland Determination (within last 5 years) or Farmed Wetland Determination Report by CWS Using NRCS Procedures ***(Required).***	☐ For Agricultural Land [3]: NRCS Certified Wetland Determination (within last 5 years) or Farmed Wetland Determination Report by CWS Using NRCS Procedures ***(Required).***
☐ Wetland Determination Report (Recommended)	☒ Air Photo with Wetland & Farmed Wetland Boundaries ***(Required).***
☒ Data Point Locations & Data Sheets (Recommended)	☒ Data Point Locations & Data Sheets ***(Required).***
	☐ Wetland Determination Report (Recommended)

Review fee listed below must be enclosed with this request form. Make check payable to: Lake County Stormwater Management Commission (check all that apply).

☒ Preliminary JD	$720.00 for first wetland + $180.00 each additional wetland
☒ Boundary Verification	$480.00 for first wetland + $180.00 each additional wetland

The undersigned hereby grants the Lake County SMC and their agent's right-of-access to the subject property for the purpose of performing the requested preliminary JD and/or boundary verification.

(FOR NORTH SHORE GAS)
Signature of Property Owner

5/22/2012
Date

---

1 **If requester is not the property owner(s), provide affidavit from owner(s) authorizing requester to seek this preliminary JD and/or boundary verification.**

2 SMC can only verify isolated wetlands/waters boundaries. *Waters of the U.S.* boundaries must be verified by U.S. Army Corps of Engineers (USACE).

3 "Agricultural Land" is land that has been farmed at least one year in the last five years.

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Former North Plant City/County: Waukegan/Lake Sampling Date: 5-2-12
Applicant/Owner: NSG State: Illinois Sampling Point: 1
Investigator(s): Hey and Associates (Kuykendall/Mosca) Section, Township, Range: S 15, T 45N, R 12E
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Concave
Slope (%): Lat: 42.375111 Long: -87.823205 Datum:
Soil Map Unit Name 802B loamy NWI Classification:
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation X , soil X , or hydrology X significantly disturbed? Are "normal circumstances" present? N
Are vegetation ___ , soil ___ , or hydrology ___ naturally problematic?

SUMMARY OF FINDINGS (If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	Y	
Hydric soil present?	Y	**Is the sampled area within a wetlan** Y
Wetland hydrology present?	Y	f yes, optional wetland site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

The subject property is a former manufactured gas plant that has undergone various stages of investigation, construction, and remediation in the past. The property may contain various depths of fill material & contaminated soil.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species	Indicator Staus
1 *Fraxinus pennsylvanica*	5	Y	FACW
2			
3			
4			
5			
	5	= Total Cover	
Sapling/Shrub stratum (Plot size:)			
1 *Salix discolor*	20	Y	FACW
2 *Comus stolonifera*	10	Y	FACW
3 *Rhamnus frangula*	10	Y	FAC
4			
5			
	40	= Total Cover	
Herb stratum (Plot size:)			
1 *Scirpus validus creber*	50	Y	OBL
2 *Juncus effusus*	30	Y	OBL
3 *Eleocharis erythropoda*	20	Y	OBL
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	
Woody vine stratum (Plot size:)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 7 (A)
Total Number of Dominant Species Across all Strata: 7 (B)
Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	100	x 1 =	100	
FACW species	35	x 2 =	70	
FAC species	10	x 3 =	30	
FACU species	0	x 4 =	0	
UPL species	0	x 5 =	0	
Column totals	145	(A)	200	(B)

Prevalence Index = B/A = 1.38

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
	See							
	Remarks							
	Below							

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ____ Histisol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ 2 cm Muck (A10)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ 5 cm Mucky Peat or Peat (S3)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Stripped Matrix (S6)
- ____ Loamy Mucky Mineral (F1)
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ____ Coast Prairie Redox (A16) (LRR K, L, R)
- ____ Dark Surface (S7) (LRR K, L)
- ____ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ____ Iron-Manganese Masses (F12) (LRR K, L, R)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (explain in remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: ____________
Depth (inches): ____________

Hydric soil present? Y

Remarks:

The subject property consists of potentially contaminated soils and were not sampled. Soils are assumed to be hydric based on geomorphic position, hydrology and vegetation.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- X Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- X True Aquatic Plants (B14)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Gauge or Well Data (D9)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ____ FAC-Neutral Test (D5)

Field Observations:
Surface water present? Yes ____ No X Depth (inches): ____
Water table present? Yes ____ No X Depth (inches): ____
Saturation present? (includes capillary fringe) Yes X No ____ Depth (inches): surface

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Former North Plant
City/County: Waukegan/Lake
Sampling Date: 5-2-12
Applicant/Owner: NSG
State: Illinois
Sampling Point: 2
Investigator(s): Hey and Associates (Kuykendall/Mosca)
Section, Township, Range: S 15, T 45N, R 12E
Landform (hillslope, terrace, etc.):
Local relief (concave, convex, none): none
Slope (%):
Lat: 42.374919
Long: -87.822983
Datum:
Soil Map Unit Name 802B loamy
NWI Classification:
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation Y , soil Y , or hydrology Y significantly disturbed?
Are "normal circumstances" present? N
Are vegetation , soil , or hydrology naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present? N
Hydric soil present? Y
Wetland hydrology present? N

Is the sampled area within a wetland N
If yes, optional wetland site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

The subject property is a former manufactured gas plant that has undergone various stages of investigation, construction, and remediation in the past. The property may contain various depths of fill material & contaminated soil.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species	Indicator Staus
1 *Populus deltoides*	50	Y	FAC
2			
3			
4			
5			
	50	= Total Cover	
Sapling/Shrub stratum (Plot size:)			
1 *Rhamnus cathartica*	30	Y	FACU
2 *Elaeagnus angustifolia*	20	Y	FACU
3			
4			
5			
	50	= Total Cover	
Herb stratum (Plot size:)			
1 *Poa pratensis*	30	Y	FAC
2 *Solidago altissima*	20	Y	FACU
3 *Bromus inermis*	20	Y	UPL
4 *Trifolium pratense*	10	N	FACU
5 *Solidago gigantea*	10	N	FACW
6			
7			
8			
9			
10			
	90	= Total Cover	
Woody vine stratum (Plot size:)			
1 *Vitis riparia*	5	Y	FACW
2			
	5	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across all Strata: 7 (B)
Percent of Dominant Species that are OBL, FACW, or FAC: 42.86% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	80	x 3 =	240
FACU species	80	x 4 =	320
UPL species	20	x 5 =	100
Column totals	190	(A)	680 (B)

Prevalence Index = B/A = 3.58

Hydrophytic Vegetation Indicators:

Rapid test for hydrophytic vegetation
Dominance test is >50%
Prevalence index is ≤3.0*
Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
	See							
	Remarks							
	Below							

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ 5 cm Mucky Peat or Peat (S3)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ Coast Prairie Redox (A16) **(LRR K, L, R)**
___ Dark Surface (S7) **(LRR K, L)**
___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
___ Very Shallow Dark Surface (TF12)
___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: ___
Depth (inches): ___

Hydric soil present? Y

Remarks:

The subject property consists of potentially contaminated soils and were not sampled. Soils are assumed to be hydric.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ True Aquatic Plants (B14)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Gauge or Well Data (D9)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
___ FAC-Neutral Test (D5)

Field Observations:

Surface water present? Yes ___ No X Depth (inches): ___
Water table present? Yes ___ No X Depth (inches): ___
Saturation present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Former North Plant City/County: Waukegan/Lake Sampling Date: 5-2-12
Applicant/Owner: NSG State: Illinois Sampling Point: 3
Investigator(s): Hey and Associates (Kuykendall/Mosca) Section, Township, Range: S 15, T 45N, R 12E
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Concave
Slope (%): Lat: 42.374063 Long: -87.823073 Datum:
Soil Map Unit Name 802B loamy NWI Classification:
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation Y , soil Y , or hydrology Y significantly disturbed? Are "normal circumstances" present? N
Are vegetation ___ , soil ___ , or hydrology ___ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present? Y
Hydric soil present? Y
Wetland hydrology present? Y

Is the sampled area within a wetlan Y
f yes, optional wetland site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

The subject property is a former manufactured gas plant that has undergone various stages of investigation, construction, and remediation in the past. The property may contain various depths of fill material & contaminated soil.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size:)			
1 *Salix discolor*	20	Y	FACW
2 *Cornus stolonifera*	20	Y	FACW
3 *Rhamnus frangula*	20	Y	FAC
4			
5			
	60	= Total Cover	
Herb stratum (Plot size:)			
1 *Panicum virgatum*	50	Y	FAC
2 *Juncus effusus*	20	Y	OBL
3 *Eleocharis erythropoda*	10	N	OBL
4 *Potentilla anserina*	10	N	FACW
5 *Juncus dudleyi*	10	N	FAC
6			
7			
8			
9			
10			
	100	= Total Cover	
Woody vine stratum (Plot size:)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 5 (A)
Total Number of Dominant Species Across all Strata: 5 (B)
Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	30	x 1 =	30
FACW species	50	x 2 =	100
FAC species	80	x 3 =	240
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	160 (A)		370 (B)

Prevalence Index = B/A = 2.31

Hydrophytic Vegetation Indicators:

- __ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- __ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- __ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
	See							
	Remarks							
	Below							

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ 5 cm Mucky Peat or Peat (S3)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ Coast Prairie Redox (A16) **(LRR K, L, R)**
___ Dark Surface (S7) **(LRR K, L)**
___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
___ Very Shallow Dark Surface (TF12)
___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: ______
Depth (inches): ______

Hydric soil present? Y

Remarks:

The subject property consists of potentially contaminated soils and were not sampled. Soils are assumed to be hydric based on geomorphic position, hydrology and vegetation.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
X Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
X True Aquatic Plants (B14)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Gauge or Well Data (D9)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
X Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
X Geomorphic Position (D2)
___ FAC-Neutral Test (D5)

Field Observations:

Surface water present? Yes ___ No X Depth (inches): ___
Water table present? Yes ___ No X Depth (inches): ___
Saturation present? (includes capillary fringe) Yes X No ___ Depth (inches): surface

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Former North Plant City/County: Waukegan/Lake Sampling Date: 5-2-12

Applicant/Owner: NSG State: Illinois Sampling Point: 4

Investigator(s): Hey and Associates (Kuykendall/Mosca) Section, Township, Range: S 15, T 45N, R 12E

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): none

Slope (%): Lat: 42.373989 Long: -87.823406 Datum:

Soil Map Unit Name 802B loamy NWI Classification:

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation Y , soil Y , or hydrology Y significantly disturbed? Are "normal circumstances" present? N

Are vegetation , soil , or hydrology naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	Y		
Hydric soil present?	Y	Is the sampled area within a wetlan	N
Wetland hydrology present?	N	f yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

The subject property is a former manufactured gas plant that has undergone various stages of investigation, construction, and remediation in the past. The property may contain various depths of fill material & contaminated soil.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species	Indicator Staus
1 *Populus deltoides*	30	Y	FAC
2 *Robinia pseudoacacia*	10	Y	FACU
3			
4			
5			
	40	= Total Cover	
Sapling/Shrub stratum (Plot size:)			
1 *Rhamnus cathartica*	20	Y	FACU
2 *Rhamnus frangula*	20	Y	FAC
3 *Cornus stolonifera*	20	Y	FACW
4 *Lonicera tatarica*	20	Y	FACU
5			
	80	= Total Cover	
Herb stratum (Plot size:)			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
	0	= Total Cover	
Woody vine stratum (Plot size:)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across all Strata: 6 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 50.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:				
OBL species	0	x 1 =	0	
FACW species	20	x 2 =	40	
FAC species	50	x 3 =	150	
FACU species	50	x 4 =	200	
UPL species	0	x 5 =	0	
Column totals	120	(A)	390	(B)

Prevalence Index = B/A = 3.25

Hydrophytic Vegetation Indicators:

____ Rapid test for hydrophytic vegetation

____ Dominance test is >50%

____ Prevalence index is ≤3.0*

____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)

____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
	See							
	Remarks							
	Below							

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ 5 cm Mucky Peat or Peat (S3)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ Coast Prairie Redox (A16) **(LRR K, L, R)**
___ Dark Surface (S7) **(LRR K, L)**
___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
___ Very Shallow Dark Surface (TF12)
___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: ___
Depth (inches): ___

Hydric soil present? Y

Remarks:

The subject property consists of potentially contaminated soils and were not sampled. Soils are assumed to be hydric.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ True Aquatic Plants (B14)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Gauge or Well Data (D9)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes		No	X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes		No	X	Depth (inches):	

Wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Former North Plant City/County: Waukegan/Lake Sampling Date: 5-2-12
Applicant/Owner: NSG State: Illinois Sampling Point: 5
Investigator(s): Hey and Associates (Kuykendall/Mosca) Section, Township, Range: S 15, T 45N, R 12E
Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): none
Slope (%): ______ Lat: 42.372653 Long: -87.823783 Datum: ______
Soil Map Unit Name 802B loamy NWI Classification: ______
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation Y , soil Y , or hydrology Y significantly disturbed? Are "normal circumstances" present? N
Are vegetation ____ , soil ____ , or hydrology ____ naturally problematic?

SUMMARY OF FINDINGS (If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	Y	
Hydric soil present?	Y	**Is the sampled area within a wetlan** N
Wetland hydrology present?	N	f yes, optional wetland site ID: ______

Remarks: (Explain alternative procedures here or in a separate report.)

The subject property is a former manufactured gas plant that has undergone various stages of investigation, construction, and remediation in the past. The property may contain various depths of fill material & contaminated soil.

VEGETATION -- Use scientific names of plants.

	Absolute % Cover	Dominant Species	Indicator Staus
Tree Stratum (Plot size: ______)			
1 *Robinia pseudoacacia*	50	Y	FACU
2 *Populus deltoides*	20	Y	FAC
3			
4			
5			
	70	= Total Cover	
Sapling/Shrub stratum (Plot size: ______)			
1 *Cornus stolonifera*	20	Y	FACW
2 *Rhamnus cathartica*	10	Y	FACU
3 *Lonicera tatarica*	10	Y	FACU
4 *Rhamnus frangula*	10	Y	FAC
5			
	50	= Total Cover	
Herb stratum (Plot size: ______)			
1 *Solidago altissima*	20	Y	FACU
2 *Alliaria petiolata*	20	Y	FAC
3 *Hesperis matronalis*	10	Y	UPL
4			
5			
6			
7			
8			
9			
10			
	50	= Total Cover	
Woody vine stratum (Plot size: ______)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across all Strata: 9 (B)
Percent of Dominant Species that are OBL, FACW, or FAC: 44.44% (A/B)

Prevalence Index Worksheet

Total % Cover of:			
OBL species	0	x 1 =	0
FACW species	20	x 2 =	40
FAC species	50	x 3 =	150
FACU species	90	x 4 =	360
UPL species	10	x 5 =	50
Column totals	170 (A)		600 (B)

Prevalence Index = B/A = 3.53

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- ___ Dominance test is >50%
- ___ Prevalence index is ≤3.0*
- ___ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: 5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
	See							
	Remarks							
	Below							

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ 5 cm Mucky Peat or Peat (S3)

___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ Coast Prairie Redox (A16) (LRR K, L, R)
___ Dark Surface (S7) (LRR K, L)
___ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
___ Iron-Manganese Masses (F12) (LRR K, L, R)
___ Very Shallow Dark Surface (TF12)
___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: ________________
Depth (inches): ________________

Hydric soil present? Y

Remarks:

The subject property consists of potentially contaminated soils and were not sampled. Soils are assumed to be hydric.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)

___ Aquatic Fauna (B13)
___ True Aquatic Plants (B14)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Gauge or Well Data (D9)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches):	___
Water table present?	Yes	___	No	X	Depth (inches):	___
Saturation present? (includes capillary fringe)	Yes	___	No	X	Depth (inches):	___

Wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Former North Plant City/County: Waukegan/Lake Sampling Date: 5-2-12
Applicant/Owner: NSG State: Illinois Sampling Point: 6
Investigator(s): Hey and Associates (Kuykendall/Mosca) Section, Township, Range: S 15, T 45N, R 12E
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Concave
Slope (%): Lat: 42.37278 Long: -87.823573 Datum:
Soil Map Unit Name 802B loamy NWI Classification:
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation Y , soil Y , or hydrology Y significantly disturbed? Are "normal circumstances" present? N
Are vegetation ___ , soil ___ , or hydrology ___ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present? Y
Hydric soil present? Y
Wetland hydrology present? Y

Is the sampled area within a wetlan Y
f yes, optional wetland site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

The subject property is a former manufactured gas plant that has undergone various stages of investigation, construction, and remediation in the past. The property may contain various depths of fill material & contaminated soil.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominan t Species	Indicator Staus
1 *Fraxinus pennsylvanica*	10	Y	FACW
2			
3			
4			
5			
	10	= Total Cover	

Sapling/Shrub stratum (Plot size:)	Absolute % Cover	Dominan t Species	Indicator Staus
1 *Salix discolor*	30	Y	FACW
2 *Cornus stolonifera*	20	Y	FACW
3			
4			
5			
	50	= Total Cover	

Herb stratum (Plot size:)	Absolute % Cover	Dominan t Species	Indicator Staus
1 *Potentilla anserina*	50	Y	FACW
2 *Lythrum salicaria*	20	Y	OBL
3			
4			
5			
6			
7			
8			
9			
10			
	70	= Total Cover	

Woody vine stratum (Plot size:)	Absolute % Cover	Dominan t Species	Indicator Staus
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 5 (A)
Total Number of Dominant Species Across all Strata: 5 (B)
Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:				
OBL species	20	x 1 =	20	
FACW species	110	x 2 =	220	
FAC species	0	x 3 =	0	
FACU species	0	x 4 =	0	
UPL species	0	x 5 =	0	
Column totals	130	(A)	240	(B)

Prevalence Index = B/A = 1.85

Hydrophytic Vegetation Indicators:

- __ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- __ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- __ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: 6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
	See							
	Remarks							
	Below							

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ 5 cm Mucky Peat or Peat (S3)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ Coast Prairie Redox (A16) (LRR K, L, R)
___ Dark Surface (S7) (LRR K, L)
___ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
___ Iron-Manganese Masses (F12) (LRR K, L, R)
___ Very Shallow Dark Surface (TF12)
___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: ___
Depth (inches): ___

Hydric soil present? Y

Remarks:

The subject property consists of potentially contaminated soils and were not sampled. Soils are assumed to be hydric based on geomorphic position, hydrology and vegetation.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
X Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
X True Aquatic Plants (B14)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Gauge or Well Data (D9)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
X Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
X Geomorphic Position (D2)
___ FAC-Neutral Test (D5)

Field Observations:
Surface water present? Yes ___ No X Depth (inches): ___
Water table present? Yes ___ No X Depth (inches): ___
Saturation present? (includes capillary fringe) Yes X No ___ Depth (inches): surface

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Former North Plant City/County: Waukegan/Lake Sampling Date: 5-2-12
Applicant/Owner: NSG State: Illinois Sampling Point: 7
Investigator(s): Hey and Associates (Kuykendall/Mosca) Section, Township, Range: S 15, T 45N, R 12E
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Concave
Slope (%): Lat: 42.372665 Long: -87.825505 Datum:
Soil Map Unit Name 802B loamy NWI Classification:
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation Y , soil Y , or hydrology Y significantly disturbed? Are "normal circumstances" present? N
Are vegetation , soil , or hydrology naturally problematic?

SUMMARY OF FINDINGS (If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	Y	Is the sampled area within a wetland	Y
Hydric soil present?	Y	f yes, optional wetland site ID:	
Wetland hydrology present?	Y		

Remarks: (Explain alternative procedures here or in a separate report.)

The subject property is a former manufactured gas plant that has undergone various stages of investigation, construction, and remediation in the past. The property may contain various depths of fill material & contaminated soil.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species	Indicator Staus
1 *Fraxinus pennsylvanica*	10	Y	FACW
2 *Populus deltoides*	10	Y	FAC
3			
4			
5			
	20	= Total Cover	
Sapling/Shrub stratum (Plot size:)			
1 *Cornus stolonifera*	20	Y	FACW
2 *Rhamnus cathartica*	20	Y	FAC
3 *Rhamnus frangula*	20	Y	FAC
4			
5			
	60	= Total Cover	
Herb stratum (Plot size:)			
1 *Smilacina stellata*	10	Y	FAC
2 *Hemerocallis fulva*	10	Y	NI
3 *Geum canadense*	5	Y	FAC
4			
5			
6			
7			
8			
9			
10			
	25	= Total Cover	
Woody vine stratum (Plot size:)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 7 (A)
Total Number of Dominant Species Across all Strata: 8 (B)
Percent of Dominant Species that are OBL, FACW, or FAC: 87.50% (A/B)

Prevalence Index Worksheet

Total % Cover of:			
OBL species	0	x 1 =	0
FACW species	30	x 2 =	60
FAC species	65	x 3 =	195
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	95	(A)	255 (B)

Prevalence Index = B/A = 2.68

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: 7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(Inches)	Color (moist)	%	Color (moist)	%	Type*	Loc**	Texture	Remarks
	See							
	Remarks							
	Below							

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ 5 cm Mucky Peat or Peat (S3)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Very Shallow Dark Surface (TF12)
___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: ____________
Depth (inches): ____________

Hydric soil present? Y

Remarks:

The subject property consists of potentially contaminated soils and were not sampled. Soils are assumed to be hydric based on geomorphic position, hydrology and vegetation.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
X Sediment Deposits (B2)
X Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ True Aquatic Plants (B14)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Gauge or Well Data (D9)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
X Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
X Geomorphic Position (D2)
___ FAC-Neutral Test (D5)

Field Observations:
Surface water present? Yes ___ No X Depth (inches): ___
Water table present? Yes ___ No X Depth (inches): ___
Saturation present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Former North Plant City/County: Waukegan/Lake Sampling Date: 5-2-12
Applicant/Owner: NSG State: Illinois Sampling Point: 8
Investigator(s): Hey and Associates (Kuykendall/Mosca) Section, Township, Range: S 15, T 45N, R 12E
Landform (hillslope, terrace, etc.): ____ Local relief (concave, convex, none): none
Slope (%): ____ Lat: 42.372702 Long: -87.825266 Datum: ____
Soil Map Unit Name 802B loamy NWI Classification: ____
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation Y, soil Y, or hydrology Y significantly disturbed? Are "normal circumstances" present? N
Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present? Y
Hydric soil present? Y
Wetland hydrology present? N

Is the sampled area within a wetland N
If yes, optional wetland site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

The subject property is a former manufactured gas plant that has undergone various stages of investigation, construction, and remediation in the past. The property may contain various depths of fill material & contaminated soil.

VEGETATION -- Use scientific names of plants.

	Absolute % Cover	Dominant Species	Indicator Staus
Tree Stratum (Plot size: ____)			
1 Populus deltoides	20	Y	FAC
2 Fraxinus pennsylvanica	10	Y	FACW
3 Robinia pseudoacacia	10	Y	FACU
4			
5			
	40	= Total Cover	
Sapling/Shrub stratum (Plot size: ____)			
1 Rhamnus cathartica	20	Y	FACU
2 Fraxinus pennsylvanica	10	Y	FACW
3 Lonicera tatarica	10	Y	FACU
4			
5			
	40	= Total Cover	
Herb stratum (Plot size: ____)			
1 Alliaria petiolata	20	Y	FAC
2 Solidago altissima	20	Y	FACU
3 Achillea millefolium	10	Y	FACU
4			
5			
6			
7			
8			
9			
10			
	50	= Total Cover	
Woody vine stratum (Plot size: ____)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across all Strata: 9 (B)
Percent of Dominant Species that are OBL, FACW, or FAC: 44.44% (A/B)

Prevalence Index Worksheet

Total % Cover of:				
OBL species	0	x 1 =	0	
FACW species	20	x 2 =	40	
FAC species	40	x 3 =	120	
FACU species	70	x 4 =	280	
UPL species	0	x 5 =	0	
Column totals	130	(A)	440	(B)

Prevalence Index = B/A = 3.38

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- ____ Dominance test is >50%
- ____ Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL Sampling Point: 8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
	See							
	Remarks							
	Below							

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: ___
Depth (inches): ___

Hydric soil present? Y

Remarks:

The subject property consists of potentially contaminated soils and were not sampled. Soils are assumed to be hydric.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
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- ___ Inundation Visible on Aerial Imagery (B7)
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- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

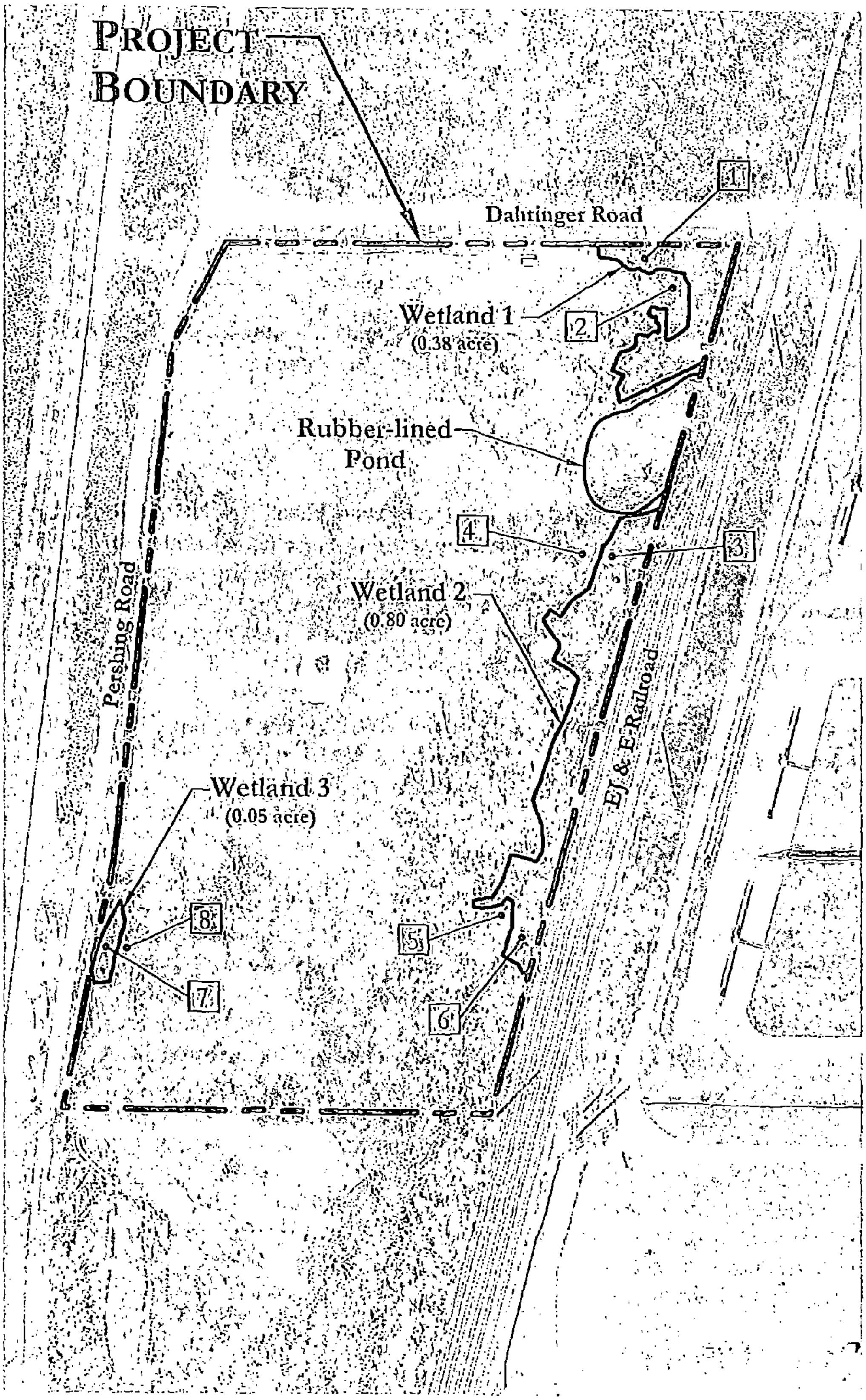
Field Observations:

Surface water present? Yes ___ No X Depth (inches): ___
Water table present? Yes ___ No X Depth (inches): ___
Saturation present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:



☒ Data Point Location

EXHIBIT 7

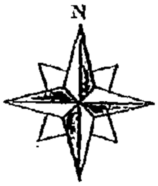
NSG FORMER
NORTH PLANT

WAUKEGAN, IL

SURVEYED
WETLAND
BOUNDARY ON
AERIAL
PHOTOGRAPH

DATE OF PHOTO:
2010

SCALE:
1" = 200'



P:\12000\12-0130 Wetlands-MGP site in Waukegan for Natural Resource Technology\Data\CAD\12-0130_2012-Delineation-Report_Lake-County.dwg, (7) Aerial, 5/21/2012 3:17:21 PM

LAKE COUNTY

STORMWATER MANAGEMENT COMMISSION

June 11, 2012

Mr. Naren M. Prasad
Integrys Business Support
130 East Randolph Street, 22nd Floor
Chicago, IL 60601

RE: WDP No. 02-47-214A; Preliminary Jurisdictional Determination/Boundary Verification
Property at SEC Dahringer and Pershing Roads; Waukegan, Illinois
PIN 08-15-300-030; **Lat:** 42.37392 **Lon:** -87.82446

Dear Mr. Prasad:

This letter responds to your application submitted on your behalf by Natural Resource Technology, Inc., and received by the Lake County Stormwater Management Commission (SMC) on May 24, 2012 requesting a preliminary wetland jurisdictional determination (PJD) and boundary verification for the property referenced above. SMC reviewed source materials in the company of Mr. Mike Murphy of the U.S. Army Corps of Engineers (USACE) on June 7, 2012. Please note that wetland numbers are as depicted on Exhibit 7 (attached).

Wetlands 1, 2, and 3 are "Isolated Waters of Lake County" (IWLC) as defined in the Lake County Watershed Development Ordinance (WDO). SMC concurs with the wetland boundaries as flagged in the field. See below for permitting requirements.

Lake County's Watershed Development Ordinance Requirements:

This letter satisfies the WDO requirement for a written jurisdictional determination under Article IV, Section E.2.a. Your proposed work appears to be within the City of Waukegan. The WDO requires a Watershed Development Permit (WDP) issued by Waukegan for any proposed development. You should contact Mr. Ron Laubach at 847/625-6827 for the appropriate permit application form and procedures with respect to the WDO's requirements. Please contact me (SMC) for approval of the project with respect to the WDO isolated wetland provisions.

SMC determined the jurisdiction of potential WOUS areas on the subject property based upon the guidance provided in the EPA/USACE Memorandum entitled "Clean Water Act Jurisdiction Following the U.S. Supreme Court's decision in Rapanos v. United States & Carabell v. United States" dated June 5, 2007 (revised December 2, 2008) and the USACE's *Jurisdictional Determination Form Instructional Guidebook* dated May 30, 2007. For areas not considered to be WOUS, we determined jurisdiction using the definition of *Isolated Waters of Lake County* contained in Appendix A of the WDO.

SMC's Chief Engineer approved this PJD and the findings are valid for a period of three (3) years from the date of this letter, unless new information warrants a revision before the expiration date. We would like to be of assistance. If you have any questions, or would like to set up a meeting, please call our office at (847) 377-7705 or e-mail me at jhmieleski@lakecountyil.gov. If you have any additional concerns that have not been addressed by the regulatory staff, you may contact Chief Engineer Kurt Woolford kwoolford@lakecountyil.gov or Executive Director Michael Warner mwarner@lakecountyil.gov at (847) 377-7700.

Sincerely,

LAKE COUNTY STORMWATER MANAGEMENT COMMISSION

Joseph I. Hmieleski | Kurt Woolford

Joseph I. Hmieleski, P.W.S., CFM
Principal Wetland Specialist

Kurt Woolford, PE, CFM
Chief Engineer

c: Mr. Mike Murphy – USACE
Mr. Ron Laubach – City of Waukegan
Mr. Scott Kuykendall – Hey and Associates
Mr. Glenn Luke - NRT

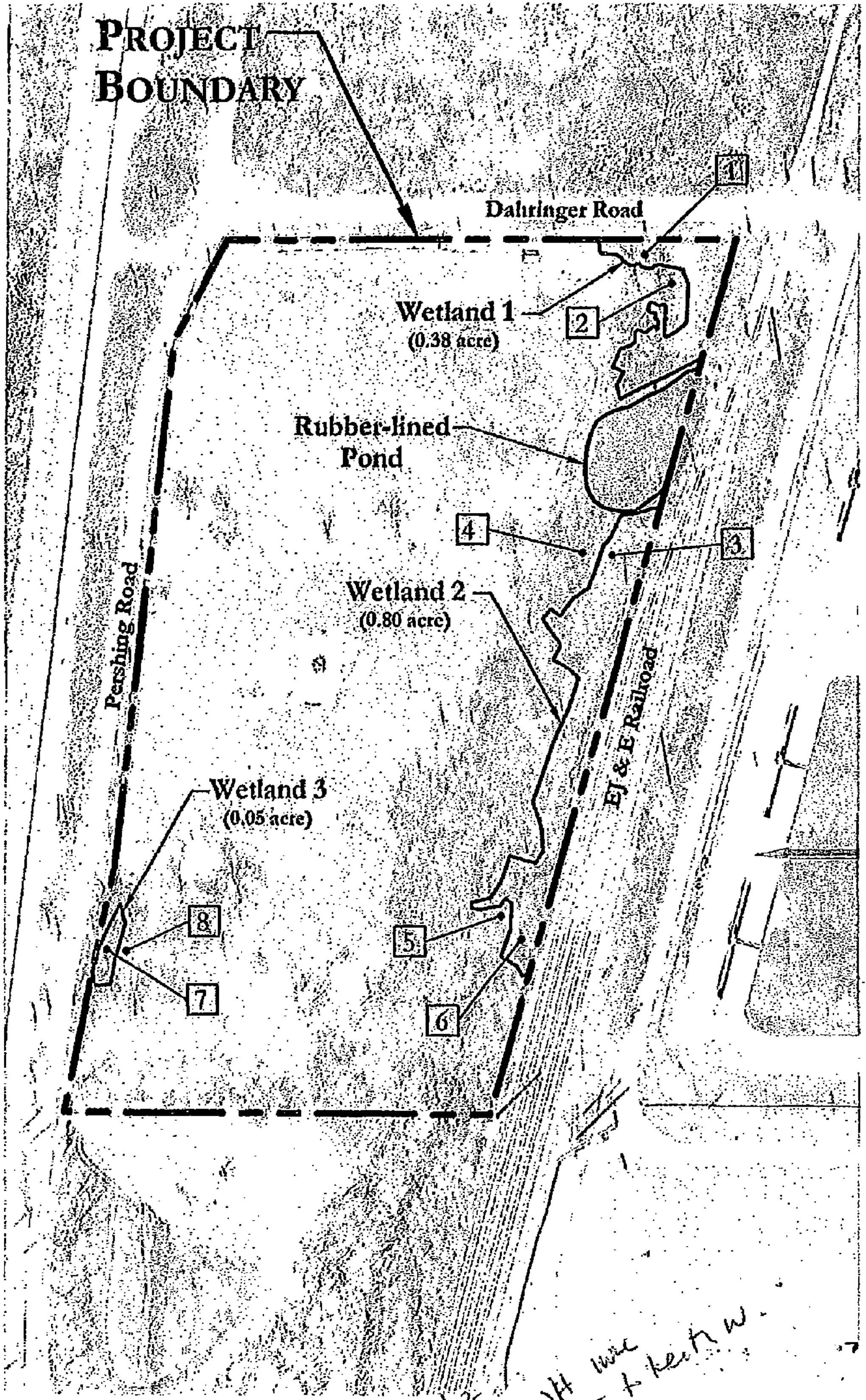


EXHIBIT 7

NSG FORMER NORTH PLANT

WAUKEGAN, IL

SURVEYED WETLAND BOUNDARY ON AERIAL PHOTOGRAPH

DATE OF PHOTO:
2010

SCALE:
1" = 200'

N

6/7/12 MM JH [illegible]
send note to Keith W.

P:\12000\12-0130 Wetlands-MGP site in Waukegan for Natural Resource Technology\Data\CAD\12-0130_2012-Delineation-Report_Lake-County.dwg, (7) Aerial, 5/21/2012 3:17:21 PM

Hey and Associates, Inc.
Water Resources, Wetlands and Ecology

BROOKFIELD, WISCONSIN
26575 W. COMMERCE DRIVE, SUITE 601
VOLO, ILLINOIS 60073
PHONE (847) 740-0888
FAX (847) 740-2888
CHICAGO AND AURORA, ILLINOIS

July 12, 2012

Mr. Glenn Westman
Lake County Stormwater Management Commission
500 W. Winchester Road
Libertyville, IL 60048

Project No.: 12-0130

Re: WDP No. 02-47-214A
North Shore Gas Company
North Plant Site
Waukegan, Illinois

Dear Glenn:

In anticipation of our upcoming pre-application meeting, we wanted to provide you with some specific background information about the site history of the referenced property. A great deal of industrial activities have taken place on the site and these are relevant to the existing conditions that occur on the site today. We are providing this information to initiate the discussion regarding the on-site wetland areas being exempted from the provisions of the Watershed Development Ordinance (WDO) due to the previous earthwork and other activities that have taken place on the site.

On-site industrial activities began in the early 1900's as a manufactured gas plant with railroad access. The facility was active in various permutations until the 1970's when gas production ceased. Over time buildings and associated structures were razed and the site was filled and graded. Little activity has taken place on the site over the last several decades other than some remediation of coal tar deposits in the mid 1990's and the construction of the rubber-lined pond that currently exists on the site.

The following is a list of attached exhibits that we have extracted from the large amount of previously collected data about the site's history and contaminated soils.

Exhibit 1 – Site Location Map
Exhibit 2 – 1939 Aerial Photograph
Exhibit 3 – 1964 Aerial Photograph
Exhibit 4 – 1990 Aerial Photograph
Exhibit 5 – Soil Boring/Probe Location Index Map
Exhibit 6 – Representative Soil Borings for Wetland Areas
Exhibit 7 – Geologic Cross-Section Location Map
Exhibit 8 – Geologic Cross Sections
Exhibit 9 – Lake County Soil Survey

The aerial photographs clearly show that the site has undergone many changes through the decades. We understand that the water feature shown on the 1964 aerial photograph (Exhibit 3) was excavated as a borrow area and then later used for depositing waste materials. The 1990 aerial (Exhibit 4) clearly shows that the feature has been filled in. The fact is further documented in both the soil borings (Exhibit 6) and the geologic cross sections (Exhibit 8) that the entire site has a continuous layer of fill materials of varying materials from Dahringer Road to the railroad tracks. The Lake County Soil Survey (Exhibit 9) is of limited value since the map was prepared after the majority of the site was modified and is entirely labeled "Made Land". There are both upland and wetland soils adjacent to the site but it would be difficult to reconstruct a legitimate pre-disturbance soil map for the site.

It is unclear whether wetlands occurred on the site prior to any industrial activities. The near-lake environs of the Waukegan area even to this day is a complex mix of upland and wetland areas due to the dune and swale features prevalent in that part of the county. However, we believe that the data provided clearly indicates that the existing wetland formed on non-native "soil" materials, including brown sand, topsoil, gypsum and coal tar. Shallow groundwater, which is likely partially trapped by the railroad embankment, expresses itself at or near the surface for a long of period of time to help develop wetland conditions.

In conclusion, we believe that a reasoned argument can be made that the site wetlands should be exempted from the wetland provisions of the Watershed Development Ordinance since the wetlands have formed on top of fill materials. Article IV, Section A.2 indicates that certain development can be exempted from the performance standards of the Ordinance if certain conditions are met. The subject property was developed and abandoned decades before October 18, 1992 and well before any regulatory permits were necessary for such activities. Therefore, it can be reasonably assumed that the site land use was "permitted by right" as was customary for similar sites in the early to mid 1900's. Also, using the definitions in the WDO, the site wetlands could meet either the criteria for an excavation/impoundment or as an area created by incidental grading. Either way, the areas could legitimately be exempted from regulation under the WDO.

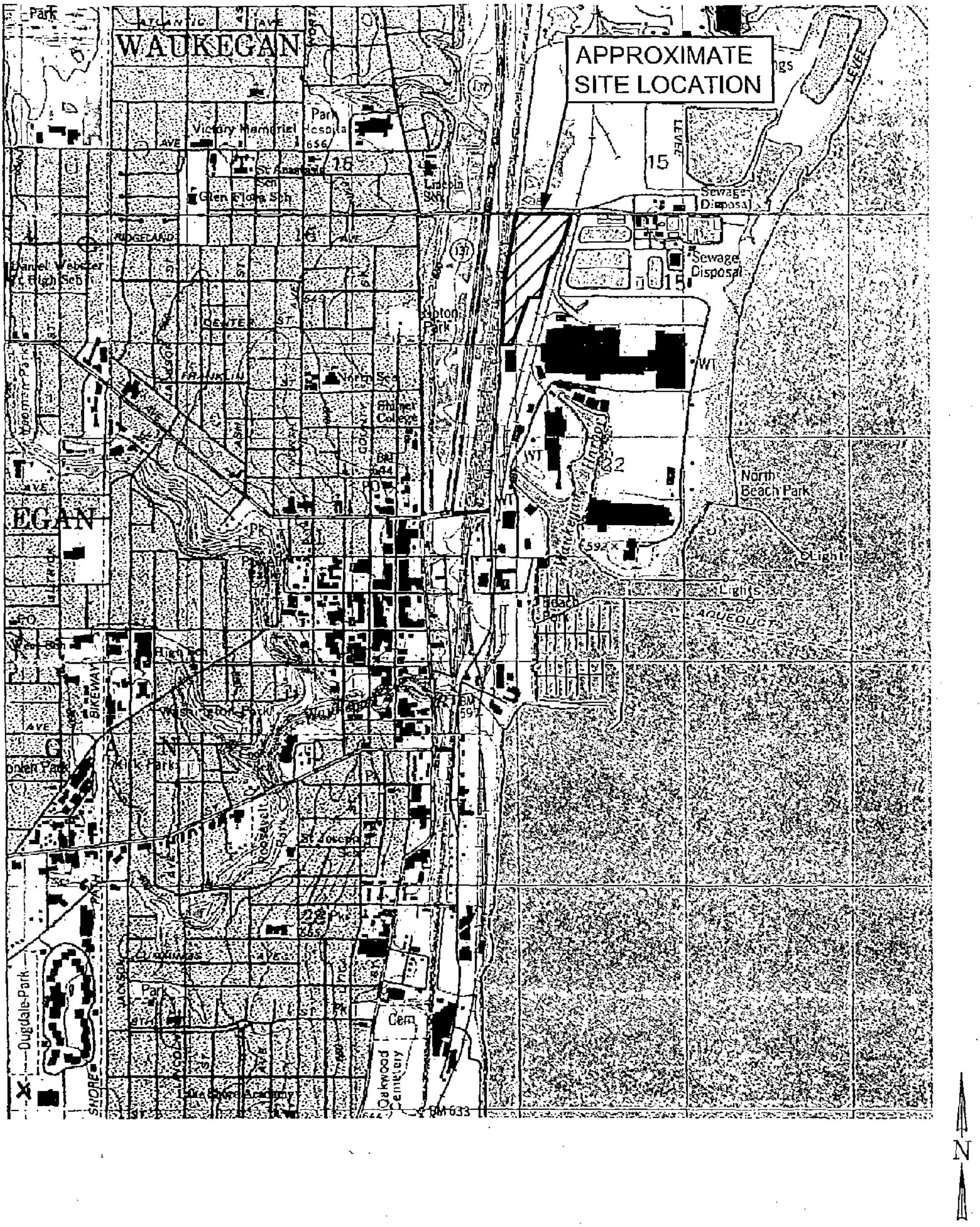
We will bring additional background materials with us to the pre-application meeting. We look forward to discussing the site and its unique circumstances at that time.

Sincerely,

Vincent J. Mosca, CWS #023
Senior Ecologist, Vice President

cc: Glenn Luke, NRT
Naren M. Prasad, Integrys Business Support, LLC
Mike Jouras, Integrys Business Support, LLC

Enclosures



SOURCE NOTE:
THIS DRAWING WAS DEVELOPED FROM THE FOLLOWING BURNS-McDONNELL DIGITAL FILE:
FIGURE 1 SITE LOCATION.DWG

NATURAL
RESOURCE
TECHNOLOGY

SITE LOCATION MAP

FORMER NORTH PLANT
NORTH SHORE GAS COMPANY
WAUKEGAN, ILLINOIS

PROJECT NO.
1986/2.0

DRAWING NO.
1986-A02C

FIGURE NO.
1

DRAWN: SJD 6/22/11 CHK'D: EPK APP'D: EPK DATE: 6/28/11

N

Burns & McDonnell
SINCE 1898

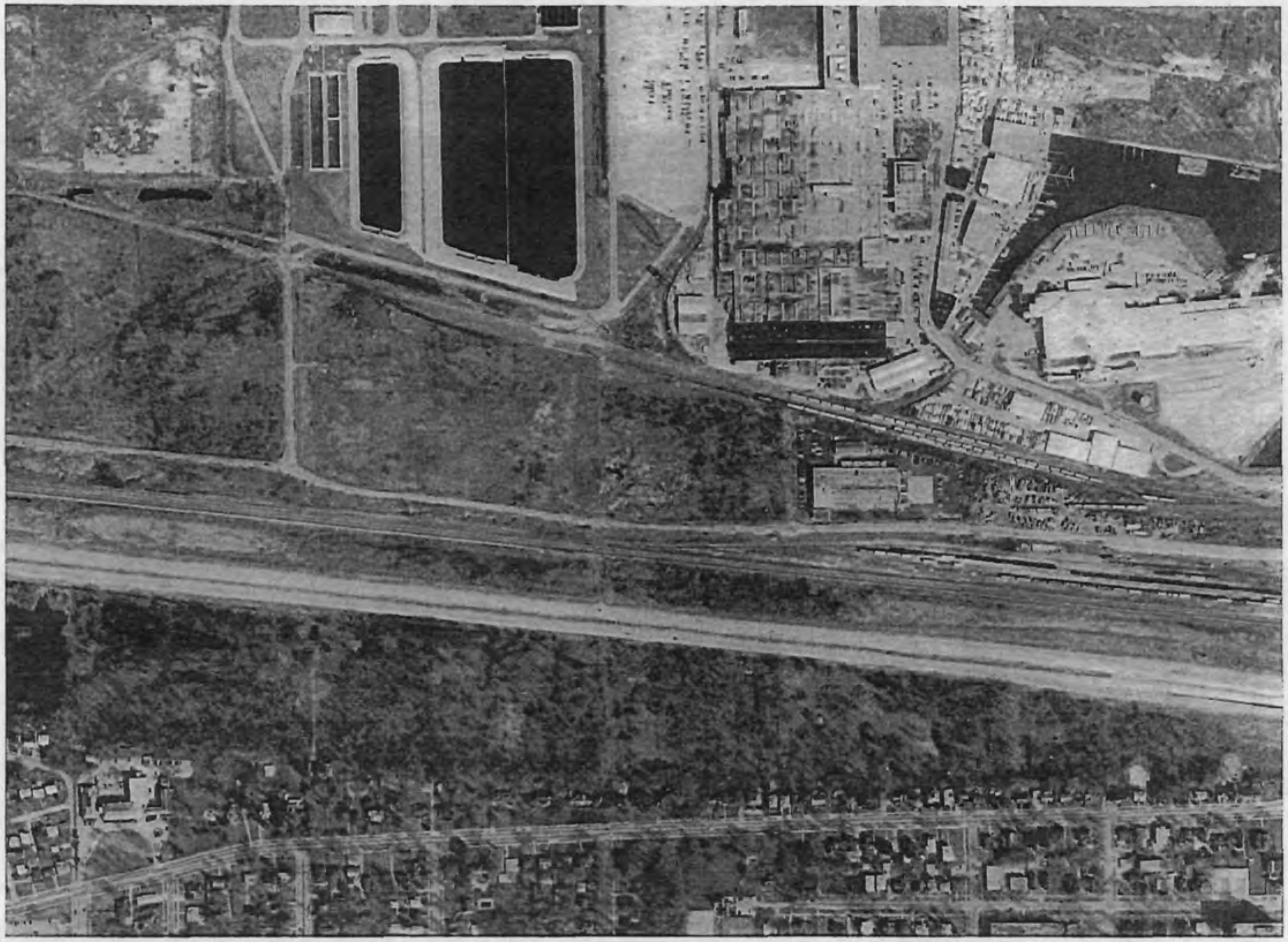
THE PEOPLES GAS
LIGHT AND COKE COMPANY
CHICAGO, ILLINOIS

HISTORICAL AERIAL 1939
FORMER NORTH PLANT
WAUKEGAN, ILLINOIS

I:\PEOPLES GAS\NORTH PLANT—29187\GAS\CAD\HISTORICAL AERIALS\HISTORICAL AERIAL-1939.DWG

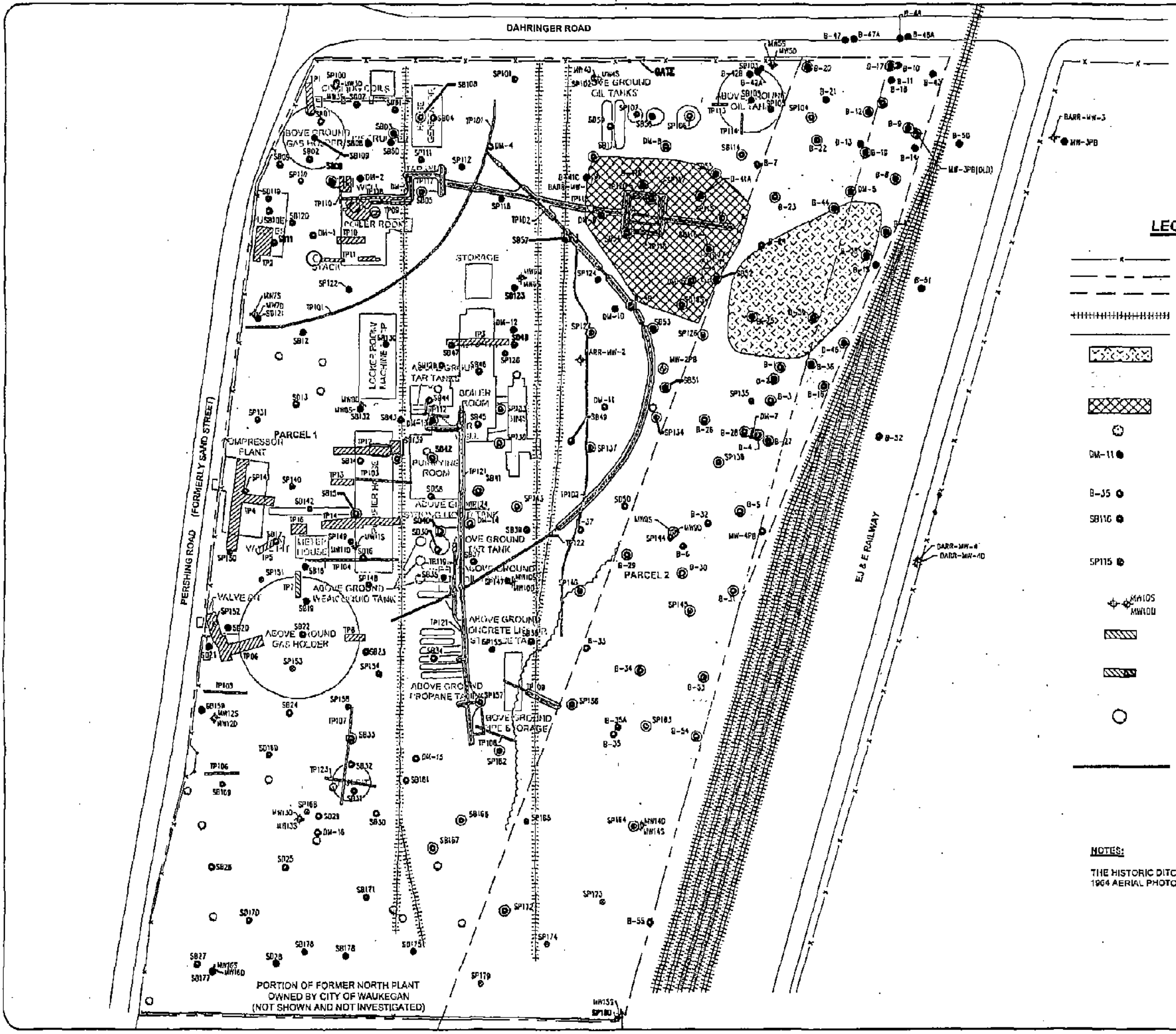
THE PEOPLES GAS
LIGHT AND COKE COMPANY
CHICAGO, ILLINOIS

HISTORICAL AERIAL 1964
FORMER NORTH PLANT
WAUKEGAN, ILLINOIS



THE PEOPLES GAS
LIGHT AND COKE COMPANY
CHICAGO, ILLINOIS

HISTORICAL AERIAL 1990
FORMER NORTH PLANT
WAUKEGAN, ILLINOIS



LEGEND

—x—	FENCE
— — —	PROPERTY LINE
— — — —	PARCEL LINE
++++++++	RAILROAD TRACKS
——	HISTORICAL STRUCTURES
▨	PONDED WATER (FORMER TAR PIT)
	WETLAND
▩	TAR AT SURFACE
○	EXISTING TREE
DM-11 ●	SOIL BORING LOCATION INSTALLED BY DAMES & MOORE
B-35 ●	SOIL BORING LOCATION INSTALLED BY BARR
SB110 ●	SOIL BORING LOCATION INSTALLED BY BURNS & MCDONNELL
SP115 ●	SOIL PROBE LOCATION INSTALLED BY BURNS & MCDONNELL
⌖ MW10S MW10D	GROUNDWATER MONITORING WELL
▭	TEST PIT LOCATION
▨	TAR VISUALLY IDENTIFIED OR SAMPLE EXCEEDS CSAT OR ATTENUATION CAPACITY
○	TAR VISUALLY IDENTIFIED OR SAMPLE EXCEEDS CSAT OR ATTENUATION CAPACITY
——	HISTORIC DITCH LOCATION

NOTES:

THE HISTORIC DITCH WAS APPROXIMATED FROM THE 1958 & 1964 AERIAL PHOTOGRAPHY.

N

0 60' 120'
SCALE IN FEET

SOURCE NOTE:
THIS DRAWING WAS DEVELOPED FROM THE FOLLOWING BURNS-McDONNELL DIGITAL FILES DATED 12-04-08:
FIG # SAMPLE LOCATION MAP.DWG, Base50b.DWG, Base50F.DWG, Borings.DWG,
HISTORICAL.DWG, [illegible], UTILITIES.DWG, WETLAND-POND PLAT.DWG, ALL SAMPLES-REGULAR SCALE.DWG

DRAWN BY:	SJD	DATE:	11/17/11
CHECKED BY:	EPK	DATE:	11/17/11
APPROVED BY:	EPK	DATE:	11/17/11
DRAWING NO: 1986-2-B06C			
REFERENCE:			

SOIL BORING/PROBE LOCATIONS

SITE SPECIFIC WORK PLAN
FORMER NORTH PLANT
NORTH SHORE GAS COMPANY
WAUKEGAN, ILLINOIS

NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO.
1986/2.0.

FIGURE NO.
6

BORING LOG

PROJECT: Waukegan Tar Pit Site
DATE STARTED: 3-26-91
DATE COMPLETED: 3-26-91
FIELD INSPECTOR: Ray Wuolo (BEC)
CREW CHIEF: Exploration Technology

BORING NO.: B-17
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.8

Depth (Feet) 0	Blows Per 6"	Sample Type	Percent Recovery	Water Content	Net HNU	Profile	DESCRIPTION OF MATERIALS AND REMARKS
		CS	50%	dry to moist	0ppm	▨	0.0-0.2 Brown sandy topsoil 0.2-1.4 Dark brown sandy silt 1.4-1.7 Tan sand slightly cohesive Continuous sampling abandoned due to poor recovery.
5	2 1 1 1	SS	50%	wet	NA	▨	Brown sand, no tar
	2 1 1 1	SS	5%	wet	NA	▨	Sand with black tar in pores, oil sheen, strong tar odor (slight solvent odor)
	1 0 0 0	SS	0%	wet	NA	▨	No recovery -cuttings-have dark oily sheen-sand odor is that of gasoline or a solvent
10	0 50-NA	SS	NA	wet	NA	▨	Same as above, bottom inch is very strongly cemented sandy gravel- the gravel is very angular white to buff material (sample), no visible sheen or coloration
	11 14 8 21	SS	NA	wet	NA	▨	Fine to medium, gray to brown silty sand some tarry sand (very minor tar at 12.0)- maybe in groundwater. Minor tar odor (slight solvent odor).
15 20 25 30							Augering stopped at 11.5'- auger going crooked

COMMENT: Ground Surface Elevation Referenced to North East Manhole (Assigned Elevation of 100 Ft.).
Later converted to Feet MSL (100 Ft. = 586.4 Ft. MSL).
CS: Continuous Sample
SS: Split Spoon Sample

SHEET 1 OF 1

BORING LOG

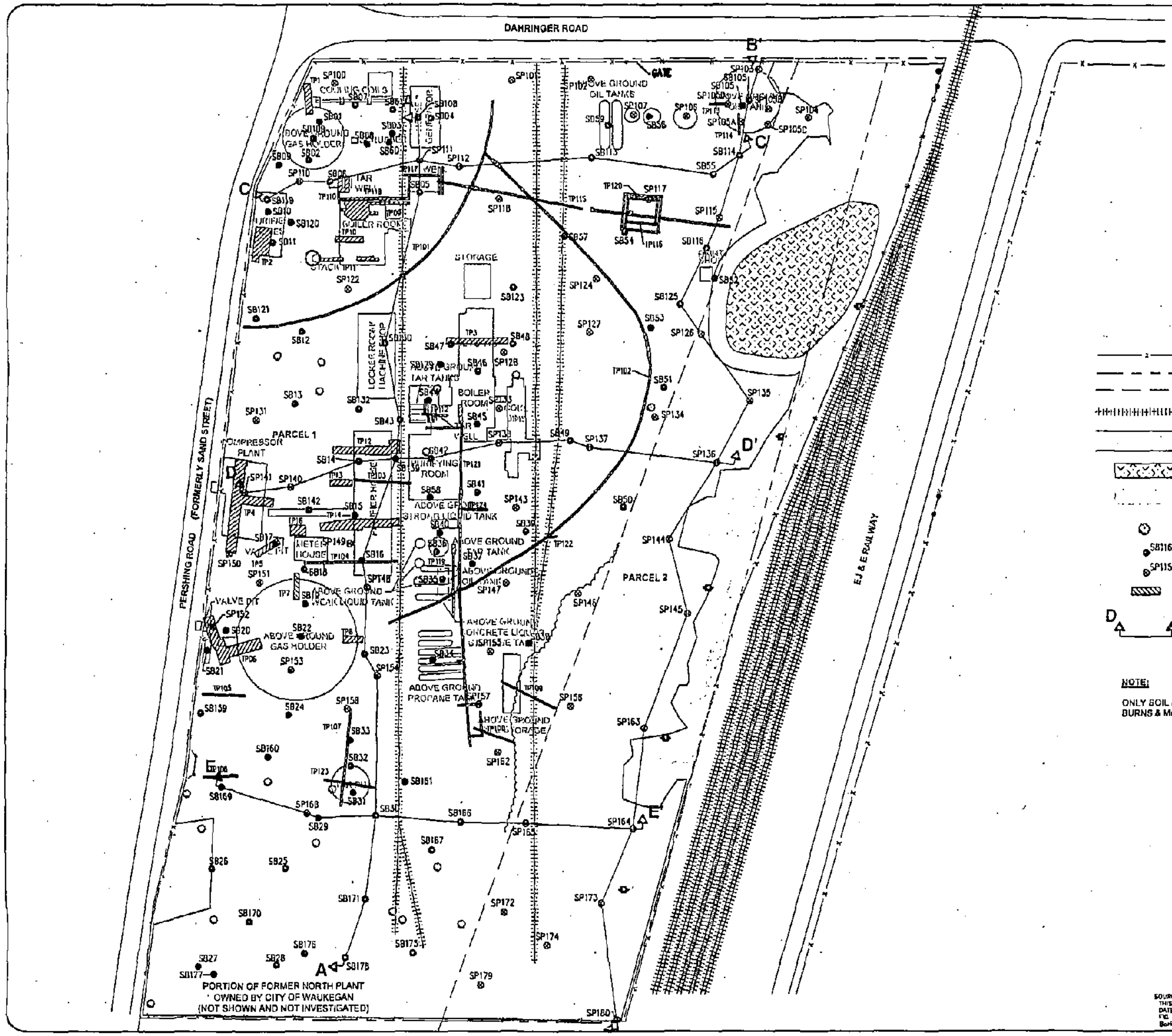
PROJECT: Waukegan Tar Pit Site
DATE STARTED: 3-29-91
DATE COMPLETED: 3-29-91
FIELD INSPECTOR: James Staberg(BEC)
CREW CHIEF: Exploration Technology

BORING NO.: B-31
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.1

Depth (Feet)	Blows Per 6"	Sample Type	Percent Recovery	Water Content	Net HNU	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	0 1 4 3	SS	50%	dry	1ppm	▨	Broken gypsum board material with a trace of tar
	3 4 5 4	SS	20%	wet	5ppm	▨	Gypsum board material with some tar (sample)
5	3 4 5 5	SS	50%	wet	40 ppm 5ppm (in hole)	■ ▨	4.4 Tar 5.0-5.4 Tar with sand (sample)
	3 1 2 4	SS	90%	wet	35ppm	▨	Black sand-tar (sample) (picture-8) tar at 7.0
10	5 4 9 14	SS	100%	wet	30ppm	▨ ■ ▨	Black sand with traces of tar at 9.0'
	6 8 11 15	SS	100%	wet	25ppm	▨	Same as above, no traces of tar
	1 6 10 14	SS	100%	wet	13ppm 6ppm	▨	Same as above (sample from top)
15	5 9 8 14	SS	100%	wet	20ppm	▨	Same as above (picture-9)
							E.O.B. 16'
20							
25							
30							

COMMENT: Ground Surface Elevation Referenced to North East Manhole (Assigned Elevation of 100 Ft.).
Later converted to Feet MSL (100 Ft. = 586.4 Ft. MSL).
CS: Continuous Sample
SS: Split Spoon Sample

SHEET 1 OF 1



LEGEND

- FENCE
- PROPERTY LINE
- PARCEL LINE
- RAILROAD TRACKS
- HISTORICAL STRUCTURES
- SILT FENCE
- PONDED WATER (FORMER TAR PIT)
- WETLAND
- EXISTING TREE
- SB116 BURNS & McDONNELL SOIL BORING LOCATION
- SP115 BURNS & McDONNELL SOIL PROBE LOCATION
- TEST PIT LOCATION
- D D' GEOLOGIC CROSS-SECTION LOCATION

NOTE:

ONLY SOIL BORINGS, PROBES AND TEST PITS ADVANCED BY BURNS & McDONNELL ARE PRESENTED IN CROSS SECTIONS.

N

0 60' 120'
SCALE IN FEET

SOURCE NOTE:
THIS DRAWING WAS DEVELOPED FROM THE FOLLOWING BURNS-McDONNELL DIGITAL FILES
DATED 12-04-08:
FIG. F XSECTION LOC.DWG, Base50A.DWG, Base50D.DWG, Base50F.DWG, BUCD SAMPS.dwg, BUCD TEST PITS-REV.dwg, Borings.dwg, HISTORICAL.dwg, mpinlley.dwg, TEST PITS 09-2004.dwg, UTILITIES.dwg, WETLAND-POND PLAT.dwg

DRAWN BY: SJD DATE: 6/22/11
CHECKED BY: EPK DATE: 6/22/11
APPROVED BY: EPK DATE: 6/28/11
DRAWING NO: 1986-2-B08C
REFERENCE:

GEOLOGIC CROSS-SECTION LOCATION MAP

SITE SPECIFIC WORK PLAN
FORMER NORTH PLANT
NORTH SHORE GAS COMPANY
WAUKEGAN, ILLINOIS

NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO.
1986/2.0

FIGURE NO.
8

LEGEND

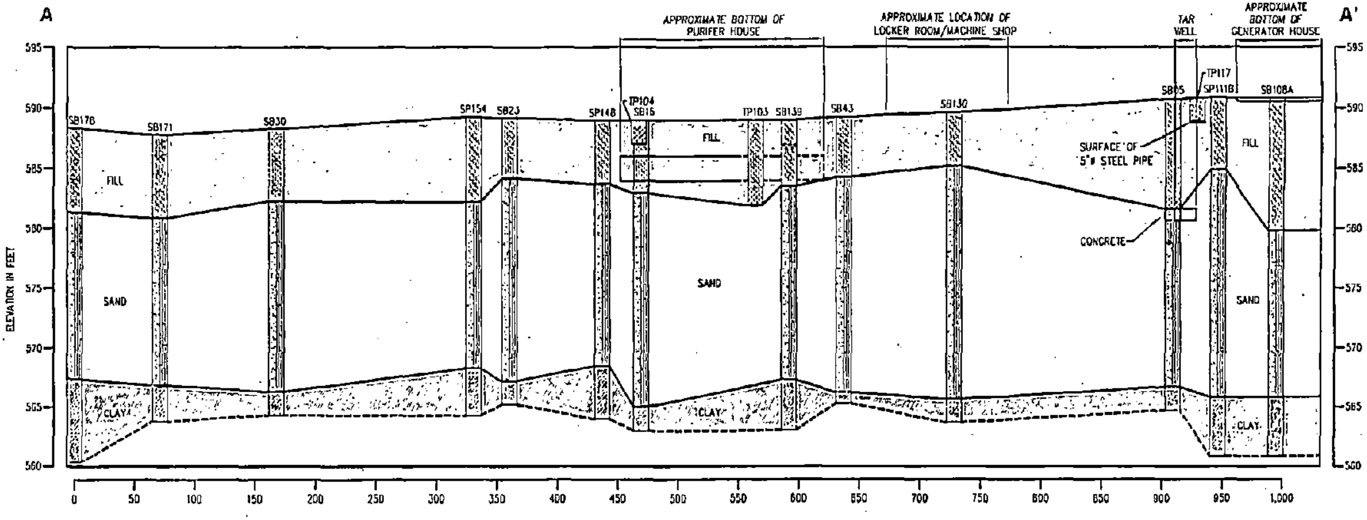
☐ FILL
☐ SAND
☐ CLAY
▨ CONCRETE
▨ TAR SATURATED MATERIAL
▨ FILL
▨ SAND
▨ CLAY
▨ CONCRETE
▨ BLUE/YELLOW STAINED SOIL

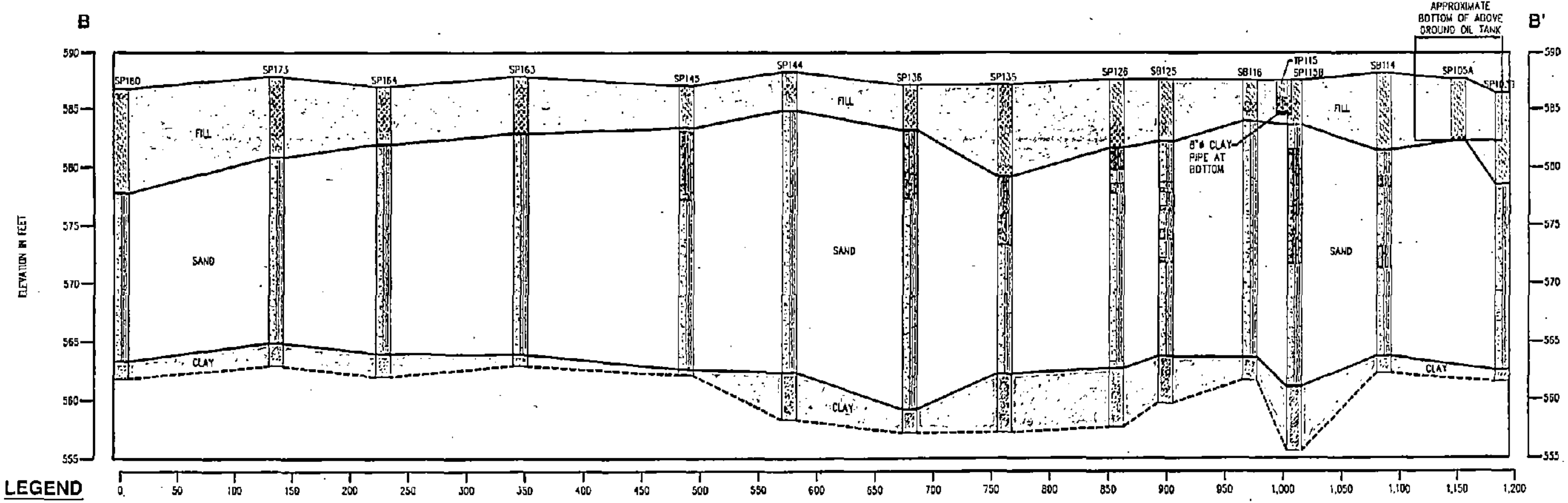
NOTES:

1. WIDTH OF SOIL BORINGS/PROBES, TEST PITS AND FEATURES WITHIN TEST PITS MAY BE EXAGGERATED HORIZONTALLY TO SHOW DETAIL.
2. ACTUAL THICKNESS OF CLAY IS UNKNOWN. IT WAS CONSISTENTLY ENCOUNTERED IN ALL BORINGS.

5 0 5 10
VERTICAL SCALE IN FEET

50 0 50 100
HORIZONTAL SCALE IN FEET





LEGEND

☐ FILL
☐ SAND
☐ CLAY
▨ TAR SATURATED MATERIAL
▨ FILL
▨ SAND
▨ CLAY
▨ GYPSUM

NOTES:

1. WIDTH OF SOIL BORINGS/PROBES, TEST PITS AND FEATURES WITHIN TEST PITS MAY BE EXAGGERATED HORIZONTALLY TO SHOW DETAIL.
2. ACTUAL THICKNESS OF CLAY IS UNKNOWN. IT WAS CONSISTENTLY ENCOUNTERED IN ALL BORINGS.

5 0 5 10
VERTICAL SCALE IN FEET

50 0 50 100
HORIZONTAL SCALE IN FEET

SOURCE NOTE:
THIS DRAWING WAS DEVELOPED FROM THE FOLLOWING BURNS-McDONNELL DIGITAL FILES
DATED 12-04-08:
FIG 6 XSECTION A-B.DWG

GEOLOGIC CROSS SECTIONS A-A' AND B-B'

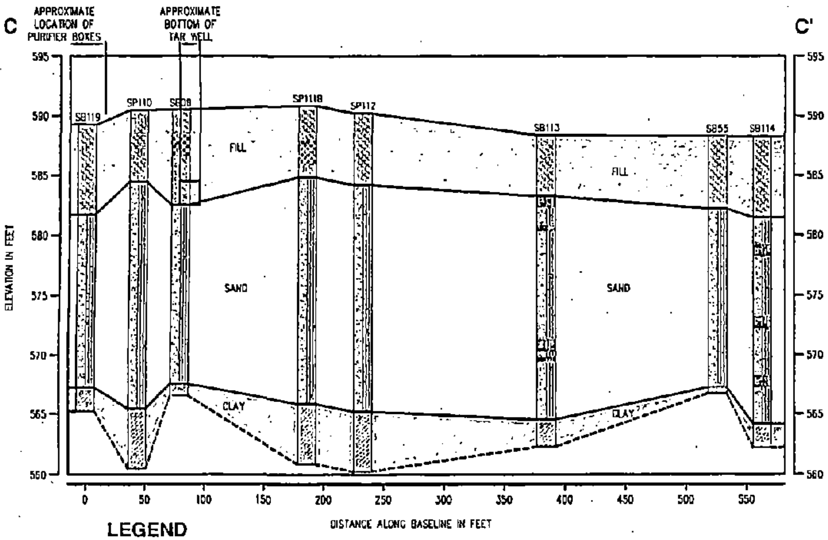
SITE SPECIFIC WORK PLAN
FORMER NORTH PLANT
NORTH SHORE GAS COMPANY
WAUKEGAN, ILLINOIS

DRAWN BY:	SJO	DATE:	6/22/11
CHECKED BY:	EPK	DATE:	6/22/11
APPROVED BY:	EPK	DATE:	6/28/11
DRAWING NO: 1986-2-B09C			
REFERENCE:			

NATURAL RESOURCE TECHNOLOGY

PROJECT NO.
1986/2.0

FIGURE NO.
9



LEGEND

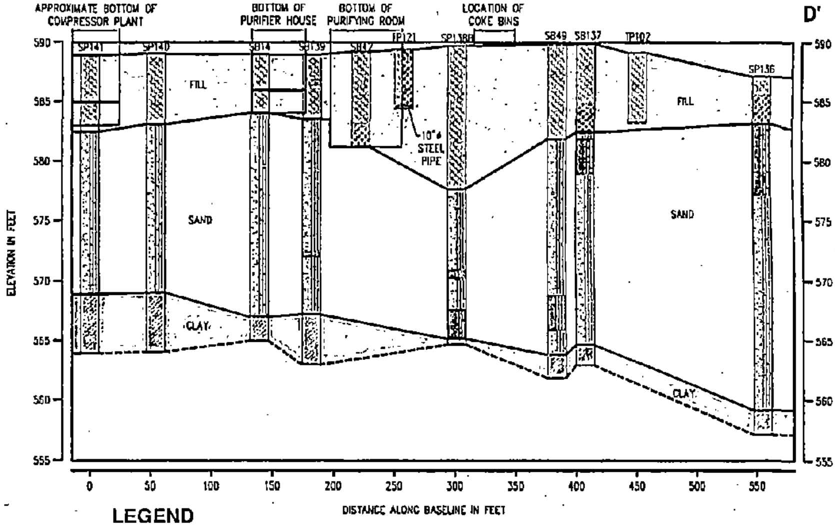
- ☐ FILL
- ☐ SAND
- ☐ CLAY
- ▤ TAR SATURATED MATERIAL
- ▨ FILL
- ▨ SAND
- ▨ CLAY

NOTES:

1. WIDTH OF SOIL BORINGS/PROBES, TEST PITS AND FEATURES WITHIN TEST PITS MAY BE EXAGGERATED HORIZONTALLY TO SHOW DETAIL.
2. ACTUAL THICKNESS OF CLAY IS UNKNOWN. IT WAS CONSISTENTLY ENCOUNTERED IN ALL BORINGS.

5 0 5 10
VERTICAL SCALE IN FEET

50 0 50 100
HORIZONTAL SCALE IN FEET



LEGEND

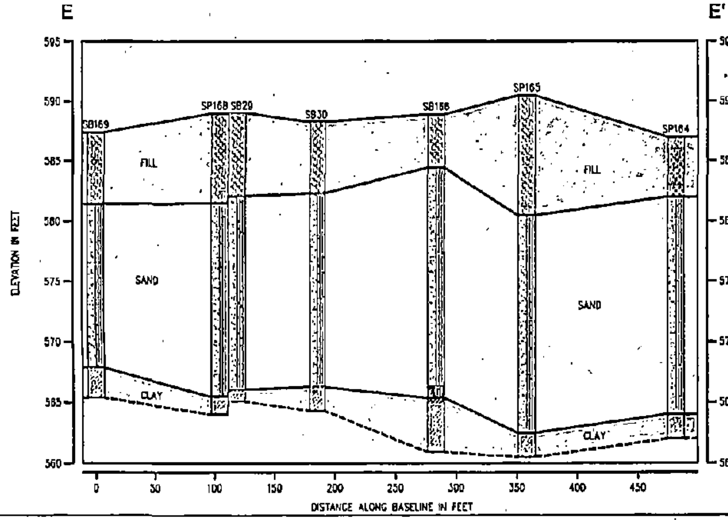
- ☐ FILL
- ☐ SAND
- ☐ CLAY
- ▤ TAR SATURATED MATERIAL
- ▨ FILL
- ▨ SAND
- ▨ CLAY
- ▨ GYPSUM

NOTES:

1. WIDTH OF SOIL BORINGS/PROBES, TEST PITS AND FEATURES WITHIN TEST PITS MAY BE EXAGGERATED HORIZONTALLY TO SHOW DETAIL.
2. ACTUAL THICKNESS OF CLAY IS UNKNOWN. IT WAS CONSISTENTLY ENCOUNTERED IN ALL BORINGS.

5 0 5 10
VERTICAL SCALE IN FEET

50 0 50 100
HORIZONTAL SCALE IN FEET



LEGEND

- ☐ FILL
- ☐ SAND
- ☐ CLAY
- ▤ TAR SATURATED MATERIAL
- ▨ FILL
- ▨ SAND
- ▨ CLAY
- ▨ GYPSUM

NOTES:

1. WIDTH OF SOIL BORINGS/PROBES, TEST PITS AND FEATURES WITHIN TEST PITS MAY BE EXAGGERATED HORIZONTALLY TO SHOW DETAIL.
2. ACTUAL THICKNESS OF CLAY IS UNKNOWN. IT WAS CONSISTENTLY ENCOUNTERED IN ALL BORINGS.

5 0 5 10
VERTICAL SCALE IN FEET

50 0 50 100
HORIZONTAL SCALE IN FEET

SOURCE NOTE:
THIS DRAWING WAS DEVELOPED FROM THE FOLLOWING BURNS-McDONNELL DIGITAL FILES DATED 12-04-08:
FIG 9 XSECTION C-D-E.DWG

DRAWN BY: SJD	DATE: 6/22/11	
CHECKED BY: EPK	DATE: 6/22/11	
APPROVED BY: EPK	DATE: 6/28/11	
DRAWING NO:1986-2-B10C		
REFERENCE:		

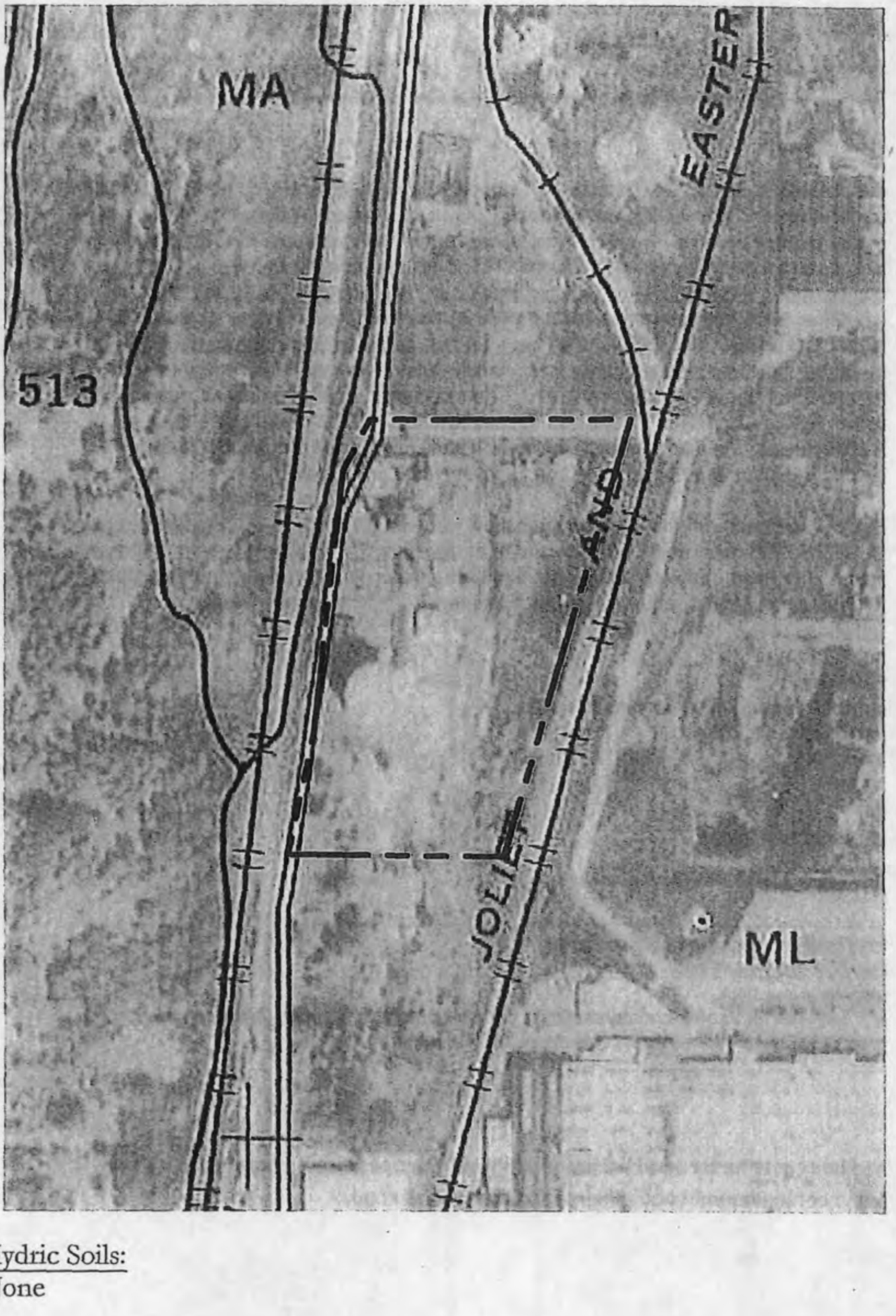
GEOLOGIC CROSS SECTIONS C-C', D-D' AND E-E'

SITE SPECIFIC WORK PLAN
FORMER NORTH PLANT
NORTH SHORE GAS COMPANY
WAUKEGAN, ILLINOIS

NATURAL RESOURCE TECHNOLOGY

PROJECT NO.
1986/2.0

FIGURE NO.
10



Hydric Soils:
None

EXHIBIT 9

NSG FORMER
NORTH PLANT

WAUKEGAN, IL

1970 LAKE
COUNTY
SOIL SURVEY

DATE: 1970

SCALE:
1" = 400'

N

P:\12000\12-0130 Wetlands-MGP site in Waukegan for Natural Resource Technology\Data\CAD\12-0130_2012-Delineation-Report_Lake-County.dwg, (9) Soil_1970, 7/12/2012 11:19:15 AM

From: Westman, Glenn H.
To: "vmosca@heyassoc.com"
Cc: Glenn R. Luke; Jennifer M. Kahler; nmprasad@integrysgroup.com; mpjouras@integrysgroup.com; Woolford, Kurt A.
Subject: RE: NSG Property at SEC Pershing & Dahringer, Waukegan
Date: Tuesday, July 17, 2012 2:43:18 PM

7-17-12; SMC Permit File #02-47-214A

Following up on our pre-application meeting yesterday, I had the opportunity today to confer with Kurt Woolford, SMC's chief engineer, concerning the regulatory status of isolated Wetlands 1-3 on the NSG property (see attached wetland exhibit). Based on our review of the various maps, historic air photos and other supporting documentation provided by Hey & NRT, it appears that Wetlands 1 and 2 meet exclusion criterion a.(2) under the definition of *Isolated Waters of Lake County* (IWLC) in WDO Appendix A. **Therefore, SMC will issue a letter shortly formally excluding these 2 IWLC from regulatory status under the WDO.** Wetland 3 in the southwest area of the site does not appear to meet any of the IWLC exclusion criteria – this small wetland appears to be a remnant wetland on the site, based on the information reviewed. Therefore, this small wetland will remain a regulated IWLC under SMC's jurisdiction. Proposed impacts to Wetland 3 will require written authorization from SMC (impacts to this non-high quality wetland would qualify for SMC's General Permit #2, as the wetland is less than 0.1 acre – no mitigation would be required).

We would like to be of assistance. If you have any questions, or would like to set up a meeting, please call our office at (847)377-7705 or e-mail Glenn Westman at gwestman@lakecountyil.gov. If you have any additional concerns that have not been addressed by the regulatory staff, you may contact Chief Engineer Kurt Woolford kwoolford@lakecountyil.gov or Executive Director Michael Warner mwarner@lakecountyil.gov at (847)377-7700.

Glenn H. Westman
Principal Wetland Specialist
Lake County Stormwater Management Commission (SMC)
500 W. Winchester Road, Suite 201
Libertyville, IL 60048
Phone: (847)377-7718
Fax: (847)984-5747
E-Mail: gwestman@lakecountyil.gov

Please consider the environment before printing this e-mail

From: Vince Mosca [mailto:vmosca@heyassoc.com]
Sent: Thursday, July 12, 2012 3:43 PM
To: Westman, Glenn H.
Cc: 'Glenn R. Luke'; 'Jennifer M. Kahler'; nmprasad@integrysgroup.com; mpjouras@integrysgroup.com
Subject: WDP No. 02-47-214A - Materials for Pre-application Meeting

Glenn:

Please find attached our cover letter and background information for discussion at our pre-app meeting on Monday. Let me know if you'd like me to bring a hard copy.

Call with any initial questions.

Vince

Vincent Mosca
Sr. Ecologist
Hey and Associates, Inc.
26575 W. Commerce Drive
Suite 601
Volo, Illinois 60073

847-740-0888 office
847-740-2888 fax
847-404-3303 mobile

LAKE COUNTY

STORMWATER MANAGEMENT COMMISSION

August 6, 2012

Mr. Naren M. Prasad
Integrys Business Support
130 East Randolph Street, 22nd Floor
Chicago, IL 60601

RE: WDP No. 02-47-214A
North Shore Gas Property at SEC Dahringer and Pershing Roads; Waukegan, Illinois
PIN # 08-15-300-030
ISOLATED WETLAND EXCLUSIONS

Dear Mr. Prasad:

This letter is a follow-up to the preliminary jurisdictional determination (PJD) letter for the subject property issued by the Lake County Stormwater Management Commission (SMC) on June 11, 2012 (copy enclosed for reference). Based on supplemental information provided on your behalf by Hey & Associates, Inc. (Hey), received by the SMC on July 12, 2012, it is our determination that **Wetlands 1 and 2 shown on the enclosed Exhibit 7 are excluded from regulation under the Lake County Watershed Development Ordinance (WDO).** Specifically, these two wetlands appear to meet exclusion criterion a.(2) under the definition of *Isolated Waters of Lake County* in WDO Appendix A: "Excavations and impoundments permitted by right, prior to being a regulated activity, within 40% or more non-hydric soils."

Wetland 3 shown on the enclosed Exhibit 7 does not appear to meet the WDO exclusion criteria; therefore, this wetland remains a regulatory IWLC under the jurisdiction of the SMC.

Permitting Considerations:

The WDO requires that a Watershed Development Permit (WDP) be issued by the City Waukegan for proposed development of the property. Please contact Mr. Ron Laubach, the City's WDO enforcement officer, at (847)625-6827 for the WDP submittal requirements. SMC's written authorization will be required for any proposed impacts to Wetland 3 prior to the City's issuance of the WDP.

If you have any questions, or would like to set up a meeting, please call our office at (847)377-7705 or e-mail me at gwestman@lakecountyil.gov. If you have any additional concerns that have not been addressed by the regulatory staff, you may contact Chief Engineer Kurt Woolford kwoolford@lakecountyil.gov or Executive Director Michael Warner mwarner@lakecountyil.gov at (847) 377-7700.

If you would like to provide feedback regarding the SMC permit/inspection process please go to:
(password – *survey*)
www.lakecountyil.gov/Stormwater/Pages/permit-process-survey.aspx
www.lakecountyil.gov/Stormwater/Pages/inspection-process-survey.aspx

Sincerely,

LAKE COUNTY STORMWATER MANAGEMENT COMMISSION

Kurt Woolford — Glenn H. Westman

Kurt Woolford, P.E., CFM
Chief Engineer

Glenn H. Westman, PWS, CWS, CFM
Principal Wetland Specialist

Enclosure: SMC's PJD Letter Dated 6-11-12 with Wetland Exhibit 7 (Hey)

c: Ron Laubach – City of Waukegan
Mike Jouras – Integrys Group
Scott Kuykendall & Vince Mosca – Hey and Associates
Glenn Luke - NRT

APPENDIX D

PERIMETER AIR MONITORING ACCEPTABLE AIR CONCENTRATIONS – TECHNICAL MEMORANDUM

Exponent®
1800 Diagonal Road, Suite 500
Alexandria, VA 22314

Technical Memorandum
July 27, 2012

Site-Specific Time Critical Removal Action Perimeter Air Monitoring Acceptable Air Concentrations

As part of the focused time critical removal action project to be performed at the North Shore Gas Company's former North Plant Manufactured Gas Plant (MGP) (Site) in Waukegan, Illinois, air monitoring will be conducted to measure the concentrations of MGP-related constituents associated with the removal action. Two types of air monitoring will be conducted during the project.

The first type will be real-time air monitoring of specific constituents (total volatile organic compounds [TVOCs], particulate matter less than 10 μm in size [PM_{10}]) conducted with stationary air monitoring instruments as described in the air monitoring plan (AMP) presented in the *Removal Action Work Plan* developed by Natural Resource Technology, Inc. The real-time air monitoring stations will be located at the perimeter of the Site. These real-time measurements will be collected using automated air sampling and analysis devices at a specified sampling interval (e.g., every 15 minutes) over the entire day and compared in real-time to the perimeter Action Levels presented in the AMP. Any exceedance of the Action Levels will require specific response measures by the removal action contractor to reduce the vapor and/or particulate phase emissions. Also, in the event that the TVOC Action Level is exceeded, the real-time monitoring will include automated collection of constituent-specific data (benzene, toluene, ethylbenzene, and xylenes [BTEX]).

The second type of air monitoring will be done using stationary sampling devices that take integrated air samples over a 24-hour period to measure the concentrations of MGP-related constituents at the Site perimeter (i.e., the fence line). These samples are then sent to an offsite laboratory for analysis. These air concentrations will be compared to the acceptable air concentrations (AACs) developed to be protective of public health, as described in this technical memorandum. The goal of the air monitoring program is to maintain air concentrations at the secured perimeter of the Site, as measured in the integrated 24-hour samples, at levels below applicable AACs.

Exponent was requested by Integrys Business Support, LLC (IBS) to develop AACs for the removal action project. The AACs were developed to be protective of the residents living nearby, as they are the most sensitive population located in the Site area. The AACs were developed using U.S. Environmental Protection Agency (EPA) risk assessment methods, the most current available toxicity data, physical parameter information, and by applying site-specific exposure parameters that consider the nature of the removal project (U.S. EPA 2009a-d, 2012a,b). These site-specific AACs were developed based on the fact that the only potential exposure pathway for nearby residents for chemicals associated with the removal action project (i.e., soil removal) would be inhalation of fugitive air emissions, as the Site will remain secured with a perimeter fence. These fugitive air emissions would be in the form of dust for those MGP-constituents that are relatively non-volatile (e.g., high-molecular-weight polycyclic aromatic hydrocarbons [PAHs]) and as chemical vapors for volatile MGP constituents (e.g., benzene and naphthalene).

The specific MGP-related constituents for which AACs were developed were those that are typically evaluated for MGP projects because of their volatility and/or toxicity, including BTEX and eight specific PAHs. In addition, the health-based value developed by EPA for dust (i.e., PM_{10}) was adopted to address health concerns associated with particulate matter or dust.

The Site is a vacant parcel located about one-half mile west of Lake Michigan. The EJ&E railway is located along the eastern perimeter of the Site, Pershing Road is along the western perimeter, and Dahringer Road is along the northern perimeter. Further west is the Amstutz Expressway, a four-lane divided highway. The closest resident is located west of the expressway approximately 600 ft to the west of northwest corner of the Site. The closest industrial area is about 750 ft south of the Site. The perimeter fence is the closest location to the active removal project where the general public could potentially be exposed to fugitive emissions, as the general public will not have access to the Site. The AACs were developed using a conservative approach, so that if exposure to MGP-related constituents occurred at the secured perimeter over the entire duration of the removal project for 24 hours per day, the exposure would not pose a health concern to the general public. As distance from the Site increases, air concentrations will be diluted and reduced in concentration relative to those measured at or near the Site. The calculations used to derive the AACs are described below, followed by the specific exposure and toxicity factors used as inputs. The resultant AACs are presented in Table 1.

Equations and Methods Used to Derive AACs

Equations

The equations used to calculate the AACs were derived from current EPA guidance for inhalation exposures, as presented in the user's guide for EPA's regional screening levels (U.S. EPA 2012a).

For this Site, the exposure terms were simplified because the exposure duration is short (i.e., approximately a year) because of the nature of the planned removal action, yielding the following site-specific equations for developing the AACs. The equations differ slightly for noncarcinogenic and carcinogenic effects of a chemical. The input values and definitions of all abbreviations are provided in Table 1.

Noncarcinogenic

$$\text{AAC noncarc (mg/m}^3\text{)} = \frac{\text{THQ} \times \text{AT(noncarc)}}{\text{EF} \times \text{ET} \times \text{(1 day/24 hrs)} \times \text{(1/RfC)}}$$

Carcinogenic

$$\text{AAC carc (mg/m}^3\text{)} = \frac{\text{TR} \times \text{AT(carc)}}{\text{EF} \times \text{ET} \times \text{(1 day/24 hrs)} \times \text{IUR} \times 1000}$$

For noncarcinogens, a target hazard quotient of 1 was used to estimate the AACs. For carcinogens, AACs were calculated using three different target risk levels of 1×10^{-4}, 1×10^{-5}, and 1×10^{-6}, so that values could be developed that spanned the risk range typically considered when assessing cancer risks at Comprehensive Environmental Response, Compensation and

Liability Act of 1980 (CERCLA) sites. Cumulative risks within the risk range are considered potentially acceptable depending upon site-specific circumstances that are evaluated by EPA. Cumulative risks above 1×10^{-4} are not typically considered acceptable. The goal will be to manage fugitive air emissions during the removal action such that air concentrations are as low as practically possible. Thus on average, the goal will be to meet AACs that are at the lower end of the risk range, and if possible below the range presented in Table 1.

For chemicals for which both cancer- and noncancer-based toxicity values are available (i.e., benzene, ethylbenzene, and naphthalene), the AACs were calculated using both sets of toxicity values. When the noncancer-based AAC was lower than the cancer-based AAC (for a particular risk level), the noncancer-based AAC was selected to be health protective, and is indicated with a box in Table 1. Typically, at the 1×10^{-6} risk level, the cancer-based values are lower than the noncancer-based values, but as the target risk level for carcinogens is increased (i.e., from 1×10^{-6}, to 1×10^{-5}, to 1×10^{-4}), the noncancer-based AAC may be lower than the cancer-based value. This situation occurs for benzene at the 1×10^{-4} and the 1×10^{-5} risk levels and for naphthalene at the 1×10^{-4} risk level, indicating the cancer-based values for benzene and naphthalene in these cases are not health protective for noncancer-based effects and cannot be used as AACs.

Exposure Factors

The following section explains the basis for the site-specific exposure factors used to develop the AACs for the residential population near the Site. The toxicity values addressed later in this document were developed in a conservative manner to be health protective for sensitive human populations, including children, and were used following the most current inhalation dosimetry methodology, thus do not require normalization to body weight and daily inhalation rate (U.S. EPA 2009e).

Exposure Frequency and Exposure Time

The duration of the removal action is planned to be approximately 1 year (52 weeks), with activities that could potentially lead to fugitive emissions (e.g., active excavation of soil to remove historical structures and *in situ* stabilization/solidification of contaminated soil) potentially occurring during the entire period. During active construction, excavated soil will be loaded onto trucks for offsite disposal as soon as possible to minimize stockpiling. Stockpiles left during non-working hours will be covered with a vapor-phase suppressant foam and/or a tarp to minimize fugitive air emissions. If necessary, additional engineering controls, such as a misting system or fan, will be used to control fugitive emissions from the Site.

Work schedules at this Site may vary in terms of number of hours per day or number of days per week worked. Therefore, the AACs were conservatively developed using the assumptions that emissions could occur 24 hours per day, 7 days per week during the entire year-long duration of the project (Table 1). These exposure assumptions also correspond to the air monitoring sampling period (24 hours/day) that will be used for collecting the integrated air samples.

Averaging Time

For carcinogens, the averaging time is the full lifetime of an individual, assumed to be 70 years (equivalent to 25,550 days) based on EPA risk assessment guidelines (U.S. EPA 1989).

For noncarcinogens, the averaging time is limited to the duration over which exposure may occur based on the same EPA risk assessment guidelines (U.S. EPA 1989). For this site-specific scenario, exposures may occur intermittently over the entire year, so the averaging time for noncarcinogens is 365 days.

Toxicity Values

Toxicity values used are presented in Table 1. Values used were obtained from EPA's Integrated Risk Information System (IRIS, U.S. EPA 2012b), EPA's provisional peer-reviewed toxicity values (PPRTVs, U.S. EPA 2009a-d), and the California Environmental Protection

Agency (Cal-EPA 2009). For noncarcinogenic effects of chemicals, reference concentrations (RfCs) were used to assess the toxicity of the MGP-related constituents. RfCs are available for BTEX and naphthalene. For carcinogenic effects, inhalation unit risk (IUR) factors were used to assess the MGP-related constituents. There are IUR values for benzene, ethylbenzene, and the eight PAHs.

For noncarcinogens, subchronic rather than chronic toxicity values were used. EPA defines a subchronic exposure duration as one lasting more than 30 days up to 10% of a lifetime in humans, which would be 7 years (U.S. EPA 2011). Thus, the 1-year total duration of this project is more appropriately considered a subchronic exposure period, rather than a chronic exposure period. EPA provides PPRTVs for subchronic exposures for benzene, ethylbenzene, and xylenes, which were used in Table 1 (U.S. EPA 2009a-c). For toluene, the PPRTV document recommends the use of the chronic value for subchronic exposures (U.S. EPA 2009d).

For naphthalene there are no subchronic inhalation toxicity values. The EPA chronic RfC for naphthalene is based on a 2-year mouse study where nasal inflammation was observed in mice chronically exposed to naphthalene. EPA did not note additional adverse effects at or near the dose level used to derive the RfC. Nasal inflammation is a reversible effect, meaning once exposure ends, the inflammation will subside. The estimated human equivalent concentration of naphthalene that would cause the nasal inflammation based on this study was 9 mg/m^3 (U.S. EPA 1998, 2012b). This human equivalent concentration was used by EPA with an uncertainty factor of 3,000 to derive the chronic naphthalene RfC of 0.003 mg/m^3. The 3,000-fold uncertainty factor is based on the following:

- A 10-fold factor for extrapolation from an adverse-effect-level to a no-adverse-effect-level
- A 10-fold interspecies extrapolation factor to account for the differential sensitivity of humans compared to other animals (e.g., mice)

- A 10-fold intraspecies extrapolation factor to account for the difference in sensitivity among humans
- An additional 3-fold factor was included because there were deficiencies in the toxicology data available (e.g., lack of reproductive data).

As the period of exposure for this short-term project will be clearly subchronic in nature, a subchronic RfC was desired to more closely match the short-term exposure period. To estimate a subchronic inhalation toxicity value for naphthalene, EPA's chronic RfC (0.003 mg/m^3) was multiplied by a 10-fold factor to adjust from a no-adverse-effect-level over a *chronic* period of exposure to a no-adverse-effect-level over a *subchronic* exposure period (i.e., 0.03 mg/m^3).

The seven PAHs listed in the attached table, other than naphthalene, are compounds that have been classified by EPA as probable human carcinogens for decades and are normally evaluated as such. Benzene is classified as a known human carcinogen, and there is an IUR available for it in IRIS. However, only oral cancer-based toxicity values (i.e., slope factors) have been developed for these seven PAHs by EPA. The oral cancer slope factor for benzo[a]pyrene is presented in IRIS while the values for the other six PAHs are based on a potency factor relative to benzo[a]pyrene (U.S. EPA 1993). However, Cal-EPA has developed inhalation toxicity values for these seven PAHs, which were used in the calculation of the AACs. The classification of naphthalene and ethylbenzene as to whether they are considered carcinogens is currently under review by EPA (U.S. EPA 2004, 2012b). However, Cal-EPA has developed cancer-based inhalation toxicity values for these two compounds. AACs for naphthalene and ethylbenzene were developed using both cancer and noncancer toxicity values, with the lowest value being selected as the AAC.

Estimated AACs and Application of AACs

The estimated AACs are presented in Table 1. Integrated air sample results collected over a 24-hour period will be compared to the AACs in Table 1 for each of the volatile constituents (i.e., BETX and naphthalene). While naphthalene is a volatile PAH that will be present in the vapor phase in air, the other seven PAHs for which AACs were developed (i.e., benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenzo[a,h]-anthracene, and indeno[1,2,3-cd]pyrene) are relatively non-volatile. These seven non-volatile PAHs are bound on the particulate matter or dust generated during the soil removal process rather than present as a vapor (like naphthalene) in air. For these seven PAHs, two sampling methods will initially be used to evaluate compliance with the AACs, including integrated air sampling, and real-time air sampling of dust using a DustTrac monitor. Integrated air sampling methods (i.e., using polyurethane foam (PUF) sampling media) will be used to directly measure the air concentration of the seven PAHs in the dust over a 24-hour period. The integrated air sample results using the PUF sampling method will be compared to the applicable AACs listed in Table 1.

In addition, the ambient air respirable dust concentration (i.e., PM_{10}) will be measured using a real-time DustTrac monitor over the same 24-hour period that the PUF samples are collected. The measured dust concentration will be compared to the PM_{10} standard in Table 1. The real-time dust monitoring will be used to indirectly monitor if the AACs for the seven non-volatile PAHs are achieved when the PM_{10} standard is achieved. Based on the maximum concentrations of each of the seven non-volatile PAHs detected in soil in the Removal Action Area, the maximum air concentrations of each PAH that could be generated if the PM_{10} standard (i.e., 0.15 mg/m^3) is achieved were estimated (Table 2). The predicted maximum air concentration of each non-volatile PAH (assuming the dust concentration was equivalent to the PM_{10}) was compared to its AAC that was developed using a target cancer risk of 1×10^{-5}, which is in the middle of the acceptable target risk range (Table 2). In each case, the maximum predicted air concentration of each non-volatile PAH was much less than the selected AAC (Table 2). For this reason, as long as the PM_{10} air standard is achieved, the air concentrations of each of the seven non-volatile PAHs are predicted to be below their respective AACs based on a target risk of 1×10^{-5}. If the PUF samples collected concurrently with the DustTrac dust monitoring yield PAH air concentrations below the AACs during the initial period of sampling this will verify the presumably conservative nature of the predicted air concentrations in Table 2. Once this verification is completed with the PUF sampler and if the air concentrations of the non-volatile PAHs are much lower than their AACs, then the achievement of the AACs for these non-volatile PAHs may be monitored indirectly by measuring the PM_{10} concentration (i.e., using a DustTrac hand held monitor), rather than using PUF samplers.

Prior to beginning the removal action, concentrations of the MGP-related constituents will be measured to evaluate baseline levels in the Site area. It is expected that the ambient or background air concentrations of the MGP-related constituents will be much lower than the AACs and will not contribute significantly to the daily air concentrations measured at the secured perimeter. If significant baseline air concentrations are detected (i.e., near the AACs), then the AACs will be reassessed to account for this contribution. Specifically, the AACs based on noncancer effects need to be achieved when considering the cumulative air emissions from both the removal action and baseline ambient conditions to maintain protection of the public. For the AACs based on carcinogenic effects, the point of comparison will be the incremental increased air concentration attributable to the remedial action (i.e., the incremental air concentration measured above the baseline conditions).

Once the removal action begins, the project will be managed to minimize fugitive air emissions. The first line of information used to make management decisions to control fugitive air emissions will be real-time monitoring and comparison to perimeter air Action Levels. These Action Levels are guidelines and not health-based concentration limits. The primary management goal will be to minimize fugitive air emissions to meet the AACs presented in Table 1, as the AACs are health-based concentrations.

For chemicals with only known noncarcinogenic effects (e.g., toluene and xylenes), there is a single noncarcinogenic-based AAC; thus, air concentrations above that value will be considered an exceedance of the AAC, which will require consideration of taking additional actions to reduce fugitive emissions at the Site. For chemicals that are potentially carcinogenic, the daily incremental air concentrations above background will be considered acceptable if they are within the AAC target risk ranges presented within Table 1 (i.e., 1×10^{-4} to 1×10^{-6}), as long as the cancer-based AAC at a given target risk does not exceed the noncancer-based AAC (see Table 1). An incremental air concentration above background that is greater than the AAC based on a 1×10^{-4} target risk level will be considered an exceedance that requires considering additional actions to reduce fugitive emissions. However, any air concentration greater than the lowest AAC for a specific analyte will be viewed by IBS and their contractors as a need to review the process used to manage fugitive emissions. Because Action Levels will be used with real-time monitoring as the first line of defense to minimize fugitive air emissions, exceedances of the AACs will reflect the need to review Action Levels and the real-time monitoring program to determine if lower Action Levels are required, or if more focused real-time monitoring is needed to better manage fugitive emissions.

It is important to note that the AACs are representative of the average concentrations to which a residential receptor could be exposed without exceeding the target risk level over the exposure period (i.e., 1-year project duration). Therefore, cumulative averages over the duration of the project are a more appropriate comparison value than single-day measurements for meeting the overall project goal of protecting the public. While daily concentrations will be used as a guide to address the need for reviewing the fugitive emission controls, the overall goal of meeting the AACs will be based on the average concentrations achieved over the project duration. If the project duration is extended significantly because of unforeseen circumstances, AACs may need to be adjusted. However, whether adjusting the AACs is necessary will be determined based on the performance of the removal action up to the time that a project extension is first anticipated. The expectation is that the average air concentrations measured during the removal action will be maintained far enough below the calculated AACs that an extension of the project duration would not present any likelihood that the cumulative target risk goal (i.e., hazard quotient of 1 or within the risk range) would be exceeded. Therefore, unless this expectation is not met, the AACs should not need to be adjusted. A comparison of the integrated air monitoring data to the AACs will be part of the completion report prepared once the removal action is complete.

Lastly, these AAC values implicitly assume that a receptor will be near the Site for 24 hours a day during the entire project. If residents spend any of their time in a different location, actual risks will be lower.

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Table 1. Site-specific time critical removal action perimeter air monitoring acceptable air concentrations: Residential exposure scenario

					Site-Specific Acceptable Air Concentrations											
					At Target Cancer Risk: 1E-04 at Target Hazard Quotient: 1				At Target Cancer Risk: 1E-05 at Target Hazard Quotient: 1				At Target Cancer Risk: 1E-06 at Target Hazard Quotient: 1			
Constituent	Noncancer RfC (mg/m³)	Cancer IUR (µg/m³)⁻¹	Basis and Source of Toxicity Values		(mg/m³)	(µg/m³)	(ppmv)	(ppbv)	(mg/m³)	(µg/m³)	(ppmv)	(ppbv)	(mg/m³)	(µg/m³)	(ppmv)	(ppbv)
Benzene (cancer)	–	7.8E-06	C	IRIS	0.90	900	0.28	280	0.090	90	0.028	28	0.0090	9.0	0.0028	2.8
Benzene (noncancer, subchronic)	0.080	–	NC	PPRTV	0.080	80	0.025	25	0.080	80	0.025	25	0.080	80	0.025	25
Toluene	5.0	–	NC	IRIS	5.0	5,000	1.3	1,300	5.0	5,000	1.3	1,300	5.0	5,000	1.3	1,300
Ethylbenzene (cancer)[a]	–	2.5E-06	C	Cal-EPA	2.8	2,800	0.65	650	0.28	280	0.065	65	0.028	28	0.0065	6.5
Ethylbenzene (noncancer, subchronic)	9.0	–	NC	PPRTV	9.0	9,000	2.1	2,100	9.0	9,000	2.1	2,100	9.0	9,000	2.1	2,100
Xylenes (subchronic)	0.40	–	NC	PPRTV	0.40	400	0.092	92	0.40	400	0.092	92	0.40	400	0.092	92
Naphthalene (cancer)[a]	–	3.4E-05	C	Cal-EPA	0.21	210	0.039	39	0.021	21	0.0039	3.9	0.0021	2.1	0.00039	0.39
Naphthalene (noncancer, subchronic)	0.030 [c]	–	NC	IRIS[c]	0.030	30	0.0057	5.7	0.030	30	0.0057	5.7	0.030	30	0.0057	5.7
Benz[a]anthracene[b]	–	1.1E-04	C	Cal-EPA	0.064	64	0.0068	6.8	0.0064	6.4	0.00068	0.68	0.00064	0.64	6.8E-05	0.068
Benzo[a]pyrene[b]	–	1.1E-03	C	Cal-EPA	0.0064	6.4	0.00062	0.62	0.00064	0.64	6.2E-05	0.062	6.4E-05	0.064	6.2E-06	0.0062
Benzo[b]fluoranthene[b]	–	1.1E-04	C	Cal-EPA	0.064	64	0.0062	6.2	0.0064	6.4	0.00062	0.62	0.00064	0.64	6.2E-05	0.062
Benzo[k]fluoranthene[b]	–	1.1E-04	C	Cal-EPA	0.064	64	0.0062	6.2	0.0064	6.4	0.00062	0.62	0.00064	0.64	6.2E-05	0.062
Chrysene[b]	–	1.1E-05	C	Cal-EPA	0.64	640	0.068	68	0.064	64	0.0068	6.8	0.0064	6.4	0.00068	0.68
Dibenz[a,h]anthracene[b]	–	1.2E-03	C	Cal-EPA	0.0058	5.8	0.00051	0.51	0.00058	0.58	5.1E-05	0.051	5.8E-05	0.058	5.1E-06	0.0051
Indeno[1,2,3-cd]pyrene[b]	–	1.1E-04	C	Cal-EPA	0.064	64	0.0056	5.6	0.0064	6.4	0.00056	0.56	0.00064	0.64	5.6E-05	0.056
PM_{10}	–	–	NAAQS for PM_{10}		0.15	150	–	–	0.15	150	–	–	0.15	150	–	–

Site-Specific Assumptions for Residential AAC Equations:

Averaging Time (AT) (carc)	70	years (lifetime)
=	25,550	days
Averaging Time (AT) (noncarc)	365	days (reflects 52 weeks total duration of project)
Exposure Frequency (EF)	365	days (reflects number of days removal of contaminated material occurs and time a resident would be in area, 52 weeks × 7 days/week)
Exposure Time (ET)	24	hours/day (reflects number of hours a resident might be exposed)

Notes and Footnotes:

AAC equations, toxicity values, and sources based on EPA's regional screening levels (http://www.epa.gov/region9/superfund/prg/), which were last updated May 2012.

All AACs are rounded to two significant figures.

For noncarcinogenic effects, subchronic values were used when available. For toluene, the subchronic value was the same as the chronic value.

When both cancer-based and noncancer-based AACs were available for a particular chemical, the lowest value (for a particular risk level) was selected to be health protective, and is indicated with a box. ☐

[a] Classification of napthalene and ethylbenzene is currently under review by EPA. Also see U.S. EPA (2004).

[b] The PM_{10} NAAQS of 150 µg/m³ would also be protective of potential exposures to PAHs in dust.

[c] A subchronic RfC was estimated based on the chronic RfC. Refer to the text for details.

AAC – acceptable air concentration
Cal-EPA – California Environmental Protection Agency
C – AAC based on cancer endpoint
EPA – U.S. *Environmental Protection Agency*
IRIS – Integrated Risk Information System
IUR – inhalation unit risk
NAAQS – national ambient air quality standard
NC – AAC based on noncancer endpoint
PAH – *polycyclic aromatic hydrocarbon*
PM_{10} – particulate matter less than 10 µm in size
PPRTV – provisional peer-reviewed toxicity values (U.S. EPA; http://hhpprtv.ornl.gov/quickview/pprtv_papers.php)
RfC – reference concentration
THQ – target hazard quotient
TR – *target risk (carcinogenic)*

Air concentrations converted using the formula: (Concentration in mg/m³) = (Concentration in ppm) × (Molecular Weight/24.45)
taken from U.S. EPA: http://www.epa.gov/iris/subst/0276.htm.
Molecular weights taken from EPA, regional screening values: http://www.epa.gov/region9/superfund/prg/.

Conversion 1 ppm to	mg/m³
Benzene	3.19
Toluene	3.77
Ethylbenzene	4.34
Xylenes	4.34
Naphthalene	5.24
Benz[a]anthracene	9.34
Benzo[a]pyrene	10.32
Benzo[b]fluoranthene	10.32
Benzo[k]fluoranthene	10.32
Chrysene	9.34
Dibenz[a,h]anthracene	11.38
Indeno[1,2,3-cd]pyrene	11.30

Noncarcinogenic

$$\text{AAC noncarc (mg/m}^3) = \frac{\text{THQ} \times \text{AT(noncarc)}}{\text{EF} \times \text{ET} \times (1\text{ day}/24\text{ hrs}) \times (1/\text{RfC})}$$

Carcinogenic

$$\text{AAC carc (mg/m}^3) = \frac{\text{TR} \times \text{AT(carc)}}{\text{EF} \times \text{ET} \times (1\text{ day}/24\text{ hrs}) \times \text{IUR} \times 1{,}000}$$

Table 2. Maximum predicted ambient concentrations in air for particulate-related constituents North Plant MGP Site, Waukegan, Illinois

Constituent	Maximum Soil Concentration[a] (mg/kg)	Maximum Predicted Air Concentration[b] (mg/m^3)	Residential Acceptable Air Concentration[c] (mg/m^3)	Risk Ratio[d] (unitless)
Benz[a]anthracene	960	0.000144	0.0064	0.023
Benzo[a]pyrene	810	0.000122	0.00064	0.19
Benzo[b]fluoranthene	630	0.000095	0.0064	0.015
Benzo[k]fluoranthene	420	0.000063	0.0064	0.0098
Chrysene	970	0.000146	0.064	0.0023
Dibenz[a,h]anthracene	88	0.000013	0.00058	0.023
Indeno[1,2,3-cd]pyrene	300	0.000045	0.0064	0.0070

[a] Maximum soil concentrations listed are based on the highest concentration of each constituent sampled from within the proposed excavation areas. The highest concentrations were obtained from soil boring locations SB42-001 (6–8'), SP136-002 (4–6'), and SP156-002 (8–10').

[b] Based on an action level for PM_{10} of 0.15 mg/m^3 and calculated using the concentration of each constituent in soil as the assumed concentration of the constituent in airborne respirable dust.

$$\begin{array}{c}\text{Maximum Predicted Air}\\\text{Concentration (mg/m}^3\text{)}\end{array} = \begin{array}{c}\text{Maximum Soil}\\\text{Concentration (mg/kg)}\end{array} \times \begin{array}{c}\text{PM}_{10}\text{ Action}\\\text{Level (mg/m}^3\text{)}\end{array} \times (1\times10^{-6}\ \text{kg/mg})$$

[c] Acceptable air concentration (AAC) for a resident based on a 1×10^{-5} target risk (from Table 1).

[d] Risk ratio represents the ratio of the maximum predicted air concentration over the AAC. A value less than 1 represents an air concentration below the selected target risk level.

APPENDIX E

WASTE DISPOSAL PROFILE

WASTE MANAGEMENT

Profile Addendum: State of Illinois
GENERATOR'S CERTIFICATION OF SPECIAL WASTE STATUS

F. Additional Waste Stream Information

Profile Number: EF 1496

Generators Name: Former North Plant Site

Generators SITE Address: Undeveloepd parcel southeast of Pershing Rd. and Dehringer Rd, Waukegan, IL
(The location where the waste is generated)

Waste Name: MGP contaminated soil

The Illinois Pollution Control Act allows a Generator to certify that their pollution control waste or industrial process waste, is not an Illinois Special Waste (Section 3.45). By completing the following questionnaire, you may certify that the waste stream represented by the Waste Management Profile referenced above is not an Illinois Special Waste as defined in the Act.

Is the waste referenced above any of the following:

1. A Potentially Infectious Medical Waste (PIMW)? ☐ Yes ☑ No
2. A Hazardous Waste as defined in 40 CFR 261 or in 35 IAC 722.111? ☐ Yes ☑ No
3. A Liquid Waste (fails the paint filter test as defined in 35 IAC 811.107)? ☐ Yes ☑ No
4. A regulated PCB waste as defined in 40 CFR 761? ☐ Yes ☑ No
5. A NESHAP regulated asbestos waste other than waste from renovation or demolition? ☐ Yes ☑ No
6. A waste resulting from the shredding recyclable metals (auto fluff)? ☐ Yes ☑ No
7. A de-listed or de-characterized hazardous waste, subject to LDR requirements under 35 IAC 728.107? ☐ Yes ☑ No

In determining that this waste is not a liquid, I have used knowledge of the processes generating the waste and the attached supporting documentation: ☐ MSDS ☑ Analytical ☑ Other (explain below):

Profile established in 2002 and extended in 2004.

In determining that this waste is not RCRA hazardous, I have used knowledge of the processes generating the waste and the attached supporting documentation: ☐ MSDS ☐ Analytical ☑ Other (explain below):

MGP exemption

8. Is the waste represented by this profile sheet subject to the Illinois Solid Waste Management Act fee? ☐ Yes ☑ No

By signing below, I certify my waste is NOT an Illinois Special Waste, and that I understand that a person who knowingly and falsely certifies that a waste is not special waste is subject to the penalties set forth in subdivision (6) of subsection (h) of section 44 of the Illinois Pollution Control Act.

Name: (Print) Naren Prasad as rep for Integrys/North Shore Gas Title: Sr. Environmental Engineer

Signature: Naren Prasad Date: 4/18/2012

WM
WASTE MANAGEMENT, INC.

GENERATOR'S WASTE PROFILE SHEET

Profile Number: WMI EF 1496

Service Agreement on File? ☒ YES ☐ NO
Profile History ☐ Renewal ☒ Initial
☒ Non-Hazardous ☐ Non-Special ☐ TSCA ☐ Hazardous
Renewal Date: ~~09/06/03 9K~~ 08-01-07 9K

A. Waste Generator Information

1. Generator Name: Former North Plant MGP Site
2. SIC Code:
3. Facility Street Address: Undeveloped parcel Southeast of Pershing Rd & Dahringer Road
4. Phone: ( ) NA - vacant parcel
5. Facility City: Waukegan
6. State/Province: IL
7. Zip/Postal Code: 60085
8. Generator USEPA/Federal ID #: NA
9. County: Lake
10. State/Province ID #: 0971903009
11. Customer Name: North Shore Gas Company
12. Customer Phone: (312)240-4832
13. Customer Contact: Alison Millerick
14. Customer Fax: 312-240-4765
15. Billing Address 130 East Randolph Drive, Chicago, IL 60601 ☐ Same as above

B. Waste Stream Information

1. **Description**
   a. Name of Waste: MGP contaminated soil
   b. Process Generating waste: Site investigation and interim remedial activities at the former MGP are the processes generating the waste.

c. Color	d. Strong odor (describe):	e. Physical state @ 70°F	f. Layers	g. Free liquid range
brown	faint coal tar odor	☒ Solid ☐ Liquid ☐ Gas ☐ Sludge ☐ Other ☐ Powder/Dust	☒ Single Layer ☐ Multi-layer	0% to 0% h. pH: Range 7.5 to 9.62

i. Liquid Flash Point: ☐ <73°F ☐ 73-99°F ☐ 100-139°F ☐ 140-199°F ☒ ≥ 200°F ☐ Not applicable

j. Physical and Chemical Composition (List all constituents (including organics, debris, UHC's, and any incidental or periodic materials) present in any concentration and submit representative sample or analysis. Where non-hazardous organic solvents are present, please explain source.)

Constituents	Concentration Range	Constituents	Concentration Range
sand	~ 85%	debris (brick, concrete)	~ 5%
silt, clay & gravel	~ 10%		
MGP related contaminants	<1%		

[illegible]

k. ☐ Oxidizer ☐ Pyrophoric ☐ Explosive ☐ Radioactive
☒ Carcinogen ☐ Infectious ☐ Shock Sensitive ☐ Water Reactive

l. Does the waste represented by this profile contain any of the carcinogens which require OSHA notification? (list in Section B.1.j) ☐ YES ☒ NO

m. Does the waste represented by this profile contain dioxins? (list in Section B.1.j) ☐ YES ☒ NO

n. Does the waste represented by this profile contain asbestos? ☐ YES ☒ NO
If yes ☐ friable ☐ non-friable

o. Does the waste represented by this profile contain benzene subject to the waste operations NESHAP ☐ YES ☒ NO
If yes, concentration ________ ppm

p. Is the waste subject to RCRA Subpart CC controls? (for hazardous waste only) ☐ YES ☒ NO
If yes, volatile organic concentration ________ ppmw

q. Does the waste contain any Class I or Class II ozone-depleting substances? ☐ YES ☒ NO

r. Does the waste contain debris? (list in Section B.1.j) ☒ YES ☐ NO

s. Are all containers included in this waste stream empty and as defined in 40 CFR 261.7 and/or 761.79 (If yes, please include MSDS for former contents) ☐ YES ☐ NO ☒ NA

2. **Quantity of Waste**
   Estimate Annual Volume approx. 9000 ☐ Tons ☒ Yards ☐ Drums ☐ Other (specify)

3. **Shipping Information**
   a. Packaging: ☒ Bulk Solid ☐ Bulk Liquid ☐ Drum ☐ Other Type/Size: 15 cy trucks/roll-offs
   b. Shipping Frequency: Units approx. 600 Per: ☐ Month ☐ Quarter ☒ Year ☐ One time ☐ Other
   c. Is this a U.S. Department of Transportation (USDOT) Hazardous Material? (If no, skip d, e, and f) ☐ YES ☒ NO
   d. Reportable Quantity (lbs.;kgs.):
   e. Hazard Class/ID #:
   f. USDOT Shipping Name:
   g. Personal Protective Equipment Requirements: latex gloves, eye protection
   h. Transporter/Transfer Station:

Profile Number: WMI EF 1496

[illegible]

1. Is this a USEPA hazardous waste (40 CFR Part 261)? If the answer is no, skip to 2. ☐YES ☒NO
    a. If yes, identify ALL USEPA listed and characteristic waste code numbers (D, F, K, P, U) ______
    b. If a characteristic hazardous waste, do underlying hazardous constituents (UHCs) apply? ☐YES ☐NO (If yes, list in Section B.1.j)
2. Does the waste represented by this waste profile sheet contain any of the following pesticides or herbicides: Endrin, Lindane, Methoxychlor, Toxaphene, 2,4,D, 2,4,5-TP (silvex), chlordane, Heptachlor (and its epoxide)? ☐YES ☒NO
3. Is the waste from a CERCLA (40 CFR 300, Appendix B) or state mandated clean-up? ☐YES ☒NO
    If yes, attach Record of Decision (ROD), 104/106 or 122 order or court order that governs site clean-up activity. For state mandated clean-up, provide relevant documentation.
4. Does the waste represented by this waste profile sheet contain radioactive material, or is disposal regulated by the Nuclear Regulatory Commission? ☐YES ☒NO
5. Does the waste represented by this waste profile sheet contain concentrations of Polychlorinated Biphenyls (PCBs) regulated by 40 CFR 761? (≥50 ppm or derived from a source ≥ 50 ppm) ☐YES ☒NO
    a. If present, is the concentration based on a dry weight analysis? ☐YES ☐NO
    b. If yes, were the PCBs imported into the U.S.? ☐YES ☐NO
6. Is the waste represented by this waste profile sheet a de-listed or de-characterized hazardous waste, subject to LDR requirements under IL TI 35 728.107? ☐YES ☒NO
7. Is the waste represented by this waste profile sheet subject to the Illinois Solid Waste Management Act fee? ☐YES ☒NO
    If so, explain.
8. Does the waste profile sheet and all attachments contain true and accurate descriptions of the waste material, and has all relevant information within the possession of the Generator regarding known or suspected hazards pertaining to the waste been disclosed to the Contractor? ☒YES ☐NO
9. Will all changes which occur in the character of the waste be identified by the Generator and disclosed to the Contractor prior to providing the waste to the Contractor? ☒YES ☐NO
10. By checking "yes", I certify my waste is not an Illinois Special Waste, and that I understand that a person who knowingly and falsely certifies that a waste is not special waste is subject to the penalties set forth in subdivision (6) of subsection (h) of section 44 of the Illinois Pollution Control Act. ☐YES ☒NO
11. How has the generator determined the waste is not a RCRA hazardous waste? ☒Analysis ☐ MSDS ☐ Other (explain)

☐Check here if a Certificate of Destruction or Disposal is required.

Any sample submitted is representative as defined in 40 CFR 261 - Appendix I or by using an equivalent method. I authorize WMI to obtain a sample from any waste shipment for purposes of recertification. If this certification is made by a broker, contractor, or consultant, the undersigned signs as authorized agent of the generator and has confirmed the information contained in this Profile Sheet from information provided by the generator and additional information as it has determined to be reasonably necessary. If approved for management, Contractor has all the necessary permits and licenses for the waste that has been characterized and identified by this approved profile.

Certification Signature: Alison Millerick Title: Senior Engineer

Name (Type or Print): Alison Millerick Company Name: North Shore Gas Date: ~~8/30/02~~ 9/4/02 AM

☒Check if additional information is attached. Indicate the number of attached pages ~~12~~ 7 AM

D. WMI Management's Decision **FOR WMI USE ONLY**

1. Management Method ☒Landfill ☐Non-hazardous Solidification ☐Bioremediation ☐Incineration ☐Hazardous Stabilization ☐Other (Specify) 25 Sod disposal
2. Proposed Ultimate Management Facility: COUNTRYSIDE
3. Precautions, Special Handling Procedures, or Limitation on Approval:
    None.
4. Waste Form ______ 5. Source ______ 6. System Type ______

Special Waste decision ☒Approved ☐Disapproved

Salesperson's Signature: ______ Date: ______

Division Approval Signature: ______ Date: ______

Special Waste Approvals Person Signature: Joseph Kosh Date: 09-06-02

Extended date Joseph Kosh 07-01-04

WM
WASTE MANAGEMENT, INC.

Annual Generator Special Waste Recertification for Disposal of Special Waste

Generator Name: North Shore Gas Co, Profile Number: EP 1496

Illinois EPA ID Number: 0971903009

Generic Waste Name: MGP contaminated soil

Process which generated waste: Remediation activities Former MGP site

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is true, accurate, and complete. I have used intimated knowledge of our process which generates the waste and certify that neither the process generating the waste nor the chemical or physical characteristics of the waste have changed since the pre-acceptance analysis was conducted on this waste. I am aware that there are significant penalties for knowingly submitting false information, including the possibility of fine and imprisonment.

For waste being received for disposal, please certify one of the following by marking it with an "X":

X There have been no changes in the following since the Special Waste Pre-acceptance form was filed:

1. Laboratory analysis (copies to be attached);
2. Raw material in the waste-generating process;
3. The waste-generating process itself;
4. The physical or hazardous characteristics of the waste; and
5. New information on the human health effects of exposure to the waste; or

____ The change in the physical or hazardous characteristic of the waste is not sufficient to require a new special waste profile.

Explain:

Signature: Christopher F. Szela
(Facility operator or duly authorized agent)

Date: 07-01-04

Printed Name: Christopher E Szela

Title: Project Manager

Note to Generator: Pre-acceptance analysis must be conducted at least every five years in accordance with the receiving facility's permit.

Special Waste Group
5245 W. 38th Street
Cicero, Illinois 60804
708-222-5056

Dear Generator,

WPS # EF 1496

Your waste has been found to contain reactive sulfide and/or cyanide in concentrations greater than 10 PPM, but less than 500 PPM for sulfides and 250 PPM for cyanides. The Illinois EPA has indicated that additional information concerning this waste stream will be required prior to landfill approval. Specifically:

Has the waste ever caused injury to a worker because of H2S or HCN generation?	Yes [✓ No]
Have the OSHA workplace air concentration limits for either H2S or HCN been exceeded in areas where the waste is generated, stored, or otherwise handled?	Yes [✓ No]
Have air concentrations of H2S or HCN above a few PPM ever been encountered in areas where the waste is generated, stored, or otherwise handled?	Yes [✓ No]
Have any of the problems described above ever been encountered with disposal of this waste? (i.e. land disposal, treatment, etc.)	Yes [✓ No]

If you indicated a positive response to any of the above questions, please explain below:

____

____

____

Sincerely,

(Generator's Signature)

Joe Kash
Regional Compliance Manager

SENIOR ENGINEER
(Title)

9/5/02
(Date)

E F 1496

Special Waste Preacceptance Form (Profile Identification Sheets)

Facility Name Countryside Landfill
Facility Address 31725 N Rt 83, Grayslake
Generator Name: Former North Plant MGP Site
Generator Address: Pershing Rd. & Dahringer Rd.
Waukegan, IL 60085
ILGenerator ID No: 097 150 3009
Generator SIC Code:

Facility ID No 0970250003
Generator Contact Person Alison Millerick
Generator Mailing Address:
(If different)
Phone Number: (312) 240-4837
Transporter:
Transporter Phone:

This is a: ☐ Pollution Control Waste, ☐ Industrial Process Waste as defined in Section 3 of the Act.

(leave blank any constituent for which analysis has not been conducted)

Process Description Site investigation and interim remedial activities at the former MGP
Generic Name: MGP Contaminated Soil
Ultimate Disposal: 25-Codisposal

Analysis

Physical Characteristics: Brown
Paint filter test: [✓ Pass]
(Indicate pass or fail)
Waste Phase: Solid
Percent Acidity/Alkalinity N/A

Major Constituents: Soil
Pnetrometer Test: N/A
Percent Solids: 92.3
Flash Point °F: >200
pH (for aqueous wastes only) 7.5

		ppm		
	Constituant	Limit	PQL	Result
D004	Arsenic	5.0		<0.10
D005	Barium	100.0		<1.0
D006	Cadmium	1.0		<0.050
D007	Chromium	5.0		<0.050
D008	Lead	5.0		<0.050
D009	Mercury	0.2		<0.0020
D010	Selenium	1.0		<0.10
D011	Silver	5.0		<0.050
D012	Endrin	0.02		<0.00500
D013	Lindane	0.4		<0.0025
D014	Methoxychlor	10.0		<0.025
D015	Toxaphene	0.5		<0.050
D016	2, 4-D	10.		<0.10
D017	2, 4, 5-TP Silvex	1.0		<0.010
D018	Benzene	0.50		<0.10
D019	Carbon Tetrachloride	0.5		<0.10
D020	Chlordane	0.03		<0.010
D021	Chlorobenzene	100.0		<0.10
D022	Chloroform	6.0		<0.10
D023	o-Cresol	200.0		<0.10
D024	m-Cresol	200.0		<0.10
D025	p-Cresol	200.0		<0.10

		ppm		
	Constituant	Limit	PQL	Result
D026	Cresol	200.0		
D027	1, 4-Dichlorobenzene	7.5		<0.10
D028	1, 2-Dichloroethane	0.5.		<0.10
D029	1, 1-Dichloroethylene	0.7		<0.10
D030	2, 4-Dinitrotoluene	0.13		<0.10
D031	Heptachlor (& epoxide)	0.008		<0.0050
D032	Hexachlorobenzene	0.13		<0.10
D033	Hexachlorobutadiene	0.5		<0.10
D034	Hexachloroethane	3.0		<0.10
D035	Methyl ethyl ketone	200.0		<0.10
D036	Nitrobenzene	2.0		<0.10
D037	Pentachlorophenol	100.0		<0.50
D038.	Pyridine	5.0		<0.20
D039	Tetracholorethylene	0.7		<0.10
D040	Trichloroethylene	0.5		<0.10
D041	2, 4, 5-Trichlorophenol	400.0		<0.50
D042	2, 4, 6-Trichlorophenol	2.0		<0.10
D043	Vinyl Chloride	0.2		<0.10
	Reactive Sulfide	500.		<230 *See Letter
	Reactive Cyanide	250.	0.32	1.6
	Phenols	1000.	0.29	2.0
	EOX	10,000		
	PCBs	50.		<0.16

The above analysis has been conducted in accordance with SW-846 Test-Methods for Evaluation of Solid Waste. I have reviewed the analysis and the attached certification form (if applicable) and determined that the waste will be: ✓ accepted ______ rejected in accordance with the terms of our facility operating permit. In addition, I agree to require the generator to recertify annually that this waste has not changed sine the preacceptance analysis was conducted.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is true, accurate and complete. I am aware that there are significant penalties for knowingly submitting false information, including the possibility of fine and imprisonment.

Signature Joseph Kash
Date: 09-06-02

Printed Name: Joseph Kash
Title: SwAP

APPENDIX F

HEALTH AND SAFETY PLAN

NATURAL
RESOURCE
TECHNOLOGY

SITE-SPECIFIC HEALTH AND SAFETY PLAN

FORMER MANUFACTURED GAS PLANT SITE
NORTH SHORE GAS COMPANY NORTH PLANT SITE
849 PERSHING ROAD
WAUKEGAN, ILLINOIS

Project No: 2088

Prepared by:
Natural Resource Technology, Inc.
23713 W. Paul Road, Suite D
Pewaukee, WI 53072

July 26, 2012

Andrew Millspaugh Environmental Engineer	Glenn Luke Environmental Engineer

NATURAL RESOURCE TECHNOLOGY

SECTION A HEALTH AND SAFETY PLAN SUMMARY

A copy of this Health and Safety Plan (HASP) will be maintained on site during field activities and updated as deemed necessary by the Project Manager.

SITE INFORMATION

Site Address:	849 Pershing Road
Municipality / County:	Waukegan, Il / Lake County
Major Cross Roads and/or Geographic Features:	SE of W Greenwood Ave and HWY 137 ~0.5 mile West of Lake Michigan

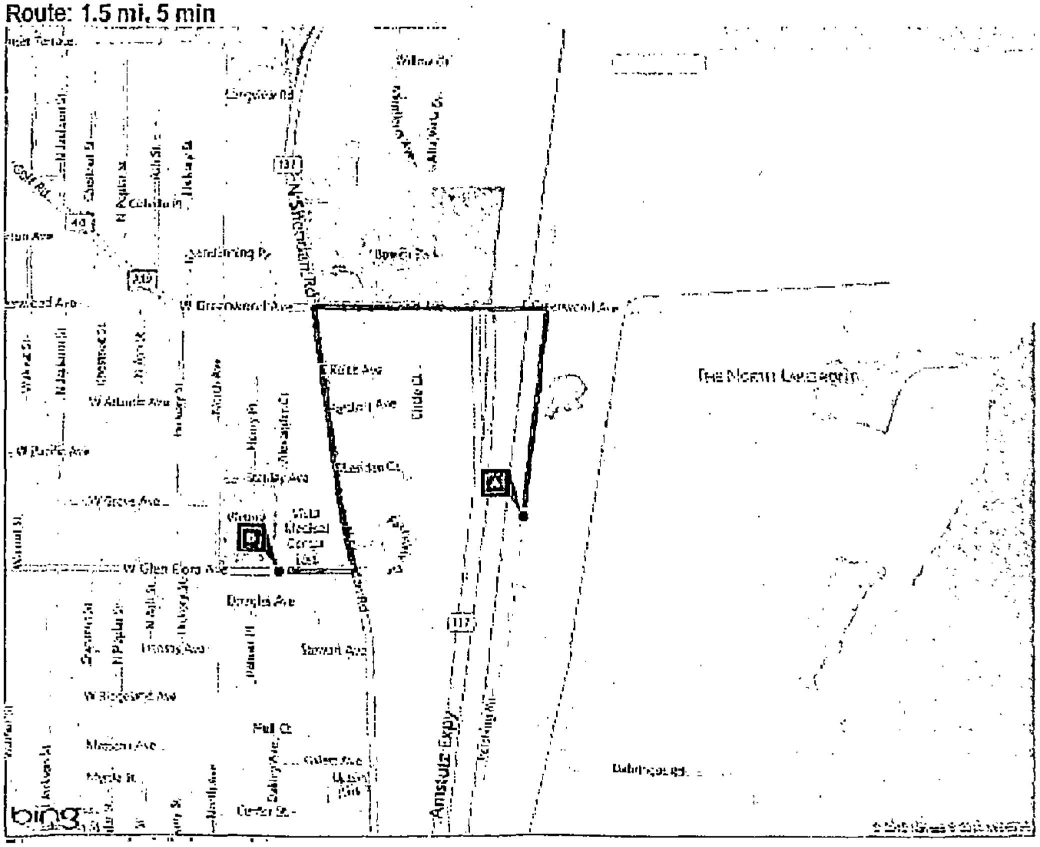
HOSPITAL INFORMATION

Route to Hospital Map, detailed description on next page

Hospital Name:	Vista Medical Center – East
Hospital Address	1324 North Sheridan Road Waukegan, Il 60085

Route to Hospital Map, detailed description on next page

Route: 1.5 mi, 5 min



HOSPITAL ROUTE DESCRIPTION

	Description
1.	Start at **849 Pershing Road** going NORTH toward Greenwood Ave
2.	Turn LEFT on Greenwood Ave
3.	Turn LEFT on **North Sheridan Road**
4.	Arrive at **1324 North Sheridan Road**
5.	Turn RIGHT on **Glen Flora Ave** for Emergency Room Entrance

EMERGENCY CONTACT LIST

	Agency Name and Address (if applicable)	Contact Number(s)
Fire Dept:	Waukegan Fire Department	911 / 847.249.5410
Police:	Waukegan Police Department	911 / 847.360.9000
Sheriff:	Lake County Sheriff's Department	911 / 847.377.4000
Local Utilities:	JULIE Illinois One-Call System	811 / 800.892.0123
NRT PM:	Glenn R. Luke	262.523.9000 office 262.719.4513 cellular
Ambulance	911	911
Hospital:	Vista Medical Center – East 1324 North Sheridan Road Waukegan, Illinois, 60085	911 Emergency General (847.360.3000)

Description of Site:
The North Plant Site is a former manufactured gas plant covering approximately 21 acres and comprises four parcels. The site is bound to the north by Dahringer Road, to the west by Pershing Road, to the east by property owned by the EJ&E Railroad, and to the south by property owned by A.L. Hasen Manufacturing Company. Two parcels covering approximately 16 acres are currently vacant and undeveloped. The remaining area is owned by EJ&E Railroad and Includes the remainder of the Waukegan Tar Pit.

Activities:
Surface material at the site will be removed through excavation for landfill disposal. Subsurface source material at the site will be remediated through in situ solidification/stabilization. Material is expected to contain contamination related to the former MGP facility and typical of a developed industrial area. Excavation and ISS will be performed by a qualified contractor. NRT will perform oversight activities and will collect and process soil, air, and wastewater samples. NRT will not operate any excavation equipment. Specific activities anticipated for NRT include the following:

Air Monitoring:
- Operation and collection of samples from SUMMA canisters
- Operation of portable aerosol monitoring equipment
- Operation and maintenance of photoionization detector

Soil Sampling:
- Collection, processing, and shipping of samples for laboratory analysis
- Preserving soil samples with ice and/or methanol

Wastewater Disposal Sampling:
- Collection, processing, and shipping of samples for laboratory analysis
- Preservation of water samples with ice, hydrochloric acid, nitric acid, sulfuric acid, and/or sodium hydroxide

HEALTH AND SAFETY MONITORTING AND LABORATORY AND FIELD ANALYSIS:

Air monitoring will be performed for VOCs and particulates.

EQUIPMENT, PRESERVATIVES, CALIBRATION MATERIAL, DECONTAMINATION CHEMICALS:

MSDS for listed materials are in Appendix A

- Air Monitoring Equipment – with lithium ion battery
- Field Chemicals including bug repellent spray or cream (e.g., Off) and sun screen
- *First Aid Kit including eye wash sterile solution, rapid aid instant cold pack,* PVP iodine scrub solution, burn spray, hydrocortisone cream 1%, neomycin antibiotic ointment, antiseptic spray
- Equipment decontamination with Alconox

Health/Safety Hazards on Site:

Chemical / Material	Media	Maximum Concentration	Routes of Exposure
Volatile Organic Compounds	Soil/Water	High, Potential for tar	Inhalation, ingestion, skin/eye contact.
Semi-Volatile Organic Compounds	Soil/Water	High, Potential for tar	Inhalation, ingestion, skin/eye contact.
Metals (arsenic, copper, lead, mercury, zinc)	Soil	Low	Inhalation, ingestion, skin/eye contact

The safety coordinator/emergency coordinator will be the NRT staff personnel supervising the field investigation/work.

Protective Equipment/Instruments:

In general, personal protective equipment (PPE) will be used as specified on Table 1 for the anticipated project tasks. The health and safety manager and/or the project manager may require additional PPE based on field conditions or additional data collection.

Safety Equipment:

Fire extinguishers and first aid kits in field vehicles and field office.

DISTRACTED DRIVING ACTIVITY PROHIBITIONS

Illinois bans the use of handheld cell phones while driving in school zones or highway construction zones. NRT prohibits all driving distraction activities, including eating, grooming, reading, text messaging, taking notes, internet access, and media viewing related activities when driving NRT owned or rented vehicles, whether driving for business or personal reasons.

NRT prohibits all driving distraction activities; including eating, grooming, reading, text messaging, taking notes, internet access, and media viewing related activities when driving NRT owned or rented vehicles, whether driving for business or personal reasons.

The use of cellular phones for conversation should be reserved as a non-driving activity or limited with the following guidelines:

- The first priority during cell phone use is safe driving. Never allow a phone conversation to distract you from concentrating on driving.
- Always follow restrictions and bans for the state and municipality you're traveling in; the following link has a summary of State laws http://www.ghsa.org/html/stateinfo/laws/cellphone_laws.html.
- If it's unsafe for you to answer a call, let your voice-mail pick it up.
- Use a headset while driving, or pull over to use a handheld phone. NRT will provide a hands-free accessory of NRT's choosing, for your cell phone if the accessory did not come with your cell phone.
- Keep conversations short and suspend the call in serious circumstances (e.g., heavy traffic, stop-and-go traffic, maneuvering around hazards, severe weather conditions).
- Avoid placing calls while moving; use speed dialing when making calls and strive to plan calls before driving is started. When dialing manually without the speed-dialing feature, dial only when the vehicle is stationary.
- When receiving a call, inform the caller that you are driving and will suspend/end the call without notice if traffic conditions become hazardous in any way. If possible, ask a passenger to make the call for you or at least dial the number for you.
- If you're talking while driving, keep your head up, your eyes on the road, and frequently check the side and rearview mirrors.
- To obtain roadside assistance or report emergencies, use 911 and give exact location, nature of emergency, name, and number.

Reporting
Report all cell phone near-misses and accidents on the NRT Accident/Near-Miss Reporting Form included in Appendix B.

Table 1. Summary of PPE By Sampling Activities

PPE Required	Site Reconnaissance/Field Mobilization	ISS Field Oversight	Soil Sampling (heavy equipment or drill rig)	Soil Sampling (hand augers or shovels)	Test Pit Excavation/Trenching	Subsurface structure inspection (from surface)
Steel-Toed Boots (Rubber)		Av	Av	Av	Av	Av
Steel-Toed Boots (Leather)	X	X	X	X	X	X
Hard Hat		X	X		X	X
Safety Glasses/Goggles	X	X	X	X	X	X
Gloves-Inner (Nitrile)	Av	AV	X	X	X	Av
Gloves-Outer (Nitrile)			X	X	X	
High Visibility Vest	X	X	X	X	X	X
Tyvek Coverall			Av	Av	Av	
Photoionization Detector (PID)		Av	X	X	Av	Av
Hearing Protection		Av	Av		Av	Av

X = PPE Required
Av = Have available at work site

FIELD HEALTH & SAFETY PLAN REVIEW

I CERTIFY THAT I HAVE READ AND UNDERSTOOD ALL HEALTH AND SAFETY PROCEDURES WITHIN THIS HEALTH AND SAFETY PLAN:

Name and Affiliation (printed)	Signature	Date

SITE-SPECIFIC SAFETY MEETINGS				
Lead	Date	Time	Topic(s)	Personnel

SITE-SPECIFIC SAFETY MEETINGS				
Lead	Date	Time	Topic(s)	Personnel

SECTION B - HEALTH AND SAFETY PLAN

TABLE OF CONTENTS

APPENDICES

1 INTRODUCTION

1.1 Purpose and Scope

This document describes the health and NRT safety procedures and requirements for field activities. This document is intended to serve as a Multi-Site Health and Safety Plan (HASP) to ensure that fieldwork performed by NRT is in compliance with applicable federal, state, and local occupational safety and health regulations. Subcontractors shall be made aware of the requirements of this plan; however, **subcontractors are required to have their own plan for the health and safety of their own employees** and for following all applicable federal, state, and local regulations.

In compliance with HAZWOPER, a comprehensive work plan will be developed for each site to evaluate the logistics and resources needed to reach work objectives for site operations. The work plan will identify key individuals and their responsibilities, site activities, methods for accomplishing objectives (sampling plans), and normal operating procedures. Site-specific work plan(s) will be available on location at the site.

1.2 Health and Safety Plan Modification Procedures

Due to varying site conditions or encountering unanticipated hazards, it may be necessary to revise the health and safety plan. Necessary plan changes that call for more stringent procedures or a higher level of personal protective equipment (PPE) may be made at any time by the Health and Safety Manager (HSM), Project Manager (PM), or Task Leader in cooperation with the Project Health and Safety Officer (PHSO).

Plan changes that would make safety procedures or PPE requirements less stringent may be made only with approval of the HSM and PM. Plan changes must always be put in writing and communicated to all field personnel.

2 KEY PERSONNEL/IDENTIFICATION OF H&S PERSONNEL

2.1 Key Personnel

Responsibilities for health and safety compliance issues associated with hazardous waste operations are primarily vested in the project organization, with support from appropriate health and safety professionals on NRT's technical and administrative staffs.

2.2 Site-Specific Health and Safety Personnel and Organizational Responsibility

2.2.1 Corporate Health and Safety Manager

The Corporate Health and Safety Manager (HSM) acts as a technical resource to all NRT offices on health and safety matters. This person is responsible for ensuring that all NRT health and safety programs comply with applicable federal, state, and local statutes for safety and health protection; executive orders; operating orders; permits and regulations; and company policies and procedures. The HSM is also responsible for review and approval of all site-specific Health and Safety Plans, serves in a consultation capacity to the technical staff on health and safety-related issues, and has the authority to conduct health and safety audits.

2.2.2 Project Manager

The Project Manager (PM) is accountable for health and safety compliance on his or her projects. The PM is responsible for the technical and financial execution of the project, and has the authority to commit resources, adopt program policies and procedures, and approve expenditures and subcontracts. The PM will ensure that adequate resources are budgeted and available to implement the health and safety program and that appropriate technical resources are brought in to support the health and safety needs of the project. The PM will ensure that health and safety is a high priority in planning fieldwork and/or lab studies, and that adequate resources are available to develop and implement an appropriate project-specific health and safety plan.

2.2.3 Project Health and Safety Officer

The Project Health and Safety Officer (PHSO) is responsible for developing and implementing the project- or Site-Specific Health and Safety Plan. In the event a PHSO has not been identified for a specific project, the PM will assume those responsibilities. The PM is ultimately responsible for health and safety for the project. It is the responsibility of the PM to report any unsafe conditions reported by project staff to the HSM and to work cooperatively to mitigate unsafe conditions. The PHSO will also ensure compliance with health and safety requirements presented in this Plan. The PM will serve as the PHSO unless site-specific hazards are identified warranting assignment of a PHSO to the project. To meet these responsibilities, the PM/PHSO may:

- Act as a health and safety consultant to the project field staff
- Provide site-specific training to staff assigned to work at the site
- Review and confirm any changes in personal protective clothing or respiratory protection requirements
- Require the specific health and safety precautions be taken before personnel enter a site
- Restrict access to the site or a portion thereof
- Perform necessary personnel monitoring
- Stop work when the health or safety of project personnel are jeopardized and order the immediate evacuation of personnel from any area of the site
- Require personnel to obtain immediate medical attention if warranted
- Provide health and safety briefings to site visitors
- Enforce the requirements stated in the Corporate Health and Safety Manual and the project- or Site-Specific Health and Safety Plan

2.2.4 Field Team Members

NRT personnel must know, understand, and comply with the requirements of this Plan developed for their projects. Field personnel will:

- Read and understand all applicable health and safety plans
- Perform work safely
- Be aware of and alert for signs and symptoms of work-related injuries and illnesses
- Promptly report any unsafe conditions that may occur on site to the PHSO, PM, and/or HSM

2.2.5 Subcontractors

Subcontractors have primary responsibility for the health and safety of their own employees. However, NRT is required by OSHA standards (e.g., 29 CFR 1910.120) to provide information to its subcontractors on known or potential workplace hazards, as well as the methods proposed to manage the identified hazards.

It is currently OSHA policy to issue citations to prime contractors in the event that their subcontractor is found to be out of compliance with regulatory requirements. NRT may incur civil penalties as a result of non-compliance with regulatory requirements by its subcontractors and/or injuries or illnesses incurred by the subcontractor's staff. Personal injury suits have been successfully brought against prime contractors in instances where a subcontractor's employee has demonstrated that the lack of health and safety oversight on the part of a prime contractor played a role in his or her sustaining an injury or illness.

NRT intends to manage its subcontractors to protect the health and well-being of NRT staff. NRT's objective is to manage subcontractors in a way that limits NRT's and our client's liabilities related to subcontractor performance, including management of health and safety issues. To achieve this objective, a minimum level of subcontractor surveillance, with respect to health and safety issues is required.

When required by NRT, **the subcontractor must review project-specific health and safety information and hazards, and develop and implement a health and safety plan.** This plan must comply with all applicable health and safety regulations and any project-specific requirements that NRT has specified. The subcontractor must provide NRT with a copy of this plan before the start of work. NRT acceptance of the subcontractor's plan does not mean that NRT concurs with the adequacy of the plan for protection of the health and safety of the subcontractor's employees. That responsibility rests solely with the subcontractor. NRT's review of subcontractor health and safety plans will be for the purposes of: **1) assessing potential health and safety impacts to NRT personnel and 2) meeting NRT legal responsibilities as a prime contractor.** Any deficiencies in the subcontractor's plan or inconsistencies in proposed work practices between NRT and its subcontractor should be identified. If appropriate, these deficiencies or differences should be resolved before the work begins.

2.3 Communication

Field staff and subcontractors are both permitted to call 911 in an emergency situation. As part of preparing the Site-Specific Health and Safety Plan, 911 services will be verified for each site location. Assuming the PM is not on site, field staff should contact the PM as soon as possible regarding the on-site situation. It is then up to the discretion of the PM to contact the Client.

3 TASK/OPERATION SAFETY AND HEALTH RISK ANALYSIS

3.1 Historical Overview of Site

A historical overview of the site along with details of the project description is provided in the project Work Plan. Specific protocols for sampling, sample handling and storage, chain-of-custody, and laboratory and field analyses to be performed are described in NRT's SOPs. Quality assurance/quality control (QA/QC) procedures are structured in accordance with applicable technical standards, regulations, and guidance.

3.2 Risk Analysis-General

Personnel in the vicinity of the drilling, excavation, and sampling operations are not only subject to the hazards of direct exposure to contaminants, but also to dangers posed by machinery operation. In addition, stresses due to working in protective clothing may be encountered. Physical, chemical, and biological hazards are present to some degree at most job sites.

3.2.1 Heat/Cold Stress

Temperature extremes, wet working conditions, and PPE can all combine to cause injury and illness to field workers. In general, high temperatures and/or impermeable PPE can induce heat stress. Cold stress can be induced by low temperatures and/or wet skin or clothing.

PRECAUTIONS

Heat Stress: Wear thin cotton clothing under Tyvek™ suits; have thirst liquids available; try to schedule work during cooler parts of the day (early morning or evening), take frequent breaks, and, stop work and move to a cool location if heat exhaustion occurs (e.g., light headedness, profuse sweating).

Cold Stress: Dress in layers and regulate clothing to activity levels; wear plenty of layered clothing (so layers can be added or removed); cover exposed skin especially if it is windy; use glove liners which can keep hands warm but reduce dexterity; use face masks and helmet liners to keep head warm and, take frequent breaks to warm up or stop work if conditions get too cold.

SYMPTOMS

Heat Stress: Profuse sweating, weakness, rapid pulse, dizziness, nausea, and headache.

Heat Stroke: high temperature, hot, dry skin, nausea, vomiting, fatigue, dizziness, muscle cramps, and flushed appearance.

Cold Stress: Involuntary shivering, speech difficulty, loss of manual dexterity, and memory lapse. The most severe localized form of cold stress, frostbite, causes the skin to become numb, pale, hard, and cold.

FIRST AID MEASURES

Heat Stress: Move the person to a shaded, cool area. Have them drink large quantities of fluids.

Heat Stroke: Seek medical attention immediately; cool the person as quickly as possible

Cold Stress: Move the person to a heated, sheltered area. Immerse exposed body parts in warm (104-130 °F) water. If exposed skin is numb, do not rub it. If frostbite is suspected, seek medical attention as soon as possible.

3.2.2 Slips, Trips, and Falls

The most common hazards that will be encountered on a jobsite will be slips, trips, and falls. Common sense will be used to avoid these hazards. When working on slippery surfaces, tasks will be planned to decrease the risk of slipping. Slippery surfaces will be avoided, work and travel will not be hurried, and good housekeeping will be maintained. It is not advisable to walk and talk on a cell phone at a job site, if possible. It is also not advisable to text while walking on a job site. Personnel must vigilantly observe where they are working and walking to avoid slips, trips, and falls.

3.2.3 Vehicular Traffic

Another common hazard that will be encountered at many sites will be vehicle traffic, including cars, trucks, drilling rigs and heavy machinery. When it is necessary to move a vehicle, site drivers must be mindful that pedestrians are present on site. If appropriate, site personnel on foot may guide site drivers while moving vehicles to alert and protect non-site personnel. Site personnel on foot must avoid standing in blind spots or in high traffic areas, be aware of vehicle locations, and make eye contact with site drivers if crossing the path of vehicles is necessary. Site personnel on foot must vigilantly observe where they are working and walking to avoid being struck by vehicles which, for one reason or another, are moving. Finally, when working in high traffic areas (e.g., on the edge or in the middle of city streets, heavily used parking areas) site personnel are required to set up traffic cones and wear orange traffic safety vests to alert drivers to their presence.

Work performed in rail yards or along railroad tracks poses an additional hazard. Numerous incidents have occurred when working between or alongside rail lines and have resulted in serious injury or death. Therefore, the following rules must be followed when working near rail lines:

- Never walk or step on a railroad track; tracks can be slick and injury due to slipping off a track is possible
- Never run over tracks - Always Walk; tripping injuries can occur when running over the tracks which can result in serious head injuries
- Never stand between the tracks; when necessary, walk across the railroad tracks and stand to one side or the other of a rail line
- Always wear a hard hat, eye protection, steel-toed boots, and an orange reflective vest for personal protection

In addition to these rules, whenever work is done near railroad tracks or in a railroad right-of-way, the railroad company must be contacted and a flagman requested to monitor work activities. No work will be done without a railroad flagman being present unless the railroad company expressly permits it.

3.2.4 Hunting Season

It is possible field activities will be conducted during hunting seasons and may pose a risk to site workers. The hunting season dates will be reviewed prior to conducting field activities in non-urban areas. During hunting season, site workers will wear a minimum of at least 50% of the outer clothing above the waist in 100% blaze orange (faded blaze orange is not acceptable) to alert potential hunters to their presence. If site work is performed in densely vegetated locations, site personnel may post signs along access locations to indicate their presence.

3.2.5 Exposure to Excessive Noise

Overexposure to noise can result in hearing loss. If it is difficult to hear normal speech when the speaker is 3 to 4 feet from the listener, and that condition is present for more than four hours a day, it will be assumed that the noise level exceeds 85 decibels (dBA) and appropriate hearing protection will be used. The disposable "ear plug" type hearing protectors are recommended.

3.2.6 Chemical Hazards

PPE requirements are stated in Personnel Protection Section 5 of this Plan. Material Safety Data Sheets for suspected contaminants present at a site are contained in Appendix A.

3.2.7 Biological Hazards

During warm weather months, potential biological hazards include venomous insects, snakes, and poisonous plants. Appropriate safety measures, such as the use of insect repellent (with DEET) and probing of possible nesting areas, will be taken to prevent exposure to biological hazards.

Ticks are common in wooded and heavily vegetated areas in spring, summer, and fall in the Midwest. The deer tick, also known as a bear tick or a blacklegged tick, is much smaller than the wood tick. Adults are about 1/8 inch long and reddish-brown in color. They live in the woods and are common along trails. Deer ticks crawl, rather than jump, so are most likely to come into contact with humans as they brush against low-lying vegetation.

Wood ticks are a type of hard tick. Male wood ticks have mottled gray backs. Females have gray coloration behind their heads. They are found in both grassy and wooded areas. Both wood ticks and deer ticks can occasionally cause illness in their hosts. The deer tick can sometimes carry Lyme disease, a serious illness which can cause a rash, fever, tiredness, and flu-like symptoms. Wood ticks can carry Rocky Mountain spotted fever, a rare but sometimes serious illness that causes a rash and severe flu-like symptoms. At the end of the day personnel should do a self-inspection for ticks to remove them. Pulling them off with tweezers works the best. Grab the tick as close to the skin as possible and pull upward with a slow steady pressure. Try not to leave the head or any mouth parts of a tick imbedded in the skin as it can transmit diseases.

Poison ivy, poison oak, and poison sumac release oil (urushiol) when the leaf or other plant parts are bruised, damaged, or burned. When the oil gets on the skin an allergic reaction, referred to as contact dermatitis, occurs in most exposed people as an itchy red rash with bumps or blisters. When exposed to 50 micrograms of urushiol, an amount that is less than one grain of table salt, 80 to 90 percent of adults will develop a rash. The rash, depending upon where it occurs and how broadly it is spread, may significantly impede or prevent a person from working. Although over-the-counter topical medications may relieve symptoms for most people, immediate medical attention may be required for severe reactions. Long sleeves and pants will provide protection from contact with poisonous plants and insects. Field personnel should familiarize themselves with poison ivy, poison oak, and poison sumac. Care should be taken to avoid contact with poisonous plants.

3.2.8 Thunderstorms and Rain

Drilling/excavation and sampling activities during electrical storms poses a hazard of electrocution by a lightning strike, and adverse working conditions, as well as high winds tipping the drill rig.
Drilling/ excavation and sampling activities will stop and the drilling rig mast will be lowered at the

approach of a thunderstorm. Drilling activities during rainstorms can cause not only slippery conditions but also excess friction on cathead pulleys. This can cause dangerous conditions during drive sampling operations. Therefore, drive sampling operations will cease and, depending on the PHSO's assessment, drilling may be halted.

When drilling or using excavating equipment, if lightning is seen or thunder is heard, regardless of the distance, all drilling and excavation operations must be temporarily shut down. If possible, the mast on the rig should be lowered and connection with the drill pipe in the ground broken. Operations may not resume until all threat from lightning is over, which is at least 30 minutes after the last observed lightning or thunder. Lighting strikes are possible up to 10-miles from an obvious storm front. It is recommended to check local radar images to determine if other storms are following the one that shut operations down before resuming drilling.

3.3 Risk Analysis-Task-by-Task

Table 1. Anticipated Task Hazards

	Hazards													
					Physical									
	Chemical	Biological	Explosive	General Safety	Heat	Cold	Traffic	Noise	Slip, Trips, Falls	Heavy Equipment	Underground utilities	Overhead Power	Lines	Trench/Excavation
Site reconnaissance/field mobilization	X	X	X	X	X	X	X	X	X	X	X		X	
Well and borehole drilling	X	X	X	X	X	X	X	X	X	X	X	X	X	
Monitoring well development	X	X		X	X	X	X		X					
Groundwater level measurements	X	X		X	X	X	X		X					
Groundwater and soil sampling	X	X		X	X	X	X		X					X
Test pits and excavation	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Surface water sampling	X	X		X	X	X	X	X	X	X			X	
Sampling solid material, wipe sampling, surface sampling	X	X		X	X	X	X	X	X	X	X	X	X	
Sampling through ice	X	X		X		X	X	X	X	X			X	

3.3.1 Well and Borehole Drilling

In addition to the possibility of contact with the above listed chemicals, physical hazards associated with well and borehole drilling includes:

- Snapping cables
- Brush and equipment fires
- Being hit by equipment
- Being caught in rotating tools
- Falling objects
- Exposure to excessive noise
- Contact with energized electrical lines

3.3.2 Air Rotary Drilling

This type of drilling, in addition to the above listed hazards, may also expose field personnel to blowing dust and high-pressure airlines.

3.3.3 Groundwater, Seep, Soil, and Pipe Sampling

Collection of these samples presents inhalation and, direct skin contact hazards with the substances listed in Appendix A.

3.3.4 Drilling/Excavation near Overhead Electrical Lines

Drilling or excavation activities near overhead electrical lines present a serious electrocution hazard. Safe work distance must be maintained. This distance is a function of the humidity and the voltage present. Should work in the proximity of overhead lines be required, the minimum clearance will be determined based on OSHA standards as follows:

- Lines rated 50kV or below - minimum clearance between the lines and any part of the crane or load shall be 10 feet. (1926.550(a)(15)(i))
- Lines rated over 50 kV - minimum clearance between the lines and any part of the crane or load shall be 10 feet plus 0.4 inch for each 1 kV over 50 kV, or twice the length of the line insulator, but never less than 10 feet (CFR 1926.550(a)(15)(ii)).

Safe working distances are as follows:

- Power line 51,000 to 138,000 volts - work at least 11 feet away

- Power line more than 230,000 volts - work at least 13 feet away
- Power line ≥500,000 volts - work at least 18 feet away

Note that humid or wet conditions (rain) are conducive to potential arcing from power lines to the piece of equipment. It is not advisable to work near power lines during humid or wet conditions.

3.3.5 Drilling/Excavation near Underground Electrical/Utility Lines

Buried electrical/utility lines present a hidden danger while drilling/excavating. The subcontractor will be responsible for contacting the local underground utility locator service (call 811 nationally for state one-call system); however, it is the responsibility of the NRT PM or PHSO to ensure that the subcontractor has contacted the appropriate locator service to ensure that site activities can be completed in accordance with the schedule. The locator service will mark underground lines to ensure safe working conditions. Drilling/excavation will not occur until the site is properly marked. Drilling/excavation will not occur within three feet of any marked utility.

3.3.6 Test Pits and Excavation

Test pits and excavations pose a serious threat of injury resulting from falls or excavation wall collapses. During excavation or digging activities an exclusion work zone will be established around excavating machinery. Bystanders and on-lookers will be prohibited from entering this work zone while the excavating machinery is in operation. The work zone will be large enough so that the excavating machinery (e.g., trackhoe) can rotate 360-degree without extending out of the work zone. After the excavation is completed it should either be backfilled immediately or the entire excavation will be encircled with a physical barrier (e.g., barricades, orange excavation fencing), which will limit access to the excavation and decrease the likelihood of injury resulting from falls. Any excavation greater than four feet deep will not be entered unless the walls of the excavation have been reinforced to prevent wall collapse. Entry into any excavation greater than four feet deep will constitute a confined space entry procedure. Therefore, no excavation entrance is allowed.

A photoionization detector (PID) may be used to monitor air quality in the breathing zone of the work area for volatile organic compound (VOC) vapor levels and in an excavation (See Section 7 of this plan) if VOCs are anticipated to be present. Prior to Contractor Personnel entering any excavations to install piping or any other equipment, at a minimum the PID will be lowered into the excavation to determine air quality in the excavation. Depending on the potential hazards present additional air monitoring may include, oxygen levels, lower explosives limit, sulfide, carbon monoxide, and cyanide. Confined spaces will not be entered.

3.3.7 Operations on Surface Waters

The procedures specified in this subsection are designed to protect NRT staff when conducting work activities involving water craft vessels on surface waters. Governmental laws and regulations regarding onshore waters are under the jurisdiction of the Unites States Coast Guard (USCG) and the state regulatory agency and its regulations will be adhered to. **Always Work In Pairs – Never Conduct Work Activities Alone.**

3.3.7.1 Scope and Applicability

The procedures specified in this subsection apply to all work activities involving surface waters (including sediment sampling). The highest ranking NRT staff member (e.g., Project Manager, Field Task Leader) at the work site is responsible for implementing this plan. The work activities will not be initiated prior to receiving approval from the PM.

- Work activities can be conducted in "open water" or "ice" conditions
- Each NRT staff person at the site is responsible for following these procedures

3.3.7.2 Water Craft

The following procedures will be observed when NRT staff conducts work activities in "open water" conditions in a water craft vessels (including drill rigs mounted on barges):

- Work will not be initiated prior to meeting approval from the PM
- Work activities conducted on surface waters will be conducted in accordance with the requirements of the USCG and the appropriate state agency
- Personal Flotation Devices (PFD) that is USCG approved must be worn at all times when on surface waters. The PFD must be properly securely fastened. One adult size PFD (wearable style) for every person on the water craft is required
- A minimum of two PFDs must be on board on the water craft at all times
- A minimum of one "throwable" flotation device w/attached line must be on board
- Distribute weight evenly across the beam of the watercraft
- Only allow one person to stand at a time in a small watercraft vessel
- Do not exceed manufacture's capacity plate load limits

- Attach a lanyard or safety line which can be tied to the sampling personnel when water surface conditions are rough. This will enable easier retrieval of the person should he/she fall over the side of the water craft
- Check running condition of the outboard motor prior to launching (e.g., ample supply of fuel/oil mix, fuel line condition, integrity of the propeller, **EXTRA SHEER PINS** for the propeller)
- Equipment to have on board include oars, anchor w/line (100 foot minimum line on inland waters) and mooring lines of adequate length
- Wear work gloves when using equipment that could injure hands
- Wear hard hat if overhead hazards exist (e.g., A-Frame, use of long coring devices)
- Secure overboard equipment to vessel
- Use proper lifting techniques when retrieving heavy equipment

3.3.7.3 Shallow Water

Site-Specific Work Plan and the site reconnaissance will evaluate the best approach to sampling in shallow water. If wading is necessary, work activities in shallow water along the shore line shall consider the following hazards:

- Use waders to minimize exposure to water, sediment contaminant exposure and heat loss
- Proceed carefully – water currents and falling can cause the waders to fill creating a very serious condition. In addition to wearing a PFD, a safety line should be tethered to the person walking in water currents
- Fatigue can occur more rapidly from walking through the water

3.3.7.4 Sampling Through Ice

Collection of samples through frozen rivers/lakes presents the difficulties of working on ice. Precautions for slips, trips, and falls will be observed. Ice thickness will be at a minimum of 9-inches thick before work activities will commence.

The following procedures will be observed when NRT staff conducts work activities on "ice" conditions:

- Work activities will not be initiated prior to meeting approval from the Environmental Health & Safety Manager (EHSM)
- Know the ice (e.g., thickness) and proceed with extreme caution. Ice thickness at a minimum should be 18 to 24 inches (when conducting drilling operations) and inspected for integrity. Check ice thickness regularly when traversing across ice to assure adequate support exists. Be especially cautious when approaching pressure cracks, areas of open water or areas of rivers where water velocity may be higher

- Wear PFDs at all times
- Warm weather causes ice thinning and potential for slipping (drilling holes on thinning ice can cause flooding of ice surface and can accelerate ice thinning and breakage)
- Equipment may be required to be hauled between work stations (use sleds)
- Fatigue can occur from walking and drilling holes

Based on water currents, water temperature and the amount of clothing worn by NRT staff, the threat of being swept downstream or drowning is possible. Extreme caution must be used when conducting these types of work activities. If a NRT staff employee should fall into the water, the employee will be retrieved and all warranted precautions shall be taken to ensure the safety and well being of that individual. Work activities will be immediately suspended and the person brought to shore. Wet clothing shall be removed and the person shall be dried and dressed in a set of dry clothes. If the possibility of hypothermia exists, seek medical attention immediately.

Persons sampling contaminated or potentially contaminated materials should wear the same PPE as listed for monitoring well sampling. The required PPE will be carried along on the sediment sampling water craft. PPE can add to heat stress during warm conditions and can cause decreased mobility dexterity.

3.3.7.5 Subcontractors

It is the responsibility of the PM to require subcontractors assisting in the work activities, to adhere to state and federal governmental laws and regulations related to onshore and inland waters. Any refusal on behalf of the subcontractor will mandate shutdown of the project.

4 PERSONNEL TRAINING REQUIREMENTS

4.1 General

NRT and subcontractor employees performing field work on this project are required to have appropriate safety training as specified in the OSHA Standards, particularly the HAZWOPER Standard 29CFR1910.120. NRT personnel performing fieldwork on this project must meet the necessary general training requirements. Subcontractors are responsible for supplying NRT's PM with written statements certifying that their project personnel meet the necessary general training requirements.

4.2 Site-Specific

Site-specific hazard and hazard control information is contained in this health and safety plan. NRT personnel will be provided with a copy of this plan prior to the beginning of fieldwork. Each person will be required to "sign off" that they have read, understood, and will follow the procedures set forth in the plan.

4.3 Informational Briefings

It is the responsibility of each NRT staff member directing field operations to keep their crew members appraised of site conditions relative to health and safety, and of any approved modifications to the plan. This will be accomplished through ongoing daily "tailgate" safety meetings. NRT personnel are required to report injuries, illnesses, and unsafe conditions to their immediate supervisor. The supervisor is required to report in writing any such accidents to the HSM, PM, and PHSO within 24 hours of occurrence.

5 PERSONAL PROTECTIVE EQUIPMENT

Listed in the health and safety plan summary at the very beginning of this plan are hazardous substances that have been found or are suspected to be present at the site. Hazardous substances may be found in air, soil, sediment, surface water and/or groundwater. Common routes of exposure include inhalation, ingestion, and absorption. Proper PPE should be worn when applicable.

5.1 Drilling/Excavation/Installation of Wells

Persons handling contaminated or potentially contaminated equipment, soils, sediment, or groundwater must wear the following PPE:

- Long sleeve coveralls (light or heavy weights subject to ambient temperature)
- Bib style rain pants where wet operations exist
- Nitrile gloves
- Vinyl gloves for sample handling
- Safety glasses with side-shields (REQUIRED AT ALL TIMES)
- Hard hat (REQUIRED AT ALL TIMES)
- Steel-toed boots (REQUIRED AT ALL TIMES)
- Reflective orange vest (worn as the situation warrants)
- Hearing protection (as required – see note below)

NOTE: Guidance on the requirements of ear protection is as follows: if you must raise your voice to converse with persons three feet away from you, you are probably being overexposed to noise. This roughly equates to being exposed to over 85 dbs of noise for greater than a 4 hour period. In these instances, the wearing of hearing protection is required. The muff or "EAR" type disposable earplugs will suffice.

5.2 Ground/Surface Water and Soil/Sediment Sampling

Persons sampling contaminated or potentially contaminated materials, soil, sediment, or water must wear the following PPE:

- Long sleeve coveralls (light or heavy weights subject to ambient temperature)
- Bib style rain pants where wet operations exist
- Nitrile gloves
- Vinyl gloves for sample handling
- Safety glasses with side-shields
- Steel-toed boots
- Hearing protection (as required)

Persons whose skin or inner clothing comes in contact with contaminated soils or liquids should remove such clothing, shower or clean as appropriate, then re-suit for continued work activities.

6 MEDICAL SURVEILLANCE REQUIREMENTS

6.1 Medical Surveillance

The hazardous substances known or suspected to be present at the site are not known to produce injury or illness that would not be detected by the medical examination specified in the NRT Standard Practices Manual, Section 6, Health and Safety, Number 06-10. The medical monitoring program established in this section of the Standard Practices Manual complies with all OSHA guidelines regarding and necessitating medical monitoring in the work place.

7 FREQUENCY AND TYPES OF AIR MONITORING/SAMPLING

7.1 Site Air Monitoring

A PID and possibly a combustible gas indicator (CGI) may be used to measure air contaminant concentrations in the breathing and work zones if required in the Health and Safety Plan Summary. Readings are to be recorded on the logs and in the project logbook. The PID will be calibrated per the air monitoring action plan below. If a CGI is also used to detect combustible conditions at the work site, the monitoring will also follow the plan below.

7.2 Sampling Air Monitoring

A PID may be used to measure air VOC concentrations at the well head or soil sample location during sampling or drilling operations if required in the Health and Safety Plan Summary. If measurements are collected, they should be recorded in the project logbook. These measurements may be used to upgrade or change PPE requirements and/or the methods of performing the work. The PID will be calibrated at the start of each day of use. Air monitoring should follow the action plan below.

7.3 Air Monitoring Action Plan

A PID will be calibrated and checked on a minimum basis at least three times per day: 1) before work activities begin; 2) during lunch break or approximately half way through the working day; and 3) following work activities at the end of the day. These calibration checks will be used to ensure accuracy of VOC readings. Calibration procedures will follow those outlined in the PID manual and NRT's SOPs and typically use isobutylene as the calibration gas.

The PID will be used to monitor air quality in the breathing zone of the work area for the presence of VOC vapor levels if required in the Health and Safety Plan Summary. Prior to Contractor Personnel entering any excavations to install piping or any other equipment, the PID will be lowered into the excavation to determine air quality in the excavation. Confined spaces will not be entered. Besides using the PID to monitor VOC vapors in the breathing zone, an oxygen meter and/or a CGM may also be used. The oxygen meter may be used to measure percent oxygen in any excavation and the CGM may be used to measure the explosive limit. Calibration of the combustible gas meter is required based on use to insure accuracy.

The VOCs "action level" is considered when a reading of 50 ppm is sustained on the PID when the PID is held at a constant height, whether in the excavation or the breathing zone. Reaching the VOC action level will require use of either full-face or half-face respirators utilizing Organic Vapor cartridge filters. Additionally, further air quality monitoring will be required to ensure that the PID readings do not exceed a sustained reading of 500 ppm. This will be done under the direction of the NRT PHSO who will determine specific modifications to work practices and PPE requirements.

If the 500-ppm action level is achieved, all activities on the site will immediately stop. The NRT PM will be contacted prior to taking any further action on the site, unless a situation exists which requires immediate action. Options such as nitrogen purging will be considered based on the most current information available.

It should be noted that action levels are determined by the contaminants present (if known). For example the action level for known petroleum contaminants (gasoline or diesel fuel) may be as indicated in the preceding paragraph. However, if chlorinated solvents are suspected to be present with much lower threshold limit values than petroleum contaminants then the action levels would be adjusted to lower values.

8 SITE CONTROL MEASURES

8.1 Buddy System

Each worker will maintain visual contact with another worker at all times. The buddy system will ensure against an employee becoming stressed with a co-worker being aware of his or her condition. Workers should watch out for each other while working close to potential chemical and physical hazards. For example, all work in the exclusion zone should be scheduled so that no employee works alone in this zone at any time.

8.2 Safe Work Practices

To prevent accidental ingestion of chemical contaminants, the following rules must be compiled with when working within the exclusion/contamination reduction zones, and when taking or handling samples.

- No eating, drinking, or smoking is allowed at work locations
- No fires are allowed at work locations unless approved by the Project Health and Safety Officer on a site-specific, task-specific basis. If fires or propane torches are used, fires will be maintained away from potential ignition sources and site personnel will not leave the fire unattended and a fire extinguisher will be immediately available
- NRT and contractor personnel must wash their hands, arms, face, and neck immediately after leaving the exclusion/contamination reduction zones. This must also be done after taking samples and prior to eating, drinking, smoking, or using the restroom

8.3 Work Zone Definition

Work crews, whether drilling, excavating, or performing other activities, must prevent the uncontrolled movement of contaminated or potentially contaminated soil, water, PPE, and equipment. All soil and water removed from its natural setting should be considered contaminated unless proven otherwise by chemical analysis or specifically known to be clean material in which verification sampling is occurring. This is also the case for PPE and equipment which either must be decontaminated or disposed. Work crews will prevent migration of contaminated materials by establishing work zones and decontamination procedures. Work zones will be delineated. Only persons certified as having the necessary training and medical qualifications will be allowed in the Exclusion Zone (EZ) or Contamination Reduction Zone (CRZ). The following describes the zones to be established during drilling or excavation:

- Exclusion Zone: An EZ will be established surrounding the drilling or excavation site, if necessary and is the area where contamination does exist or could occur. The EZ will comprise an area of at least as large as a circle having a diameter equaling one half the mast height of the drilling equipment or arm of excavating equipment. The size and shape of the EZ will be determined by the PHSO. No personnel will be permitted in the EZ unless they are in full compliance with the site health and safety plan

- Contamination Reduction Zone: This is the transition area between the exclusion zone and the support zone. It is the area where the decontamination of equipment and personnel takes place. Its purpose is to keep the support zone free of contamination
- Support Zone: The support zone is the area free of contamination. People wear normal work clothes in this area. The personnel in this zone are responsible for organizing off-site emergency response teams in the event of an emergency

8.4 Daily Start-up and Shutdown Procedures

The following protocols will be followed daily prior to the start of work activities:

- The PHSO will review site conditions to determine if modifications of the work and safety plans are needed
- Personnel will be briefed and updated at the daily tailgate safety meeting on any new safety procedures based on the previous day's findings and the planned work activity for that day
- All safety equipment will be checked for proper function
- The PHSO will ensure that the hospital route map and first aid equipment are readily available; and
- The PHSO will initiate appropriate monitoring.

The following protocol will be followed at the end of daily operations and before breaks:

- All personnel will proceed through appropriate decontamination procedures and facilities;
- The work site will be left clean. Drums will be properly labeled and staged; and
- All PPE must be removed prior to eating, drinking, smoking, or using the restroom.
- Equipment will be decontaminated and properly stored.

8.5 Equipment

Drilling rigs and heavy equipment should be inspected at the start of each day to detect equipment problems. Particular attention should be paid to cables and hydraulic lines. Examine them for evidence of stretching, fraying and cracking. The fuel system and hydraulic system should be in good repair (free from leaks) to avoid the potential for fire or explosion. Kill switches should be tested and functioning properly. The drill rig and heavy equipment should be equipped with or have stationed in the area two 20-pound type BC fire extinguishers.

8.6 Drilling/Excavation Area

The drilling/excavation area should be located away from overhead electrical lines. The location of buried water, storm and sanitary sewer, electrical, telephone, and gas utility lines must be determined and marked by the authorized personnel. Slope of terrain, stability of embankments, soil load bearing ability, etc. should be evaluated in selection of the drilling/excavation locations.

9 DECONTAMINATION PLAN

9.1 Decontamination Procedures

Personal decontamination will be accomplished by using good personal hygiene. Personal contamination should not occur if the protection methods specified in this plan are used. However, the following procedures must be complied with to ensure that contamination does not remain on equipment, sample containers, or in contact with personnel.

- While in the EZ clean gross contamination off equipment by scraping or brushing. Collect all contaminated soil with the drill cuttings and transport the cuttings in an appropriate manner to the staging area on site (e.g., placed in DOT approved 55-gallon drums).
- If steam cleaning of equipment is required it will occur at the designated area on site. If capture of decontamination water is required, it will be placed in DOT approved 55-gallon drums.

After equipment and sample container decontamination is accomplished, drilling crewmembers must remove PPE before leaving the CRZ. PPE must be removed in a step-wise fashion to prevent contamination of work clothing, as follows:

- Remove all contaminated soil from work boots and remove protective clothing for decontamination or disposal. If disposable PPE is required, it should be placed in an open top drum designated for that purpose. A lid should be placed on the drum after usage. All drummed material will be labeled identifying contents and the date filled.
- Remove and wash outer gloves and hard hat. Place disposable gloves in a collection bag.
- The use of respiratory protection is not anticipated. If a respirator must be used or otherwise removed from its containers, wash it down and take it with you as you exit the CRZ.
- Final daily decontamination will be reviewed by the PHSO to ensure that no contaminated articles are accessible to the public. Therefore, all disposable PPE and other miscellaneous garbage will be stored in a drum with a secured lid.

After leaving the CRZ, and before eating, drinking, smoking, or using the restroom, all personnel must wash their hands, arms, face, and neck. In addition, all personnel should take a full-body shower at the end of the workday. A full-body shower includes the use of a wash cloth to scrub the skin.

9.2 Waste Storage and Disposal

Since all soil and water removed from its natural setting is considered potentially contaminated, these materials will be stored and disposed of according to the guidelines established in the Work Plan for the site. If no guidelines have been established in the work plan for storage and disposal of these investigative wastes, the procedures outlined in NRT Standard Practices Manual, Section 6, Health and Safety, Number 06-07.

Waste container contents and identification will be made in the field log for future reference. The number of containers will be counted and assessed for the amount of content present in each (1/2 full, full). All containers will be distinctly labeled using a paint pen or marker. At a minimum the drum will be labeled with the following information:

- Company name
- Date contents added to drum
- Contents of drum (soil, water, PPE)
- Well or soil boing identification (MW-1 or SB-1)

10 EMERGENCY ACTION PLAN

10.1 Medical Emergencies

In the event of a medical emergency, the following procedures should be used.

1. If serious injury or life-threatening condition exists, call 911. Clearly describe the location, injury, and conditions to the dispatcher. Designate a person to direct emergency responders to the injured person(s).
2. Call the project manager.
3. Implement steps to prevent the reoccurrence of the accident.

10.2 Chemical Emergencies

1. If serious injury or life-threatening condition exists, call 911. Clearly describe the location, injury, and conditions to the dispatcher.
2. Evacuate other on-site personnel to a safe place in an upwind direction until it is safe for work to resume.
3. Call the PM.
4. If necessary contact clean-up contractor.
5. If release requires contacting government agencies the PM makes the appropriate calls (PM also contacts Client).

10.3 General Emergencies

In the case of fire (other than a managed pre-approved fire, discussed in Section 8.2), flood, explosion, spills, severe weather, tank or pipe punctures, or other hazard, work shall be halted and if applicable, 911 called. All on-site personnel will immediately be evacuated to a safe place.

10.4 Accident Reports and Follow up

All accidents, including those that do not result in injury or illness, are to be reported verbally to the PHSO or the PM immediately, with written documentation within 24 hours of their occurrence. The report form is included as Appendix B. The policy specified in the NRT Standard Practices Manual, Section 6, Health and Safety, Number 06-12 regarding notification of the HSM, PHSO or PM will be followed.

11 CONFINED SPACE ENTRY PROCEDURES

No confined spaces (or the need to enter a confined space) are anticipated at the site; however, should such an issue arise (or become anticipated at a particular site), it will be addressed in the site specific work plan. Only properly trained individuals may enter or be an attendant for confined space entry and only after a confined space permit has been completed.

12 SPILL CONTAINMENT PROGRAM

In the event of an accidental release of potentially hazardous materials or waste (e.g., spilled purge water or soil cuttings, ruptured hydraulic line), site personnel will:

- Contact the HSM, Project Health and Safety Officer and Project Manager
- Contain the spill, if it is possible and it can be done safely
- Initiate cleanup
- Report the spill to the proper authorities if the spill volume is a reportable quantity

Appendix A
Chemical Information / Material Safety Data Sheets

Appendix B
Accident / Injury or Near Miss Report Form

NATURAL
RESOURCE
TECHNOLOGY

ENVIRONMENTAL CONSULTANTS

ACCIDENT/INJURY OR NEAR MISS REPORT FORM

Incident Date (required): ____________ **Incident Time** (required): ____________

Incident Location (Minimum of State and County with City/Town and project site name optimal):

____

Was Anyone Injured? YES __ **NO** __ **Name of Injured:** ____________

Use a separate form for EACH injured individual

List Witness (if applicable): ____________

Last previous workday for injured individual: ____________

Name(s) and Date(s) NRT personal notified of Incident:

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Description of Incident (list all tools and equipment):

Description of Injury (if applicable). Injury description must specify body part(s) and body side if applicable (e.g., left arm, right foot, right eye):

Did anything "cause" the incident (if applicable):

Describe Company First Aid (if applicable):

Emergency Crew and/or Physician's Treatment (if applicable):

Corrective Action (if applicable):

Additional Comments (if applicable)

Reported By: ______________________________ Date: ____________

Health & Safety Coordinator: ______________________ Date: ____________

Project Manager (if applicable): ____________________ Date: ____________

Supervisor: _________________________________ Date: ____________