INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
HAZARDOUS WASTE POST-CLOSURE PERMIT

Name of Permittee: Hammond Pest Control

Facility Location: 702 State Street, Hammond, Indiana

EPA Identification Number: INR 000 008 623

Issuance Date:

Expiration Date: (Add 10 years to issuance date)

<u>Authorized Activities</u>

Pursuant to the Indiana Environmental Statutes (IC 13) and the rules promulgated thereunder and codified in Title 329 of the Indiana Administrative Code, Article 3.1 (329 IAC 3.1), the State permit conditions of the Resource Conservation and Recovery Act of 1976 (RCRA) permit (hereinafter called the permit) are issued to Hammond Pest Control (hereinafter called the Permittee) to maintain and monitor a former hazardous waste management unit located in Hammond, Indiana, Section 36, Township 37 North, Range 10 W at latitude 41.616046° N and longitude -87.510956° W, Calumet City, Indiana Quadrangle, on the U.S. Geological Survey topographic map.

The State RCRA program is authorized under 40 CFR Part 271 and Section 3006 of RCRA to administer the hazardous waste management program in lieu of the Federal program.

The Permittee operated a hazardous waste container storage unit, which was closed with contamination in-place using engineering controls. The Permittee is required to maintain and monitor the closed unit for the duration of this permit.

Federal regulations 40 CFR Parts 260 through 270 have been incorporated by reference. Where exceptions to incorporated Federal regulations are necessary, these exceptions will be noted in the text of the State rule (329 IAC 3.1-1-7).

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Applicable Regulations

The conditions of this post-closure permit were developed in accordance with the following applicable provisions of 329 IAC 3.1:

- ID & Listing of Hazardous Waste: 329 IAC 3.1-6, 40 CFR 261
- Standards for Owners and Operators of Treatment, Storage, and Disposal Facilities: 329 IAC 3.1-9, 40 CFR 264 Subpart A
- General Facility Standards: 329 IAC 3.1-9, 40 CFR 264 Subpart B
- Ground Water Protection: 329 IAC 3.1-9, 40 CFR 264 Subpart F
- Post-Closure: 329 IAC 3.1-9, 40 CFR 264 Subpart G
- Financial Requirements: 329 IAC 3.1-15
- Corrective Action for Solid Waste Management Units: 329 IAC 3.1-9, 40 CFR 264 Subpart S
- Hazardous Waste Permit Programs: 329 IAC 3.1-13, 40 CFR 270 Subparts A, B, C, and D
- Inspection and Investigation: 329 IAC 3.1-1-3 and 329 IAC 3.1-1-4
- Enforcement: 329 IAC 3.1-1-5

Permit Approval

The Permittee must comply with all terms and conditions of this permit. This permit consists of the conditions contained herein (including those in any Attachments) and the applicable rules and requirements contained in 329 IAC 3.1 and 40 CFR 260 through 270 as specified in the permit. Applicable rules are those that are in effect on the date of issuance of this permit. 329 IAC 3.1-13; 40 CFR 270.32

This permit is based on the assumption that the information submitted in the permit application (VFC# 82978830), is accurate and that the facility has been or will be constructed and/or operated as specified in the application. The IDEM Virtual File Cabinet (VFC) may be viewed online from the IDEM homepage at www.IN.gov/idem.

Any inaccuracies found in the application may be grounds for the modification, revocation and reissuance, or termination of this permit (329 IAC 3.1-13-7), and potential enforcement action. The Permittee must inform the Indiana Department of

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Environmental Management (IDEM) of any deviation from, or changes in, the information in the application that would affect the Permittee's ability to comply with the applicable rules or permit conditions.

Pursuant to IC 13-15-5-3 and IC 4-21.5-3-5(f), this permit takes effect 15 days from receipt of this notice. If you wish to challenge this decision, IC 13-15-6-1 and IC 4-21.5-3-7 require that you file a Petition for Administrative Review. If you seek to have the effectiveness of the permit stayed during administrative review, you must also file a Petition for Stay. The petition(s) must be submitted to the Office of Environmental Adjudication, Government Center North, Room N103, 100 North Senate Avenue, Indianapolis, Indiana 46204, within 15 days after your receipt of this notice. The petition(s) must include facts demonstrating that you are either the applicant, a person aggrieved or adversely affected by the decision, or otherwise entitled to review by law. Identifying the permit, decision, or other order for which you seek review by permit number, name of the applicant, location, or date of this notice will expedite review of the petition. Additionally, IC 13-15-6-2 requires that a Petition for Administrative Review must include:

1. the name and address of the person making the request;

2. the interest of the person making the request;

3. identification of any persons represented by the person making the request;

4. the reasons, with particularity, for the request;

5. the issues, with particularity, proposed for consideration at the hearing; and

6. identification of the terms of the permit that, in the judgment of the person making the request, would be appropriate in the case in question to satisfy the requirements of the law governing licenses of the type granted or denied by the Commissioner.

Pursuant to IC 4-21.5-3-1(f), any document serving as a petition for review or review and stay must be filed with the Office of Environmental Adjudication. Filing of such a document is complete on the earliest of the following dates:

1. the date the petition is delivered to the Office of Environmental Adjudication, Government Center North, Room N103, 100 North Senate Avenue, Indianapolis, Indiana 46204;

2. the date of the postmark on the envelope containing the petition, if the petition is mailed by United States mail; or

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3. the date the petition is deposited with a private carrier, as shown by a receipt issued by the carrier, if the petition is sent by private carrier.

The portions of the permit for which a Petition for Stay has been filed will take effect at the expiration of the additional 15 day period unless or until an Environmental Law Judge stays the permit in whole or in part. This permit will remain in effect until the expiration date unless revoked and reissued, modified, or terminated (329 IAC 3.1-13-7), or continued in accordance with IC 13-15-6-3.

This permit terminates and supersedes any other State hazardous waste management permit.

Issued this _____ of _____ 2020.

By

Corey Webb
Deputy Assistant Commissioner
Office of Land Quality

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Hammond Pest Control
Hammond, Indiana
INR 000 008 623

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I. STANDARD CONDITIONS

A. EFFECT OF PERMIT

The Permittee is authorized to maintain and monitor a former hazardous waste management unit closed (with contaminated media in-place using engineering controls) in accordance with the conditions of this State hazardous waste management post-closure permit. Any management of hazardous waste not authorized in this permit or the regulations is prohibited.

Pursuant to 329 IAC 3.1 and 40 CFR 260 through 270 (for HSWA Provisions), compliance with the conditions of this State hazardous waste management post-closure permit generally constitutes compliance for purposes of enforcement with the Indiana Environmental Statutes and Resource Conservation and Recovery Act (RCRA), as amended by Hazardous Solid Waste Amendments (HSWA), except for those requirements not included in the permit that become effective by statute, or that are promulgated under 329 IAC 3.1 and 40 CFR Section 260 through 270, restricting the placement of hazardous wastes in or on the land.

Issuance of this permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of Federal, State, or local laws or regulations.

Compliance with the terms of this permit does not constitute a defense to any Order issued or any action brought under Section 3013 or Section 7003 of RCRA; Section 106(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. 9601), commonly known as CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986 (42 U.S.C. 9606(a)), commonly known as SARA, or any other law providing for protection of public health or the environment. 329 IAC 3.1-13; 40 CFR 270.4; IC 13

B. PERMIT ACTIONS

This permit may be modified, revoked and reissued, or terminated for cause as specified in 329 IAC 3.1-13-7. The filing of a request by the Permittee for a permit modification, revocation and reissuance, or termination, or the notification of planned changes or anticipated noncompliance on the part of the Permittee does not stay the applicability or enforceability of any permit condition.

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C. SEVERABILITY

The provisions of the permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit will not be affected thereby. In the event that a condition of this permit is stayed for any reason, all provisions of the permit severable from the stayed provisions will take effect. With regard to stayed provisions of the permit, the Permittee shall continue to comply with the related applicable and relevant standards in 329 IAC 3.1-9 and 329 IAC 3.1-15 from the previously issued permit until final resolution of the stayed condition, unless the Commissioner of the Indiana Department of Environmental Management (Commissioner) determines that compliance with the related applicable and relevant standards would be technologically incompatible with other conditions of this permit that have not been stayed. 329 IAC 3.1-13; 40 CFR 270.32

D. DUTIES AND REQUIREMENTS

1. Duty to Comply The Permittee must comply with all conditions of the State permit, except to the extent and for the duration such noncompliance is authorized by an emergency permit. Any permit noncompliance, other than noncompliance authorized by an emergency permit, constitutes a violation of IC 13 and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. 329 IAC 3.1-13; 40 CFR 270.30(a); 270.61

2. Duty to Reapply The Permittee must submit a complete application for a new permit at least 180 days before this permit expires unless: a) the Permittee has been notified by the Commissioner that it is no longer required to have a State hazardous waste management permit; or b) permission for submittal on a later date has been granted by the Commissioner. The Commissioner will not grant permission for application to be submitted later than the expiration date of the existing permit. 329 IAC 3.1-13; 329 IAC 3.1-13-3(h); 40 CFR 270.30(b)

3. Permit Expiration The duration of this permit shall not exceed the expiration date of the permit, except as provided by 329 IAC 3.1-13-15. This permit, and all conditions herein, will remain in effect beyond the permit's expiration date if the Permittee has submitted a timely, complete application for a new permit and through no fault of the Permittee, the Commissioner has not issued a new permit with an effective date under 329 IAC 3.1-13-14 on or before the expiration date of the previous permit. 329 IAC 3.1-13-16

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4. Need to Halt or Reduce Activity Not a Defense It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. 329 IAC 3.1-13; 40 CFR 270.30(c)

5. Duty to Mitigate In the event of non-compliance with this permit, the Permittee shall take all reasonable steps to minimize releases to the environment, and shall carry out such measures as are reasonable to prevent significant adverse impacts on human health or the environment. 329 IAC 3.1-13; 40 CFR 270.30(d)

6. Proper Operation and Maintenance The Permittee shall, at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the Permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit. 329 IAC 3.1-13; 40 CFR 270.30(e)

7. Duty to Provide Information The Permittee shall furnish to the Commissioner, within a reasonable time, any relevant information that the Commissioner may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The Permittee shall also furnish to the Commissioner, upon request, copies of records required to be kept by this permit. 329 IAC 3.1-13; 40 CFR 270.30(h); 264.74

8. Inspection and Entry The Permittee shall allow the Commissioner, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

   a. Enter at reasonable times upon the Permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit (329 IAC 3.1-13; 40 CFR 270.30(i)(1));

   b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit (329 IAC 3.1-13; 40 CFR 270.30(i)(2));

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c. Inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit (329 IAC 3.1-13; 40 CFR 270.30(i)(3)); and

d. Sample or monitor, at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by IC 13, any substances or parameters at any location (329 IAC 3.1-13; 40 CFR 270.30(i)(4)).

9. Monitoring and Reporting

a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. The method used to obtain a representative sample of the waste to be analyzed must be the appropriate method from 329 IAC 3.1-6; 40 CFR 261, Appendix I. Laboratory methods must be those specified in Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846, (Third Edition as amended by updates) (as referenced in 40 CFR 260.11); Standard Methods for the Examination of Water and Wastewater, (the 19th Edition, 1995); or an equivalent method as specified in the attached Waste Analysis Plan. 329 IAC 3.1-13; 40 CFR 270.30(j)(1)

b. The Permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports and records required by this permit, and records of all data used to complete the application for this permit for a period of at least 3 years from the date of the sample, measurement, report, or record or for a period of time greater than 3 years as specified elsewhere in this permit. This period may be extended by request of the Commissioner at any time and is automatically extended during the course of any unresolved enforcement action regarding this facility. 329 IAC 3.1-13; 40 CFR 270.30(j)(2) and 40 CFR 264.74(b)

c. Records of monitoring information shall include:

i. the date(s), exact place, and times of sampling or measurements (329 IAC 3.1-13-1; 40 CFR 270.30(j)(3)(i));

ii. the individual(s) who performed the sampling or measurements (329 IAC 3.1-13-1; 40 CFR 270.30(j)(3)(ii));

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iii. the date(s) analyses were performed (329 IAC 3.1-13-1; 40 CFR 270.30(j)(3)(iii));

iv. the individual(s) and laboratory who performed the analyses (329 IAC 3.1-13-1; 40 CFR 270.30(j)(3)(iv));

v. the analytical technique(s) or method(s) used. Analytical technique(s) or method(s) is defined as encompassing both the sampling technique (method) and method of chemical analysis used. This information must be provided in the Waste Analysis Plan (329 IAC 3.1-13-1; 40 CFR 270.30(j)(3)(v)); and

vi. the result(s) of such analyses, including QA/QC documentation (329 IAC 3.1-13-1; 40 CFR 270.30(j)(3)(vi)).

d. Monitoring results shall be reported to the Commissioner at the intervals specified elsewhere in this permit. 329 IAC 3.1-13; 40 CFR 270.30(l)(4)

10. Reporting Planned Changes The Permittee shall give notice to the Commissioner as soon as possible of any planned physical alterations or additions to the permitted facility. 329 IAC 3.1-13; 40 CFR 270.30(l)(1)

11. Transfer of Permits This permit may be transferred to a new owner or operator only if it is modified or revoked and reissued pursuant to 329 IAC 3.1-13-1; 40 CFR 270.40(b) or 40 CFR 270.41(b)(2) to identify the new permittee and incorporate such other requirements as may be necessary under IC 13. Before transferring ownership or operation of the facility during its operating life, the Permittee shall notify the new owner or operator, in writing, of the requirements of 329 IAC 3.1 and IC 13. 329 IAC 3.1-13-1; 40 CFR 270.40

12. Reporting Anticipated Noncompliance The Permittee shall give advance notice to the Commissioner of any planned changes in the permitted facility or activity that may result in noncompliance with permit requirements. Such notification does not excuse the Permittee's duty to comply with permit requirements. 329 IAC 3.1-13-1; 40 CFR 270.30(l)(2)

13. Compliance Schedules Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date. 329 IAC 3.1-13-1; 40 CFR 270.30(l)(5)

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14. Twenty-four Hour Reporting The Permittee shall report to the Commissioner any noncompliance with the permit that may endanger health or the environment. Any such information must be reported orally to the IDEM 24 hour emergency telephone number (888) 233-7745, within 24 hours from the time the Permittee becomes aware of the circumstances. This report must include the following:

a. information concerning the release of any hazardous waste that may endanger public drinking water supplies; and

b. information concerning the release or discharge of any hazardous waste, or of a fire or explosion at the facility, that could threaten the environment or human health outside the facility. The description of the occurrence and its cause shall include:

i. name, address, and telephone number of the owner or operator;

ii. name, address, and telephone number of the facility;

iii. date, time, and type of incident;

iv. name and quantity of material(s) involved;

v. the extent of injuries, if any;

vi. an assessment of actual or potential hazards to the environment and human health outside the facility, where this is applicable; and

vii. estimated quantity and disposition of recovered material that resulted from the incident.

A written submission shall also be provided within 5 days of the time the Permittee becomes aware of the circumstances. The written submission shall contain: a description of the noncompliance and its cause; the period of noncompliance (including exact dates and times); whether the noncompliance has been corrected; and if not, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. The Permittee need not comply with the 5 day written notice requirement if the Commissioner waives the requirement and the Permittee submits a written report within 15 days of the time the Permittee becomes aware of the circumstances. 329 IAC 3.1-13-1; 40 CFR 270.30(l)(6)

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15. Other Noncompliance The Permittee shall report all instances of noncompliance not otherwise required to be reported under Condition I.D. 12-14 at the time monitoring reports, as required by this permit, are submitted. The reports shall contain the information listed in Condition I.D.14. 329 IAC 3.1-13-1; 40 CFR 270.30(l)(10)

16. Other Information When the Permittee becomes aware that the facility failed to submit any relevant facts in the permit application, or submitted incorrect information in a permit application or in any report to the Commissioner, the Permittee shall promptly submit such facts or information. 329 IAC 3.1-13-1; 40 CFR 270.30(l)(11)

17. Submittal of Reports or Other Information All reports or other information required to be submitted by the terms of this permit must be sent to:

    Indiana Department of Environmental Management
    Office of Land Quality
    Attn: Chief Hazardous Waste Permit Section
    IGCN 1101
    100 North Senate Avenue
    Indianapolis, IN 46204

18. All other requirements contained in 40 CFR 270.30 not set forth herein are hereby fully incorporated in this permit.

E. SIGNATORY REQUIREMENT

All reports or other information requested by the Commissioner shall be signed and certified. 329 IAC 3.1-13-1; 40 CFR 270.11

F. CONFIDENTIAL INFORMATION

The Permittee may claim confidential any information required to be submitted by this permit. Confidential claims must be submitted in accordance with 329 IAC 6.1. 329 IAC 3.1-13-4; IC 13-14-11-1

G. DOCUMENTS TO BE MAINTAINED AT FACILITY SITE

Except as noted, until the post-closure period is completed and certified by the owner/operator and a qualified professional engineer, the Permittee shall maintain at the facility the most recent version of the following documents required by this permit:

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1. Groundwater Monitoring Plan and any document(s) referenced therein to describe on-site procedures (329 IAC 3.1-9, 40 CFR 264.97);

2. groundwater monitoring data (329 IAC 3.1-9, 40 CFR 264.97);

3. Post-Closure Plan (329 IAC 3.1-9, 40 CFR 264.118(c);

4. inspection schedules (329 IAC 3.1-9, 40 CFR 264.15(b)(2)); and

5. record of facility inspections kept for at least 3 years from the date of the inspection. 329 IAC 3.1-9; 40 CFR 264.15(b)(2); 264.15(d)

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II. GENERAL FACILITY CONDITIONS

A. MAINTENANCE OF FACILITY

The Permittee shall maintain the facility to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water that could threaten human health or the environment.

B. SECURITY

The Permittee shall comply with the security provisions described in the Post-Closure Plan, Attachment C, which is incorporated herein by reference.
329 IAC 3.1-9; 40 CFR 264.14(b) and (c)

C. GENERAL INSPECTION REQUIREMENTS

The Permittee shall follow the inspection schedule in Attachment C, which is incorporated herein by reference. The Permittee shall remedy any deterioration or malfunction discovered by an inspection. 329 IAC 3.1-9; 40 CFR 264.15(c)

D. RECORDKEEPING AND REPORTING

If the Permittee is a generator of hazardous waste, it shall comply with the biennial report requirements of 329 IAC 3.1-9 and 40 CFR 264.75.

E. POST-CLOSURE

1. The Permittee shall maintain post-closure of the facility in accordance with the Post-Closure Plan, Attachment C, which is incorporated herein by reference. 329 IAC 3.1-9; 40 CFR 264.117

2. No later than 60 days after completion of the established post-closure care period for the post-closure unit, Permittee must submit to the Commissioner, by registered mail, a certification that the post-closure care period for the post-closure unit was performed in accordance with the specifications in the approved post-closure permit. The certification must be signed by the owner or operator and a qualified Professional Engineer. Documentation supporting the Professional Engineer's certification must be furnished to the Commissioner upon request until he releases the owner or operator from the financial assurance requirements for post-closure care described in Permit Condition II.G. 329 IAC 3.1-9; 40 CFR 264.120

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F. COST ESTIMATE FOR FACILITY POST-CLOSURE

The Permittee's post-closure cost estimate, prepared in accordance with 329 IAC 3.1-15-5, is specified in the Post-Closure Plan, Attachment C.

1. The Permittee must revise the post-closure cost estimate whenever there is a change in the facility's post-closure plan. 329 IAC 3.1-15-5(c)

2. The Permittee must keep at the facility the latest post-closure cost estimate. 329 IAC 3.1-15-5(d)

G. FINANCIAL ASSURANCE FOR POST-CLOSURE CARE

The Permittee shall demonstrate continuous compliance with 329 IAC 3.1-15-6 by providing documentation of financial assurance, as specified by 329 IAC 3.1-15-10, in at least the amount of the cost estimates required by Permit Condition II.F. Changes in financial assurance mechanisms must be approved by the Commissioner. 329 IAC 3.1-15-6

H. INCAPACITY OF OWNERS OR OPERATORS, GUARANTORS, OR FINANCIAL INSTITUTIONS

The Permittee shall comply with 329 IAC 3.1-15-9 whenever necessary.

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III. POST-CLOSURE UNIT CONDITIONS

A. WASTE IDENTIFICATION

The Permittee closed a former hazardous waste container storage unit with contamination in place using an engineered cap. The quantities and types of hazardous wastes managed in the former container storage unit are listed in the attached Table A-1.

B. LOCATION INFORMATION

The unit location is shown in the Facility Description, Attachment A incorporated herein by reference.

C. POST-CLOSURE

The Permittee must comply with all post-closure requirements contained in 329 IAC 3.1-9 and 40 CFR 264.117 through 40 CFR 264.120 and 40 CFR 264.310, including maintenance and monitoring throughout the post-closure care period. The owner or operator must:

1. maintain the integrity and effectiveness of the final cover, including making repairs to the cover as necessary to correct the effects of settling, subsidence, erosion, or other events;

2. maintain and monitor the groundwater monitoring system; and

3. inspect and maintain the Stormwater Management System.

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IV. GROUNDWATER MONITORING CONDITIONS

A. GENERAL DESCRIPTION OF THE GROUNDWATER MONITORING SYSTEM AND THE UPPERMOST AQUIFER

The groundwater monitoring system for the Hammond Pest Control facility is based on several geologic and hydrogeologic investigations conducted between 1972 and 2020, which is summarized and referenced in Attachment D. The facility is set within the Calumet Lacustrine Plain physiographic subdivision of the Northern Moraine and Lake Region. The facility is underlain by the unconfined Calumet aquifer, which is characterized as sand and fine gravel deposits to approximately 30 feet in depth. The depth to water beneath the facility fluctuates seasonally, although it is generally found approximately seven feet below grade. Hydraulic conductivity estimates for the Calumet aquifer range from 4.8 to 30 feet/day and average 17.9 feet/day, and groundwater velocities range from 10 to 124 feet/year. The monitoring system includes seven wells screened in fine to medium grained sand at depths of 15 feet within the Calumet aquifer.

B. TYPE OF MONITORING PROGRAM; 40 CFR 270.14(c)(7) AND 264.99

The Permittee shall implement a compliance monitoring program in accordance with 40 CFR 264.99. The requirement to enter into the compliance monitoring program results from the historical detection of dissolved arsenic and pentachlorophenol. The historic groundwater data reside in the permit application and groundwater data reports on file at IDEM. The Permittee has not demonstrated an alternate source of hazardous constituents detected in the groundwater. Therefore, any hazardous constituent found in the groundwater, and not attributable to an alternate source, is expected to be in or derived from the facility.

Under the compliance monitoring program, the Permittee shall sample the monitoring points specified in Permit Condition IV.D.1 for the chemical parameters and hazardous constituents specified by the groundwater protection standard (GWPS) in Permit Condition IV.E.2, quarterly or annually as indicated in Table D-5, throughout the post-closure care period.

C. POINT OF COMPLIANCE; 40 CFR 270.14(c)(3) AND 264.95

The point of compliance (POC) shall be defined as the vertical surface located at or beyond the hydraulically down-gradient limit of the hazardous waste management unit that extends down into the uppermost aquifer underlying the regulated unit. For the facility, the POC is expressed at the ground surface as the line connecting wells MW-3, MW-4, MW-5, MW-6, and MW-7R, as shown on Figure D-10.

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D. WELL LOCATION, CONSTRUCTION AND MAINTENANCE; 40 CFR 270.14(c)(5), 270.14(c)(6)(ii), 264.97(a-c), and 264.99(b)

1. The Permittee's compliance groundwater monitoring system for the facility shall consist of monitoring wells MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, and MW-7R. Within the groundwater monitoring system, MW-1 serves as an up-gradient well and MW-2 serves as a source area well. The remaining wells serve as down-gradient, compliance point wells. The monitoring well locations are shown on Figure D-10.

2. The Permittee shall inspect and maintain the wells and sampling-related equipment at least quarterly in accordance with the procedures described in the sampling and analysis plan (SAP) provided in Appendix E. The Permittee shall redevelop a well prior to sampling if it has accumulated sediment in excess of 20 percent of the saturated screen length.

3. If it is determined that an existing monitoring well cannot yield representative samples, the Permittee must replace the monitoring well in accordance with 40 CFR 264.97 and 264.99, and submit a Class 1 Permit Modification meeting the requirements of 40 CFR 270.42. The Permittee must submit this modification to the Commissioner within seven (7) days after placing the change into effect. The replacement monitoring well must meet the same depth, design and material specifications as the existing monitoring well, and be located within a ten-foot radius of the original well.

4. The Permittee shall construct new wells as needed in accordance with Section D-4b(1) of Attachment D. Detailed construction logs for existing wells are shown in Appendix H.

5. The Permittee shall submit to the Commissioner a report on the progress of any new borings, new or replacement wells, well abandonments, well repairs, or well developments, within sixty (60) days of completion. Reports shall describe the work performed, including, but not limited to, well as-built diagrams, boring logs, sample analytical results, well development data, hydraulic conductivity testing data, surveyed elevation data, and any other pertinent information.

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E. GROUNDWATER PROTECTION STANDARD; 40 CFR 270.14(c)(7), 264.99(a), 264.92, 264.93, and 264.94

1. The Permittee shall collect groundwater samples from the monitoring wells specified in Permit Condition IV.D to determine whether the regulated unit is in compliance with the groundwater protection standard (GWPS) (specified in Permit Condition IV.E.2) at the POC (specified in Permit Condition IV.C) during the compliance period (specified in Permit Condition IV.E.3)

2. The GWPS is comprised of the following list of hazardous constituents at the concentration limits indicated in mg/L:

Constituent	Concentration Limit
Arsenic, dissolved	9.8
Pentachlorophenol	0.266

3. The compliance period for the facility is a minimum of 18.25 years based on the established time of the release prior to the October 21, 1996 inspection discussed in Agreed Order H-13417 (VFC # 65622478), and the completion of closure activities after the January 30, 2015, letter (VFC # 80325428). The GWPS applies through the compliance period. If the Permittee is conducting corrective action at the end of the specified compliance period, then the compliance period shall be extended until the Permittee demonstrates that the GWPS has not been exceeded for three (3) consecutive years.

4. In addition, the Permittee shall monitor for the general water quality field parameters; specific conductance, pH, and temperature through field measurements using the techniques, procedures, and equipment described in the SAP provided in Appendix E. The analytical data collected for these three constituents shall be reported to IDEM along with the results of the statistical analyses for the GWPS constituents.

5. The Permittee may request to shorten the compliance period if the plume stability evaluation described in Attachment D demonstrates a statistically stable/no trend or decreasing trend at monitoring wells MW-2, MW-3, MW-6, and MW-7R. The Permittee may submit certification in accordance with Permit Condition II.E.2.

F. SAMPLING AND ANALYSIS PROCEDURES; 40 CFR 264.97(d),(e), and 264.99(g)

1. The Permittee shall obtain and analyze samples from the groundwater monitoring wells specified in Permit Condition IV.D using the techniques,

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procedures, and equipment described in Appendix E, and Tables D-2, D-5, and D-6 for sample collection, preservation, shipment, chain-of-custody, and analysis.

2. The Permittee shall sample the monitoring wells for compliance monitoring at least semiannually each year during the post-closure period.

3. Annually, the Permittee shall analyze monitoring wells MW-2 and MW-3 for dissolved arsenic and pentachlorophenol, and samples from monitoring wells MW-6 and MW-7R for dissolved arsenic. Analytical methods for these parameters are provided in Tables D-2 and D-6.

4. The Permittee shall submit the results of these analyses and any verification analyses (including deliverable requirements of Permit Condition IV.I) to the Commissioner within sixty (60) days of receipt of the final laboratory report unless delays beyond the Permittee's control occur; in which case, the Commissioner shall be notified with the reason for the delay within the sixty (60) day period.

G. <u>GROUNDWATER ELEVATION; 40 CFR 264.97(f) and 264.99(e)</u>

1. The Permittee shall determine the water-level elevation in each groundwater monitoring well specified in Permit Condition IV.D each time the groundwater is sampled in accordance with Permit Condition IV.F and Appendix E. Using this information, the Permittee shall determine the hydraulic head difference, and the direction and rate of groundwater flow in the aquifer units beneath the facility. The Permittee shall submit the results of these determinations to the Commissioner by March 1 of the following year. The Permittee may use additional monitoring wells or observation wells for the determination of groundwater flow rate and direction with prior approval from the Commissioner.

2. The Permittee shall submit a Class 2 Permit Modification if and when the groundwater flow direction evaluation under Permit Condition G.1 indicates that the monitoring wells are no longer adequately monitoring the compliance point as defined by Permit Condition IV.C. This proposal shall be submitted to the Commissioner within ninety (90) days, and prior to any changes to the groundwater monitoring system.

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H. STATISTICAL PROCEDURES; 40 CFR 270.14(c)(7)(vi), 264.97(h) and 264.99(c),(d),(f)

1. The Permittee shall follow the statistical procedures described in Attachment D, and Appendix I. The Permittee shall calculate a 95% Upper Confidence Limit (UCL) of the mean or median (depending on the data distribution) of each GWPS constituent for comparison with the GWPS of each constituent listed Permit Condition IV.F.3 for each monitoring point and each sampling event. When the 95% UCL exceeds the GWPS concentration limit in Point of Compliance Wells MW 6, and MW-7R, the constituent shall be considered to be out of compliance with the GWPS. This test shall be done at a Type I error level no less than 0.01 for each sampling event. This statistical approach complies with 40 CFR 264.97(h)(5) and 264.97(i)(2), and meets the latest requirements as specified in RCRA groundwater monitoring regulations, IDEM guidance, and the most recent USEPA statistical guidance document published in March 2009.

2. The Permittee shall conduct statistical comparisons of monitoring well data to the GWPS at least semiannually throughout the post-closure period beginning with the first semiannual sampling event following the effective date of the permit.

3. The Permittee shall use the Reporting Limits listed in Table D-6 as the reporting limits for hazardous waste constituent analyses. The constituent reporting limits are appropriate to allow for the determination of statistically significant increases.

4. The Permittee shall continue compliance monitoring if none of the comparisons of compliance well data to the GWPS show a statistically significant exceedance using the statistical procedure described in Attachment D, and Appendix I.

5. If any constituent in the monitoring wells MW-6 or MW-7R exceeds the statistical criteria, the Commissioner shall be notified within seven (7) days that there is a statistically significant exceedance and the Permittee shall proceed to comply with Permit Condition IV.I.4.

6. If the plume stability evaluation described in Attachment D, Section D-5h(7), and Appendix I, demonstrates a statistically significant increasing trend at a monitoring well (MW-2, MW-3, MW-6, or MW-7R) that previously had a stable/no trend or decreasing trend, the Commissioner shall be notified within seven (7) days that there is a statistically significant increasing trend. The notification shall indicate which chemical constituents have shown a statistically significant increasing trend.

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I. REPORTING, RECORD KEEPING AND RESPONSE; 40 CFR 264.97(j), and 264.99(g)

1. The Permittee shall enter all monitoring, testing, and analytical data obtained pursuant to Permit Conditions IV.B, IV.E., IV.F., IV.G. and IV.H. in the operating record.

2. The Permittee shall submit an electronic report of the laboratory analytical results and field parameters for each required groundwater sampling event to the IDEM within sixty (60) days following receipt of the results from the laboratory. The electronic report must be in the required format (available at the IDEM website) and submitted to the official IDEM website for electronic data submittal currently listed at the following web address as of the date of permit issuance: http://www.in.gov/idem/5384.htm.

3. The Permittee shall submit two (2) paper copies of the laboratory analytical results with associated statistics and discussion of compliance status for each required groundwater sampling event obtained pursuant to Permit Conditions IV.B, IV.E., IV.F., IV.G. and IV.H. to IDEM within sixty (60) days following receipt of the results from the laboratory, addressed to:

   Mr. Jeff Workman
   Indiana Dept. of Environmental Management
   Office of Land Quality, Permits Branch MC 65-45
   100 N. Senate Ave., IGCN 1101
   Indianapolis, IN 46204-2251

4. If the analytical results at any compliance point monitoring well(s) exceed the statistical criteria described in Permit Condition IV.H., the Permittee will:

   a. Notify the Commissioner in writing within seven (7) days that there is a confirmed statistically significant exceedance of the GWPS. The notification must indicate which chemical constituents have shown statistically significant evidence of exceedance and the location of the exceedance..

   b. Within 180 days submit an application for a permit modification to establish a corrective action program meeting the requirements of 40 CFR 264.100 and containing all of the information required under 40 CFR 264.99(h)(2).

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c. Alternatively, the Permittee may notify the Commissioner within seven (7) days of the intention to make an alternate source demonstration in accordance with 40 CFR 264.99(i).

J. PERMIT MODIFICATION; 40 CFR 264.98(h)

If the Permittee or the Commissioner determines that the compliance monitoring program required by this permit no longer satisfies the requirements of the regulations, the Permittee must submit an application for a permit modification to the Commissioner within ninety (90) days to make the appropriate changes to the program which will satisfy the regulations. The Permittee must assure that monitoring and corrective measures necessary to achieve compliance under 40 CFR 264.92 are taken during the term of the permit.

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V. CORRECTIVE ACTION CONDITIONS

A. STANDARD REQUIREMENTS

1. Corrective Action At The Facility

In accordance with Section 3004(u) of RCRA (IC13-22-2-5) and the regulations promulgated pursuant thereto, the Permittee must institute corrective action as necessary to protect human health and the environment for all releases of hazardous waste(s) and hazardous constituent(s) from any solid waste management unit (SWMU) or area of concern (AOC) at the facility, regardless of the time the waste was placed in such units.

2. Corrective Action Beyond The Facility Boundary

In accordance with Section 3004(v) of RCRA (IC 13-22-2-5) and the regulations promulgated pursuant thereto, the Permittee must implement corrective action(s) beyond the facility property boundary, where necessary to protect human health and the environment, unless the Permittee demonstrates to IDEM's satisfaction that, despite the Permittee's best efforts, the Permittee was unable to obtain the necessary permission to undertake such actions. The Permittee is not relieved of all responsibility to clean up a release that has migrated beyond the facility boundary where off-site access is denied.

3. Applicable Guidance

The Permittee shall use the principles and procedures set forth in IDEM's 2012 Remediation Closure Guide, and all revisions and additions thereto, or other risk-based methodologies approved by IDEM's Office of Land Quality Permits Branch, as the basis for selecting risk-based endpoints that will be used for the investigations, studies, interim measures, and corrective measures under the permit. Additional guidance includes IDEM's Remediation Program Guide, USEPA's "Test Methods for Evaluating Solid Waste" (SW-846, the 3rd Edition, or most recent edition, and the most recent updates), and Standard Methods for the Examination of Water and Wastewater (the 23rd Edition, or most recent edition).

4. Notification

a. Field Activities

The Permittee must notify IDEM at least 7 days before engaging in any field activities, such as well drilling, installation of equipment, or sampling. At

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IDEM's request, the Permittee must provide IDEM or its authorized representative split samples of all samples collected by the Permittee pursuant to this permit. Similarly, at the Permittee's request, IDEM will allow the Permittee or its authorized representatives to take split or duplicate samples of all samples collected by IDEM under this permit.

b. Submittals

One hard copy and one PDF copy on CD of all reports, plans, and other submissions relating to or required by this permit must be sent to:

Indiana Department of Environmental Management
Office of Land Quality
Hazardous Waste Permit Section
IGCN 1101
100 N. Senate Avenue
Indianapolis, IN 46204

B. IDENTIFICATION OF SWMUs

1. Definitions

a. "Area of Concern (AOC)" means a unit or area, existing or historical, that could potentially produce unacceptable exposures or be a potential source of ground water contamination, but the unit or area does not meet the definition of a solid waste management unit.

b. "Facility" means all contiguous property under the control of the owner/operator of a facility seeking a permit under RCRA Subtitle C.

c. "Hazardous waste," as defined in IC 13-11-2-99, means a solid waste or combination of solid wastes that may cause or significantly contribute to an increase in: mortality, serious irreversible illness, or an incapacitating reversible illness; or pose a substantial present or potential hazard to human health or the environment. This term is further defined in 40 CFR Part 261.3.

d. "Hazardous constituent" means any constituent identified in Appendix VIII of 40 CFR Part 261, or any constituent identified in Appendix IX of 40 CFR Part 264.

e. "Release" means any spilling, leaking, pouring, emitting, emptying, discharging, injecting, pumping, escaping, leaching, dumping, or disposing of hazardous wastes or hazardous constituents into the

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environment, including the abandonment or discarding of barrels, containers, and other closed receptacles containing hazardous wastes or hazardous constituents.

f. "Solid waste" means any garbage, refuse, sludge, or other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, or agricultural operations or from community activities. This term is further defined in 40 CFR Part 261.2.

g. "Solid Waste Management Unit (SWMU)" means any discernable unit, permitted or unpermitted, existing or historical, at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at a facility at which solid wastes have been routinely and systematically released.

2. SWMUs and AOCs Requiring Corrective Action

Based on the information contained in the administrative record, corrective action is required at the former hazardous waste storage unit, closed with contaminated media in-place.

C. CONDITIONS PERTAINING TO ALL SWMUs AND AOCs

1. Notification Requirements

The Permittee must notify IDEM, within 30 days of discovery, of the following information for any new SWMU or AOC identified at the facility, in accordance with 329 IAC 3.1-13-1 and 40 CFR 270.14(d):

a. the location of the unit on the site topographic map;

b. designation of the type of unit;

c. general dimensions and structural description (supply any available drawings);

d. when the unit was operated; and

e. specifications of all waste(s) that have been managed at the unit.

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2. Release Information

The Permittee must submit to IDEM, within 30 days of discovery, all available information pertaining to any release of hazardous waste(s) and hazardous constituent(s) from any new or existing SWMU or AOC.

3. Corrective Action

IDEM will review the information provided as required in the above permit conditions, and may, as necessary, require investigations and/or corrective measures. The Permittee must submit a written RFI Work Plan to the Section Chief of the Hazardous Waste Permit Section in accordance with Condition V.D.2.

D. CORRECTIVE ACTION ACTIVITIES

The major tasks and required submittal dates are shown below. Additional tasks and associated submittal dates may also be specified in the Corrective Action Activities Schedule (Condition V.F.).

1. Interim Measures (IM)

a. The Permittee may undertake interim measure activities to prevent or minimize the further spread of contamination while long-term remedies are pursued. An IM Work Plan must be submitted to IDEM for approval before the Permittee initiates any remedial activity. The interim measure(s) must be capable of being integrated into any long-term solution at the facility.

b. While performing work pursuant to Permit Condition V, if the Permittee identifies an immediate threat to human health or the environment, the Permittee must immediately notify the Section Chief orally and in writing within 7 days summarizing the immediacy and magnitude of the potential threat to human health or the environment.

This notification should be made to:

Indiana Department of Environmental Management
Office of Land Quality
Attn: Chief Hazardous Waste Permit Section
IGCN 1101
100 North Senate Avenue
Indianapolis, IN 46204
800-451-6027 or 317-232-8603

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Upon receiving this information, IDEM will determine if an IM Work Plan is necessary. If one is necessary, the Section Chief will send a notice to the Permittee requiring the submission of an IM Work Plan. Within 21 days after receiving this notice, the Permittee must submit to the Section Chief a work plan for approval that identifies the interim measure(s).

The work plan should be consistent with and integrated into any long-term solution at the facility. In addition, the following Interim Measure schedule must be initiated:

i. Within 5 days of identifying an immediate threat to human health or the environment, the Permittee must provide an alternate water supply to parties that have a contaminated water supply well;

ii. Within 7 days of identifying an immediate threat to human health or the environment, the Permittee must submit a report to the Section Chief detailing the activity pursued and a plan for further Interim Measures activity;

iii. Within 7 days following the Section Chief's transmission of comments, the Permittee must revise the plan in accordance with the comments; and

iv. Within 7 days following IDEM's approval or modification of the plan, the Permittee must implement the revised plan in accordance with the schedule therein.

2. RCRA Facility Investigation (RFI)

The Permittee must conduct an RFI to thoroughly evaluate the nature and extent of the release of hazardous waste(s) and hazardous constituent(s) from all SWMUs and AOCs identified as requiring an RFI.

a. RFI Work Plan

The Permittee must submit a written RFI Work Plan to the Section Chief within 90 days after written notification by the Section Chief that further investigation is necessary.

IDEM will approve, modify and approve, or disapprove and provide comments on the work plan in writing to the Permittee. Within 60 days

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of receipt of such comments, the Permittee must provide a response to IDEM's comments.

b. RFI Implementation

Within 30 days of IDEM's written approval of the RFI Work Plan, the Permittee must implement the plan according to the terms and schedule contained therein.

c. RFI Report

Within 90 days after the completion of the RFI, the Permittee must submit an RFI Report to the Section Chief. The RFI Report must describe the procedures, methods, and results of the RFI. The report must contain adequate information to support further corrective action decisions at the facility. After the Permittee submits the RFI Report, IDEM will either approve or disapprove the report in writing. If IDEM disapproves the report, the Section Chief will notify the Permittee in writing of the deficiencies. The Permittee has 60 days after receipt of IDEM's comments to submit a revised RFI Report to the Section Chief.

3. Determination of No Further Action

a. Permit Modification

After completion of the RFI, and based on its results and other relevant information, the Permittee may submit an application to the Section Chief for a permit modification under 40 CFR 270.42 to terminate the corrective action tasks of the Corrective Action Activities Schedule for all or a portion of the facility. Tasks identified in Permit Condition V.F. for the SWMUs, solid waste management areas (a group of SWMUs in an area to be addressed as a single unit), and/or the AOCs identified in the modification (for a determination of no further action) will be stayed pending a decision by IDEM. This permit modification must demonstrate that there are no releases of hazardous waste(s), including hazardous constituents, from SWMUs or AOCs that are the subject of the modification at the facility that pose a threat to human health or the environment.

If, based upon review of the Permittee's request for a permit modification, the results of the completed RFI, and other information, IDEM determines that releases or suspected releases that were investigated either are nonexistent or do not pose a threat to human health or the environment, IDEM will grant the requested modification.

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b. Further Investigations

A determination of no further action will not preclude IDEM from requiring further investigations, studies, or remediation at a later date, if new information (including different risk assumptions) or subsequent analysis indicates that a release or likelihood of a release from a SWMU or AOC at the facility is likely to pose a threat to human health or the environment. In such a case, IDEM will initiate a modification to the Corrective Action Activities Schedule to rescind the determination made in accordance with the above permit condition. Additionally, IDEM may determine that there is insufficient information on which to base a determination and may require the Permittee to perform additional investigations as needed to generate the needed information.

4. Community Relations Plan

The Permittee must prepare and submit to IDEM for review and approval a Community Relations Plan for the dissemination of information to the public regarding investigation activities and results for offsite activities. The plan must be consistent with "IDEM's Guide for Citizen Participation" and U. S. EPA's "1996 RCRA Public Participation Manual."

5. Corrective Measures Study (CMS) and Remedy Selection

If IDEM determines, based on the results of the RFI and other relevant information, that corrective measures are necessary, the Section Chief will notify the Permittee in writing that the Permittee must conduct a CMS. The purpose of the CMS is to develop and evaluate the corrective action alternative(s) that will satisfy the performance objectives specified by IDEM. The CMS must be conducted within 60 days of notification by the Section Chief that the CMS is required. This period of time may be extended by the Section Chief if necessary to adequately complete the CMS. Note that this process can be significantly shortened by the selection of presumptive remedies (i.e., remedies that are known to be effective). Additional tasks and associated submittal dates may also be specified in the Corrective Action Activities Schedule (Condition V.F.).

a. CMS Report

Within 60 days after the completion of the CMS, the Permittee must submit a CMS Report to the Section Chief. The CMS Report must summarize the results of the investigations for each remedy studied and must include an evaluation of each remedial alternative. After the

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Permittee submits the CMS Report, IDEM will either approve, modify and approve, or disapprove the Report. If IDEM disapproves the report, the Section Chief will notify the Permittee in writing of the deficiencies. The Permittee has 60 days after receipt of IDEM's comments to submit a revised CMS Report to the Section Chief. The CMS Report, as approved, becomes an enforceable condition of this permit.

b. CMS Remedy Selection

IDEM will approve a corrective measure for implementation based on the following factors. The corrective measure selected for implementation must: (1) be protective of human health and the environment; (2) attain media cleanup standards; (3) control the source(s) of releases so as to reduce or eliminate further releases of hazardous waste(s) (including hazardous constituent(s)); (4) minimize the transfer of contamination from one environmental medium to another; and (5) comply with all applicable standards for management of wastes.

If two or more of the corrective measures studied meet the threshold criteria set out above, IDEM will choose among alternatives for implementation by considering remedy selection factors including: (1) long-term reliability and effectiveness; (2) the degree to which the corrective measure will reduce the toxicity, mobility or volume; (3) the corrective measure's short-term effectiveness; (4) the corrective measure's implementability; and (5) the relative cost associated with the alternative. In selecting the corrective measure(s), IDEM may also consider such other factors as may be presented by site-specific conditions.

6. Permit Modification

Within 30 days of IDEM's approval of a corrective measure, the Permittee will initiate a permit modification, pursuant to 40 CFR 270.41 or 40 CFR 270.42, respectively, for the implementation of the corrective measure(s) selected. No permit modification fees are required for any modifications submitted under this condition.

7. Corrective Measures Implementation (CMI)

a. If the corrective measure(s) recommended in the Corrective Measures Study Report is (are) not the corrective measure(s) approved by IDEM after consideration of public comments, the Section Chief will inform the Permittee in writing of the reasons for such decision. Within 30 days after the effective date of the permit modification, the Permittee must implement the corrective measure(s).

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b. Financial Assurance

As part of the permit modification of this permit to incorporate the CMI, the Permittee must provide financial assurance in the amount specified in the IDEM-approved CMS Report as required by 40 CFR 264.101(b) and (c).

8. Incorporation of Plans and Reports

All approved plans and reports prepared for this permit will be incorporated into this permit on the date the Section Chief or his/her designee approves such plan or report.

E. DISPUTE RESOLUTION

1. If IDEM disapproves or modifies and approves any submission required by Condition V. of the permit, IDEM will provide the Permittee with a written notice setting forth the reasons for the disapproval or modification and approval.

2. If the Permittee disagrees, in whole or in part, with any written decision concerning IDEM's disapproval or modification and approval of any submission required by Condition V. of the permit, the Permittee must notify IDEM of the dispute. The Permittee and IDEM must informally, and in good faith, endeavor to resolve the dispute.

3. If the Permittee and IDEM cannot resolve the dispute informally, the Permittee may pursue the matter formally by submitting a written statement of position to the Commissioner or his/her designee, within 28 days of receipt of IDEM's written disapproval or modification and approval. The Permittee's statement of position must set forth the specific matters in dispute, the position that the Permittee asserts should be adopted as consistent with the requirements of the permit, the basis for the Permittee's position, and must include any supporting documentation. If the Permittee fails to follow any of the requirements contained in this paragraph, then it will have waived its right to further consideration of the disputed issue. IDEM’s decision to discontinue further consideration under this condition will constitute a final agency action, which is subject to review under IC 4-21.5.

4. IDEM and the Permittee will have an additional 14 days from the date of the Commissioner’s receipt of the Permittee's statement of position to meet or confer to attempt to resolve the dispute. This time period may be extended by mutual agreement of the Permittee and IDEM. If agreement is reached, the Permittee must submit a revised submission, if necessary, and must

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implement the submission in accordance with such agreement.

5. If IDEM and the Permittee are not able to reach agreement within the 14 day period, or such longer period corresponding to IDEM's extension for good cause, the Permittee may submit any additional written arguments and evidence not previously submitted, or further explain any arguments or evidence previously submitted, to the Commissioner. Based on the record, the Commissioner, or delegate, will thereafter issue a written decision that will include a response to the Permittee's arguments and evidence. This written decision will constitute a final agency action, which is subject to review under IC 4-21.5.

6. Notwithstanding the invocation of this dispute resolution procedure, the Permittee must proceed to take any action required by those portions of the submission and of the permit that IDEM determines are not substantially affected by the dispute. The activity schedule for those portions of the submission and of the permit that are substantially affected by the dispute will be suspended during the period of dispute resolution.

F. CORRECTIVE ACTION ACTIVITIES SCHEDULE FOR NEWLY IDENTIFIED SWMUs and AOCs

	Activity	**Due Date**
1.	IM Work Plan	21 days after receiving IDEM's notice
2.	RFI Work Plan	90 days after receiving IDEM's notice
3.	Notification of newly identified SWMUs of AOCs	30 days after discovery
4.	RFI Work Plan for newly identified SWMUs or AOCs	90 days after receiving IDEM's notice
5.	RFI Work Plan modification	60 days after receiving IDEM's comments
6.	RFI Implementation	30 days after RFI Work Plan approved
7.	RFI Report	90 days after completion of RFI
8.	RFI Report Modification	60 days after receiving IDEM's comments
9.	Progress Reports	Semi-annually; to coincide with ground water reporting if possible

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10.	CMS Report	60 days after receiving IDEM's notificatior
11.	CMS Report Modification	60 days after receiving IDEM's comments
12.	Permit Modification for Corrective Measure Implementation	30 days after receiving IDEM's notificatior (modification may be a Class 1, 2, or 3 at IDEM's discretion)
13.	CMI Program Plan	30 days after effective date of permit modification
14.	CMI Program Plan Modification	30 days after receiving IDEM's comments
15.	CMI Reports	Semi-annually; to coincide with ground water reporting if possible
16.	CMI Report Modification	30 days after receiving IDEM's comments
17.	Operation and Maintenance Progress Reports	Semi-annually; to coincide with ground water reporting if possible

IDEM may, at the facility's request, grant extensions to the time frames listed in this section. IDEM-approved time extensions will not require a permit modification.

G. FORCE MAJEURE

"Force Majeure," for purposes of this Permit, is defined as any event arising from causes beyond the control of the Permittee that delays or prevents the performance of any obligation under this Permit despite Permittee's best efforts to fulfill the obligation. The requirement that the Permittee exercise "best efforts to fulfill the obligation" includes using best efforts to anticipate any potential force majeure event as it is occurring and best efforts to address the effects of any potential force majeure event as it is occurring and following the potential force majeure event, such that the delay is minimized to the greatest extent possible. "Force Majeure" does not include financial inability to complete the work required by this Permit nor any increases of costs to perform the work.

The Permittee must notify IDEM by calling within 3 calendar days and by writing no later than 7 calendar days after any event that the Permittee contends is a force majeure. Such notification must describe the anticipated length of the delay, the cause or causes of the delay, the measures taken or to be taken by the Permittee to minimize the delay, and the timetable by which these measures will be implemented. The Permittee must include with any notice all available documentation supporting its

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claim that the delay was attributable to a force majeure. Failure to comply with the above requirements will preclude the Permittee from asserting any claim of force majeure for that event. The Permittee will have the burden of demonstrating that the event is a force majeure. The decision of whether an event is a force majeure will be made by IDEM. Said decision will be communicated to the Permittee.

If a delay is attributable to a force majeure, IDEM will extend, verbally or in writing, the time period for performance under this Permit by the amount of time that is attributable to the event constituting the force majeure. Any final determination by IDEM under this section will be reviewable under IC 4-21.5. However, if the Permittee appeals an IDEM decision concerning force majeure, such appeal will not toll the accrual of penalties during the review of that appeal.

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A FACILITY DESCRIPTION

A-1 GENERAL DESCRIPTION

Hammond Pest Control (EPA ID# INR 000 008 623) is an active business located at 664 State Street within the city limits of Hammond in Lake County, Indiana (Figure A-1). The site is located within the northeast quarter of the southeast quarter of Section 36, Township 37 North, Range 10 West, in Hammond, Indiana. The site consists of the main Hammond Pest

Control (HPC) operations building west of Jesse Avenue and a former small storage building and garage east of Jesse Avenue.

HPC is a small pest control company providing general pest control services. The NAICS code for HPC is 561710 (exterminating and pest control services). HPC is the owner and operator of the Hazardous Waste Management Unit (HWMU) that has been closed at the subject property. The HWMU is located east of the main operations building across Jessie Avenue at the southeast corner of State Street and Jessie Avenue (Figure A-2).

The parcel containing the HWMU is bordered to the south by an unnamed alley, beyond which is a residential property; to the east by a vacant property; to the north by State Street, beyond which are residential properties; and to the west by Jessie Avenue, beyond which is Hammond Pest Control's business operation. The parcel originally had two structures constructed on it, a storage shed and a garage, that were connected. Both structures have been demolished. The former storage shed and garage were reportedly constructed circa 1917. The shed portion comprised approximately 2,264 square feet, and the garage portion comprised approximately 488 square feet. The

one-story structures were constructed of brick and concrete block walls. The flooring varied throughout and consisted of concrete, wood, or earth. The shed portion of the building was in serious disrepair. After the contents of the shed were removed, the shed was demolished in November 1997. The garage was demolished on December 2, 2014.

A concrete pad was present on grade in the southwest corner of what would have been the main portion of the former storage shed. There was a joint trending east-west across the pad that bisected it into north and south halves. There were no curbs at the perimeter of the concrete pad. There were occasional cracks visible in the southern half of the pad. More numerous cracks were present in the northern half of the pad, especially along the north edge. There were no floor drains in the HWMU. As part of site closure activities, the concrete pad was power washed on December 8, 2014, and the south west corner of the concrete pad was removed on December 10, 2014. The remainder of the pad was left in place and eventually covered with a cap consisting of a geocomposite liner (GCL) and concrete. The concrete cap was constructed so that it could be used for vehicle parking for HPC employees.

The HWMU was operated solely as a storage facility for product intended for use in commercial applications or for sale. HPC unintentionally stored pest control products beyond the period for which the products were usable and subsequently, the area was classified as a HWMU by the Indiana Department of Environmental Management (IDEM). Arsenic trioxide, which constituted the bulk of the stored product, was placed in the facility beginning sometime during the early 1970s. The arsenic trioxide was originally stored in a variety of small containers. Other products were placed in the facility during the subsequent years. Table A-1 is a list of products removed from the storage shed and disposed of in 1997. It is believed that once material was placed in

the facility, it typically was not disturbed until needed or until it was removed for final disposal.

Throughout the time these products were stored, some of the materials were released to the environment in solid form. This solid material did not flow beyond the immediate area of spillage. The released arsenic trioxide is not known to have come in contact with water, except possibly with precipitation after the partial collapse of the storage shed. Arsenic trioxide mixes slowly with water, according to the Chemical Hazard Response Information System (CHRIS) (USDOT 1991). If arsenic trioxide did dissolve in water, it is believed likely to have infiltrated the soils at the site rather than running off onto adjacent properties due to the relatively flat nature of the subject property.

A-2 TOPOGRAPHIC MAP

A topographic map showing the site location, surrounding land use, surface contours, and surface waters indicates the site is relatively flat and is provided as Figure A-3. The site is located outside of the 100-year floodplain. Figure A-2 and Figure A-4 show in detail the prior and current layout of the site, respectively. Figure A-2 shows the previous garage, the HWMU, and property boundaries of the HPC site and surrounding properties. Figure A-4 shows the newly constructed parking lot, the location of new sewer infrastructure, and the direction of surface drainage on the parking lot. The edges of the parking lot are coincident or extend beyond the boundary of the hazardous waste area. The point of compliance (POC) wells consist of Monitoring wells MW-3, MW-4, MW-5, MW-6, and new well MW-7R which was installed on February 27, 2018 to replace well MW-7 because the integrity of MW-7 had become compromised due to intrusion of tree roots through the well screen. The Grand Calumet River is located approximately 1,500 feet north of the subject property.

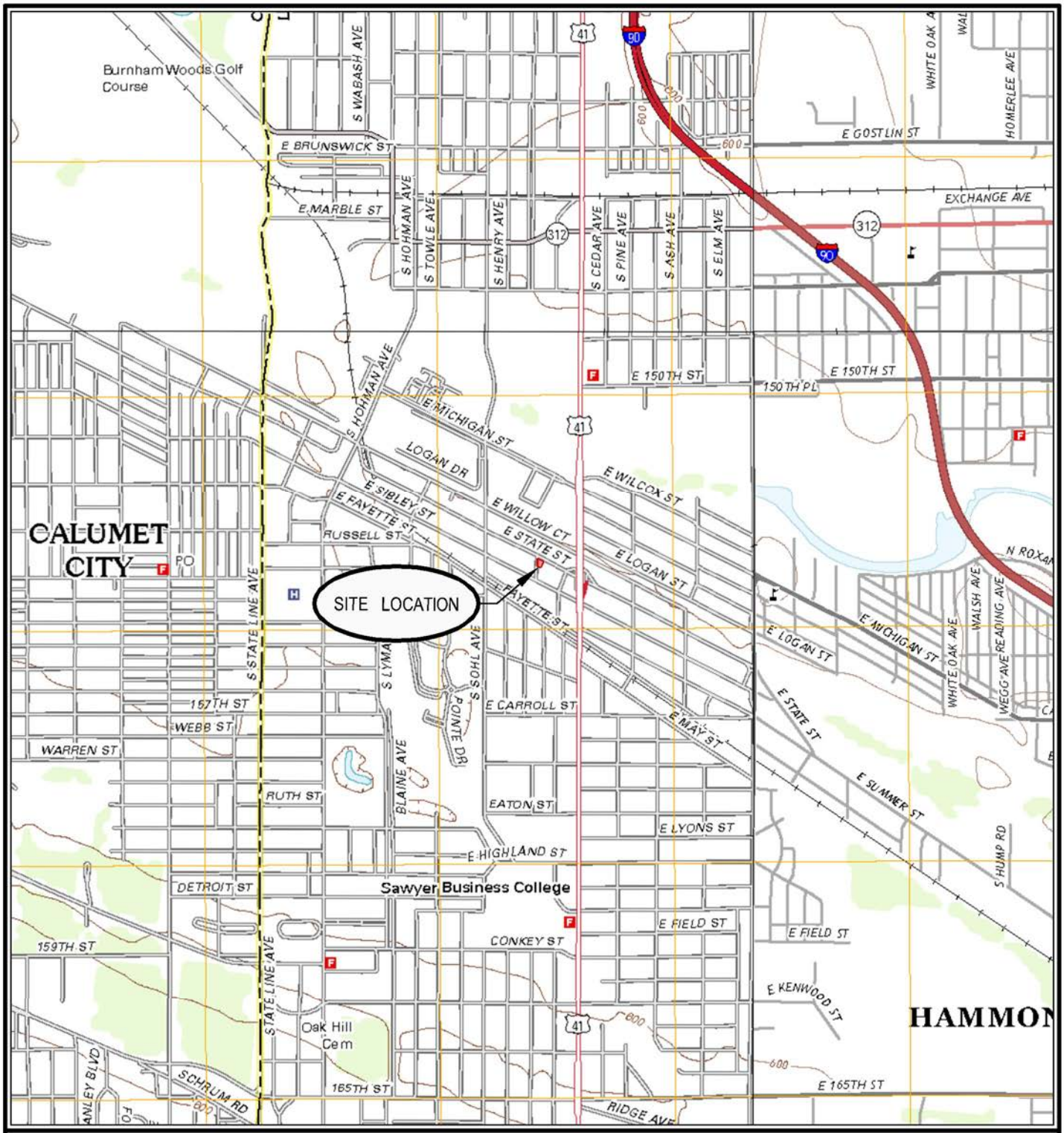
The site was surveyed following construction of the GCL and the parking lot. Figure A-4 shows the elevations of the GCL and the finished grade elevations for the concrete. The parking lot surface has been raised between 1 and 3 feet with respect to the surrounding grade elevation. The parking lot has been sloped towards an interceptor trench, which collects and routes run-off via a sewer to the City sewer.

A-3 FLOODPLAIN STANDARD

The Grand Calumet River is located approximately 1,500 feet north of the subject property. As stated previously, the HWMU is not located within the 100-year flood plain. According to the National Flood Insurance Program, Firm Flood Insurance Rate Map for the City of Hammond (Panel Number 180134 0005 B, Effective Date March 16, 1981) the site is in Flood Zone C. Zone C is described as areas of minimal flooding. Figure A-5 shows a portion of the referenced flood map. In the unlikely event flood waters would cover the site, waste closed in place in the HWMU will be protected by the concrete parking lot and associated GCL.

A-4 POST-CLOSURE NOTICES

A copy of the Environmental Restrictive Covenant (ERC) for the site is included in Appendix A. The ERC prevents residential land use and use of on-site groundwater and requires the maintenance of the parking lot as an engineered barrier.



QUADRANGLE LOCATION

Scale 1:24000

0 1/2 1 MILE

1000 0 1000 2000 3000 FEET

(SOURCE OF MAP IS USGS 7.5 MINUTE QUADRANGLE MAP, CALUMET CITY (2012), ILLINOIS-INDIANA)

CHECK BY	GRP
DRAWN BY	OS
DATE	6-15-15
SCALE	AS SHOWN
CAD NO.	00184.02M[2]
PRJ NO.	19-00184

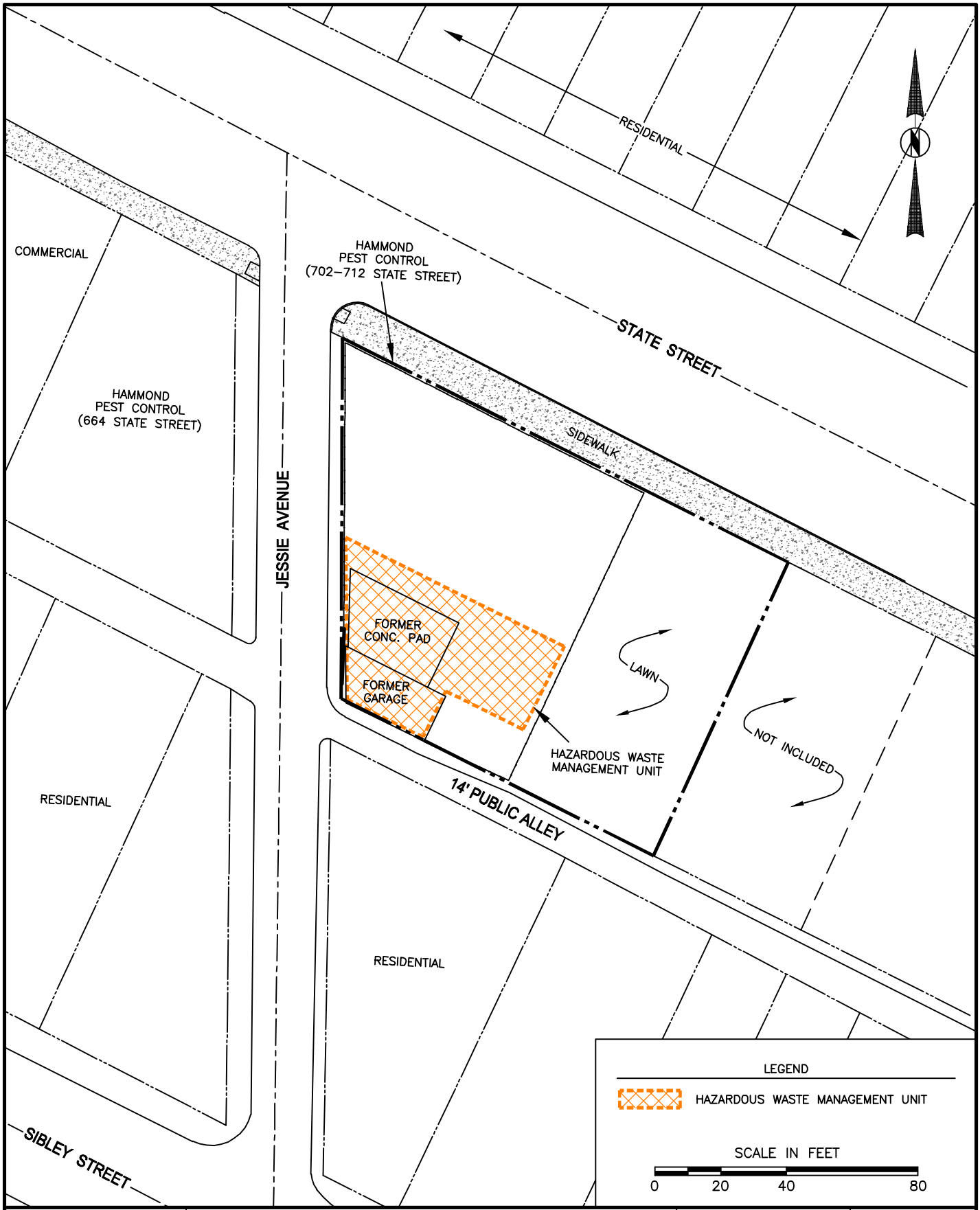
SITE LOCATION MAP

HAMMOND PEST CONTROL
HAMMOND, INDIANA

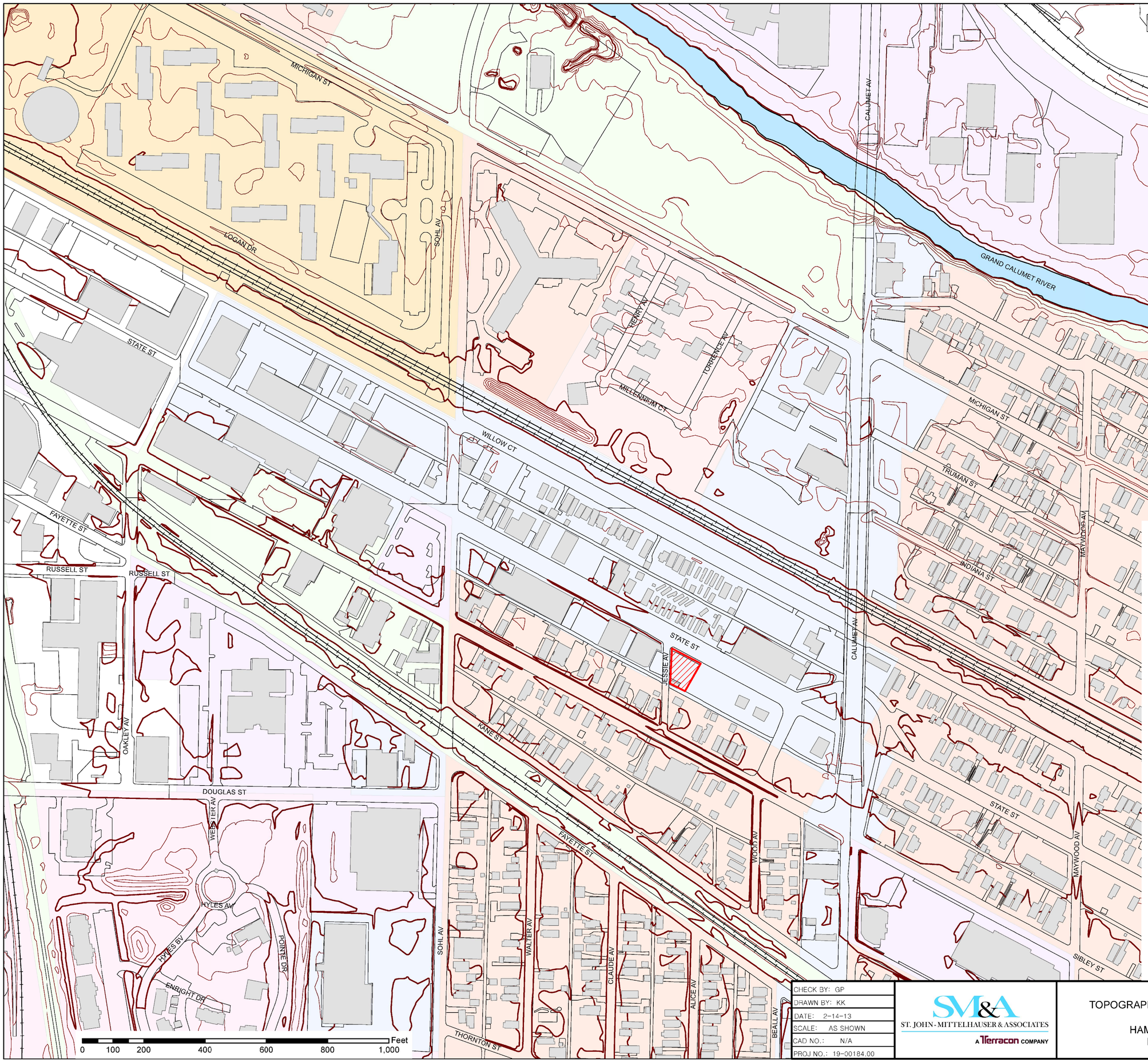
SM&A
ST. JOHN-MITTELHAUSER & ASSOCIATES
A Terracon COMPANY

FIGURE

A-1



CHECK BY GRP	LOCATION OF HAZARDOUS WASTE MANAGEMENT UNIT HAMMOND PEST CONTROL HAMMOND, INDIANA	SM&A ST. JOHN-MITTELHAUSER & ASSOCIATES A Terracon COMPANY	FIGURE
DRAWN BY OS			A–2
DATE 7–28–15			
SCALE AS SHOWN			
CAD NO. 00184.02C[2]			
PRJ NO. 19–00184			



Legend

Site Location

Contours (2 foot Interval)

Index

Intermediate

Land use

Commercial

Institutional

High Density Res

Medium Density Res

Low Density Res

PUD Residential

Park/Open Space/Recreation

Notes:

1. Base Map from Hammond Sanitary District and the City of Hammond, Indiana March, 1995.

2. Land Use data from Northwestern Indiana Regional Planning Commission Regional Comprehensive Plan 2009-2011.

CHECK BY:	GP
DRAWN BY:	KK
DATE:	2-14-13
SCALE:	AS SHOWN
CAD NO.:	N/A
PROJ NO.:	19-00184.00

SM&A
ST. JOHN-MITTELHAUSER & ASSOCIATES
A Terracon COMPANY

TOPOGRAPHIC MAP OF SITE AND VICINITY

HAMMOND PEST CONTROL
HAMMOND, INDIANA

FIGURE
A-3

STATE STREET

SIDEWALK

87'-4"

13'-4"

6" PVC SOLID PIPE TO EXISTING SEWER LATERAL

PERENNIALS AND BUSHES

STORMCEPTOR

TWO 4" PVC SOLID DRAINAGE PIPES

3" SLOTTED PVC DRAINAGE PIPE

31'-2"

TURF

CLEANOUT WITH CHECK VALVES

CONCRETE PARKING LOT

INTERCEPTOR TRENCH

SLIDING GATE

22'-1"

JESSIE AVENUE

3" SLOTTED PVC DRAINAGE PIPE

43'-2"

TURF

94'-0"

LAWN

NOT INCLUDED

TURF

56'-1"

14' PUBLIC ALLEY

MW-1 MW-2 MW-3 MW-4 MW-5 MW-6 MW-7R

590.59 590.44 590.74 590.07 590.79 590.30 590.56 590.92 590.85 590.11

590.05 F.E. 588.81 G.E.
591.89 F.E. 590.69 G.E.
592.41 F.E. 591.10 G.E.
592.97 F.E. 591.75 G.E.
589.85 F.E. 588.71 G.E.
591.09 F.E. 590.01 G.E.
592.45 F.E. 591.15 G.E.
593.01 F.E. 591.95 G.E.
590.17 F.E. 589.10 G.E.
591.75 F.E. 590.50 G.E.
592.55 F.E. 591.31 G.E.
593.01 F.E. 591.75 G.E.
591.55 F.E. 590.40 G.E.
591.79 F.E. 590.39 G.E.
592.39 F.E. 591.21 G.E.
593.00 F.E. 591.80 G.E.

ABBREVIATIONS AND SYMBOLS

+	SPOT ELEVATION
G.E.	GEO COMPOSITE LINER ELEVATION
F.E.	FINISHED ELEVATION
⊗	MONITORING WELL LOCATION
———	PROPERTY BOUNDARY
	POWER POLE
CB	CATCH BASIN
←	APPROXIMATE SURFACE WATER FLOW DIRECTION

SCALE IN FEET

0 7.5 15 30

CHECK BY	GRP
DRAWN BY	OS
DATE	5-11-20
SCALE	AS SHOWN
CAD NO.	00184.02L[4]
PRJ NO.	19-00184

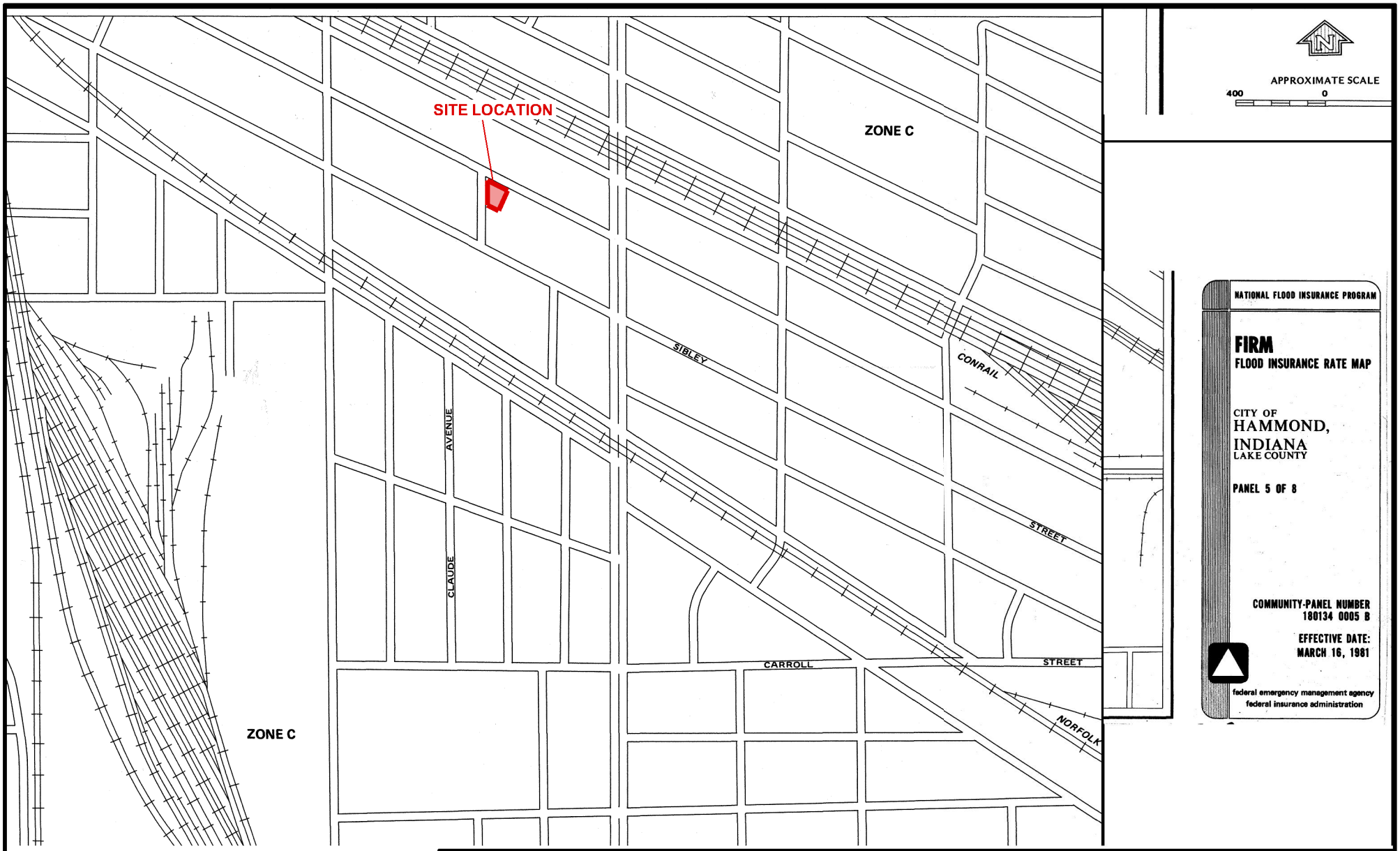
PARKING LOT AND SITE LAYOUT

HAMMOND PEST CONTROL
HAMMOND, INDIANA

SM&A ST. JOHN-MITTELHAUSER & ASSOCIATES A Terracon COMPANY

FIGURE

A-4



SCALE IN FEET

0 300 600 1200

CHK BY	GRP
DWN BY	OS
DATE	6–18–15
SCALE	AS SHOWN
CAD NO.	00184.02N
PRJ NO.	19–00184

FLOOD INSURANCE MAP

HAMMOND PEST CONTROL
HAMMOND, INDIANA

SM&A
ST. JOHN-MITTELHAUSER & ASSOCIATES
A Terracon COMPANY

FIGURE

A–5

TABLE A-1
Former Contents of HWMU

Hammond Pest Control / Hammond, Indiana

Materials	USEPA Hazardous Waste Code	Quantity	Container	Disposal Method
Lead Arsenate	D004, D008	1	55 gallon drum	Hazardous Landfill
Deodorant / Fragrance / Debris (waste flammable liquids - mineral spirits)	D001	6	55 gallon drum	Landfill
Deodorant / Fragrance / Debris (waste flammable liquids - mineral spirits)	D001	1	85 gallon overpack drum	Landfill
Arsenic Trioxide / Debris	D004, P012	23	55 gallon drum	Incineration
Arsenic Trioxide / Debris	D004, P012	3	55 gallon drum	Incineration
Liquid Bulk Pesticide	D001, D008, D013, D018, D019, D020, U036, U129, U244, U240, U067, U019, P075, D016	2	55 gallon drum	Incineration
Rinse Water (arsenic trioxide rinsewater)	D004, P012	1	55 gallon drum	Chemical Treatment
Solid Pesticides (strychnine, lindane)	D013, U129, P108, U061, U248, D021, U037	7	55 gallon drum	Incineration
Lab Waste (Waste flammable solids - paraformaldehyde)	D001	1	14 gallon drum	Incineration
Lab Waste (aerosols)	F027, D037	1	5 gallon drum	Incineration
Pentachlorophenol	F027, D037	3	55 gallon drum	Treatment
Cyanogen	P029, P106	1	55 gallon drum	Chemical Treatment
Arsenic Trioxide / Debris	D004, P012	4	55 gallon drum	Incineration
Arsenic Trioxide / Debris	D004, P012	28	55 gallon drum	Incineration
Lab Waste (aerosols)	D001, D013	1	5 gallon drum	Incineration

B POST-CLOSURE INSPECTION REQUIREMENTS

B-1 WRITTEN INSPECTION PLAN

The parking lot and GCL will be effective in isolating the impacted soil left in-place from direct contact and preventing precipitation from coming in contact with those soils and leaching constituents to groundwater. Below are the elements of the inspection plan.

1. Parking Lot. The integrity of the parking lot will be inspected annually in the late spring/early summer by a qualified building construction professional ("inspector"). An annual inspection is considered adequate as potential issues will likely only become apparent in the spring following the freeze-thaw cycle and once snow has melted from the parking lot. The inspector will determine whether 1) precipitation and run-off is being captured and not allowed to pool on top of the parking lot; 2) the parking lot is free of material cracks; 3) the interceptor trench is free of debris and is working as designed; 4) the Stormceptor is free of debris and is working as designed; 5) the concrete joint sealant is intact; and 6) the backflow prevention devices are working as designed.

2. Retaining Wall. The retaining wall associated with the parking lot at the site will be inspected annually by an inspector to verify that it remains structurally sound. The inspector will determine whether the retaining wall is free of material cracks and settling.

3. Stormwater Management System. The stormwater management system associated with the parking lot will be inspected by HPC or its designee pursuant to the Stormwater Management System Operation and Maintenance Plan developed in response to a request from the Hammond Department of Environmental Management and Sanitary District (Appendix B).

If problems are noted with the parking lot, drainage system, Stormceptor, or retaining wall during the annual inspection or at any other time during the year, repairs will be scheduled as soon as practical.

The inspector will be required to certify in writing to IDEM the results of the inspection within sixty days of completing the annual inspection. If corrective action is required, the inspector will also certify that the corrective actions have been completed.

4. Monitoring Wells. The integrity of the montoring wells will be assessed annually until the wells are properly abandoned. Each monitoring well will be assessed for any damage or deterioration to the protective casing, surface seal, and the well casing. The total depth of the well will also be measured during the integrity assessment inspection. A copy of the well integrity inspection form is attached in Appendix C. This form will be submitted with the reports documenting results of groundwater monitoring.

B-2 INSPECTION REMEDIAL ACTIONS

If the monitoring well integrity assessment reveals any damage to a well, corrective action will be attempted during the site visit that damage is discovered. If not possible during the visit, corrective action will be performed as soon as feasible. If a monitoring well cannot be repaired, it will be replaced prior to the next sampling event or as soon as practicable.

A monitoring well will be redeveloped if evidence exists (bacterial growth, poor recharge, etc.) that the screen is not in complete communication with the aquifer. A monitoring well surface seal will be repaired or replaced if significant cracking or deterioration of the surface seal is discovered. Following remedial activities to a monitoring well, the well will be sampled on the regular schedule unless the defect prohibits access for sampling or sample integrity is affected. If access is restricted or sample integrity is in question, the monitoring well will be sampled at the next scheduled sampling event following the remedial activity.

B-3 INSPECTION LOG

A report documenting the inspection results will be completed by the inspector following each annual inspection visit. Information included in the inspection report will be the date and time of the inspection, inspector’s name, observations made, and recommendations of any repairs or other remedial activities that are needed. A

description of all repairs and remedial actions will be documented and maintained in a file containing the inspection logs. Files will be maintained on site for a period of at least three years from the date of the inspection.

C POST-CLOSURE PLAN

The post-closure plan consists of (i) inspection and maintenance of the new on-site parking lot which serves as an engineered barrier; and (ii) groundwater monitoring. Pursuant to 40 C.F.R. § 265.117(a)(2), post-closure care will include inspection and maintenance of the parking lot and drainage structures as outlined below during the post-closure permit period. The ERC is provided as Appendix A. The ERC runs with the Real Estate and requires any property owner to continue to maintain the parking lot after completion of the post-closure permit period unless IDEM approves an amendment to the ERC.

The groundwater plume is essentially stable based on 18 quarters of groundwater monitoring data after the concentration spikes/outliers are removed from the data sets. The concentration spikes/outliers are believed to be generated by fluctuations in groundwater elevation and are not reflective of instability in the groundwater plume.

HPC will conduct another four quarters of groundwater monitoring and review the data. If there is sufficient evidence of continued plume stability, HPC will prepare a request to terminate the post-closure permit period. If, after the four additional quarters of groundwater monitoring and evaluation, IDEM does not concur there is sufficient evidence of plume stability, the post-closure permit groundwater monitoring period will continue as discussed in detail in Section D.

C-1 POST-CLOSURE CONTACT

Mr. Robert Dold, Senior is the site contact as follows:

Mr. Robert Dold, Senior
Hammond Pest Control, Inc.
71 Warwick Road
Winnetka, Illinois 60093
(847) 441-8300

C-2 POST-CLOSURE SECURITY

The parking lot is surrounded by a 48-inch high fence and secured with a locking vehicle gate at the entrance on Jessie Avenue. A streetlight located in the State Street right of way near the northeast corner of the site provides nighttime illumination for the property.

C-3 REQUEST FOR WAIVER OF PREPAREDNESS AND PREVENTION REQUIREMENTS

HPC requests a waiver to the Preparedness and Prevention requirements in 40 CFR 264.30 through 264.37. No hazardous wastes will be stored at the site as a result of the approved closure/post-closure activities, and all residual wastes from former activities are now contained in soils below the 6-inch concrete parking lot and associated GCL. The potential for a release of hazardous waste that would require an immediate response is nonexistent. Likewise, the wastes contained in soil is separated from any potential fire by the 6-inch concrete parking lot. Therefore, the Preparedness and Prevention requirements are not needed for the site.

C-4 MAINTENANCE PLAN

The hazardous wastes in the HWMU have been closed in place and are protected by the concrete parking lot and associated GCL constructed at the site. The parking lot and associated GCL act as an engineered barrier diverting any precipitation away from the HWMU and preventing it from infiltrating the subsurface.

The maintenance plan for the HWMU, more fully described in Section C-4e, will include annual integrity inspections by an inspector until IDEM approves a request that the post-closure permit period be terminated at the end of a successful groundwater plume stability demonstration (see Section D-5). Following the post-closure permit period,

inspection and maintenance of the parking lot will be governed by the terms of the ERC. As discussed in Section B-1, the inspector is required to certify in writing that 1) the precipitation and run-off is being captured and not allowed to pool on top of the parking lot; 2) the parking lot is free of material cracks;
3) the interceptor trench is free of debris and is working as designed; and 4) the Stormceptor is free of debris and is working as designed. In addition, the integrity of the montoring wells will be assessed annually. The inspector will also certify that any problems identified during the inspection are corrected.

C-4a List of Wastes

The HWMU was operated solely as a storage facility for product intended for use in commercial applications or for resale. The majority of the materials stored at the subject property were arsenic trioxide and solid and liquid pesticides. A complete list of the hazardous wastes manifested during removal from the former storage shed and garage at the site are provided in Table A-1.

C-4b Liner and Cap System Description

An engineering drawing package of the liner and cap system was submitted to IDEM in the July 2012 RCRA Closure Work Plan (revised on April 2014) and was approved. A copy of the design package and as built drawings are provided in Appendix D. The liner and cap system consists of a GCL covered by concrete parking lot. The liner and cap system covers all hazardous wastes in the HWMU and prevents precipitation from coming in contact with waste left in place. The parking lot footprint is shown on Figure A-4. The grade surrounding the parking lot has been sloped away from the parking lot. Run-off will not come into contact with the waste left in place. As built drawings D-1 and D-2 show a plan view and sectionals, respectively, of the parking lot cap, stormwater collection features, and subbase drainage system.

C-4b(1) Liner System Foundation Description

Hazardous wastes are contained in soil at the HPC site. The site was graded to allow for proper drainage off the GCL and concrete. The soil was compacted to 95 percent Modified Proctor density. Additional CA6 was brought in and compacted to stabilize the foundation for the GCL and concrete. A 60 mil GCL was placed directly on the compacted soil.

C-4b(2) Leachate Collection/Detection System Operation and Design

Not applicable.

C-4c Run-On Control System

Review of the United States Geological Survey (USGS) Calumet City, Illinois-Indiana Quadrangle Map, dated 1968 (photo revised in 1980), indicates that the elevation of the subject property is approximately 590 feet above mean sea level. The subject property is level and is located at the same grade as the surrounding properties. The elevation of the parking lot surface has been raised between 0.25 and 3.0 feet higher than the surrounding grade, thus minimizing the potential for run-on. State Street to the north has concrete curbs and gutters and a sewer inlet immediately north of the site to prevent water from precipitation events from running onto the site. The ground surface adjacent to the parking lot are lower in grade and sloped away from the parking lot to prevent any run-on.

The parking lot is above grade, and waterstops have been placed at gaps in the parking lot and walls to prevent water from penetrating the concrete parking lot and onto the GCL liner. Control joints were filled with an expandable joint sealant to prevent water from penetrating cracks in the joints and running onto the GCL.

The site was surveyed following construction of the GCL and parking lot and Figure A-4 shows the elevations of the GCL and the finished grade of the concrete surface and all related run-on and run-off mechanisms. As Built drawings are provided in Appendix D.

C-4d Run-Off Control System

Run-off generated from the site is in the form of water from precipitation events and water that enters the drainage layer above the GCL. The parking lot is sloped so that run-off is collected in the intercepter trench at the entrance to the parking lot and discharged to the City sewer. Any water that enters the drainage layer above the GCL drains by gravity through the sand and concrete subbase layer to a 3-inch diameter slotted drain pipe. Water that enters this pipe is routed through the Stormceptor to the City of Hammond combined storm and sanitary sewer system. The hazardous waste in the HWMU is completely covered by the GCL and concrete parking lot.

C-4e Cap Maintenance

The HWMU was closed in place and is protected by the concrete parking lot and associated GCL constructed over the unit. The parking lot is sloped so as to divert precipitation towards the interceptor trench for collection and prevent it from infiltrating the subsurface. The parking lot will be inspected pursuant to Section B-1 and the Stormwater Management System Operation and Maintenance Plan (Appendix B) until IDEM approves a request to terminate the post-closure permit period. Inspection and maintenance after the post-closure period will be governed by the ERC.

The inspector is required to certify in writing that precipitation is diverted away from the waste unit and the parking lot is free of material cracks. If material crack(s) develop in the parking lot, the crack(s) will first be blown free of any particulates or foreign matter using compressed air. If the crack is sufficently wide, a water stop will be installed in the crack. Smaller cracks will be repaired using a sealant.

All remedial actions identified as a result of annual inspections will be completed as soon as practicable. Erosion and vegetative cover in the unpaved areas will be maintained as necessary. Inspections and corrective actions will be documented as described in the operation and maintenance plan in Appendix B.

C-5 POST-CLOSURE COST ESTIMATE

Costs for the post-closure care of the HPC site include groundwater monitoring (as set forth in detail in Section D below and in the Groundwater Sampling and Analysis Plan provided in
Appendix E), annual inspections, and parking lot and monitoring well maintenance. Table C-1 shows the breakdown of costs associated with the various tasks, including plume stability demonstration monitoring, completing the reports, and obtaining approval from IDEM to terminate the post-closure permit. If IDEM does not agree plume stability has been demonstrated, the parties will meet to discuss a resolution of that concern and additional time may be added to the post-closure care period.

C-6 FINANCIAL ASSURANCE FOR POST-CLOSURE CARE

Financial assurance was previously approved by IDEM and the same mechanism will continue to be applied for the amount reflected in the Post-Closure Cost Estimate.

TABLE C-1
Post-Closure Cost Estimate

Hammond Pest Control / Hammond, Indiana

Project Assignment	Per Event Cost	Number of Events	Extended Cost
Quarterly Groundwater Sampling			
Professional Services: Project Management and Well Monitoring	$ 1,460	27	$ 39,420
Travel and Equipment	$ 719	27	$ 19,406
Laboratory Costs	$ 1,185	27	$ 31,982
Subtotal	**$ 3,363**		**$ 90,808**
Annual Groundwater Sampling			
Professional Services: Project Management and Well Monitoring	$ 1,644	9	$ 14,796
Travel and Equipment	$ 719	9	$ 6,469
Laboratory Costs	$ 1,362	9	$ 12,260
Purge Water Disposal	$ 575	9	$ 5,175
Subtotal	**$ 4,300**		**$ 38,699**
Report Preparation			
Report Preparation (quarterly)	$ 2,909	27	$ 78,530
Report Preparation (final)	$ 6,137	1	$ 6,137
Subtotal	**$ 9,045**		**$ 84,666**
Annual Inspection & Maintenance [1]			
Well Maintenance	$ 575	10	$ 5,750
Parking Lot Inspection & Report Preparation	$ 3,570	10	$ 35,700
Parking Lot Maintenance	$ 1,610	10	$ 16,100
Subtotal	**$ 5,755**		**$ 57,550**
Stormwater Management System Maintenance Program			
Parking Lot Sweeping / Housekeeping (quarterly)	Conducted with Quarterly Sampling		
SW Collection System Inspection (annual)	Included with Annual RCRA Cover Inspection		
Stormceptor Unit Inspection (annual)	Included with Annual RCRA Cover Inspection		
Stormceptor Unit Cleanout Inspection (annual)	Included with Annual RCRA Cover Inspection		
Post-Closure Costs			**$ 271,723**
Contingency (10%)			**$ 27,172**
Grand Total			**$ 298,895**

NOTES:
[1] = Inspections performed by Professional Engineer

D GROUNDWATER MONITORING

Chapter 2 of the Risk Integrated System of Closure (RISC) User's Guide, Section 2.6.3.1, provides that the length of the post-closure period, including groundwater monitoring schedules, may be developed based on the facts and circumstances of each case. In these cases, the details and duration of the facility's post-closure requirements should be tailored to the specific facts and engineering controls being utilized. 40 C.F.R. § 265.90, as adopted by reference in 329 IAC 3.1, provides similar flexibility in developing post-closure plans allowing all or part of the groundwater monitoring requirements to be waived if the owner or operator can demonstrate that there is a low potential for migration of hazardous waste that could adversely affect receptors. Similarly, the March 2012 Remediation Closure Guide (RCG) provides IDEM's current thinking with respect to plume stability demonstrations and supersedes the RISC Technical Resource Guidance Document. As set forth in the RCG, a demonstration of plume stability may be made with as little as 8 quarters of plume stability monitoring data to be statistically significant. As a result, HPC is proposing the post-closure groundwater monitoring described in this section that is consistent with a non-default process under RISC, with the RCG technical resource guidance document, and with 40 CFR 265.90.

Pursuant to 40 C.F.R. §§ 265.90 - 265.94, HPC has implemented a groundwater monitoring program capable of determining the facility's impact on the quality of groundwater. To date,
18 quarters of groundwater monitoring has been completed. The proposed constituents of concern (COCs) consist of pentachlorophenol (PCP) and dissolved arsenic.

The site closure involved consolidation of impacted soils under the parking lot to serve as an engineered barrier to prohibit future precipitation infiltration and has included a significant amount of soil sampling to identify the nature and extent of COC impacts to soil on site. The results of soil sampling for organochlorine pesticides and PCP at the

site are summarized on Figure D-1, and the results of soil sampling for inorganics are summarized on Figure D-2.

The post-closure monitoring and maintenance plan takes into account the following site-specific facts and engineering controls being utilized:

1. Past facility operations have resulted in pesticides and the inorganic constituents lead and arsenic being released to site soils.

2. The site is situated on the Calumet Lacustrine Plain physiographic area and aquifer. In the vicinity of the HPC site, sand occurs from surface grade to a depth of approximately 28 feet with the water table occurring at approximately five to seven feet below ground surface. This results in a saturated aquifer thickness of approximately 21 to 23 feet.

3. The sandy nature of surficial soils and the groundwater conditions in this sand plain aquifer resulted in the site COCs being available to precipitation infiltration and leaching before closure was completed, and groundwater being impacted as a result. However, only arsenic has been detected in downgradient groundwater monitoring wells exceeding background concentrations. This data indicates that the organochlorine pesticides and lead released to the soils on site from past operations have been immobile even under uncontrolled conditions.

4. During site closure, the on-site soils impacted with lead and arsenic above the Industrial Default Closure Levels (IDCLs) located outside the footprint of the new concrete parking lot were exhumed and placed under the parking lot constructed at the site. Impacted soil already located under the footprint of the new parking lot remained within the parking lot footprint. This parking lot and associated GCL serve as an engineered barrier and prohibit further precipitation infiltration and resulting leaching of the arsenic from impacted soils and significantly reduce, if not eliminate completely, future arsenic impacts to groundwater.

5. None of the site COCs, including arsenic, presents a complete pathway of exposure due to vapor migration and/or vapor intrusion due to the near absence of volatility of these COCs. This includes volatilization from the groundwater pathway of migration.

6. By ordinance, the use or attempted use of groundwater as a potable water supply within the corporate limits of the City of Hammond is prohibited (Appendix F). As such, there is no groundwater use of the Calumet Lacustrine Plain aquifer (or any other aquifer) in a broad area around the site. In addition, SMA conducted a potable well search which verified no potable wells are located in the vicinity of the site (Appendix G). The area covered by the well search was

approximately 374 acres and bounded by the Calumet River to the north, 1,000 feet east of Columbia Avenue to the east, Fayette Street to the south and, 1,000 feet west of Hohman Avenue to the West. There is no completed exposure pathway for human consumption of groundwater.

7. As a result of this analysis, there are no completed exposure pathways of concern presented by this Site, and no risk so long as the parking lot is maintained, which it will be as a result of the ERC.

Collectively the data observations itemized above demonstrate that the site closure remedial measures removed the potential for direct contact and migration to groundwater from site impacted soils. As a result, it is reasonable to conclude that there will be no completed exposure pathways going forward. HPC proposes to perform the following groundwater monitoring at the site:

1. Groundwater plume demonstration monitoring of wells MW-2, MW-3, MW-6, and MW-7R pursuant to the specific schedule below.

2. Quarterly and annually, the groundwater analytical parameters for Monitoring wells MW-2 and MW-3 will consist of dissolved arsenic and PCP. Quarterly and annually, the groundwater analytical parameters for Monitoring wells MW-6 and MW-7R will consist of dissolved arsenic.

3. Statistical procedures will be applied to the detected COCs on a quarterly basis, to assess the stability of these parameter concentrations in groundwater.

D-1 BACKGROUND

D-1a Site Setting

Please see Section A-1.

D-1b Description of HWMU to be Closed

Please see Section A-1.

D-1c Previous Regulatory Action

A representative of the IDEM, Office of Solid and Hazardous Waste Management (OSHWM), conducted an inspection of the former storage shed and garage on October 7, 1996. The inspection revealed that certain containers were deteriorated to the point that a portion of their contents had released. On October 21, 1996, the OSHWM sent a Hazardous Waste Determination letter to HPC. The letter notified HPC that contaminant deposition had been found to be present at the facility during the inspection and requested that the impacted soils be containerized, and a waste determination made. HPC was also requested to make a waste determination on several containers of unknown material.

HPC retained SET Environmental, Inc. (SET) of Wheeling, Illinois to manage the materials contained in the storage buildings. The arsenic trioxide and the other materials were containerized and then removed from the site on March 31, 1997 and September 24, 1997. Contaminated wood flooring material was subsequently removed from the site on
November 5, 1997. HPC retained Clayton Group Services, Inc. (Clayton) (predecessor to SMA, and hereafter referred to as “SMA” for simplicity) to prepare the Closure Work Plan (Closure Plan) for the HWMU. After a variety of submissions, the final Closure Plan dated
July 12, 2012 and last revised April 11, 2014 was approved by IDEM on April 24, 2014.

D-2 AQUIFER IDENTIFICATION

D-2a Geology and Hydrogeology

SMA’s review of the USGS Calumet City, Illinois-Indiana Quadrangle Map, dated 1968 and photo revised in 1980 (USGS, 1968), indicated that the elevation of the HPC site is

approximately 590 feet above mean sea level. The HPC site is flat and is located at the same grade as the surrounding properties. The apparent regional surface water discharge pattern in the area of the HPC site appears to be north towards the Grand Calumet River. Surface water discharge patterns are influenced by local manmade obstructions and diversions (e.g., buildings, roads, sewer systems, utility service lines). The Grand Calumet River is located approximately 1,500 feet north-northeast of the HPC site.

The HPC facility is set within the Calumet Lacustrine Plain physiographic subdivision of the Northern Moraine and Lake Region (Hartke et al., 1975). The area is characterized by generally low relief and a series of relict shorelines or beach ridges that represent various stages of advance and retreat of glacial Lake Michigan. These bench ridges occur in an arcuate pattern paralleling the current Lake Michigan shoreline throughout the plain. The arcuate, ridged belts are generally higher than the surrounding area, although over much of the area the ridges have been removed by development. Surficial thin belts of muck and peat can be found between ridges in some areas within this Calumet Lacustrine Plain and buried peat units are common. The soils in the area of the HPC site are classified as Urban Land (Persinger, 1972). Material identified as urban land consists of land that has been filled. The fill material consists of earth, cinders, slag, trash, or any combination of these materials that has subsequently been regraded. The surface soil and the subsoil have either been removed or sufficiently disturbed so that the soil can no longer be identified. SMA did not observe evidence of potential wetlands (e.g., vegetation, habitat) at the subject property.

In the vicinity of the HPC site, the surficial geology in the area is characterized as sand and some fine gravel deposits to approximately 30 feet in depth. These coarse-grained lithologies
are saturated at shallow depths (usually five to 10 feet below grade) and form the Calumet aquifer. Unconfined water table conditions prevail throughout most of the Calumet aquifer occurrence. The base of the Calumet aquifer is formed by the

occurrence of the Quaternary Lake Border and Wheeler Till sequences that are predominantly silty clay in nature. These till sequences vary in thickness from slightly less than 50 feet to more than 150 feet. Devonian and Silurian carbonate bedrock sequences occur below the glacial till.

Groundwater flow within the Calumet aquifer is controlled by availability to discharge to surface water boundaries. The groundwater flow in the Calumet aquifer has been the subject of several studies. Some of these studies have been summarized or compiled into larger analyses of the area (Kay, et. al., 1996 and Cohen, et. al., 2002) that provide a detailed analysis of groundwater flow throughout the Calumet aquifer. These studies indicate that groundwater flow within the Calumet aquifer system is predominantly horizontal and that in the vicinity of the HPC site could be expected to generally flow to the north-northeast and discharge to the Grand Calumet River approximately 1,500 feet downgradient of the site. Transient groundwater flow conditions are known to occur in close proximity to the Grand Calumet River that result from flow reversals caused by wind conditions on Lake Michigan (that cause flow into the Indiana Harbor Canal and Grand Calumet River) and due to heavy precipitation events.

A review of the potentiometric contour maps illustrated in Figures D-4 through D-9 indicate that the groundwater flow direction at the site has changed over time from being predominantly north-northwest to eastward. This change is likely associated with the remediation activities on the Grand Calumet River that is the primary discharge point for groundwater in the vicinity of the HPC site. Figure D-3 illustrates the area over which the west branch of the Grand Calumet River has been undergoing environmental remediation and restoration. Dredging of sediments along the west branch of the Grand Calumet River north of the site (Zone A) began in the Spring 2010 and was completed in December 2011. This dredging of the river sediments is likely to have created a better hydraulic connection between the Calumet aquifer and the Grand Calumet River and is likely responsible for the change in groundwater flow direction observed in the August 2002 potentiometric surface map (Figure D-4) and the

November 2010 potentiometric surface map (Figure D-5) where the groundwater flow direction changes from northeast to the north.

After completion of the dredging in the west branch in December 2011 (Zone A), an organoclay cap was placed on the remaining sediments in the river. It is likely that this organoclay cap significantly reduces groundwater baseflow discharge from the Grand Calumet River along the reach where the organoclay cap has been installed. Without the ability to discharge to this section of the river, it is likely that groundwater flow in the vicinity of the HPC site had to change direction to the east to discharge to the non-restored eastern branch of the river east of Indianapolis Boulevard. The completed restoration activity in Zone A on the Grand Calumet River and the initiation of dredging in Zone B (east of the site) likely also explains the change in groundwater flow direction toward the east observed on the four potentiometric surface maps for July 2013, May 2014, June 2015, and November 2015 (Figures D-6 through D-9). Restoration of Zone B was completed in 2016.

Hydraulic conductivities of the Calumet aquifer have been estimated from well specific capacity testing and ranged from 10 to 130 feet per day (ft/d) and averaged 60 ft/d (Rosenshein and Hunn, 1968). Other hydraulic conductivity testing performed by slug test methods determined the Calumet aquifer hydraulic conductivity to range from 4.8 to 30 ft/d and averaged 17.9 ft/d (Kay, et. al., 1996). These investigations estimated that the Calumet aquifer groundwater velocities ranged from less than 10 feet to 124 feet per year.

Based on SMA's subsurface investigations at the HPC site, the soils beneath the site consist mainly of tan fine to medium subangular quartz sand that is loosely compacted. The water table at the site is approximately 7 feet below surface grade but fluctuates seasonally. Based on other studies performed in the area, the saturated thickness of the Calumet aquifer is expected to be 20 to 25 feet in the vicinity of the HPC site. As mentioned above, this aquifer is then underlain by the Quaternary Lake Border and Wheeler Till sequences that are predominantly silty clay in nature.

D-3 CONTAMINANT PLUME DESCRIPTION

The following discussions in this Section describe the investigations that have gone into determining the occurrence of the groundwater impacts at the site.

D-3a Summary of Previous Site Investigations

Investigation activities at the site were initiated in May 2000 and continued through October 2012. The investigations were performed in phases to allow the data from the previous phases to guide additional investigations in filling data gaps. The investigation phases are described below in the order they were conducted. Additional sampling was conducted in October 2012 to evaluate soils within the setback areas for disposal purposes. Activities relating to these investigations were also described in the July 12, 2012 Modified Closure Work Plan, approved by IDEM on April 24, 2014.

D-3a(1) Phase I Soil Sampling

In accordance with the IDEM Guidance Document requirements at the time, the number of soil borings for the HWMU was determined using the grid sampling technique. A grid that slightly overlapped the unit to be sampled was established over the HWMU, and a maximum grid interval length of 10 feet was used. The number of grid intersections was determined to be 57. The cube root of 57 is 3.8; therefore, the minimum number of random sampling locations was four.

SMA conducted the initial assessment soil borings in May and June of 2000. In addition to the four required borings (S-1 through S-4), SMA advanced three additional borings (S-5 through S-7) located in areas of cracks in the concrete pad. Based on the initial analytical results, which were provided to IDEM in a Status Report dated June 20, 2000, two additional hand borings (S-8 and S-9) were completed near the eastern property boundary. The laboratory analytical results of the Phase I soil sampling are summarized in Table D-1.

During the Phase I Sampling Event conducted in May 2000, four background borings (B-1 through B-4) were also completed along the northern property boundary, the results of which were provided to IDEM in the Status Report dated June 20, 2000. IDEM stated in the Notice of Deficiency (NOD) dated July 25, 2000 that the concentrations of metals detected in the background samples were higher than ranges observed in naturally occurring soils in Indiana and requested additional background sampling in another area.

D-3a(2) Phase II Soil Sampling

Based on the results of the initial assessment borings, additional investigations were completed in 2001 (H-1 through H-4; H-6 through H-8; and BG) to identify the nature and extent of contamination and evaluate background inorganic concentrations. All soil borings having organic and inorganic compounds exceeding the RISC Residential Default Closure Levels (RDCLs) required further assessment.

Based on the initial assessment borings, there were no field indications (visual or photoionization detector meter readings) that provided information as to whether the contaminants were present in a soil sample. The vertical extent of contamination at soil borings S-3, S-5, S-6, S-8, and S-9 was re-evaluated by collecting a soil sample from the interval directly above the water table (five to 10 feet below ground surface). The soil samples were analyzed for cyanide (total), arsenic, lead, and pesticides. Figures D-1 and D-2 show the locations of the soil borings and a summary of the analytical results. The laboratory analytical results of the Phase II soil sampling are summarized in Table D-1.

D-3a(3) Phase III Soil Sampling

In July 2002, Phase III samples were collected (P-1 through P-11) to evaluate the on-site horizontal extent of contamination (see Figures D-1 and D-2 for the boring locations and a summary of the analytical results). The purpose of the borings described in this section was to evaluate the nature and extent of potential impacts at the boundaries of the property. The proposed locations correspond to the general locations suggested by IDEM in their
November 26, 2001 NOD letter. Nine of the borings were placed along the perimeter of the property and one boring was placed in the suspected source area (within the unit itself). Additional background sampling was not conducted during this investigation. Pursuant to a telephone conversation with IDEM, borings to determine horizontal extent were located a maximum distance of 10 feet from the previous impacted boring. At each location, samples were collected from a depth of 0 to 6 inches and from the two intervals directly above the water table. Based on the previous results for S-5, the samples collected north of S-5 were analyzed for cyanide, arsenic, lead, PCP, and pesticides.

Samples collected from locations south and east of S-2 and S-6 were analyzed for cyanide, arsenic, lead, and pesticides based on the results for S-2 and S-6. The sample collected from the location furthest south of S-2 and S-6 was held pending the results of the samples collected closer to S-2 and S-6.

The sample collected from the location south of S-3 was analyzed for cyanide, arsenic, lead, and pesticides based on the results for S-3. After the approximate horizontal extent of contamination was identified, borings in all four geographic directions were completed along the screening perimeter according to the April 21, 2001 Modified

Closure Work Plan. The results of this sampling were reported to IDEM in the September 12, 2001 Status Report.

SMA utilized a Geoprobe® (direct push method) to acquire subsurface soil samples during this investigation. The Geoprobe is hydraulically powered by the engine of the carrier vehicle and uses a combination of static force and percussion to advance the sampling unit. This sampling method does not generate soil cuttings. Soil samples collected with the Geoprobe utilize a 2-inch diameter; 5-foot long sampling tube fitted with disposable acetate liners. Each boring was continuously sampled and advanced to the water table. Soil borings were not advanced appreciably below the water table. Upon completion of borings not used for monitoring wells, the boreholes were backfilled with bentonite and completed to surface grade with soil.

Each soil core was scanned for organic vapors upon retrieval using an HNu photoionization detector (PID), model DL-101 manufactured by Process Analyzers, Inc., equipped with a
10.2 electron volt (eV) probe. The PID was calibrated to an isobutylene standard (100-ppm) according to the manufacture's specifications prior to use each day. Soil samples from all intervals were split into two portions; with one portion placed in a sealed plastic bag for headspace analysis with the PID and geologic classification and the other portion placed directly into a clean laboratory-provided 4 oz. glass jar with a Teflon® lined lid for potential laboratory chemical analysis. A SMA geologist used the Unified Soil Classification System to describe and classify each soil sample. Soil sample descriptions were noted according to the requirements described in the *Hazardous Waste Management Unit Closure Guidance* (IDEM, 1997), recorded on boring log forms and noted in a field logbook. Field screening data was also recorded on the boring logs.

Selection of soil samples for laboratory analysis was based on two scenarios. If a soil boring appeared "clean" based on both visual observations and headspace readings, then samples were submitted from the surface and the two intervals directly above the water

table. The sampling interval directly above the water table was held following receipt of the results from the other intervals. The sample was held so it could be possibly used for closure acceptance depending on the results from the other intervals.

Soil samples were analyzed for the following constituents: lead, arsenic, organochlorine pesticides and PCP. These constituents were quantified according to the specified laboratory analytical methods published in SW-846. Both lead and arsenic were determined by methodology 6010, organochlorine pesticides were quantified via method 8081, and PCP was determined by method 8151. The laboratory analytical results of the Phase III soil sampling are summarized in Table D-1.
Four of these borings (P-2 and P-9, P-10 and P-11) were converted to monitoring wells as discussed Section D-3a(5).

D-3a(4) Setback Area Soil Sampling

The City of Hammond required that a setback zone be established along State and the northern portion of the site adjacent to Jessie Avenue. The setback zone was being set aside for a planting area, so soil concentrations in this zone were required to meet IDCLs and TCLP characteristic hazardous waste limits. Previous sampling had established that only arsenic and lead had been detected in the setback zone. Therefore, on October 9, 2012 SMA conducted shallow hand auger borings (SB-1 through SB-12) at a spacing of 15 linear along the setback zone. At each boring location, soil was collected at one foot depth increments between 1.0 and 4.0 feet below ground surface. Initially, the laboratory analyzed the 1.0 and 2.0 foot samples collected from each boring location for both total and TCLP arsenic and lead. If concentrations at the 2.0 foot depth level exceeded IDCLs or TCLP hazardous levels, then the 3.0 foot sample from that location was analyzed. If the 3.0 foot sample also exceeded the objectives, then the 4.0 foot sample was analyzed. The sample results are summarized on Table D-1, and the boring locations are shown on Figure D-2. The soils that exceeded IDCLs and/or TCLP levels were excavated and placed beneath the parking

lot engineered barrier during its construction in December 2014 as documented in the July 31, 2015 RCRA Closure Report.

D-3a(5) Monitoring Wells

In July 2002, SMA installed four groundwater monitoring wells (Figure D-4) on the property to assess groundwater quality and determine the direction of groundwater flow. Well MW-2 was installed in the previously identified source area. Monitoring well MW-1 was installed in an upgradient location. Monitoring well MW-3 was installed in a downgradient direction close to the source and along the eastern property line of the HWMU per requirements outlined in the RISC Technical Guidance Manual. Monitoring well MW-4 was also installed in a downgradient direction along the northern property boundary. Copies of the well logs are provided in Appendix H.

In July 2013, SMA installed two additional groundwater monitoring wells (Figure D-6) on the property to verify groundwater flow direction and groundwater quality. Monitoring well MW-5 was installed in a downgradient direction at the northeast corner of the property. Monitoring well MW-6 was installed immediately downgradient on the north side of the HWMU. Copies of the well logs are provided in Appendix H.

By email dated October 8, 2015, IDEM's provided comments on HPC's June 30, 2015 Post Closure Permit Application. Comment #8 noted that groundwater flow had changed to a more easterly direction (as discussed in Section D-2a) and IDEM requested an additional well be installed to the east to provide better spatial coverage. On October 28, 2015, SMA installed one additional groundwater Monitoring well (MW-7) on the vacant parcel to the east of the Site. The integrity of this well became compromised as a result of tree roots growing through the well screen and was replaced with well MW-7R on February 27, 2018 in accordance with the IDEM approved Class 1* Modification to the Post-Closure Permit. A copy of the well log for this replacement well is provided in Appendix H.

As described previously, the soil borings were drilled using a Geoprobe® (direct push method) to acquire subsurface soil samples in five-foot intervals. An experienced SMA geologist described and classified each soil sample. Soil sample descriptions were noted according to the requirements described in the *Hazardous Waste Management Unit Closure Guidance, 1997* and recorded on boring logs and noted in a field logbook. The descriptions included the notation of saturated conditions, i.e. free water, and color changes in the sample and its depth within the borehole. The monitoring wells were constructed according to these observations with at least 1-foot of the screen extending above the saturated zone to provide for temporal changes in the water level.

Each monitoring well was constructed in accordance with specifications set forth by the Indiana Department of Natural Resources. Wells were emplaced using a truck mounted drill rig employing 4.25 inch inside diameter hollow stem augers. Wells were constructed of 2-inch Schedule-40 poly-vinyl chloride (PVC) riser and 10 feet of 0.010-inch slotted PVC screen. Previous data indicates that saturated conditions extend continuously from a depth of approximately seven feet to greater than 15 feet from surface grade. The monitoring well screen length of 10 feet at each well is completed from approximately five or six to 15 or 16 feet below grade. All the wells have ample recharge volumes when sampled. All casing couplings were constructed with flush-threaded joints. The filter pack for the screened interval of each monitoring well consisted of clean, well-sorted, coarse-grained, quartz sand designed to promote isotropic movement through the filter pack. The filter pack grain size was selected because it is approximately 3-5 times larger grained than the grains of the aquifer material.

Well construction was as follows: coarse grained filter pack to 1 to 2 feet above the screened interval; an impermeable seal of approximately 2 feet was created by pouring bentonite chips above the filter pack to 1 to 2 feet below surface grade (the bentonite chips were tamped after every 6-inch lift to prevent bridging); the bentonite was

hydrated using distilled water; a concrete surface seal that extends from grade to the top of the bentonite seal; the wells were finished with flushmount or stickup protective well protectors; and an expandable waterproof locking well cap was placed on the well casing.

Each monitoring well was developed prior to sampling to remove fine sediments that accumulate during installation and promote flow of formation water into the well. Development was conducted using a Whale pump (Model II) or disposable bailer to remove the groundwater and fine sediments and periodically surged along the screened interval during development. To prevent the possibility of cross contamination, the pump was decontaminated using an Alconox™ solution and distilled water rinse before each use. In addition, SMA started with wells furthest from the HWMU and worked back to the well within the unit. Approximately
10 well volumes were removed during development. Following development, each well was allowed to stabilize for at least five days prior to sampling.

Development fluids were containerized in 55-gallon drums and staged in a secure area on-site. All drums were labeled as to their contents and date of origin; water from specific wells was segregated into a separate drum depending on the potential to contain contaminants. Upon receipt of analytical data the development water was characterized and transported off-site for appropriate waste management.

Water level measurements were obtained from each well prior to sampling using a Slope Indicator® 100-foot measuring device to accurately determine the depth to water measured to the top of the surveyed well casing. The measuring tape was decontaminated prior to use at each monitoring well. Groundwater contours from water level measurements collected on August 6, 2002, November 1, 2010, July 29, 2013, May 6, 2014, June 8, 2015, and
November 10, 2015 are plotted and available for review on Figures D-4 through D-9, respectively.

Groundwater sampling in 2002 was conducted using disposable polyethylene bailers. The purge volumes were calculated using the saturated thickness measurements for each well and recorded in the field logbook. Each well was purged of at least three casing volumes of water prior to sampling. During purging, the groundwater was monitored for conductivity, pH, and temperature changes using an Orion Model 250A pH meter and an Orion Model 115A Conductivity meter to monitor conductivity and temperature. Each unit was calibrated prior to use each day according to manufacturer specifications using purchased standardized calibration solutions. In the event that a measuring device failed, a comparable back-up unit was available for use. Monitoring of field parameters and calibration results were recorded in the daily field log. Groundwater samples were collected only after the field parameters had stabilized for at least three consecutive readings during the time to purge each well.
Groundwater samples were collected using the same bailer used for purging. Samples were collected by directly filling the laboratory container from the bailer for all parameters, except for the dissolved metals. The dissolved metal samples were collected and prepared by the following procedure: transfer of the sample to a clean, disposable container; pulling the sample through a Geotech™ high capacity 0.45 micron disposable filter by a battery operated Cole-Parmer® peristaltic pump; and filling a pre-preserved lab container with the filtered sample. Only clean disposable tubing was in contact with the sample. Each set of tubing and filter was discarded after use.

Groundwater sampling in November 2010, July 2013, and November 2015 was conducted using low flow techniques (i.e. a bladder pump and in-line flow through cell water quality meter). A depth to water and total depth for each well were recorded in the field logbook. Each well was purged at a constant rate until stable water quality readings were achieved for three consecutive readings. During purging, the groundwater was monitored for pH, conductivity, dissolved oxygen, oxidation-reduction potential (ORP), temperature, and turbidity changes using an In-situ Troll 9500 water quality meter. The water quality meter was calibrated prior to use according to

manufacturer specifications using standardized calibration solutions. Monitoring of field parameters and calibration results were recorded in the daily field log.

Groundwater samples were collected directly from the tubing after disconnecting the flow through cell. Samples were collected by directly filling the laboratory container for all parameters, except for the dissolved metals where a Geotech™ high capacity 0.45 micron single-use disposable filter was connected to the tubing prior to filling the sample bottles. The filters were discarded after use. A list of the parameters, containers and preservatives used for groundwater sampling is provided in Table D-2.

The analytical list of constituents for groundwater sampling included dissolved arsenic, dissolved lead, total cyanide, organochlorine pesticides, and PCP. The groundwater monitoring wells at the site were sampled on four occasions prior to the post-closure groundwater sampling program; August 2002, November 2010, July 2013, and November 2015. The laboratory analytical data for these four sampling events is provided in Table D-3a. The wells have been sampled quarterly since November 2015 in accordance with the Post-Closure Permit and the laboratory analytical data is provided in Table D-3b.

D-3a(6) Groundwater Grab Samples

Pursuant to IDEM's request, three groundwater grab samples were collected from locations
P-12 through P-14 (Figure D-5) in July 2003. Copies of the boring logs are provided in Appendix H. At each location, soil samples were collected continuously until sufficiently saturated conditions were encountered at a depth of approximately 8-12 feet below grade to provide for the collection of a groundwater sample. Once saturated conditions were encountered, the drill string was withdrawn and a dedicated 5-foot length of 1-inch PVC well screen (0.010") and riser pipe was lowered to the bottom of the boring. Dedicated PVC tubing attached to a peristaltic pump was lowered into the temporary

well, and the appropriate volume of groundwater was collected. Groundwater was not purged prior to sample collection, and samples collected for dissolved lead and arsenic were filtered with a 45-micron filter prior to preservation. Samples collected for total metals were not filtered prior to placement into the appropriate containers. The samples were placed into new, clean sample containers, placed on ice in a cooler, and transported to Pace Analytical Lab. The samples were submitted for analysis of organochlorine pesticides, and both total and dissolved arsenic and lead. The data for groundwater grab samples P-12 through P-14 can be reviewed in Table D-4.

The drill tools used to collect the soil samples and prepare the borings for the temporary PVC well screen were decontaminated between each location using Alconox soap and triple rinsed with distilled water. Soil cuttings and decontamination water for all wells except MW-7 were collected and containerized in a drum and, per the GWSAP, were properly disposed. Well
MW-7 was located outside of the HWMU and area of impacted soil (MW-7 has since been replaced with MW-7R).

At the request of the City of Hammond, SMA collected groundwater grab samples from four locations around the perimeter of the HPC site in November 2010. Each boring was sampled continuously to total depth using a Geoprobe and each boring was converted into a temporary monitoring well using 1-inch PVC riser and screen. Prior to collecting groundwater samples, each temporary well was purged using a peristaltic pump until the water was relatively free of sediment. Following purging, samples of groundwater collected for total arsenic and lead were placed into 250 milliliter plastic bottles and preserved with nitric acid; samples collected for dissolved arsenic and lead were field filtered using 45 micron filters and placed into 250 milliliter plastic bottles and preserved with nitric acid. In addition, samples of groundwater from each boring collected for organchlorine pesticides were placed in 1 liter amber jars. As the samples were collected they were placed in a cooler of ice. After the samples were collected, the PVC casing and screen was pulled and each boring was backfilled with crushed

bentonite. The samples were submitted to Pace Analytical Services in Indianapolis, Indiana for analysis. The data for groundwater grab samples CH-1 GW through CH-4 GW can be reviewed in Table D-4.

D-4 DETECTION MONITORING PROGRAM

Section not applicable

D-5 COMPLIANCE MONITORING PROGRAM

The monitoring well network is shown in Figure D-10. Section D-5 below provides detail on the compliance monitoring program that will be employed at the site and establishes an ACL for arsenic and PCP in groundwater.

D-5a Waste Description

Refer to Section A-1.

D-5b Characterization of Contaminated Groundwater

The characterization of impacted groundwater at and in the vicinity of the site is discussed in detail in Section D-3 of this Post-Closure Permit Application.

D-5c Hazardous Constituents to be Monitored

Hazardous constituents related to the HWMU that have been detected in groundwater samples at the site are arsenic and organochlorine pesticides, including PCP. MW-1 is the background well, MW-2 is a source area well, and MW-3, MW-4, MW-5, MW-6, and MW-7R are RCRA POC wells. Groundwater results from the four sampling events conducted prior to the Post-Closure Permit are summarized in Table D-3a. Detected constituents during these events are summarized on Figures D-4 through D-7.

Since post-closure groundwater monitoring began in November 2015 in accordance with the Post-Closure Permit, the wells have been sampled quarterly for dissolved arsenic, 4,4-DDD, and PCP and annually for dissolved arsenic and lead, cyanide, organochlorine pesticides, and PCP. The results are summarized in Table D-3b. None of these constituents were detected in Monitoring wells MW-1, MW-4, and MW-5. Therefore, continued sampling of these three wells is unwarranted. Dissolved lead and cyanide have not been detected in the remaining four wells (i.e., MW-2, MW-3, MW-6, and MW-7R) since post-closure groundwater monitoring was initiated. Therefore, continued sampling for these constituents in unwarranted. PCP has been detected only in Monitoring wells MW-2 and MW-3, therefore continued analysis for PCP is unwarranted for Monitoring wells MW-6 and MW-7R. Heptachlor epoxide was detected in Monitoring well MW-2 for the first (and only) time in the fourth quarter of 2019 and has not been detected in any other well.

Based on the Post-Closure groundwater monitoring results presented above, it is proposed that groundwater samples will only be collected from Monitoring wells MW-2, MW-3, MW-6, and MW-7R. On a quarterly and annual basis, samples from MW-2 and MW-3 will be analyzed for dissolved arsenic and PCP. On a quarterly and annual basis, the samples from MW-6 and MW-7R will be analyzed for dissolved arsenic. The monitoring schedule is provided in Table D-5.

D-5d Concentration Limit for Heptachlor Epoxide

This section is not applicable.

D-5e Alternate Concentration Limits for Arsenic and Pentachlorophenol

As described previously, the City of Hammond has an ordinance that prohibits any use or attempted use of groundwater as a potable water supply within the corporate limits of the City of Hammond (Appendix F). The ERC recorded for the site also prohibits

groundwater use. As a result, the groundwater pathway for human exposure by consumption is not complete. In addition, the groundwater pathway for human exposure due to vapor migration is not complete because the COCs do not form volatile chemical compounds. This leaves ecological impacts to the Grand Calumet River as the only exposure pathway for the site. In this section, ACLs are calculated for arsenic and PCP.

The U.S. EPA Region 5 has established Ecological Screening Levels (ESL) for arsenic and PCP in surface water of 148 ug/l and 4.0 ug/l, respectively. Based on these ESL values, HPC proposes in this application to establish ACLs for arsenic and PCP for the site that will ensure the surface water ESLs are achieved at the groundwater-surface water interface of the Grand Calumet River. Since the groundwater flow direction in the vicinity of the site has varied over the last few years and could continue to vary over the next few years due to the continued construction activities along the Grand Calumet River (as described in Section D-2a), HPC proposes to meet these ACLs in the Grand Calumet River at its closest occurrence to the site, providing an extra level of conservatism to the calculations.

Figure D-11 illustrates the site and the location of the HWMU relative to the Grand Calumet River. The distance from the north side of the HWMU to the closest point on the Grand Calumet River is 1,610 feet (491 meters). A review of Figure D-4 indicates that the width of the HWMU perpendicular to groundwater flow (to the northeast) in a diagonal from the northwest corner to the southeast corner is 78 feet (23.8 meters). Based on these values and the hydrogeologic values identified and referenced below, the allowable groundwater concentrations for arsenic and PCP in the POC wells (the ACL) can be calculated that will result in their ESLs being met at the groundwater-surface water interface along the Grand Calumet River. The solute transport equation 17.21 from the 1990 Domenico and Schwartz text (Domenico and Schwartz, 1990) results in the following:

$$C(x,y,z,t) = \left(\frac{C_o}{8}\right) \exp\left\{\left(\frac{x}{2a_x}\right)\left[1 - \left(1 + \frac{4\lambda\alpha_x}{v}\right)^{1/2}\right]\right\}$$

$$\operatorname{erfc}\left[\frac{x - vt(1 + 4\lambda\alpha_x/v)^{1/2}}{2(\alpha_x vt)^{1/2}}\right]$$

$$\left\{\operatorname{erf}\left[\frac{(y + Y/2)}{2(\alpha_y x)^{1/2}}\right] - \operatorname{erf}\left[\frac{(y - Y/2)}{2(\alpha_y x)^{1/2}}\right]\right\}$$

$$\left\{\operatorname{erf}\left[\frac{(z + Z)}{2(\alpha_z x)^{1/2}}\right] - \operatorname{erf}\left[\frac{(z - Z)}{2(\alpha_z x)^{1/2}}\right]\right\}$$

Where:

v = unretarded interstitial groundwater velocity, 124 ft/yr (37.79 m/yr) identified as the upper end of the groundwater velocities for the Calumet Aquifer (Section D-2a)

α_x = 1/10 of the transport distance, 161 feet (49.1 m)
α_y = 1/10 of the α_x, 16.1 feet (4.91 m)
α_z = 1/10 of the α_y, 1.61 feet (0.491 m)

Z = depth below the water table that arsenic and PCP extends at the source, 10 feet (3.05 m)

λ = no decay was used
R = no retardation was used

Solving for C_o:

For Arsenic: C_o = 9,800 ug/l or 9.8 mg/l
For PCP: C_o = 266 ug/l or 0.266 mg/l

The Domenico transport analysis performed above is conservative (that is, it over estimates the mobility and transport) in the following ways:

1) The groundwater velocity used is the upper end of values reported for the Calumet Aquifer.

2) The lateral dispersion is identified as occurring at 1/10th of the longitudinal dispersion and the vertical dispersion is identified as occurring at 1/10th of the lateral dispersion.

3) The source width at the HWMU is measured on a diagonal making it as wide as possible.

4) Zero decay or attenuation was used in the calculation, but likely occurs during transport within the aquifer.

5) No retardation was used. When decay or attenuation occurs, retardation makes greater amounts of decay or attenuation occur.

6) The shortest distance between the HWMU and the Grand Calumet River was used for the calculation when in fact, the actual groundwater transport length and direction may be longer and more attenuation would occur.
7) The source depth below the water table is estimated to occur to 10 feet. This would require the entire 10-foot thickness to exhibit this source concentration. In practice, groundwater monitoring wells at the site are screened across the water table and typically have less than a 10-foot water column to sample, and since the highest concentrations should occur at and immediately below the water table (in the upper portion of the aquifer water column) in this sand plain aquifer, the groundwater monitoring values determined by the wells at the site should overestimate the occurrence of downgradient concentrations.

Additional levels of conservative analysis that are not taken into account as part of the Domenico calculation include:

1) The ESL is being used as an ecological standard for the Grand Calumet River instead of a screening level. ESLs (like IDEM's RISC and RCG "look-up tables") are not standards that have to be met in surface water. Exceeding an ESL only suggests that further evaluation should be performed (see, e.g., IDEM RCG, Section 11.1.1).

2) The calculation proposes that the ESL would be met at the groundwater-surface water interface not in the mixing zone of the river where it would be diluted significantly.

Consistent with calculations and discussions above, HPC proposed and IDEM approved ACLs for arsenic and PCP of 9.8 mg/l and 0.266 mg/l, respectively, at the POC groundwater monitoring wells. A review of the groundwater sampling data for arsenic at the POC monitoring wells to date indicate that the concentrations have ranged from <0.01 to 1.99 mg/l, and the PCP concentrations have ranged from <0.001 to 0.099 mg/l. The closure work required by the approved Closure Plan has been completed, and

precipitation infiltration and leaching of these constituents from the unsaturated zone soils has been reduced significantly (if not altogether) going forward leading to an even further reduction of arsenic concentrations in monitoring wells.

D-5e(1) Adverse Effects on Groundwater Quality

No adverse effects have occurred to groundwater quality at the site as a result of the completion of the closure work in January 2015 in accordance with the IDEM-approved Closure Work Plan for the site.

D-5e(2) Potential Adverse Effects

Adverse effects could theoretically occur if the parking lot did not act as an effective barrier to prohibit precipitation infiltration through the soils within the HWMU, which conceivably could lead to additional leaching of arsenic from the unsaturated zone soils. The installation of the parking lot over these soils has reduced precipitation infiltration to nearly zero. Moreover, even in an uncontrolled state, the arsenic concentrations present in groundwater today have not adversely affected and do not adversely affect any human or ecological receptor (e.g., the Grand Calumet). As a result, even if the parking lot were to not function perfectly in terms of preventing/reducing infiltration, this Application has demonstrated that there still would be no adverse consequence to human health and ecological receptors, and the parking lot would still function perfectly well to prevent direct contact with underlying soils.

D-5f Groundwater Monitoring System

The monitoring wells that will be used during in the compliance monitoring program are described below.

D-5f(1) Description of Wells

Each monitoring well was constructed in accordance with specifications set forth by the Indiana Department of Natural Resources Water Well Regulations defined in Indiana Code 312 IAC 13. Each well location was continuously sampled from the ground surface to 15 to 16 feet below ground surface. Soils were described in the field by SMA personnel and recorded on a field soil boring log. Wells were emplaced using a track mounted drill rig employing 4.25 inch inside diameter hollow stem augers. Wells are constructed of 2-inch schedule-40 PVC riser and
10 feet of 0.010-inch slotted PVC screen.

Previous site data indicate that saturated conditions extend continuously from approximately
7 feet to greater than 15 feet from surface grade. A screen length of 10 feet spans this zone, with the top of the screen at least 1 foot above the saturated zone. All casing couplings were constructed with flush-threaded joints. The filter pack for the screened interval of each monitoring well consists of clean, well-sorted, coarse-grained, quartz sand designed to promote isotropic movement through the filter pack. The filter pack was selected because it is approximately 3-5 times larger grained than that of the aquifer material. Well construction is as follows: coarse grained filter pack to 1 foot above the screened interval; an impermeable seal created by pouring bentonite chips above the filter pack to 1 to 2 feet below surface grade; hydrating the bentonite using tap water; a concrete surface seal that extends from grade to the
top of the bentonite seal; wells MW-1 through MW-6 are finished with flushmount well protectors, and well MW-7R with a stick up well protector; and an expandable waterproof locking well cap placed in the top of the well casing. Monitoring well construction diagrams giving specific information for each monitoring well are included in Appendix H.

During the construction of the engineered barrier parking lot, the grade at each one of the existing wells within the footprint of the parking lot was changed by as much as two feet. To accommodate this grade change, wells MW-1 through MW-6 were retro-fitted with casing extensions that allowed them to be completed at the parking lot surface level as flush-mount completions. The casing extensions were accomplished with using PVC coupling and PVC glue. The addition of these couplings will not impact the groundwater sampling results from these monitoring wells since: 1) the glued couplings will all be within the unsaturated zone;
2) the PVC glue does not contain organochlorine pesticides, PCP, arsenic, lead, or cyanide;
3) precipitation infiltration through the engineered barrier parking lot will be negligible to none, minimizing contact with the glued couplings; and 4) the additional stability of the glued couplings will result in a lower probability of the casing being compromised to effect groundwater sampling results and result in less need for replacement wells being drilled through the engineered barrier and liner.

The monitoring wells can generally be described as follows:

- Monitoring well MW-1 functions as an upgradient monitoring well for the site. The only site COC detected in the well was gamma chlordane at an estimated concentration of 0.0273 ug/L. This concentration is well below the IDCL for total chlordane of 8.2 ug/L. No COCs have been detected in Monitoring well MW-1 since the post-closure sampling began in November 2015.
- Monitoring well MW-2 functions as a source area well for the site. The dissolved arsenic concentrations in the well have ranged from 0.87 mg/L to 4.46 mg/ during the post-closure permit monitoring program. Cyanide was detected at a concentration of 0.017 mg/L in 2013, the only time it was detected in this well including the post-closure permit monitoring period. Dissolved lead has never been detected in MW-2 before or during the post-closure permit monitoring period. During the 2002 sampling event, dieldrin was detected for the first and only time in this well, including the post-closure permit monitoring period. During the post-closure permit monitoring period, the PCP concentration has ranged from 0.134 mg/L to 0.6 mg/L. Heptachlor epoxide was detected in this well for the first and only time in the last quarter of 2019.

- Monitoring wells MW-3, MW-4, MW-5, MW-6, and MW-7R serve as downgradient or cross-gradient monitoring wells.

- Monitoring well MW-3 exhibited dissolved arsenic concentrations ranging from 0.622 mg/L to 1.3 mg/L during the post-closure monitoring period. PCP concentrations have been detected in MW-3 ranging from 0.00068 mg/L to 0.099 mg/L. Dissolved lead, total cyanide, and organochloride pesticides have never been detected in MW-3.

- Dissolved arsenic, lead, total cyanide, organochloride pesticides, and PCP have never been detected in Monitoring wells MW-4 or MW-5

- Dissolved arsenic has been detected in Monitoring well MW-6 at concentrations ranging from <0.01 mg/L to 0.849 mg/L. Dissolved lead, total cyanide, organochloride pesticides, and PCP have never been detected in MW-6.

- Monitoring well MW-7R has had detectable dissolved arsenic concentrations ranging from 0.024 mg/L to 1.38 mg/L. Dissolved lead, total cyanide, organochloride pesticides, and PCP have never been detected in MW-7R

D-5f(2) Representative Samples

The groundwater samples will be collected via low-flow sampling techniques in accordance with the procedures presented in Section D-5h(1). Groundwater samples will be analyzed in accordance with Table D-5. The list of parameters, the reporting limits (RLs), method detection limits (MDLs), and the analytical methods are summarized in Table D-6. The RLs may be modified periodically based on laboratory MDL/RL studies.

Measurement of field stabilization parameters will be conducted during low flow well purging. The field parameters include pH, temperature, and conductivity. Measurements may also include dissolved oxygen (DO), reduction-oxidation potential (ORP/Eh), and turbidity. Portable field instruments will be used to measure these parameters. Field measurements, along with a visual description of the turbidity and other notable observations, will be recorded in field logbooks and/or field forms, as appropriate.

D-5f(3) Locations of Background Groundwater Monitoring Wells that are not Upgradient

A review of dissolved arsenic and lead sample results from November 2010, July 2013, and November 2015 indicate that Monitoring well MW-4 can exhibit characteristics of downgradient and upgradient groundwater concentrations for arsenic depending on the groundwater flow direction. Since November 2015, the groundwater flow direction has been consistently to the east, making Monitoring well MW-4 cross-gradient.

D-5g Background Values

Groundwater sampling at Monitoring well MW-1 is representative of background groundwater conditions at the site. As determined through groundwater analyses from Monitoring well MW-1, the background values for arsenic, lead, cyanide, the organochlorine pesticides and PCP are below their respective laboratory analytical detection limits.

D-5g(1) Background Groundwater Quality Data Currently Available

D-5g(1)(a) Background Groundwater Quality Data

HPC proposed and IDEM approved ACLs for arsenic and PCP at the site. The other groundwater monitoring constituents meet their respective IDCLs at the POC. Table D-7 identifies the groundwater protection standards and the basis for those standards for the site COCs.

For the reasons cited above, the background concentration of site COCs will have little significance because as long as the groundwater concentrations do not exceed the groundwater protection standards, the downgradient COC concentrations will be evaluated by plume stability criteria during the post-closure permit monitoring period.

D-5g(1)(b) Sampling Frequency

Groundwater sampling during the post-closure monitoring period will be conducted on a quarterly basis.

D-5g(1)(c) Sampling Quantity

A groundwater sample will be collected from Monitoring wells MW-2, MW-3, MW-6, and MW-7R during each quarterly sampling event.

D-5g(1)(d) Background Values

See Section D-5g(1)(a).

D-5g(2) Plan for Establishing Groundwater Quality Data

The plan for evaluating groundwater impacts from the site COCs is outlined in the paragraphs below.

D-5g(2)(a) Background Data

See Section D-5g(1)(a).

D-5g(2)(b) Well Location

There are seven monitoring wells located on the site as shown in Figure D-10. All seven wells will be gauged, but only Monitoring wells MW-2, MW-3, MW-6, and MW-7R sampled during the post-closure permit monitoring period.

D-5g(2)(c) Sampling Frequency

Groundwater sampling will be performed on a quarterly basis during the post-closure permit monitoring period.

D-5g(2)(d) Sampling Quantity

A groundwater sample will be collected from Monitoring wells MW-2, MW-3, MW-6, and MW-7R during each quarterly sampling event.

D-5g(2)(e) Background Values

See Section D-5g(1)(a).

D-5h Sampling, Analysis and Statistical Procedures

Groundwater sampling methodologies and analysis are discussed in this section, and statistical procedures are outlined.

D-5h(1) Sample Collection

Prior to groundwater sample collection, groundwater purging will be conducted. Purging will allow representative groundwater from the formation to enter the well. Purging will be accomplished using peristaltic pumps and low-flow methods. Groundwater from the well will be purged using dedicated tubing with a flow cell attached. This method has been designed to minimize stress on the geologic formation and reduce the disturbance of sediment in the well and the volume of purge water. The wells will be purged until the field parameters (e.g., pH, temperature, conductivity, ORP/Eh, and turbidity) stabilize. Dissolved oxygen values will be recorded, however, dissolved oxygen will not be used as a stabilization goal because a peristaltic pump is being used for sampling. The stabilization criteria are summarized below.

Turbidity (+/-10% NTUs or three consecutive readings ≤ 50 NTUs),

Conductivity (+/- 5% uS/cm),

Temperature (± 0.5° Celsius),

pH (+ or - 0.1 unit),

ORP/Eh (+/- 10 millivolts).

The field parameters will be measured during purging using a water quality meter with an attached flow-through cell. Initial field measurements and observations will be taken when water begins discharging from the flow cell. Additional readings will be taken periodically during the removal of water to determine that the water quality parameters have stabilized. All field parameter readings will be recorded in a field logbook or on field data sheets. The data recorded in the logbook will include the applicable fields presented in the data form. The presence of any odors or other field observations will be described and recorded.

Upon completion of purging and stabilization of field parameters, the samples will be collected immediately. Sample containers will be filled directly from the appropriate sampling device.

The samples will be collected from the tubing attached to a peristaltic pump. The flow through cell will be disconnected from the tubing prior to sample collection.

Unless field conditions or work plans dictate otherwise, the typical sample collection sequence will first be organics followed by inorganic parameters.

Equipment blank samples are analyzed to check for potential contamination present on/in new, sealed, disposable (one-time use) sampling equipment (e.g., bailers) as received from the manufacturer. Equipment blanks will be collected by pouring distilled water in or over the new sampling equipment upon removing the protective wrapping or

sealing, and collecting water in the sample containers. One equipment blank will be collected for every 20 investigative samples using such equipment. If fewer than 20 project samples are collected, a minimum of one equipment blank will be submitted per sampling event.

Equipment blank samples may also be analyzed to check for procedural contamination that may cause sample contamination from reusable sampling equipment. The equipment blanks will be collected in the same manner as described above.

Duplicate samples are analyzed to evaluate the reproducibility of the laboratory analytical results. One duplicate sample for each analysis will be collected for every 20 or fewer investigative samples per sampling event. Duplicate samples from a well will be collected for a parameter by alternately filling two bottles.

MS/MSD samples are used to document the precision and bias of an analytical method in a given sample matrix. They are prepared in the laboratory by spiking an aliquot of sample with a known concentration of target analyte(s). One MS/MSD sample will be collected for every 20 or fewer samples per sampling event.

Trip blank samples are analyzed to provide a measure of potential cross-contamination of samples during shipment and handling. IDEM does not require the use of trip blanks for any sample parameters other than volatile organic compounds, therefore they will not be utilized for this project.

Field duplicate samples should be numbered with a unique sample number to prevent laboratory bias of field QC samples. Equipment blanks selected for analysis will not be submitted to the laboratory in a blind manner.

The sample identification format for quality assurance/quality control samples is as follows:

SAMPLE NOMENCLATURE		
Duplicate	DUP-### / DDMMYY	Example: DUP-001 / 042512
Equipment Blank	EQB-### / DDMMYY	Example: EQB-005 / 042512
Matrix Spike/Matrix Spike Duplicate	MS/MSD-### / DDMMYY	Example: MS/MSD-001 / 042512

D-5h(2) Sample Preservation and Shipment

Appropriate sample containers will be provided by the laboratory conducting the analysis. The containers will be pre-preserved (if appropriate) for the required analytical constituents from
each well. Information for each type of analysis, including sample bottles, preservatives, and holding times is provided on Table D-2. Samples will be shipped to the laboratory at the end of each sampling event.

D-5h(3) Analytical Procedure

The laboratory QA/QC program will include the use of standards, spikes, duplicates, and laboratory blank samples for calibration and detection of potential matrix interferences. The laboratory will provide a summary of the analytical methods used, calibration results and anomalies, detection limits, dilution factors, and data qualifiers. Upon request, the raw data will be available for data validation. Commercial laboratories used to analyze water samples will maintain accreditation in accordance with the National Environmental Laboratory Accreditation Conference (NELAC).

During sampling, a series of QA/QC samples will be submitted to the laboratory to test the quality of analytical data and sampling procedures. Field QA/QC samples will include equipment blanks, duplicate samples, and MS/MSD samples.

D-5h(4) Chain-of-Custody

The field manager, or their designee, may complete the chain of custody record on behalf of individual samplers without requiring the identification of all individuals on the COC record. The field logbook documentation can be used to establish the identity of the collector(s) of any specific sample(s), as/if needed. A courier or commercial carrier used to transport samples to the laboratory will not be included in COC procedures.

The chain of custody record will include the following minimum information:

- Project name
- Sample identification (ID)
- Number of sample containers
- Sample Matrix
- Date and time of collection
- Signature of persons in the chain of possession (excluding commercial carriers)
- Inclusive dates and time upon each transfer of possession
- Analytical parameters
- Annotation as to whether the sample has been filtered

The above information is to appear on the chain of custody record that will accompany the samples being shipped to the laboratory. A two- or three-part carbonless chain of custody record (form) will be used with the client copy of the form maintained by the sampling team. One original and one copy of the chain of custody record will then accompany the sample shipment to the laboratory and will be signed by the receiving laboratory's sample custodian, who will retain the copy.

If the samples are sent by common carrier, an appropriate shipping form will be used, and copies of the form will be retained as permanent documentation. Commercial carriers are not required to sign the chain of custody form as long as the form is sealed inside the sample cooler and the tape remains intact.

D-5h(5) Additional Requirements for Compliance Point Monitoring

During the post-closure permit groundwater monitoring period, there will be no additional requirements for point of compliance monitoring.

D-5h(5)(a) Sampling Frequency

Upon approval of this Application, HPC will conduct another four quarters of groundwater monitoring and review the data. If there is sufficient evidence of continued plume stability, HPC will prepare a request to terminate the post-closure permit period. If IDEM does not concur there is sufficient evidence of plume stability, the post-closure permit groundwater monitoring period will continue.

D-5h(5)(b) Testing for Appendix IX Hazardous Constituents

The groundwater will be monitored quarterly in accordance with Table D-5 during the post-closure permit monitoring period.

D-5h(5)(c) Compliance Point Groundwater Quality Values

A 95% UCL of the mean will be calculated for the arsenic and PCP data set for the monitoring wells where these constituents were detected. The calculated means will be compared with the groundwater protection standards listed in Table D-7 to verify there are no exceedances at the POC wells. After each subsequent quarterly sampling event, the new data will be incorporated into the data set and a new 95% UCL of the mean will be calculated and compared with the next quarterly sampling results.

Quarterly reports will be provided to IDEM within 60 days of receipt of the laboratory data. The quarterly report will consist of the laboratory data, the field documentation, a potentiometric surface map, a description of the statistical analysis, discussion of the results, and conclusions. In addition, the data will be submitted electronically to the Office of Land Quality (OLQ) data section of IDEM.

D-5h(6) Annual Determination

The groundwater flow direction and rate will be determined annually based on a review of the quarterly potentiometric surface maps. This determination will be discussed in the quarterly reports submitted following the completion of the fourth quarter sampling event.

D-5h(7) Statistical Determination

Quarterly groundwater sampling data collected during the plume stability demonstration monitoring process will be used to demonstrate an understanding of plume behavior and plume stability. SMA plans to use multiple lines of evidence to make that demonstration. These multiple lines of evidence may include statistical methods (e.g., Mann-Kendall, regression analysis, graphical demonstrations, etc.), plume characteristic assessments (e.g., mass flux analysis, center of mass analysis, overall plume mass analysis, etc.), and other valid, recognized methodologies (see Appendix I). Based on the plume stability evaluation, if monitoring wells MW-2, MW-3, MW-6, and MW-7R demonstrate a statically stable/no trend or decreasing trend, a request will be submitted to IDEM for closure with the intent that no additional monitoring would occur within the plume and/or individual wells within the plume. If this demonstration cannot be made within the post-closure permit period, quarterly groundwater monitoring will continue.

D-5h(7)(a) Statistical Procedure

The groundwater analytical data for Monitoring wells MW-2, MW-3, MW-6, and MW-7R collected during the post-closure permit monitoring period will be evaluated as described in Section *D-5h(5)(c)*.

D-5h(7)(b) Results

The results of the statistical evaluation and determination will be summarized in a separate final report that clearly exhibits the statistical evaluations and results. The calculations will be shown, data will be tabulated and text will be provided that walks through the statistical evaluation.

The final report and Post-Closure Certification will be submitted to IDEM for its review and approval. Upon IDEM approval of a demonstration that groundwater protection standards have been achieved at the POC wells and that the conditions in Section D-5h(7) have been met, HPC will properly close and abandon all monitoring wells. Upon completion of that work, and submission of a well closure report to IDEM, the post-closure monitoring and maintenance period will end and the Post-Closure Permit will terminate.

H–2	6/25/01	
PARAMETERS	DEPTH	
	0–0.5'	0.5–1.0'
ALDRIN	<0.33	<1.7
CHLORDANE	<0.33	<1.7
4,4'–DDT	<0.33	<1.7
DIELDRIN	0.36	<1.7
HEPTACHLOR	<0.33	<1.7

H–2 DUP	6/25/01
PARAMETERS	DEPTH
	0–0.5'
ALDRIN	<3.3
CHLORDANE	<3.3
4,4'–DDT	<3.3
DIELDRIN	<3.3
HEPTACHLOR	<3.3

P–4	7/17/02	
PARAMETERS	DEPTH	
	0–0.5'	4.0–6.0'
ALDRIN	<0.025	<0.025
ALPHA–CHLORDANE	0.062	<0.025
GAMMA–CHLORDANE	0.040	<0.025
PENTACHLOROPHENOL	0.074	<0.017
4,4'–DDT	<0.025	<0.025
DIELDRIN	<0.025	<0.025
HEPTACHLOR	<0.025	<0.025

P–2	7/17/02	
PARAMETERS	DEPTH	
	0–0.5'	4.0–6.0'
ALDRIN	<0.025	<0.025
ALPHA–CHLORDANE	0.090	<0.025
GAMMA–CHLORDANE	0.078	<0.025
beta – BHC	0.037	NM
4,4'–DDT	0.16	<0.025
ENDRIN ALDEHYDE	0.028	<0.025
ENDRIN KETONE	0.032	<0.025

H–1	6/25/01
PARAMETERS	DEPTH
	0–0.5'
ALDRIN	<0.33
CHLORDANE	<0.33
4,4'–DDT	<0.33
DIELDRIN	<0.33
HEPTACHLOR	<0.33

S–5	5/15/00			6/25/01	
PARAMETERS	DEPTH				
	0–0.5'	0.5–1.0'	1.5–2.0'	4–6'	6–8'
ALDRIN	16,700	186,000	33,200	<0.033	0.05
ALPHA–CHLORDANE	6,840	96,300	41,000	NM	NM
GAMMA–CHLORDANE	8,580	121,100	53,900	NM	NM
CHORDANE	NM	NM	NM	<0.033	<0.033
4,4'–DDT	60,300	100,000	236,000	<0.033	<0.033
DIELDRIN	13,400	165,000	53,800	<0.033	<0.033
HEPTACHLOR	2,050	20,600	9,930	<0.033	<0.033

P–5	7/17/02	
PARAMETERS	DEPTH	
	0–0.5'	5.0–7.0'
ALDRIN	<0.025	<0.025
ALPHA–CHLORDANE	0.084	<0.025
GAMMA–CHLORDANE	0.060	<0.025
4,4'–DDD	0.057	<0.025
4,4'–DDT	0.062	<0.025
DIELDRIN	0.086	<0.025
HEPTACHLOR	<0.025	<0.025

CH–3	11/1/10
PARAMETERS	DEPTH
	0–2.0'
ALPHA CHLORDANE	110
GAMMA CHLORDANE	56.5

S–4	5/15/00	
PARAMETERS	DEPTH	
	0–0.5'	0.5–1.0'
ALDRIN	<8.0	<8.0
ALPHA–CHLORDANE	<80.0	<80.0
GAMMA–CHLORDANE	<80.0	<80.0
4,4'–DDT	<16.0	<16.0
DIELDRIN	<16.0	<16.0
HEPTACHLOR	<8.0	<8.0

P–6	7/17/02	
PARAMETERS	DEPTH	
	0–0.5'	4.0–6.0'
ALDRIN	<0.025	<0.025
ALPHA–CHLORDANE	0.410	<0.025
GAMMA–CHLORDANE	0.280	<0.025
4,4'–DDD	<0.025	<0.025
4,4'–DDT	0.2	<0.025
DIELDRIN	<0.025	<0.025
HEPTACHLOR	<0.025	<0.025

S–1	5/15/00	
PARAMETERS	DEPTH	
	0–0.5'	0.5–1.0'
ALDRIN	<8.0	<8.0
ALPHA–CHLORDANE	<80.0	<80.0
GAMMA–CHLORDANE	<80.0	<80.0
4,4'–DDT	<16.0	<16.0
DIELDRIN	<16.0	<16.0
HEPTACHLOR	<8.0	<8.0

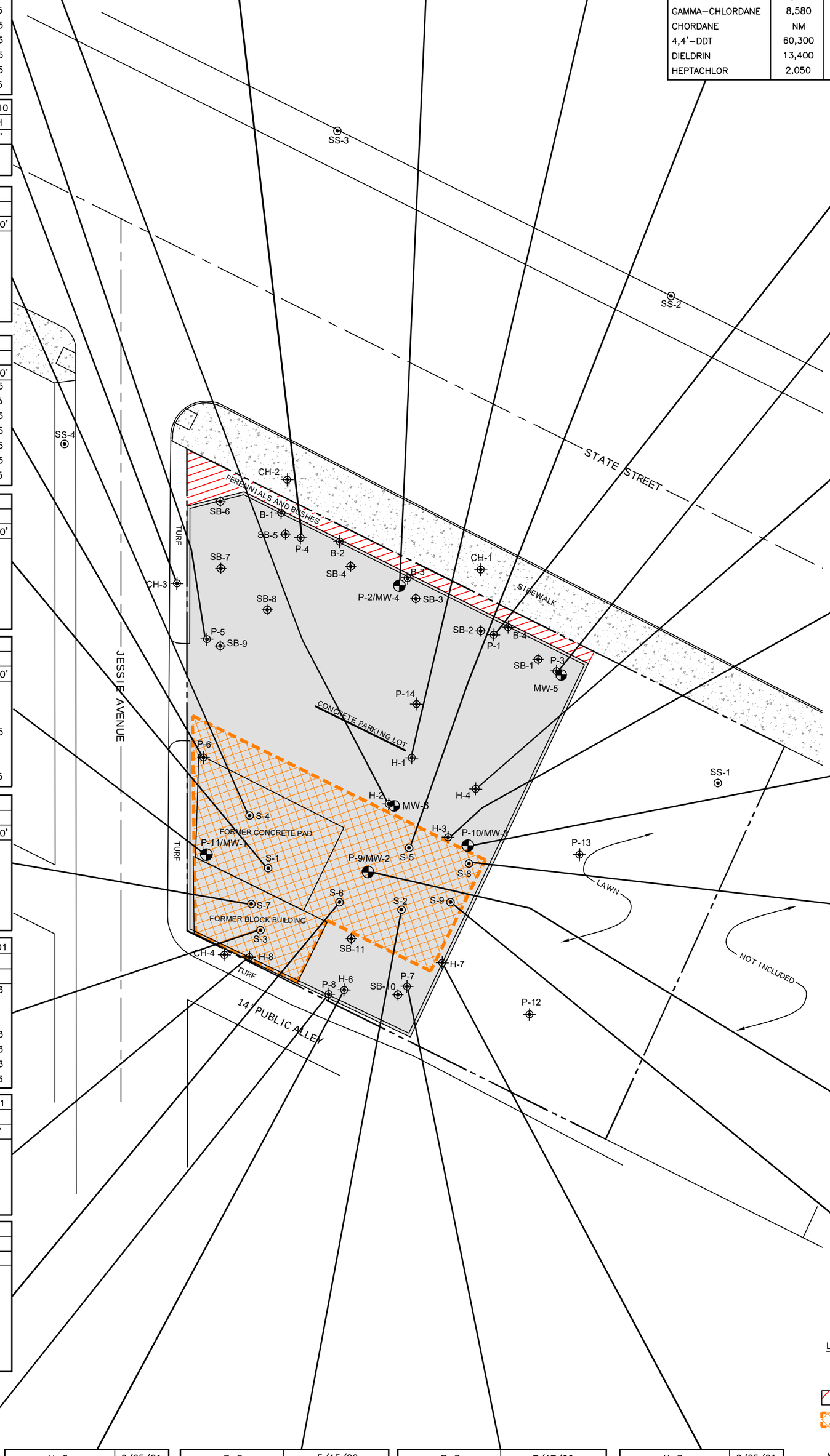
P–11	7/17/02	
PARAMETERS	DEPTH	
	2.0–4.0'	4.0–6.0'
ALDRIN	<0.025	0.34
ALPHA–CHLORDANE	0.092	1.400
GAMMA–CHLORDANE	0.069	0.95
4,4'–DDD	<0.025	<0.025
4,4'–DDT	<0.025	0.054
DIELDRIN	<0.025	0.052
HEPTACHLOR	<0.025	<0.025

S–7	5/15/00	
PARAMETERS	DEPTH	
	0–0.5'	0.5–1.0'
ALDRIN	<8.0	<8.0
ALPHA–CHLORDANE	<80.0	<80.0
GAMMA–CHLORDANE	<80.0	<80.0
4,4'–DDT	<16.0	<16.0
DIELDRIN	<16.0	<16.0
HEPTACHLOR	<8.0	<8.0

S–3	5/15/00		6/25/01
PARAMETERS	DEPTH		
	0–0.5'	0.5–1.0'	6–8'
ALDRIN	11,200	10,000	<0.033
ALPHA–CHLORDANE	2,840	2,460	NM
GAMMA–CHLORDANE	3,280	2,700	NM
4,4'–DDT	1,680	1,310	<0.033
CHLORDANE	NM	NM	<0.033
DIELDRIN	2,270	1,620	<0.033
HEPTACHLOR	975	738	<0.033

H–8	6/25/01
PARAMETERS	DEPTH
	0–0.5'
ALDRIN	<0.33
CHLORDANE	<0.33
4,4'–DDT	<0.33
DIELDRIN	<0.33
HEPTACHLOR	<0.33

S–6	5/15/00		6/25/01	
PARAMETERS	DEPTH			
	0–0.5'	0.5–1.0'	4–6'	6–8'
ALDRIN	2,230	317	<33	100
ALPHA–CHLORDANE	11,600	2,750	NM	NM
GAMMA–CHLORDANE	15,200	3,500	NM	NM
4,4'–DDT	37,400	11,800	<33	<3.3
CHORDANE	NM	NM	170	<3.3
DIELDRIN	1,700	757	<33	<3.3
HEPTACHLOR	3,130	412	<33	<3.3



P–1	7/17/02	
PARAMETERS	DEPTH	
	0–0.5'	4.0–6.0'
ALDRIN	<0.025	<0.025
ALPHA–CHLORDANE	0.640	<0.025
GAMMA–CHLORDANE	0.370	<0.025
PENTACHLOROPHENOL	0.030	<0.017
4,4'–DDT	0.093	<0.025
DIELDRIN	0.032	<0.025
HEPTACHLOR	<0.025	<0.025

P–3	7/17/02	
PARAMETERS	DEPTH	
	0–0.5'	5.0–7.0'
ALDRIN	<0.025	<0.025
ALPHA–CHLORDANE	0.072	<0.025
GAMMA–CHLORDANE	0.130	<0.025
CHLORDANE	NM	NM
4,4'–DDT	<0.025	<0.025
DIELDRIN	<0.025	<0.025
HEPTACHLOR	<0.025	<0.025

H–4	6/25/01	
PARAMETERS	DEPTH	
	0–0.5'	0.5–1.0'
ALDRIN	<33	<33
CHLORDANE	2,400	720
4,4'–DDT	<33	<33
DIELDRIN	<33	<33
HEPTACHLOR	<33	<33

H–3	6/25/01
PARAMETERS	DEPTH
	0–0.5'
ALDRIN	<0.33
CHLORDANE	<0.33
4,4'–DDT	<0.33
DIELDRIN	<0.33
HEPTACHLOR	<0.33

P–10	7/17/02	
PARAMETERS	DEPTH	
	0–0.5'	4.0–6.0'
ALDRIN	<0.025	<0.025
ALPHA–CHLORDANE	<0.025	<0.025
GAMMA–CHLORDANE	<0.025	<0.025
CHLORDANE	NM	NM
4,4'–DDT	<0.025	<0.025
DIELDRIN	<0.025	<0.025
HEPTACHLOR	<0.025	<0.025

S–8	6/1/00		6/25/01
PARAMETERS	DEPTH		
	0–0.5'	0.5–1.0'	6–8'
ALDRIN	<8.0	<8.0	<0.33
ALPHA–CHLORDANE	325	<80.0	NM
GAMMA–CHLORDANE	408	<80.0	NM
CHLORDANE	NM	NM	<0.33
4,4'–DDT	200	<16.0	<0.33
DIELDRIN	63	<16.0	<0.33
HEPTACHLOR	18	<8.0	<0.33

P–9	7/17/02	
PARAMETERS	DEPTH	
	0–0.5'	4.5–6.5'
ALDRIN	NM	<0.025
ALPHA–CHLORDANE	NM	0.097
GAMMA–CHLORDANE	NM	0.096
PENTACHLOROPHENOL	0.032	<0.025
4,4'–DDT	NM	<0.025
DIELDRIN	NM	<0.025
HEPTACHLOR	NM	<0.025

S–9	6/1/00		6/25/01
PARAMETERS	DEPTH		
	0–0.5'	0.5–1.0'	6–8'
ALDRIN	<8.0	<8.0	<0.33
ALPHA–CHLORDANE	657	<80.0	NM
GAMMA–CHLORDANE	1,020	<80.0	NM
CHLORDANE	NM	NM	<0.33
4,4'–DDT	414	<16.0	<0.33
DIELDRIN	77	<16.0	<0.33
HEPTACHLOR	138	<8.0	<0.33

LEGEND

- MONITORING WELL LOCATION
- SOIL BORING LOCATION
- SOIL EXCAVATION AREA
- HAZARDOUS WASTE MANAGEMENT UNIT

NOTES:

1. (0-0.5') INDICATES SAMPLE DEPTH BELOW GROUND SURFACE.
2. RESULTS ARE REPORTED IN mg/kg (PARTS PER MILLION) UNLESS OTHERWISE NOTED.
3. SURFACE SOILS = 0-0.5 FEET
   SUBSURFACE SOILS = >0.5 FEET
4. NM = NOT MEASURED

SCALE IN FEET

0 10 20 40

P–8	7/17/02	
PARAMETERS	DEPTH	
	0–0.5'	4.5–6.5'
ALDRIN	<0.025	<0.025
ALPHA–CHLORDANE	0.044	<0.025
GAMMA–CHLORDANE	0.031	<0.025
4,4'–DDD	<0.025	<0.025
4,4'–DDT	<0.025	<0.025
DIELDRIN	<0.025	<0.025
HEPTACHLOR	<0.025	<0.025

H–6	6/25/01
PARAMETERS	DEPTH
	0–0.5'
ALDRIN	<0.33
CHLORDANE	<0.33
4,4'–DDT	<0.33
DIELDRIN	<0.33
HEPTACHLOR	<0.33

S–2	5/15/00	
PARAMETERS	DEPTH	
	0–0.5'	0.5–1.0'
ALDRIN	<8.0	<8.0
ALPHA–CHLORDANE	<80.0	<80.0
GAMMA–CHLORDANE	<80.0	<80.0
4,4'–DDT	<16.0	<16.0
DIELDRIN	<16.0	<16.0
HEPTACHLOR	<8.0	<8.0

P–7	7/17/02	
PARAMETERS	DEPTH	
	0–0.5'	4.5–6.5'
ALDRIN	<0.025	<0.025
ALPHA–CHLORDANE	<0.025	<0.025
GAMMA–CHLORDANE	<0.025	<0.025
4,4'–DDD	<0.025	<0.025
4,4'–DDT	<0.025	<0.025
DIELDRIN	<0.025	<0.025
HEPTACHLOR	<0.025	<0.025

H–7	6/25/01
PARAMETERS	DEPTH
	0–0.5'
ALDRIN	<0.33
CHLORDANE	<0.33
4,4'–DDT	<0.33
DIELDRIN	<0.33
HEPTACHLOR	<0.33

CHECK BY: GRP	
DRAWN BY: OS	
DATE:	11–12–15
SCALE:	AS SHOWN
CAD NO.:	00184.02K1[2]
PRJ NO.:	19–00184

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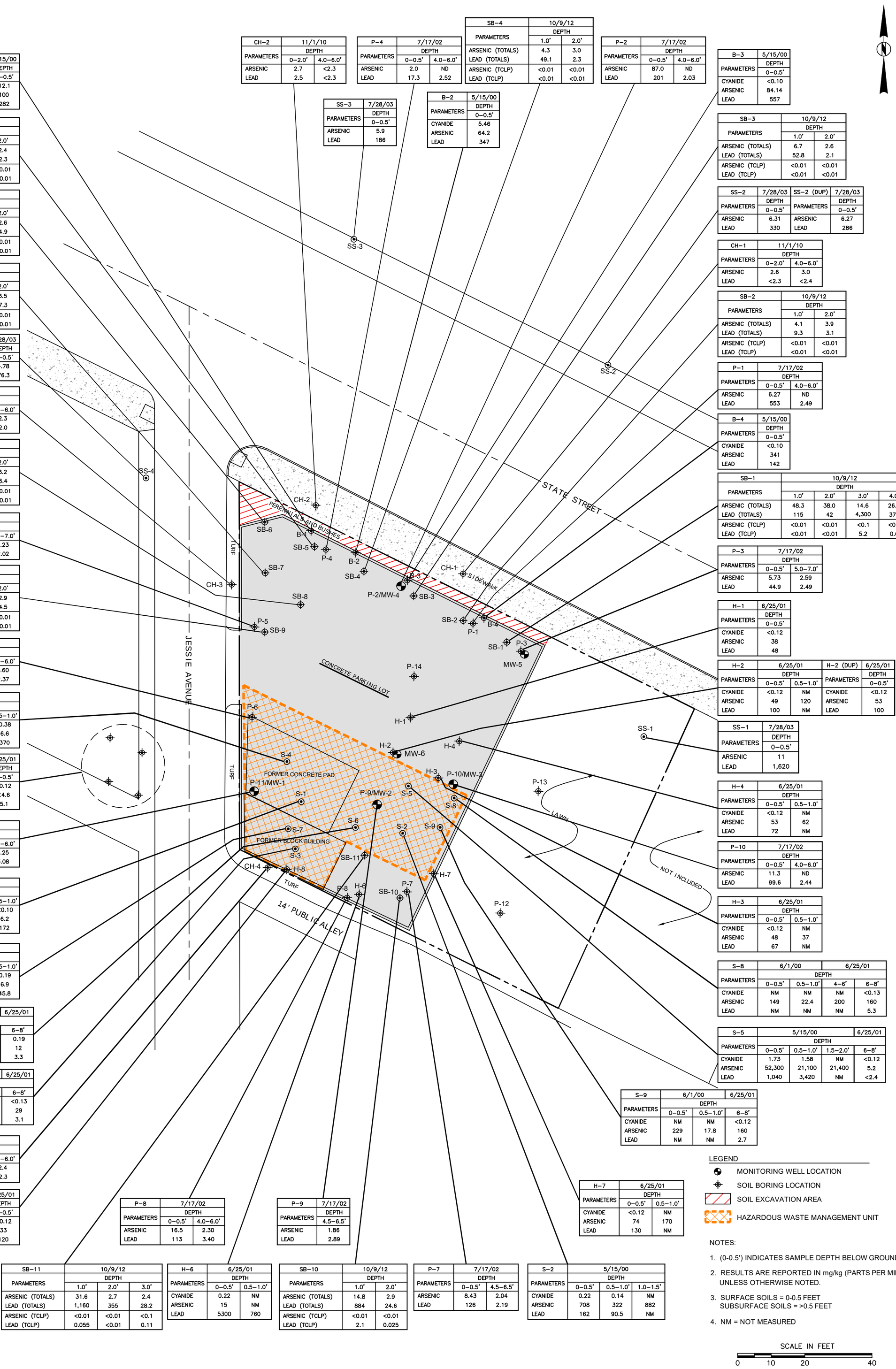
SOIL SAMPLE LOCATIONS AND ANALYTICAL RESULTS
PESTICIDES

HAMMOND PEST CONTROL
HAMMOND, INDIANA

FIGURE

D–1



B-1	5/15/00
PARAMETERS	DEPTH
	0–0.5'
CYANIDE	12.1
ARSENIC	100
LEAD	282

SB-5	10/9/12	
PARAMETERS	DEPTH	
	1.0'	2.0'
ARSENIC (TOTALS)	5.1	2.4
LEAD (TOTALS)	71.5	2.3
ARSENIC (TCLP)	<0.01	<0.01
LEAD (TCLP)	<0.01	<0.01

SB-6	10/9/12	
PARAMETERS	DEPTH	
	1.0'	2.0'
ARSENIC (TOTALS)	6.8	2.6
LEAD (TOTALS)	112	4.9
ARSENIC (TCLP)	<0.01	<0.01
LEAD (TCLP)	0.011	<0.01

SB-7	10/9/12	
PARAMETERS	DEPTH	
	1.0'	2.0'
ARSENIC (TOTALS)	13.1	3.5
LEAD (TOTALS)	1,390	7.3
ARSENIC (TCLP)	<0.01	<0.01
LEAD (TCLP)	0.27	<0.01

SS-4	7/28/03
PARAMETERS	DEPTH
	0–0.5'
ARSENIC	4.78
LEAD	76.3

CH-3	11/1/10	
PARAMETERS	DEPTH	
	0–2.0'	4.0–6.0'
ARSENIC	16.6	2.3
LEAD	502	2.0

SB-8	10/9/12	
PARAMETERS	DEPTH	
	1.0'	2.0'
ARSENIC (TOTALS)	17.7	3.2
LEAD (TOTALS)	75.9	3.4
ARSENIC (TCLP)	<0.01	<0.01
LEAD (TCLP)	0.021	<0.01

P-5	7/17/02	
PARAMETERS	DEPTH	
	0–0.5'	5.0–7.0'
ARSENIC	20.5	2.23
LEAD	92.6	2.02

SB-9	10/9/12	
PARAMETERS	DEPTH	
	1.0'	2.0'
ARSENIC (TOTALS)	5.5	2.9
LEAD (TOTALS)	114.0	4.5
ARSENIC (TCLP)	<0.01	<0.01
LEAD (TCLP)	0.017	<0.01

P-6	7/17/02	
PARAMETERS	DEPTH	
	0–0.5'	4.0–6.0'
ARSENIC	75.0	4.60
LEAD	152	2.37

S-4	5/15/00	
PARAMETERS	DEPTH	
	0–0.5'	0.5–1.0'
CYANIDE	0.18	0.38
ARSENIC	17.2	6.6
LEAD	388	370

BG	6/25/01	BG (DUP)	6/25/01
PARAMETERS	DEPTH	PARAMETERS	DEPTH
	–		0–0.5'
CYANIDE	<0.12	CYANIDE	<0.12
ARSENIC	<4.9	ARSENIC	<4.6
LEAD	18	LEAD	5.1

P-11	7/17/02	
PARAMETERS	DEPTH	
	2.0–4.0''	4.0–6.0'
ARSENIC	2.4	2.25
LEAD	3.12	3.08

S-1	5/15/00	
PARAMETERS	DEPTH	
	0–0.5'	0.5–1.0'
CYANIDE	<0.10	<0.10
ARSENIC	3.6	6.2
LEAD	56.3	172

S-7	5/15/00	
PARAMETERS	DEPTH	
	0–0.5'	0.5–1.0'
CYANIDE	0.30	0.19
ARSENIC	12.3	6.9
LEAD	116	45.8

S-6	5/15/00			6/25/01
PARAMETERS	DEPTH			
	0–0.5'	0.5–1.0'	1.5–2.0'	6–8'
CYANIDE	0.51	0.57	NM	0.19
ARSENIC	8,380	1,270	269	12
LEAD	247	173	NM	3.3

S-3	5/15/00			6/25/01
PARAMETERS	DEPTH			
	0–0.5'	0.5–1.0'	1.0–1.5'	6–8'
CYANIDE	0.46	0.26	NM	<0.13
ARSENIC	1,240	113	67.6	29
LEAD	679	106	NM	3.1

CH-4	11/1/10	
PARAMETERS	DEPTH	
	0–2.0'	4.0–6.0'
ARSENIC	3.5	2.4
LEAD	63.8	2.3

H-8	6/25/01
PARAMETERS	DEPTH
	0–0.5'
CYANIDE	<0.12
ARSENIC	33
LEAD	120

CH-2	11/1/10	
PARAMETERS	DEPTH	
	0–2.0'	4.0–6.0'
ARSENIC	2.7	<2.3
LEAD	2.5	<2.3

P-4	7/17/02	
PARAMETERS	DEPTH	
	0–0.5'	4.0–6.0'
ARSENIC	2.0	ND
LEAD	17.3	2.52

SS-3	7/28/03
PARAMETERS	DEPTH
	0–0.5'
ARSENIC	5.9
LEAD	186

B-2	5/15/00
PARAMETERS	DEPTH
	0–0.5'
CYANIDE	5.46
ARSENIC	64.2
LEAD	347

SB-4	10/9/12	
PARAMETERS	DEPTH	
	1.0'	2.0'
ARSENIC (TOTALS)	4.3	3.0
LEAD (TOTALS)	49.1	2.3
ARSENIC (TCLP)	<0.01	<0.01
LEAD (TCLP)	<0.01	<0.01

P-2	7/17/02	
PARAMETERS	DEPTH	
	0–0.5'	4.0–6.0'
ARSENIC	87.0	ND
LEAD	201	2.03

B-3	5/15/00
PARAMETERS	DEPTH
	0–0.5'
CYANIDE	<0.10
ARSENIC	84.14
LEAD	557

SB-3	10/9/12	
PARAMETERS	DEPTH	
	1.0'	2.0'
ARSENIC (TOTALS)	6.7	2.6
LEAD (TOTALS)	52.8	2.1
ARSENIC (TCLP)	<0.01	<0.01
LEAD (TCLP)	<0.01	<0.01

SS-2	7/28/03	SS-2 (DUP)	7/28/03
PARAMETERS	DEPTH	PARAMETERS	DEPTH
	0–0.5'		0–0.5'
ARSENIC	6.31	ARSENIC	6.27
LEAD	330	LEAD	286

CH-1	11/1/10	
PARAMETERS	DEPTH	
	0–2.0'	4.0–6.0'
ARSENIC	2.6	3.0
LEAD	<2.3	<2.4

SB-2	10/9/12	
PARAMETERS	DEPTH	
	1.0'	2.0'
ARSENIC (TOTALS)	4.1	3.9
LEAD (TOTALS)	9.3	3.1
ARSENIC (TCLP)	<0.01	<0.01
LEAD (TCLP)	<0.01	<0.01

P-1	7/17/02	
PARAMETERS	DEPTH	
	0–0.5'	4.0–6.0'
ARSENIC	6.27	ND
LEAD	553	2.49

B-4	5/15/00
PARAMETERS	DEPTH
	0–0.5'
CYANIDE	<0.10
ARSENIC	341
LEAD	142

SB-1	10/9/12			
PARAMETERS	DEPTH			
	1.0'	2.0'	3.0'	4.0'
ARSENIC (TOTALS)	48.3	38.0	14.6	26.9
LEAD (TOTALS)	115	42	4,300	377
ARSENIC (TCLP)	<0.01	<0.01	<0.1	<0.1
LEAD (TCLP)	<0.01	<0.01	5.2	0.6

P-3	7/17/02	
PARAMETERS	DEPTH	
	0–0.5'	5.0–7.0'
ARSENIC	5.73	2.59
LEAD	44.9	2.49

H-1	6/25/01
PARAMETERS	DEPTH
	0–0.5'
CYANIDE	<0.12
ARSENIC	38
LEAD	48

H-2	6/25/01		H-2 (DUP)	6/25/01
PARAMETERS	DEPTH		PARAMETERS	DEPTH
	0–0.5'	0.5–1.0'		0–0.5'
CYANIDE	<0.12	NM	CYANIDE	<0.12
ARSENIC	49	120	ARSENIC	53
LEAD	100	NM	LEAD	100

SS-1	7/28/03
PARAMETERS	DEPTH
	0–0.5'
ARSENIC	11
LEAD	1,620

H-4	6/25/01	
PARAMETERS	DEPTH	
	0–0.5'	0.5–1.0'
CYANIDE	<0.12	NM
ARSENIC	53	62
LEAD	72	NM

P-10	7/17/02	
PARAMETERS	DEPTH	
	0–0.5'	4.0–6.0'
ARSENIC	11.3	ND
LEAD	99.6	2.44

H-3	6/25/01	
PARAMETERS	DEPTH	
	0–0.5'	0.5–1.0'
CYANIDE	<0.12	NM
ARSENIC	48	37
LEAD	67	NM

S-8	6/1/00		6/25/01	
PARAMETERS	DEPTH			
	0–0.5'	0.5–1.0'	4–6'	6–8'
CYANIDE	NM	NM	NM	<0.13
ARSENIC	149	22.4	200	160
LEAD	NM	NM	NM	5.3

S-5	5/15/00			6/25/01
PARAMETERS	DEPTH			
	0–0.5'	0.5–1.0'	1.5–2.0'	6–8'
CYANIDE	1.73	1.58	NM	<0.12
ARSENIC	52,300	21,100	21,400	5.2
LEAD	1,040	3,420	NM	<2.4

S-9	6/1/00		6/25/01
PARAMETERS	DEPTH		
	0–0.5'	0.5–1.0'	6–8'
CYANIDE	NM	NM	<0.12
ARSENIC	229	17.8	160
LEAD	NM	NM	2.7

H-7	6/25/01	
PARAMETERS	DEPTH	
	0–0.5'	0.5–1.0'
CYANIDE	<0.12	NM
ARSENIC	74	170
LEAD	130	NM

P-8	7/17/02	
PARAMETERS	DEPTH	
	0–0.5'	4.0–6.0'
ARSENIC	16.5	2.30
LEAD	113	3.40

P-9	7/17/02
PARAMETERS	DEPTH
	4.5–6.5'
ARSENIC	1.86
LEAD	2.89

SB-11	10/9/12		
PARAMETERS	DEPTH		
	1.0'	2.0'	3.0'
ARSENIC (TOTALS)	31.6	2.7	2.4
LEAD (TOTALS)	1,160	355	28.2
ARSENIC (TCLP)	<0.01	<0.01	<0.1
LEAD (TCLP)	0.055	<0.01	0.11

H-6	6/25/01	
PARAMETERS	DEPTH	
	0–0.5'	0.5–1.0'
CYANIDE	0.22	NM
ARSENIC	15	NM
LEAD	5300	760

SB-10	10/9/12	
PARAMETERS	DEPTH	
	1.0'	2.0'
ARSENIC (TOTALS)	14.8	2.9
LEAD (TOTALS)	884	24.6
ARSENIC (TCLP)	<0.01	<0.01
LEAD (TCLP)	2.1	0.025

P-7	7/17/02	
PARAMETERS	DEPTH	
	0–0.5'	4.5–6.5'
ARSENIC	8.43	2.04
LEAD	126	2.19

S-2	5/15/00		
PARAMETERS	DEPTH		
	0–0.5'	0.5–1.0'	1.0–1.5'
CYANIDE	0.22	0.14	NM
ARSENIC	708	322	882
LEAD	162	90.5	NM

LEGEND

- MONITORING WELL LOCATION
- SOIL BORING LOCATION
- SOIL EXCAVATION AREA
- HAZARDOUS WASTE MANAGEMENT UNIT

NOTES:

1. (0-0.5') INDICATES SAMPLE DEPTH BELOW GROUND SURFACE.
2. RESULTS ARE REPORTED IN mg/kg (PARTS PER MILLION) UNLESS OTHERWISE NOTED.
3. SURFACE SOILS = 0-0.5 FEET
   SUBSURFACE SOILS = >0.5 FEET
4. NM = NOT MEASURED

SCALE IN FEET

0 10 20 40

CHECK BY:	GRP
DRAWN BY:	OS
DATE:	11–12–15
SCALE:	AS SHOWN
CAD NO.:	00184.02K8[2]
PRJ NO.:	19–00184

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SOIL SAMPLE LOCATIONS AND ANALYTICAL RESULTS
INORGANICS

HAMMOND PEST CONTROL
HAMMOND, INDIANA

FIGURE

D–2

SCALE IN FEET

0 2000 4000 8000

CHK BY	RS
DWN BY	OS
DATE	6-15-15
SCALE	NONE
CAD NO.	00184.02U2
PRJ NO.	19-00184

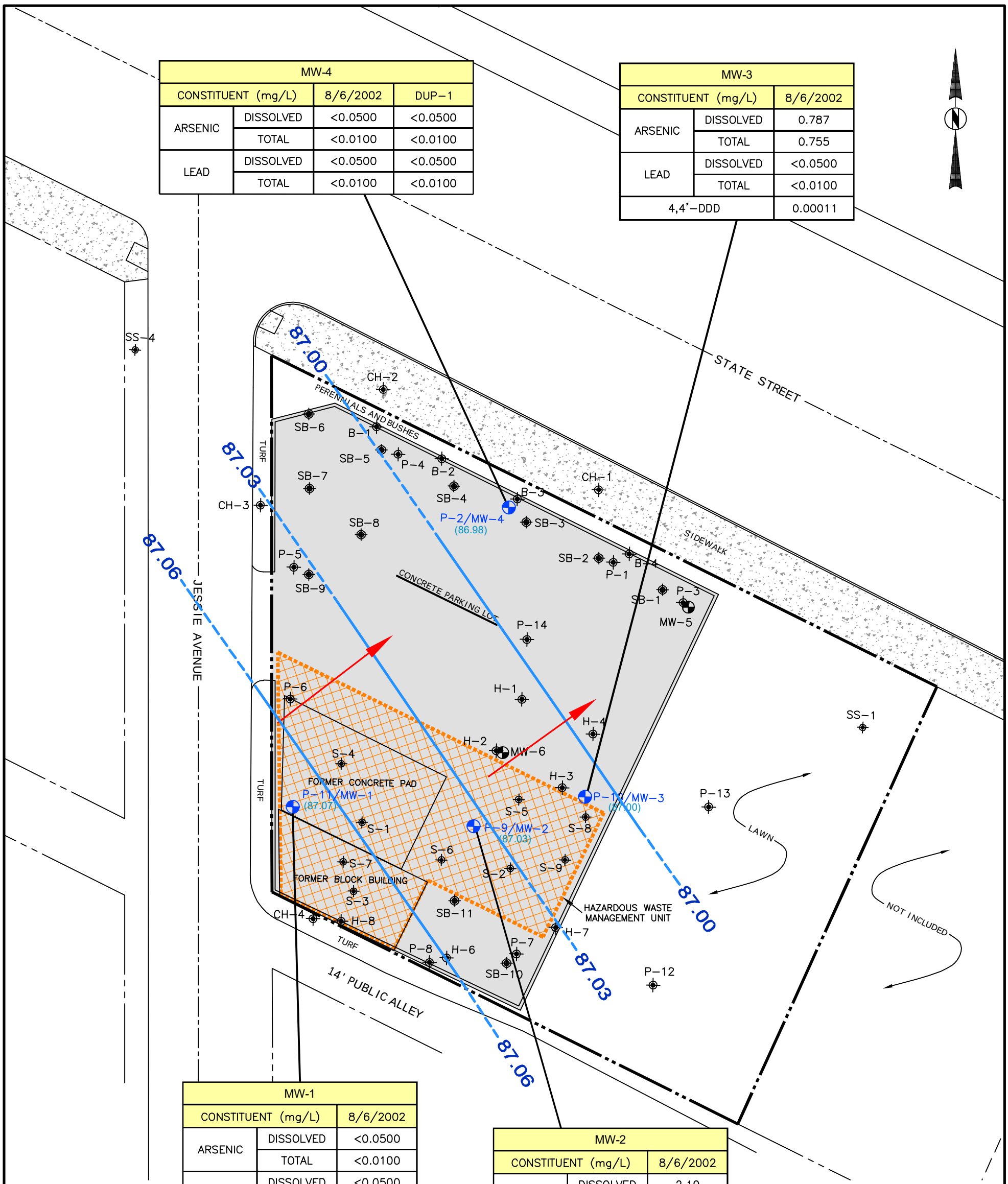
GRAND CALUMET RIVER AREA OF CONCERN

HAMMOND PEST CONTROL
HAMMOND, INDIANA

SM&A

FIGURE

D-3



MW-4			
CONSTITUENT (mg/L)		8/6/2002	DUP-1
ARSENIC	DISSOLVED	<0.0500	<0.0500
	TOTAL	<0.0100	<0.0100
LEAD	DISSOLVED	<0.0500	<0.0500
	TOTAL	<0.0100	<0.0100

MW-3		
CONSTITUENT (mg/L)		8/6/2002
ARSENIC	DISSOLVED	0.787
	TOTAL	0.755
LEAD	DISSOLVED	<0.0500
	TOTAL	<0.0100
4,4'-DDD		0.00011

MW-1		
CONSTITUENT (mg/L)		8/6/2002
ARSENIC	DISSOLVED	<0.0500
	TOTAL	<0.0100
LEAD	DISSOLVED	<0.0500
	TOTAL	<0.0100

MW-2		
CONSTITUENT (mg/L)		8/6/2002
ARSENIC	DISSOLVED	2.19
	TOTAL	2.52
LEAD	DISSOLVED	<0.0500
	TOTAL	<0.0100
BETA-BHC		0.00042
DIELDRIN		0.00024
4,4'-DDD		0.00018
APLHA-CHLORDANE		0.00009

LEGEND

- SOIL BORING LOCATION
- EXISTING MONITORING WELL LOCATION
- (86.98) GROUNDWATER ELEVATION
- 87.00 AUGUST 6, 2002 POTENTIOMETRIC CONTOUR (SITE DATUM)
- GROUNDWATER FLOW DIRECTION

SCALE IN FEET

0 10 20 40

CHECK BY	GRP
DRAWN BY	OS
DATE	11-12-15
SCALE	AS SHOWN
CAD NO.	00184.02J1[3]
PRJ NO.	19-00184.02-001

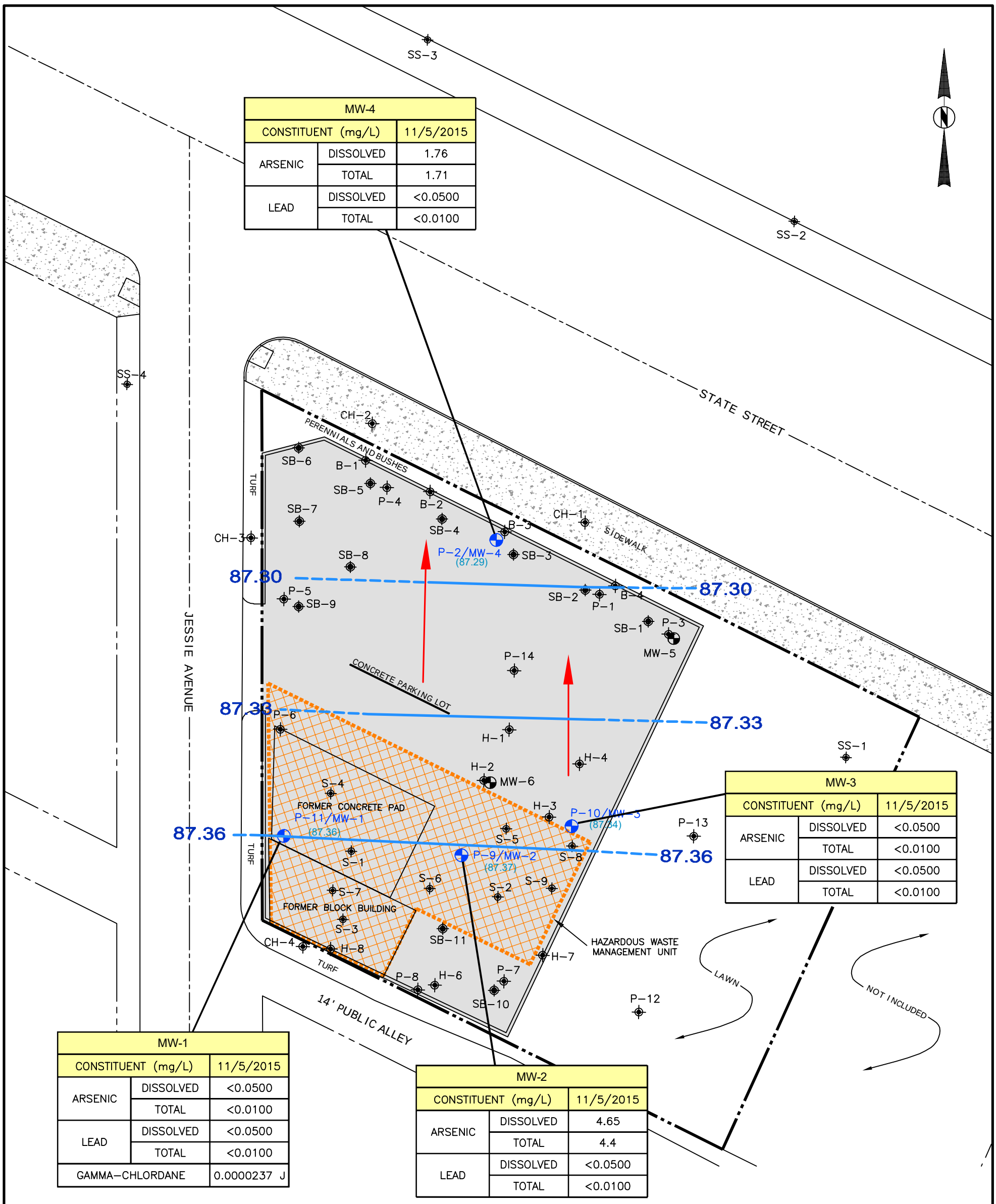
GROUNDWATER FLOW AND ANALYTICAL RESULTS
AUGUST 6, 2002

HAMMOND PEST CONTROL
HAMMOND, INDIANA

SM&A
ST. JOHN-MITTELHAUSER & ASSOCIATES
A Terracon COMPANY

FIGURE

D-4



MW-4		
CONSTITUENT (mg/L)		11/5/2015
ARSENIC	DISSOLVED	1.76
	TOTAL	1.71
LEAD	DISSOLVED	<0.0500
	TOTAL	<0.0100

MW-3		
CONSTITUENT (mg/L)		11/5/2015
ARSENIC	DISSOLVED	<0.0500
	TOTAL	<0.0100
LEAD	DISSOLVED	<0.0500
	TOTAL	<0.0100

MW-1		
CONSTITUENT (mg/L)		11/5/2015
ARSENIC	DISSOLVED	<0.0500
	TOTAL	<0.0100
LEAD	DISSOLVED	<0.0500
	TOTAL	<0.0100
GAMMA-CHLORDANE		0.0000237 J

MW-2		
CONSTITUENT (mg/L)		11/5/2015
ARSENIC	DISSOLVED	4.65
	TOTAL	4.4
LEAD	DISSOLVED	<0.0500
	TOTAL	<0.0100

LEGEND

- SOIL BORING LOCATION
- EXISTING MONITORING WELL LOCATION
- (86.98) GROUNDWATER ELEVATION
- 87.33 NOVEMBER 2, 2010 POTENTIOMETRIC CONTOUR (SITE DATUM)
- GROUNDWATER FLOW DIRECTION

SCALE IN FEET

0 10 20 40

CHECK BY	GRP
DRAWN BY	OS
DATE	11-12-15
SCALE	AS SHOWN
CAD NO.	00184.02J2[3]
PRJ NO.	19-00184.02-001

GROUNDWATER FLOW AND ANALYTICAL RESULTS
NOVEMBER 2, 2010

HAMMOND PEST CONTROL
HAMMOND, INDIANA

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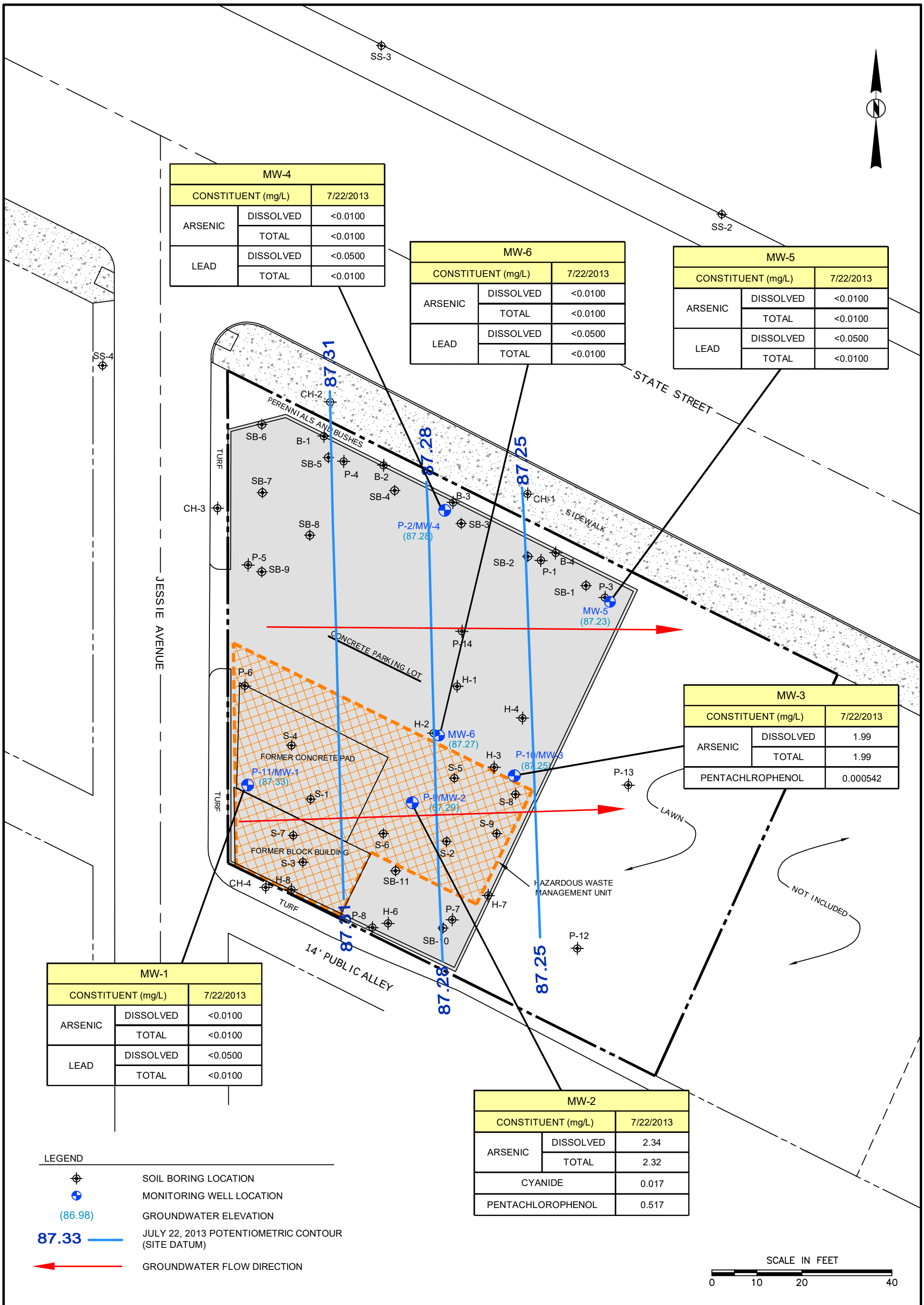
FIGURE

D-5



MW-4		
CONSTITUENT (mg/L)		7/22/2013
ARSENIC	DISSOLVED	<0.0100
	TOTAL	<0.0100
LEAD	DISSOLVED	<0.0500
	TOTAL	<0.0100

MW-6		
CONSTITUENT (mg/L)		7/22/2013
ARSENIC	DISSOLVED	<0.0100
	TOTAL	<0.0100
LEAD	DISSOLVED	<0.0500
	TOTAL	<0.0100

MW-5		
CONSTITUENT (mg/L)		7/22/2013
ARSENIC	DISSOLVED	<0.0100
	TOTAL	<0.0100
LEAD	DISSOLVED	<0.0500
	TOTAL	<0.0100

MW-3		
CONSTITUENT (mg/L)		7/22/2013
ARSENIC	DISSOLVED	1.99
	TOTAL	1.99
PENTACHLROPHENOL		0.000542

MW-1		
CONSTITUENT (mg/L)		7/22/2013
ARSENIC	DISSOLVED	<0.0100
	TOTAL	<0.0100
LEAD	DISSOLVED	<0.0500
	TOTAL	<0.0100

MW-2		
CONSTITUENT (mg/L)		7/22/2013
ARSENIC	DISSOLVED	2.34
	TOTAL	2.32
CYANIDE		0.017
PENTACHLOROPHENOL		0.517

LEGEND

- SOIL BORING LOCATION
- MONITORING WELL LOCATION
- (86.98) GROUNDWATER ELEVATION
- 87.33 JULY 22, 2013 POTENTIOMETRIC CONTOUR (SITE DATUM)
- GROUNDWATER FLOW DIRECTION

SCALE IN FEET
0 10 20 40

CHECK BY	OS
DRAWN BY	GRP
DATE	11-12-15
SCALE	AS SHOWN
CAD NO.	00184.02J3[3]
PRJ NO.	15-97010

GROUNDWATER FLOW AND ANALYTICAL RESULTS
JULY 22, 2013

HAMMOND PEST CONTROL
HAMMOND, INDIANA

SM&A
ST. JOHN-MITTELHAUSER & ASSOCIATES
A Terracon COMPANY

FIGURE
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