INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
We Protect Hoosiers and Our Environment.

Mitchell E. Daniels, Jr.
Governor

Thomas W. Easterly
Commissioner

100 North Senate Avenue
Indianapolis, Indiana 46204
(317) 232-8603
Toll Free (800) 451-6027
www.idem.IN.gov

VIA CERTIFIED MAIL

February 18, 2010

TO: D. Favero for notice, further handling

James M. Redwine, Vice President, Environmental
Motors Liquidation Company
500 Renaissance Drive, Suite 1400
Detroit, Michigan 48243

Dear Mr. Redwine:

Re: Class 1 Permit Modification
Former General Motors (GM) Former AGT
Division Surface Impoundment
RCRA Part B Post-Closure Permit
Indianapolis, Indiana
EPA ID# INR 000 021 436

The Indiana Department of Environmental Management (IDEM) acknowledges receipt of the Class 1 Permit Modification dated, January 27, 2010. The purpose of the modification is to document the name change of the responsible party from General Motors Corporation to Motors Liquidation Company. As the result of GM's recent bankruptcy, existing, non-continuing assets remain the property of "old" GM. Subsequently, "old" GM changed its name to Motors Liquidation Company. Pursuant to the Indiana Environmental Statutes (IC 13) and the rules promulgated thereunder and codified in 329 IAC 3.1, the enclosed Class 1 modifications to the state permit conditions of your hazardous waste permit are hereby approved and issued, effective fifteen (15) days from receipt of this notice.

Pursuant to 40 CFR 270.42(a), the permittee must send a notice of the modification to all persons on the facility mailing list and to the local government units. This notification must be made within ninety (90) days after approval of the modification. Within one hundred twenty (120) days of receipt of this letter, you must submit to the IDEM a copy of the notification that was sent to the persons on the facility mailing list.

D.F.

Enclosed are the revised pages of the modified final hazardous waste permit for your facility at the above referenced location. The following sections of the permit have been modified in accordance with 40 CFR 270.42(a):

- Standard Conditions
- General Facility Conditions
- Landfill Conditions
- Groundwater Monitoring Conditions
- Attachment A, Facility Description
- Attachment B, Post Closure Inspection Conditions

- Attachment C, Post Closure Plan Conditions
- Attachment D, Groundwater Monitoring Conditions
- Appendix E, Contingency Plan
- Appendix H, Sampling & Analysis Plan.

Please insert the enclosed revised pages and discard original pages. If you have any questions regarding this matter, please call (800) 451-6027, press 0, and ask for Jennifer Reno at extension 2-3264, or call 317/232-3264.

Sincerely,

Victor P. Windle, Chief
Hazardous Waste Permit Section
Permits Branch
Office of Land Quality

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Enclosure

cc: Marion County Health Department (with enclosure)
Harold Templin (with enclosure)
Steve Sommer (with enclosure)
Shyamala Raman (with enclosure)

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
HAZARDOUS WASTE POST-CLOSURE PERMIT

Name of Permittee: Motors Liquidation Company

Facility Location: 2701 West Raymond Street, Indianapolis, IN

EPA Identification Number: INR000021436

Issuance Date: January 26, 2007

Modified Date: February 19, 2010

Expiration Date: February 16, 2017

Authorized Activities

Pursuant to 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 (hereinafter called the permit) of the Resource Conservation and Recovery Act of 1976 (RCRA) permit are issued to Motors Liquidation Company (hereinafter called the Permittee) to maintain and monitor a closed hazardous waste landfill located at 2701 West Raymond Street, Indianapolis, Indiana, Section 21, Township 15N, Range 3E at latitude 39° 45' 55" N and longitude 086° 12' 50" W, Maywood, 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 surface impoundment which through closure was converted to a landfill. The legal status of the unit thereafter is that of a landfill, however, the past status of the unit may still be referenced for clarity.

The Permittee is required to maintain and monitor the closed landfill 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).

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
- Landfills: 329 IAC 3.1-9, 40 CFR 264 Subpart N
- 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 which are in effect on the date of issuance of this permit. (See 329 IAC 3.1-13; 40 CFR 270.32)

This permit is based on the assumption that the information submitted in the permit application attached to the Permittee's letter dated October 26, 2005, and any subsequent amendments (hereafter referred to as the application) is accurate and that the facility has been or will be constructed and/or operated as specified in the application. 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 Environmental Management (IDEM) of any deviation from, or changes in, the information in the application which 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 fifteen (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 1049, 100 North Senate Avenue, Indianapolis, Indiana 46204, within fifteen (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.

6. Identification of the terms of the permit which, 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 on which the petition is delivered to the Office of Environmental Adjudication, Government Center North, Room 1049, 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

3. the date on which 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 fifteen (15) day period unless or until an Environmental Law Judge stays the permit in whole or in part. This permit shall remain in effect until ten (10) years from the effective 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_____day of February, 2010.

By: _____
Thomas E. Linson, Chief
Permits Branch
Office of Land Quality

Motors Liquidation Company
Indianapolis, Indiana

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I. STANDARD CONDITIONS

A. EFFECT OF PERMIT

The Permittee is authorized to maintain and monitor disposed hazardous waste 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 RCRA Permit generally constitutes compliance for purposes of enforcement, with the Indiana Environmental Management Act and RCRA, as amended by HSWA, except for those requirements not included in the Permit which become effective by statute, or which 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 et. seq.), 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.

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 shall 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 shall take effect. With regard to stayed provisions of the permit, the Permittee shall continue to comply with the related applicable standards and relevant permitted 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 which have not been stayed. 329 IAC 3.1-13; 40 CFR 270.32

D. DUTIES AND REQUIREMENTS

1. Duty to Comply. The Permittee shall comply with all conditions of the RCRA 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 shall submit a complete application for a new permit at least 180 days before this permit expires unless: a) the Permittee no longer wishes to operate a hazardous waste management facility or the Permittee is no longer required to have a RCRA permit, or b) permission for submittal on a later date has been granted by the Commissioner. 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 ten (10) years from the effective 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

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) which 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 facility 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 which 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. Pursuant to 329 IAC 3.1-1-3 and 40 CFR 270.30(i), 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)(l));

   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));

   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, (as referenced in 40 CFR 260.11); Standard Methods for the Examination of Water and Wastewater, (20th Edition, 1998); or an equivalent method as specified in the attached Groundwater Monitoring Plan. 329 IAC 3.1-13-1; 40 CFR 270.30(j)(l)

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 three (3) years from the date of the sample, measurement, report, or record or for a period of time greater than three (3) years as specified elsewhere in this permit. These periods may be extended by request of the Commissioner at any time and are automatically extended during the course of any unresolved enforcement action regarding this facility. 329 IAC 3.1-13-1; 40 CFR 270.30(j)(2) and 40 CFR 264.74(b)

c. Pursuant to 329 IAC 3.1-13; 40 CFR 270.30(j)(3), records of monitoring information shall include:

i. The date(s), exact place, and times of sampling or measurements;

ii. The individual(s) who performed the sampling or measurements;

iii. The date(s) analyses were performed;

iv. The individual(s) and laboratory who performed the analyses;

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; and

vi. The result(s) of such analyses, including QA/QC documentation.

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(1)(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(1)(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; 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, including all applicable corrective action requirements. 329 IAC 3.1-13; 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 which 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; 40 CFR 270.30(1)(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 fourteen (14) days following each schedule date. 329 IAC 3.1-13; 40 CFR 270.30(1)(5)

14. Twenty-four Hour Reporting. The Permittee shall report to the Commissioner any noncompliance with the permit which may endanger health or the environment. Any such information shall be reported orally to the IDEM 24 hour emergency telephone number 317/233-7745, within twenty-four (24) hours from the time the Permittee becomes aware of the circumstances. Pursuant to 329 IAC 3.1-13; 40 CFR 270.30(1)(6), this report shall include the following:

    a. Information concerning the release of any hazardous waste which may endanger public drinking water supplies.

    b. Information concerning the release or discharge of any hazardous waste, or of a fire or explosion at the facility, which 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 five (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 five (5)-day written notice requirement if the Commissioner waives the requirement and the Permittee submits a written report within fifteen (15) days of the time the Permittee becomes aware of the circumstances.

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(1)(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; 40 CFR 270.30(1)(11)

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

Commissioner
Indiana Department of Environmental Management
100 North Senate Avenue
Indianapolis, IN 46204-2241
Attention: Chief, Permits Branch

18. All other requirements contained in RCRA, as amended, and 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 as required by 329 IAC 3.1-13; 40 CFR 270.11.

F. CONFIDENTIAL INFORMATION

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

G. DOCUMENTS TO BE MAINTAINED AT FACILITY SITE

Except as noted in the regulations, the Permittee shall maintain at the facility, until closure is completed and certified by the owner/operator and an independent registered professional engineer, the following documents and amendments, revisions and modifications to these documents:

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

2. Groundwater monitoring data as required by 329 3.1-9, 40 CFR 264.97 and this Permit.

3. Post-Closure Plan as required by 329 IAC 3.1-9, 40 CFR 264.118(c), and this permit.

4. Inspection schedules as required by 329 IAC 3.1-9, 40 CFR 264.15(b)(2), and this permit.

5. Record of facility inspections, as required by 329 IAC 3.1-9, 40 CFR 264.15(b)(2), and this permit. These records must be kept for at least three years from the date of the inspection per 40 CFR 264.15(d).

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, ground water or surface water which could threaten human health or the environment.

B. SECURITY

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

C. GENERAL INSPECTION REQUIREMENTS

The Permittee shall follow the inspection schedule in the Post-Closure Inspection Requirements, Attachment B and Figure 5 which is incorporated herein by reference. The Permittee shall remedy any deterioration or malfunction discovered by an inspection as required by 329 IAC 3.1-9 and 40 CFR 264.15(d).

D. RECORDKEEPING AND REPORTING

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

E. POST-CLOSURE

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

2. Certification of Post-Closure Care No later than sixty (60) days after completion of the established post-closure period for each hazardous waste disposal unit, the Permittee shall submit to the Commissioner, by registered mail, a certification that the post-closure care for the hazardous waste disposal unit was performed in accordance with the specifications of the approved Post-Closure Plan. The certification must be signed by the Permittee and an independent registered professional engineer. Documentation supporting the independent registered professional engineer's certification must be furnished to the Commissioner upon

request until the Commissioner releases the Permittee from the financial assurance requirements for post-closure care under 329 IAC 3.1-15-6.

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 Table 5 and Table 5a.

1. Each year, the post-closure cost estimate and financial assurance mechanism will be updated. The update will take into account the previous year's activities, including one less year of required post-closure care. The revised cost estimate will be documented in the annual report to IDEM and the financial assurance mechanism will reflect the new total.

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

3. The Permittee must keep at the facility the latest post-closure cost estimate as required by 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 pursuant to 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.

III. LANDFILL CONDITIONS

A. WASTE IDENTIFICATION

The surface impoundment previously received water from several sources prior to discharge to Eagle Creek under NPDES Permit No. IN0001813. The surface impoundment is classified as a hazardous waste impoundment due to its use for treatment of the following waste codes.

Waste Code	Description
F007	Spent cyanide plating bath solutions
F009	Spent stripping and cleaning bath solution

Following closure of the surface impoundment the regulatory status of the unit is changed to that of a landfill for permitting purposes.

B. LOCATION INFORMATION

The landfill is located in the area as shown in Figures 1 and 2 incorporated herein by reference.

C. POST-CLOSURE 329 IAC 3.1-9, 40 CFR 264.310

After final closure, the owner or operator must comply with all post-closure requirements contained in 329 IAC 3.1-9 and 40 CFR 264.117 through 40 CFR 264.120, 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 comply with all other applicable requirements of 329 IAC 3.1-9 and 40 CFR 264 Subpart F; and

3. Prevent run-on and run-off from eroding or otherwise damaging the final cover.

IV. GROUND WATER MONITORING CONDITIONS

The monitoring system is based on data gathered during the Comprehensive Hydrogeologic Evaluation of Motors Liquidation Company Landfill presented in Appendix D of this permit. As indicated in this permit, these wells and piezometers are constructed in water bearing aquifer units included in the uppermost aquifer. Since the effective date of the June 29, 2001 Post-Closure Permit, a detection monitoring program has been conducted. Based on the data submitted in Appendix J, Table 1 of this permit, no statistically significant increases in the indicator parameters were observed to trigger a compliance monitoring program.

A. DETERMINATION OF THE TYPE OF MONITORING PROGRAM

1. Pursuant to 40 CFR 270.14(c)(6), the Permittee shall follow the detection monitoring requirements of 40 CFR 264.98 and comply with Attachment D.

2. Pursuant to 40 CFR 270.14(c)(7), the Permittee is not required at this time to establish a compliance monitoring program. Should a compliance monitoring program become necessary, the Permittee will propose a modification of the permit and perform the compliance monitoring program in accordance with 40 CFR 264.99.

3. Pursuant to 40 CFR 270.14(c)(8), the Permittee is not required at this time to establish a corrective action program. Should a corrective action program become necessary, the program will be performed in accordance with 40 CFR 264.100.

B. POINT OF COMPLIANCE

Per the requirements of 40 CFR 264.95, the point of compliance is shown in Figure 17 of this permit. The point of compliance is physically the intragradient cutoff wall described above.

C. DESCRIPTION OF THE WELL LOCATION

As required by 40 CFR 270.14(c)(5) and 264.97(a) and 264.98(b), the Permittee shall include monitoring wells MW-201B, MW-202B, MW-203B, and MW-206B to determine the ground water quality in the detection monitoring program. Additionally, each monitoring well listed in Appendix H, Table 2 of this permit shall be included in the detection monitoring program for the purpose of determining the hydraulic head difference across the slurry wall, direction, and rate of flow in the two unconsolidated aquifer units beneath the landfill. The locations of wells are shown in Figure 17 of this permit.

D. MONITORING WELL INSTALLATION AND CONSTRUCTION

1. As required by 40 CFR 270.14(c)(2), 40 CFR 270.14(c)(6)(B), 40 CFR 264.95(b), 40 CFR 264.97 and 264.98, the Permittee shall install and maintain ground water monitoring wells at the approximate locations shown in Figure 17. Additionally, the approximate screen elevations are listed in Appendix F of this permit.

2. The Permittee shall construct new wells as needed in accordance with Appendix H of this permit. Detailed construction logs for existing wells are shown in Appendix F of this permit.

3. The Permittee shall submit to the department within sixty (60) days of completion of a report of the work for any development or construction on existing wells or replacement wells, including as built well logs and well development data.

E. INDICATOR PARAMETERS

Based on the nature of the waste and the required analytical results under 40 CFR 270.14(c)(5) and 264.98(a) in Tables 1-4 of this permit, selected metals and cyanide have been chosen as indicator chemical parameters.

1. The post-closure monitoring program will include the monitoring of 4 exterior wells for arsenic, barium, cadmium, chromium, lead, mercury, silver, selenium, and cyanide which are considered to be indicative of possible release from the regulated unit.

2. In addition, the post-closure program will obtain hydraulic head measurements at 8-paired wells and 3 wells in the lower sand unit to ensure an inward hydraulic gradient in accordance with Appendix H.

3. The Permittee shall semi-annually collect samples from all monitoring wells listed in Permit Condition IV.C, and analyze for the parameters as described in Appendix H.

4. Results of these analyses and any verification analyses or 40 CFR 264 Appendix IX analyses (including deliverable requirements of Appendix H, Table 1) shall be submitted to the Commissioner within sixty (60) days of receipt of the final laboratory technical 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.

5. Ground water data for laboratory results and field parameters must be submitted as follows:

   a. Two (2) paper copies of a final laboratory report.

   b. An electronic report in a format prescribed in Appendix H, Table 3 and Table 4.

F. SAMPLING AND ANALYSIS PROCEDURES

Ground water elevations and total well depths in the nineteen (19) hydraulic head monitoring wells will be measured semi-annually. Four exterior wells (MW-201B, -202B, -203B, and -206B) will be sampled during each of the semi-annual episodes as described below.

1. Per the requirement of 40 CFR 270.14(c)(5) and 40 CFR 264.97(d), the Permittee shall comply with Appendix H and the modifications therein. This attachment contains the plan for the collection, preservation and shipment of samples. Procedures for analytical methods that are appropriate for ground water sampling and chain-of-custody are described in the sampling and analysis plan in Appendix H.

2. The Permittee shall use the equipment listed in Appendix H, Section 4.2 to collect the samples.

3. The Permittee shall use the preservatives listed in Appendix H, Section 4.2 immediately upon collection of the samples.

4. The Permittee shall use the appropriate analytical methods listed in Appendix H, Section 4.2 or the latest approved edition of SW-846 for all other parameters that may be required by the permit.

G. STATISTICAL PROCEDURES AND DATA EVALUATION PROCEDURES

1. The ground water surface elevations taken at the hydraulic head monitoring wells will be evaluated as described in Appendix H. A report will be submitted by March 1 annually listing the head within the slurry wall, outside the slurry wall, in the lower aquifer unit, and the gallons of water removed by the extraction well system since the last report.

2. As required by 40 CFR 270.14(c)(6), 264.97(g) and 264.98(g), the Permittee shall comply with Attachment D, Section D-4c, of this permit in establishing background by collection of ground water samples from monitoring well MW-206B until the necessary number of background samples are collected for each parameter.

3. The Permittee shall, within sixty (60) days of receiving the final laboratory report of the last background sampling event, submit to the Commissioner a written report that includes the method to be used, the limits, and the data used to establish the limits for each parameter.

4. Based on the percent of non-detect values and distribution of the sample population, the statistical plan for the regulated unit will use a procedure described in Appendix H, Section 4.3. This statistical approach is in accordance with 40 CFR 264.97(h)(3), and meets the latest requirements as specified in RCRA ground water monitoring regulations, IDEM's regulations and the most recent statistical guidance document published by the US EPA in July 1992. The procedure accounts for site-wide false positive and negative rates by considering the total number of statistical comparisons. The tolerance limit procedures account for the total number of monitoring wells in the network. A summary of this procedure is included in Appendix H, Section 4.3.

5. After collecting the necessary independent samples from each well, background statistical tolerance limits for each constituent will be calculated using the initial "background" data collected during the first year. After this period, each analyte for each down gradient well will be individually compared to the statistics calculated for background. Statistical comparisons shall be submitted to the Commissioner within sixty (60) days of the receipt of the final laboratory technical report.

6. The most recent up gradient data shall be incorporated into the initial "background" data for recalculations.

7. If any constituent in any monitoring well exceeds the statistical criteria, the Commissioner will be notified within 7 days that there is a statistically significant increase. The Permittee will immediately (within 14 days of providing notification) resample the well to verify the original analysis of the specified parameter.

8. If upon receipt of the final laboratory technical report from the verification sampling, the analytical result for any particular compliance point monitoring well(s) exceeds the statistical criteria, the Permittee will:

   a. Notify the Commissioner within 7 days that there is a confirmed statistically significant increase;

   b. Immediately (within 30 days), sample all monitoring wells listed in General Facility Permit Condition IV.C for all hazardous constituents listed in Appendix IX except those identified with suggested method 8080 and 8150 (pesticides); and

   c. Within 90 days of receipt of the final laboratory technical report for the sampling required in b. above, submit a permit modification for a compliance monitoring program meeting requirements of 264.99.

9. As required by 40 CFR 98(h), if the Permittee or the Commissioner determines that the detection 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.

Attachment A

Facility Description

A-1 General Description

The Motors Liquidation Company surface impoundment (Site) is located in the southwestern portion of Indianapolis, Indiana in the NW 1/4 of Section 21, TI5N, R3E, Marion County (Figure 1). The site is located within the boundaries of the Rolls-Royce Corporation Plant 5. The Rolls Royce Plant 5 is located in a heavily industrialized area and is primarily engaged in the manufacture and testing of gas turbine engines and diesel engine components. Manufacturing processes include plating, etching, anodizing, photo etching, machining, polishing and degreasing. These processes generate spent degreasers, spent acid and caustic solutions, spent chromic acid solution, spent cyanide solutions and plating bath sludges, waste oils and process wastewaters.

The former surface impoundment covers approximately 8 acres, as depicted in Figure 2. The surface impoundment previously received water from several sources prior to discharging to Eagle Creek under NPDES Permit Number IN000I813. Influents to the surface impoundment during its over 40 years of operation included precipitation run-off, boiler blowdown water, water softener rinsewater, ash quenching water, non-contact cooling water, and effluent from the WWTP. IDEM determined that the surface impoundment was used to treat F007 and F009 waste resulting in the impoundment being classified as a hazardous waste impoundment. Tables 1 through 4 provide sediment samples characterizing the waste at the Site. Additionally, Table 1 attached in Appendix J provides groundwater analytical results from 2002 to 2005 characterizing groundwater quality.

A Closure Plan, dated August 23, 1991, was prepared for the surface impoundment and approved by IDEM in 1992. The Closure Plan included: a soil-bentonite cutoff wall located around the perimeter of the impoundment and keyed into an underlying fine-grained layer; solidified sediment by mixing with a cement-fly ash grout; a composite cap system including a soil barrier and PVC liner; a groundwater control system to ensure an inward hydraulic gradient; and routine monitoring and inspection during both closure and post closure periods. The Closure Plan was later modified and approved by IDEM to include solidified sediment by consolidation surcharge instead of the cement-fly ash grout mixture.

Construction commenced in September 1992 with the soil-bentonite cutoff wall installation. The cutoff wall installation was completed in November 1992. The consolidation surcharge was constructed between April 1993 and November 1993. The composite cap and groundwater control network were completed between May 1994 and November 1994.

A Certification of Closure Report, dated September 15, 1995, was prepared and submitted to IDEM. The Certification of Closure Report included the Certification of Closure, and summaries of the results of quality control/quality assurance (QA/QC) testing and observations made during construction of the soil bentonite cutoff wall, consolidation surcharge, composite cap and groundwater control system at the Site. IDEM reviewed the Certification of Closure Report and

sent GM a Notice of Deficiency in a letter dated April 18, 1996. An amendment to the Certification of Closure report responding to the noted deficiencies was submitted to the IDEM on May 30, 1996. The Certification of Closure was accepted by the IDEM and the total closure was considered complete as described in IDEM's March 4, 1997 letter. Based on a September 16, 1997, letter from Mr. Victor P. Windle, Chief, Hazardous Waste Permit Section, the 30-year post-closure care period began on June 4, 1996.

On or about December 1, 1993, General Motors Corporation sold Plant # 5 (i.e., the Rolls-Royce Plant), including the surface impoundment, to AEC Acquisitions Corporation. Pursuant to terms of the sales agreement, GM was to maintain responsibility for post-closure care of the surface impoundment.

AEC Acquisitions Corporation has since sold Plant # 5 (including the former surface impoundment) to Rolls-Royce Corporation. To more effectively fulfill its obligation for post-closure care of the closed surface impoundment, GM purchased the property encompassing the former surface impoundment area from Rolls-Royce. As a result of GM's bankruptcy, the operating assets of GM were sold on July 10, 2009 to a newly formed company, known as General Motors Company. Existing, non-continuing assets (including the surface impoundment) will remain the property of "old" GM, which changed its name to Motors Liquidation Company (MLC), in its capacity as a debtor-in-possession in the bankruptcy case.

MLC is therefore, the current land owner of the Site. The Site is limited to the approximately 10 acre parcel as illustrated and described in Figure 3 and Appendix C. The Site address is 2701 West Raymond Street, and the ID number is INR000021436.

A-2 Topographic Maps

Topographic maps containing the information specified in 40 CFR 270.14 are included as Figures 3 and 3a. Due to the size of the Site, Figure 3c was prepared to show Site features and surrounding land use.

A-3 Floodplain Standard

The Site is not within the 100-year floodplain, as defined by the Federal Emergency Management Agency. Refer to Figure 4 for the Site location with respect to the 100-year floodplain.

A-4 Post-Closure Notices

GM submitted to the City of Indianapolis, Department of Metropolitan Development, and the Commissioner (via Mr. Victor P. Windle, Chief, Hazardous Waste Permit Section), a survey plat, prepared and certified by a registered land surveyor, indicating the location and dimensions of the closed surface impoundment unit with respect to permanently surveyed benchmarks. A note, which was prominently displayed on the survey plat, states GM's obligation to restrict disturbance of the closed unit. A record of the type, location and quantity of hazardous wastes remaining in the closed

surface impoundment unit was also included in the same submittal. A copy of the notice to the local authorities is attached in Appendix A.

GM recorded an environmental disclosure with the Marion County Recorder's Office on May 7, 1997. The disclosure includes the following notations:

1. The land has been used to manage hazardous wastes and the legal description of the surface impoundment;

2. Its use is restricted under 40 CPR 264 Subpart G regulations; and,

3. The survey plat, and characterization, location and quantity of the hazardous wastes remaining in the closed surface impoundment unit have been filed with the Division of Permits, Department of Metropolitan Development, City of Indianapolis and with the Commissioner.

A copy of the environmental disclosure is also attached in Appendix A. GM also submitted a certification to the Commissioner on May 19, 1997 that the notation specified above had been recorded (Appendix A). A copy of the document in which the notation has been placed was submitted with the certification. GM certified the environmental disclosure in the original post-closure permit application submitted for this Site.

Attachment B

Post Closure Inspection Requirements

B-1 Written Inspection Plan

To ensure adequate performance of the final cover, security control, run-on/run-off control, the groundwater control system and the groundwater hydraulic monitoring system, MLC will conduct periodic inspections throughout the remainder of the post-closure care period. The inspection procedures are presented on the inspection checklists (Figure 5) and are described in the following sections. Inspections were performed monthly from December 1994 to September 1998. Inspections after September 1998 have been performed approximately at least every 90 days; therefore, future inspections will be performed approximately at least every 90 days. This inspection frequency is adequate given the nature of the wastes in the impoundment, closure methods, Site features, and experience. Inspections will be performed by a MLC representative familiar with the inspection procedure. Individuals performing post-closure inspections will be properly trained according to applicable RCRA and OSHA training requirements. Copies of this post-closure permit and inspection checklists will be maintained in cabinets in the Rolls-Royce Environmental Department's office as the Site is not active or manned and does not have a building with a controlled environment. The documents will be maintained throughout the post-closure period. The following items will be checked at each inspection.

B-1a Security Control Devices

The impoundment is located adjacent to industrial property and is surrounded by a six foot high chainlink security fence (no barbed wire will be on top of the fencing) (Figure 3c). The post-closure inspections will be conducted quarterly and will only pertain to that fencing that directly encloses the closed unit. Additional fencing will be installed, if required, to ensure that unauthorized personnel cannot gain access to the Site. Periodic inspections will consist of checking for storm damage, vandalism and deterioration. In addition, warning signs will be inspected to verify they are still hanging properly on the fence and are readable from a distance of at least 25 feet from the sign. Repairs to the fence or warning signs will be performed within 3 months of discovery. Any damage or deterioration that would allow unauthorized access will be corrected immediately.

B-1b Erosion Damage

The area with final cover and extending to the center line of the perimeter drainage ditch will be visually inspected quarterly. Erosion gullies exceeding 3 inches in depth will be marked and repaired when appropriate weather conditions occur (generally the spring or fall of the year).

B-1c Cover Settlement, Subsidence and Displacement

A series of 8 settlement monuments have been installed in the final cover system. The monuments were surveyed semi-annually for the first 3 plus years of post-closure (through November 1999) and will be surveyed annually thereafter. If settlement is noted during the visual inspection (quarterly) the markers will be surveyed as soon as possible following the inspection to measure the amount of settlement. If the benchmarks are damaged, the benchmark will be replaced and resurveyed within 3 months and as weather permits. Any subsidence/settlement observed will be corrected during appropriate weather conditions in the spring or fall of the year.

B-1d Vegetative Cover Condition

The cover system will be inspected quarterly for bare areas and quality of vegetation. Problem areas will be noted on the inspection checklist and accompanying figure. If overall growth of vegetation is poor, soil samples may be obtained and analyzed to assess appropriate applications of lime and fertilizer. If fertilizer is needed, the composition will be adjusted according to the sample results. Reseeding and/or fertilizing of bare areas will be performed during appropriate weather conditions either in the spring or fall of the year.

B-1e Integrity of the Run-on and Run-off Control Measures

The two culverts that drain run-off from the perimeter ditch will be visually inspected quarterly to look for obstructions. In addition, the perimeter ditch will be visually inspected quarterly to look for areas where water could potentially pond. Any hindrances to flow in the drainage culverts or perimeter ditch will be removed during appropriate weather conditions.

B-1f Cover Drainage System Function

Discharge points of the cover drainage system will be inspected quarterly for obstructions. Obstructions will be removed during the inspection if possible, or within 3 months of discovery.

B-1g Gas Venting Systems

The gas venting system will be inspected quarterly for obstructions. Obstructions will be removed during the inspection if possible, or within 3 months of discovery.

B-1h Integrity of the Cutoff Wall

The integrity of the cut-off wall is observed through evaluation of the groundwater level measurements that are collected semi-annually (See Attachment C-4b(2) and Appendix H). The water level data is evaluated semi-annually to determine the elevation of the groundwater level inside the cut-off wall relative to the elevation of the groundwater in monitoring wells outside of the cut-off wall and the rate at which the water levels inside the cut-off wall are increasing. The

rise rate is calculated (feet/day) be taking the change in groundwater elevation from any individual well from two different sampling periods divided by time (days). Any trend in the rates over time can be observed by comparing rates from different time periods. Attachment C-4b(2) of this Permit includes this process.

If groundwater level rates increase over a short time period the integrity of the cut-off wall may be compromised. Therefore, necessary corrective actions will be evaluated. The Post-Closure Care cost estimate (Table 5) provides the cost estimate to repair 10% of the total 2,219 lineal feet of the cut-off wall.

B-1i Well Condition

Protective casings, locks, and concrete surface pads will be inspected quarterly for integrity, tampering and erosion of soil from around the pad. Well numbers must be visible on the protective casings. Repairs to the casings, pads, or well number will be performed within 3 months of discovery. Additionally, the monitoring wells will be gauged during the semi-annual groundwater sampling events to evaluate the degree of siltation in the monitoring wells. The monitoring wells will be redeveloped within 3 months of discovery if greater than one foot of siltation is noted in the well (i.e. the total depth of the well is measured to be less than the total depth indicated on the revised monitoring well construction diagrams by one foot or more) (Appendix H). The monitoring wells from which samples are collected will be abandoned and replaced within 3 months of discovery if over 50% of the screened interval is filled with silt during the first monitoring event following redevelopment. Redevelopment procedures are described in Appendix H. Monitoring wells only used for hydraulic monitoring purposes will be evaluated to determine if replacement is necessary.

B-1j Extraction Well System

The extraction well system control box will be visually inspected on a quarterly frequency to determine if the control panel is properly functioning. In addition, each extraction well will be turned on at a frequency of at least yearly to verify that each well is functioning properly and inspected to ensure the integrity is adequate of covers of the concrete vaults housing the extraction wells (checked every 90 days). Any repairs to the extraction well system will be performed within 3 months of discovery that a repair is needed.

B-2 Inspection Remedial Actions

Remedial actions that may be required as a result of inspections are identified in Attachment B-1.

In the event that post-closure care remedial actions are necessary on the cover of the impoundment, a culvert and earthen drive to provide for access over the perimeter ditch to the top of the impoundment may be constructed in the northeast portion of the impoundment (Figure 3c). The culvert will allow for continued drainage of runoff through the perimeter ditch. The drive will

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rise rate is calculated (feet/day) be taking the change in groundwater elevation from any individual well from two different sampling periods divided by time (days). Any trend in the rates over time can be observed by comparing rates from different time periods. Attachment C-4b(2) of this Permit includes this process.

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Remedial actions that may be required as a result of inspections are identified in Attachment B-1.

In the event that post-closure care remedial actions are necessary on the cover of the impoundment, a culvert and earthen drive to provide for access over the perimeter ditch to the top of the impoundment may be constructed in the northeast portion of the impoundment (Figure 3c). The culvert will allow for continued drainage of runoff through the perimeter ditch. The drive will

provide access for maintenance vehicles to the cap area and minimize damage to the drainage ditch and vegetative cover.

B-3 Inspection Log

Notes will be made of all observations and measurements on inspection checklists and approximately located on a figure of the surface impoundment (Figure 5). Inspection checklists will be maintained by MLC at the adjacent Rolls-Royce Environmental Department's Office for review during the post-closure care period. These records will include the date and time of inspection, name of the inspector, a notation of the observations made. Where repair is needed, a brief description of the work required will be included on the inspection form. As work is completed, a memorandum will be placed in a maintenance file and maintained with the post-closure care records.

Attachment C

Post Closure Plan

The following is the post-closure plan for the former surface impoundment area. The post-closure plan is based on the post closure permit previously approved by IDEM. Based on a September 16, 1997, letter from Mr. Victor P. Windle, Chief, Hazardous Waste Permit Section, the 30-year post-closure care period began on June 4, 1996.

C-1 Post Closure Contact

MLC (or its' designated representative) should be contacted if there are any questions concerning this project. The Vice President and Project Manager for this project are:

James M. Redwine, Vice President, Environmental
Motors Liquidation Company
500 Renaissance Drive, Suite 1400
Detroit, MI 48243
Atten: James M. Redwine
Telephone: 214-906-2146
jredwine@alixpartners.com

David M. Favero, Project Manager
Favero Geosciences
1210 South 5th Street
Springfield, Illinois 62703
Telephone: (217) 522-6714
dfavero@ameritech.net

C-2 Post-Closure Security

A 6 foot tall chain-linked fence will surround the entire cap area. There are access gates in the northeast, northwest, and southwest corners of the fence which are kept locked at all times except during maintenance and monitoring activities. The fence location is shown in Figure 3c. Warning signs marked "DANGER UNAUTHORIZED PERSONNEL KEEP OUT", "DO NOT ENTER AUTHORIZED PERSONNEL ONLY" or similar language to indicate only authorized personnel are allowed to enter the area are posted on each of the gates and around the perimeter of the fence. The gates are each padlocked such that only MLC, the Security Personnel at Rolls-Royce, and certain firms retained by MLC to perform post-closure care, have keys with which to enter the area. The potential for human contact with the sediment is also minimized due to the composite cap construction.

C-3 Request for Waiver of Preparedness and Prevention Requirements

The Site is an unmanned grass-covered field in which no hazardous wastes are stored; therefore, an alarm system is not necessary. Therefore, a partial waiver is requested to eliminate the need for an alarm system at the Site. The inspector or anyone completing work at the Site will carry a cell phone for communication purposes. Additionally, a fire extinguisher is housed inside the two buildings located on Site.

The Contingency Plan for the Site is attached in Appendix E.

C-4 Landfill Maintenance Plan

C-4a List of Wastes

A list of the various influent liquids that the surface impoundment formerly received while it was in operation is included in Section A1 General Description. The EP toxicity and total constituent analyses from the sediment sampling are included as Tables 1 through 4. IDEM determined that the unit was used to treat F007 and F009 waste, therefore IDEM classified the Site as a hazardous waste impoundment.

C-4b Liner and Cap System Description

C-4b(1) Liner System Foundation Description

The impoundment does not have a synthetic liner on the bottom or sides of the impoundment. However, the former surface impoundment is considered to be contained by the following: a soil bentonite cut-off wall around its perimeter; natural clay underlying the former surface impoundment area; and, a composite cap system.

A soil-bentonite cutoff wall was constructed around the perimeter of the surface impoundment and keyed into the underlying clay layer. Based on the geotechnical studies during the development of the Closure Plan, the clay layer is reported (Geraghty and Miller, 1991; refer to Appendix D) to have a hydraulic conductivity of 6.1×10^{-7} centimeters per second (cm/s). Based on the construction quality control/quality assurance (QC/QA) testing, the soil-bentonite cutoff wall is estimated to have an average hydraulic conductivity of approximately 2×10^{-8} cm/s. Bentonite powder used in the construction of the cutoff wall consisted of Federal Jel 90, manufactured by M-I Drilling Fluids Company of Houston, Texas. The cutoff wall is a linear distance of 2,219 feet, a total of 3 feet wide and is keyed into the underlying clay at approximately 55 feet below ground surface. The perimeter of the cutoff wall is shown on Figure 3. A cross-section reference sheet and a cross-section of the cutoff wall are provided as Figures 5a and 5b, respectively.

The cap system, from top to bottom, is as follows: 3.5 feet of vegetative cover and topsoil; geotextile filter; geonet; 40-mil PVC liner; and either 2 foot soil barrier with hydraulic conductivity less than 1 X 10^{-6} cm/s (United Soil Classification System (USCS) code of 'CL' representing a sandy silty clay) or geosynthetic clay liner (GCL). The geotextile filter and geonet were manufactured by the National Seal Company. The geotextile filter is 0.24 inches thick. The geonet is a 'poly-net 2000/3000' and is 0.16/0.2 inches thick. The 40-mil PVC liner was manufactured by Nan Ya Plastics Corporation of America and is 1.238 millimeters thick.

The final contours of the cap are shown in Figure 6. Figure 7 displays the area of the cap in which the GCL was installed. A cross-section of the final cover system is included in Figure 8. The GCL was used over approximately 10% of the Site, which may not have contained an adequate 2 foot barrier soil.

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

Nine groundwater extraction wells are located inside the perimeter of the cap area, and 16 hydraulic head monitoring wells are located in pairs on the inside and outside of the cutoff wall (Figures 17 and 18). Construction details for monitoring and extraction wells located inside the cutoff wall are found in Appendix F. Figure 2 shows the transmission piping from the extraction wells to the discharge building. In addition, 3 monitoring wells were installed outside of the containment area into the lower aquifer. The groundwater extraction system, hydraulic monitoring systems, and cut-off wall substitute for the leachate collection system. Refer to Figure 2 and Figure 3c for locations of the extraction wells and hydraulic head monitoring wells.

A temporary groundwater extraction system of 6 extraction wells was installed in June 1993, during the consolidation surcharge construction. This temporary system was operated until the end of June 1994, when it was taken out of service to begin construction of the permanent system of 9 extraction wells within the cut-off wall. Once the temporary system was taken out of service, the groundwater elevations in the perimeter paired monitoring wells were measured approximately weekly to monitor the performance of the cut-off wall and soil barrier. Figures 9 through 16 plot the groundwater levels for each pair or pairs of monitoring wells with respect to time. In the figures, "A" represents the interior monitoring well, "B" represents exterior monitoring wells and "C" represents the lower aquifer monitoring wells. As can be seen in the attached figures, the recovery in the interior monitoring wells was slow, and inward hydraulic head differences of 8 to 12 feet were maintained across the cutoff wall without any groundwater being removed from the containment area, and without the PVC liner installed over the soil barrier.

In November 1994, the permanent groundwater extraction system was placed into service. Historical groundwater elevation data from 1985 to 1990 from within the cap area was reviewed to estimate the range of local groundwater fluctuations. Groundwater levels in the upper aquifer in this area during that period were measured between elevations 659 and 670. During the 1980's, groundwater withdrawal at the Site for operational use was higher than its current rate, thus causing the water table to be lower than its current levels. Because of the ranges of groundwater elevations observed between 1985 to 1990, a groundwater elevation of 663 feet was originally

established as the elevation at which extraction well pumps would be started. However, more recent groundwater monitoring data suggests that the groundwater potentiometric level in the lower sand and gravel unit is approximately at an elevation of 666 to 670 feet and that the rate of rise in the containment area is very slow (0.003 feet per day). Table 3 attached in Appendix J provides the historical and current groundwater elevation data and the calculated rise rate for November 2005. Based on the very slow water level rise rate observed in the interior of the containment area, semi-annual monitoring of hydraulic head will provide ample time to commence pumping if necessary to maintain the prescribed head differential. Therefore, extraction wells will be manually turned on when groundwater elevations in one or more of the "A" series interior wells reach an elevation within 1 foot of the groundwater elevation observed in either aquifer (B and C series monitoring wells).

The nine extraction pumps are normally in the 'off' position and may be manually turned on when the control button is moved to the 'hand' position. Generally, one or more extraction wells are turned on so that the pumping rate does not exceed the current discharge limit of 200 gallons per minute (all 9 wells are generally not activated at one time). Each extraction well pumps groundwater at approximately 25 gallons per minute (gpm). Pumping approximately 800,000 gallons of groundwater from the interior of the slurry wall lowers the water level in the interior of the slurry wall by about one foot. Therefore, in order to lower the water level in the interior of the slurry wall by 1 foot using one extraction well, it is estimated to take 22 days. The extraction wells are operated until they lower the groundwater level within the slurry wall to approximately 2 to 3 feet below the initial level. Because the recovery rates are low (0.003 feet per day), the extraction wells have been pumped every 2 or 3 years. The total amount of liquid pumped from the extraction wells is measured by a flow meter/totalizer located in the discharge building. The extracted groundwater is transmitted from the discharge building to the sanitary sewer line along Raymond Street. Upon completion of pumping, the extraction wells are manually returned to the 'off' position. The amount of liquid pumped and the total time (in days) pumped is recorded and provided in an annual report to IDEM submitted by March 1 of every year. The total flow is submitted to the City according to the requirements of the Industrial Waste Discharge Permit (Appendix G).

The inward hydraulic gradient is demonstrated by measuring groundwater elevations in monitoring wells installed within and outside the cut-off wall perimeter, and the upward hydraulic gradient is demonstrated by measuring groundwater elevations in monitoring wells installed in the lower aquifer. This will ensure that groundwater flow direction will be into the waste material, and prevent any release of waste constituents into the groundwater outside the cutoff wall. The groundwater elevations in the hydraulic head monitoring wells will be measured semi-annually to verify the inward hydraulic gradient and to allow for calculation of the rise rate of the groundwater inside the cut-off wall. The conceptual groundwater control and hydraulic monitoring system showing groundwater elevations in the two sand and gravel units, as well as inside the surface impoundment from November 2005 is attached as Appendix J.

For the post-closure care period, the groundwater monitoring will include the hydraulic head monitoring at 8-paired wells and 3 wells in the lower sand unit.

C-5 Post-Closure Cost Estimate

The costs for annual post-closure care of the closed surface impoundment unit are itemized in Table 5 and Table 5a. The total estimated cost for annual post-closure care (monitoring and maintenance) are in accordance with the applicable post-closure requirements, and based on recent experience at the Site, is $49,100 (2006 dollars). The total post-closure cost estimate has been calculated by multiplying the annual post-closure cost by the number of years of post-closure care. Based on the September 16, 1997 letter from Mr. Victor P. Windle, Chief, Hazardous Waste Permit Section, post-closure care began on June 4, 1996. Therefore, as of December 31, 2006, the current post-closure care estimate is $967,379 with approximately 19.5 years remaining in the post-closure maintenance period. The annual post-closure cost was estimated based on the costs to MLC of hiring a third party to conduct post-closure activities. The post-closure monitoring and maintenance activities are detailed in Table 5 and summarized as follows:

1. Semi-annual groundwater monitoring, data evaluation, and annual report (2 events/year);
2. Replace (3,000 ft) security fence (1 event per 15 years);
3. Pump and discharge to sanitary sewer of 1.6 million gallons of interior ground water (1 event/ 2 year);
4. Replace soil, seed and fertilize soil (10,000 sqft);
5. Vegetative maintenance: mowing (6 events/year);
6. Groundwater monitoring well maintenance (1 event/ year);
7. Replace groundwater monitoring wells (1 event/30 years);
8. Routine inspections (4 events/year);
9. Cut-off Wall Inspection (Groundwater level measurements and data evaluation) (2 events/ year);
10. Surveying of settlement monuments (1 event/year);
11. Redevelop groundwater extraction wells (1 event per 30 years);
12. Replace groundwater extraction pump (1 event/10 years);
13. Administrative (40 hours/year);
14. Install access culvert (1 event/30 years); and,
15. Soil bentonite cut-off wall (replace approximately 220 linear feet (10% of 2,219 linear fee), 3 feet wide and 55 feet deep (1 event/30 years).

Table 5a provides a detailed cost breakdown of the following items:

1. Semi-annual groundwater monitoring, data evaluation, semi-annual report documenting groundwater quality (2 events/year) and annual report documenting the inward hydraulic gradient (1 event/year);
2. Groundwater monitoring well maintenance (1 event/ year);
3. Redevelop groundwater extraction wells (1 event per 30 years); and,
4. Replace groundwater extraction pump (1 event/10 years).

MLC will keep the latest post-closure care cost estimate, or revised post-closure care cost estimate, on file at the Rolls-Royce Environmental Department's Office during the post-closure care period for the Site.

MLC is using a performance bond for the purpose of establishing the post-closure financial assurance, during the post-closure period. Each year, the post-closure cost estimate and financial assurance mechanism will be updated. The update will take into account the previous year's activities, including one less year of required post-closure care. The revised cost estimate will be documented in the annual report to IDEM and the financial mechanism will reflect the new total. During the post-closure care period of the Site, MLC will revise the post-closure cost estimate no later than 90 days after a revision has been made to the post-closure plan that increases the cost of post-closure care. MLC will keep the revised post-closure cost estimate in the Rolls-Royce Environmental Department's Office during the post-closure period.

C-6 Financial Assurance for Post-Closure Care

C-6b Performance Bond

C-6b(1) Performance Bond Guaranteeing Payment into a Post-Closure Trust

MLC has provided a detailed written estimate of the annual cost of post-closure monitoring and maintenance of the closed surface impoundment. MLC has established financial assurance for both post-closure monitoring and maintenance for the Site. The performance bond is included in Appendix B.

Attachment D

Groundwater Monitoring

D-1 Interim Status Period Groundwater Monitoring Data

This section is not applicable at this time.

D-2 Aquifer Identification

The surface impoundment was constructed in a glacial-outwash deposit within the White River Valley. The White River is located one mile southeast of the surface impoundment unit. Eagle Creek, a tributary of the White River, is located one-half mile east of the impoundment. Eagle Creek flows in a southerly direction. Numerous ponds are located north and south of the surface impoundment. These ponds are remnants of sand and gravel quarries within the glacial-outwash deposit. The land surface immediately surrounding the impoundment gently rises from east to west with elevations ranging from 685 to 690 feet, MSL.

A soil boring program was implemented in 1985 to obtain data for use in the design of the groundwater monitoring network and the design and construction of the cutoff wall around the surface impoundment unit. Appendix D contains the Geraghty & Miller's *Hydrogeological, Geophysical, and Geotechnical Investigation of the Area Around Retention Basins #1 and #2*, dated August 1991. Geraghty & Miller reported that an upper sand and gravel unit extends from a few feet below ground surface to a depth of approximately 50 to 55 feet below ground surface (bgs). Geraghty & Miller performed a falling head slug test on March 22, 1993. The data collected was analyzed using the Bower and Rice method. Based on the analysis, the average hydraulic conductivity of the upper aquifer was 160 ft/day. Slug tests, however, tend to under predict the hydraulic conductivity, because of well inefficiency. Based on the available data, ARCADIS Geraghty & Miller estimates the hydraulic conductivity of the upper aquifer beneath the Site is approximately 300 ft/day. Meyer et al., 1975 estimates the hydraulic conductivity values to range from 100-200 ft/day within the vicinity of the impoundment. The effective porosity of the upper sand and gravel aquifer was assumed to be 0.375.

The principal clay layer was encountered from approximately 50 to 55 feet bgs to approximately 70 feet bgs. The hydraulic conductivity values ranged from 5.5×10^{-7} cm/sec to 1.8×10^{-8} cm/sec (Appendix D). A clay lens was also encountered from approximately 31 to 40 feet bgs southeast of the surface impoundment, and south of the concrete retention basin #2 (Appendix D).

A lower sand and gravel unit (including silty-clayey sand and gravel with shale fragments) was encountered from approximately 65 or 70 feet bgs to approximately 105 feet bgs. Reported hydraulic conductivities for the lower sand and gravel aquifer range from 200 to 390 feet/day (Meyer et al., 1975). The effective porosity of the lower sand and gravel aquifer was assumed to

be 0.35. Competent bedrock was encountered at approximately 115 bgs. A geologic cross-section is included as Figure 5a of Appendix D.

Based on static water-level measurements recorded outside the surface impoundment in November 2005, groundwater flow in the upper aquifer outside of the slurry wall flows from the west to the east with an estimated hydraulic gradient of 0.0054 (MW-208B and MW-201B) directly north of the surface impoundment. The piezometric surface in the lower aquifer generally is to the north to northeast (Appendix J). The piezometric surface in the lower aquifer is likely influenced by the pumping rates of two nearby production wells used to supply water for Rolls-Royce's operations. The hydraulic gradient of the lower aquifer, based on data collected from the monitoring wells installed in the lower aquifer, is estimated to be 0.004 (MW-202C and MW-203C). The historical and current groundwater elevation data is included as Table 2 in Appendix J.

D-3 Contaminant Plume Description

Background groundwater monitoring was completed for the surface impoundment in 1986. As described in the Closure Plan, no statistically significant increases in the indicator parameters were observed to trigger a compliance monitoring program. For the five year period before the construction of the cutoff wall, GM conducted groundwater quality monitoring around the surface impoundment unit. This monitoring system consisted of five well nests that were screened at depths that permitted monitoring of the top and base of the upper sand and gravel aquifer. The well nests were positioned around the surface impoundment such that two nests were hydraulically upgradient, two nests were downgradient, and one nest was cross-gradient to the regulated unit. These five well nests were abandoned prior to the construction of the cutoff wall.

As stated in Section C-4b, the sediment within the surface impoundment is encapsulated/contained from the environment via the soil barrier and composite cap, the soil-bentonite cut-off wall, and the clay layer separating the upper sand unit and lower sand unit. The surface impoundment was closed in a manner resulting in a low potential for the migration of hazardous waste constituents via the uppermost aquifer to water supply wells or surface water bodies. The integrated engineering control system installed makes use of traditional groundwater monitoring system components for monitoring groundwater hydraulic heads.

D-4 Detection Monitoring Program

Four of the exterior monitoring wells (one upgradient and three downgradient) will be sampled during each of the semi-annual monitoring events. These samples will be analyzed for the constituents identified below in accordance with the Sampling and Analysis Plan provided in Appendix H.

D-4a Indicator Parameters

Based on the nature of the waste and the historic groundwater monitoring results, selected metals and cyanide have been chosen as indicator chemical parameters. Therefore, the post-closure monitoring program will include monitoring of four exterior wells for arsenic, barium, cadmium, chromium, lead, mercury, silver, selenium and cyanide.

D-4a(1) Hazardous Waste Characterization

Summaries of the analytical results from the 1984 EP toxicity; May, 1985 EP toxicity; May, 1985 total constituents; and the 1987 total constituents analyses on the surface impoundment sediments are shown in Table 1 through Table 4. IDEM determined that the impoundment was used to treat F007 and F009 waste and IDEM classified it as a hazardous waste impoundment.

D-4a(2) Behavior of Constituents

Due to the inward hydraulic gradient that will be maintained throughout post-closure, the constituents are not expected to be mobilized and leave the area capped and surrounded by a slurry wall. Also, the sediments were significantly dewatered during the surcharge construction. The waste types, metals and cyanide, are persistent but are generally not very mobile in groundwater. These constituents are not expected to be of concern since the waste has been deposited in its location for numerous years and there were no statistically significant increases in constituent concentrations in groundwater detected during the interim status detection monitoring period. Further, the waste will remain encapsulated in that location with a very low probability of migration out of the contained impoundment area.

D-4a(3) Detectability

The chemical constituents listed above are easily detected in groundwater at levels below concentrations of concern using standard analytical methods. The estimated quantitation limits (EQLs) for each of the chemical constituents listed above are found in Appendix H.

D-4b Groundwater Monitoring Program

The groundwater elevations and total well depths in the hydraulic head monitoring wells will be measured semi-annually. Four exterior wells (MW-201B, -202B, -203B, and -206B) will be sampled during each of the semiannual episodes as described in the Sampling and Analysis Plan (Appendix H). A report documenting the inward hydraulic gradient and groundwater quality will be sent annually to IDEM and a report on the ground water quality will be sent semi-annually to IDEM.

D-4b(1) Description of Wells

A monitoring well construction report, including the monitoring well number, coordinate location, total depth, screened interval, and well construction materials is included in Appendix F.

D-4b(2) Representative Samples

The sampling and analytical methods selected for this monitoring program have been chosen to ensure that representative samples are collected of the exterior groundwater. The Sampling and Analysis Plan is included as Appendix H.

D-4b(3) Locations of Background Monitoring Wells That Are Not Upgradient

Since the sediment in the surface impoundment is contained by the soil barrier, composite cap, the perimeter soil-bentonite cutoff wall, and the maintained inward hydraulic gradient, all of the exterior wells are essentially upgradient of the waste. Regionally, monitoring well 206B has been selected to represent upgradient. Therefore, no additional background monitoring wells are installed or necessary.

D-4c Background Values

Background groundwater quality values for the indicator parameters are included in Appendix I and J. However, additional independent background samples will be collected from MW-206B and background water quality will be calculated as described below.

D-4c(1) Data Currently Available

Monitoring well MW-206B (background location) was sampled monthly for four consecutive months in accordance with procedures described in the Sampling and Analysis Plan approved in 2001. Additionally, monitoring well MW-206B has been monitored semi-annually since the start of the post-closure care groundwater monitoring program (2002 to 2005) in accordance with procedures described in the approved Sampling and Analysis Plan. The data obtained from this monitoring will be used to calculate the upgradient/background values for the indicator parameters.

D-4c(1)(a) Background Groundwater Quality Data

Background groundwater samples were collected from the background monitoring well, MW-206B, between August and November 2001. Based on the analysis of these samples, background concentrations and the statistical analysis for the monitored constituents were calculated and are summarized in a letter to IDEM dated March 12, 2002 (Appendix I). Additionally, Appendix I includes a letter from the laboratory summarizing the reevaluation of the EQLs (included as Attachment A to Appendix I) and a table summarizing the revised reporting limits (included as Table 2 in Appendix I). However, the background groundwater quality will be recalculated after sixteen independent samples are collected and analyzed from

the background well. One background sample is collected from the designated background monitoring well semi-annually and is summarized in the Annual Monitoring Report (Table 1 in Appendix J). A summary of the historical Site groundwater elevation data is included in Table 7. Sample locations are show on Figure 17.

D-4c(1)(b) Sampling Frequency

One groundwater sample will be collected semi-annually from the background monitoring well and will be analyzed for the specified analytes for use in the background calculations. A summary of the background groundwater quality data is included in Appendix I and J.

D-4c(1)(c) Sampling Quantity

One sample will be collected semi-annually from the background monitoring well. Sample quantities needed for analysis of each indicator parameter is specified in the Appendix H.

D-4c(1)(d) Background Values

Upon completion of obtaining the required sixteen independent background samples from MW-206B, a report will be submitted to IDEM to show that the background values for each monitoring parameter or constituent are expressed in the form necessary to determine statistically significant increases. The statistical approach to establishing background values is included in Attachment D-4d(7)(a) and Appendix H. Background values will be updated semi-annually after each sampling event if appropriate, as specified in the approved statistical procedures.

D-4c(2) Plan for Establishing Groundwater Quality Data

The following procedures will be used to establish water quality at the Site.

D-4d Sampling, Analysis and Statistical Procedures

Groundwater quality exterior to the containment area will be monitored semi-annually. Four of the exterior monitoring wells will be sampled during each of the semi-annual monitoring episodes.

D-4d(1) Sample Collection

The groundwater elevations in the hydraulic head monitoring wells will be measured using an electronic water level indicator. The water level indicator will be graduated with 0.01-foot markings and calibrated according to manufacturer's specifications. The probe will be rinsed with distilled water after each measurement. After obtaining groundwater elevation measurements, four wells will be sampled via low-flow/low-stress sampling procedures specified in the Sampling and Analysis Plan provided in Appendix H.

D-4d(2) Sample Preservation and Shipment

Samples will be preserved in accordance with the procedures specified in the Sampling and Analysis Plan (Appendix H).

D-4d(3) Analytical Procedures

Chemical analyses will be performed in accordance with the procedures specified in EPA Document SW-846 (e.g., Method 6010B for Ag, As, Ba, Cd, Cr, Pb, and Se; Method 7470A for Hg; and Method 9010B for cyanide) as detailed in the Sampling and Analysis Plan (Appendix H). The chemical constituents listed above are easily detected in groundwater at levels below concentrations of concern using standard analytical methods. The EQLs for the chemical constituents listed above are provided in Appendix H. Additionally, Appendix I includes a letter from the laboratory summarizing the reevaluation of the EQLs (included as Attachment A to Appendix I) and a table summarizing the revised reporting limits (included as Table 2 in Appendix I).

D-4d(4) Chain-of-Custody

All samples will be handled under strict Chain-of-Custody controls and documentation, utilizing labels provided by the analytical laboratory and MLC-specific chains-of-custody, as described in Appendix H.

D-4d(5) Additional Requirements for Compliance Point Monitoring

D-4d(5)(a) Sampling Frequency

The compliance point groundwater monitoring wells will be sampled semi-annually for chemical analysis (Appendix H).

D-4d(5)(b) Compliance Point Groundwater Quality Values

Three wells have been selected for monitoring downgradient groundwater quality (MW-201B, MW-202B and MW-203B). Historical and current groundwater elevations and data collected during the post-closure monitoring program are provided in Table 6 and Appendix J, respectively.

D-4d(6) Annual Determination

Preparation of groundwater flow maps will allow confirmation that the upgradient well (MW-206B) continues to be upgradient and the downgradient wells (MW-201B, -202B and 2-03B) continue to be downgradient. Groundwater flow rate is calculated by taking the change in hydraulic head between two separate monitoring wells divided by the total distance between the monitoring wells, multiplying the result by the hydraulic conductivity, and dividing the product by the effective porosity. Groundwater flow direction is identified as being perpendicular to the

groundwater elevation contours. The determination of the flow rate and direction will be included in the annual evaluation report that will be submitted to IDEM.

D-4d(7) Statistical Determination

MLC will compare groundwater quality in the downgradient wells to background groundwater quality observed in MW-206B to determine if there is a statistically significant increase in the concentration of the indicator parameters between MW-206B and the downgradient wells.

D-4d(7)(a) Statistical Procedure

The initial statistical comparison was conducted in 2001 through 2002 and summarized in a letter to IDEM dated March 12, 2002 (Appendix I of the permit application). The background quality will be established in accordance with the procedures described in Attachment D-4c(2). The Tolerance Interval procedure to be followed is detailed in the Sampling and Analysis Plan provided in Appendix H. Additionally, a confidence level of 95% and 95% coverage is proposed to protect human health and the environment in accordance with the *Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities, Interim Final Guidance* (EPA Document/530-SW-89-206, April 1989) and the *Addendum to Interim Final Guidance*, July 1992.

If statistically significant increases above background are observed, MLC will notify the Commissioner in writing within 60 days of the sampling date (document provided according to the Commissioner's requirements), and sample and analyze groundwater from the well (or wells) indicating an increase to verify the observed result (within 75 days of the original sample date).

D-4d(7)(b) Results

The groundwater sampling results and statistical analysis report which documents the semi-annual monitoring program will be provided to IDEM within sixty (60) days of the final laboratory technical report. If groundwater quality results indicate a statistically significant change for any sampled parameters in the sampled wells, within 60 days of the sampling event, IDEM will be notified of which parameters and monitoring wells the statistically significant increase(s) occurred. After notifying IDEM of the statistically significant change, a verification sample from the non-statistically compliant monitoring well will be collected within 15 days (or 75 days from the original sample date) and analyzed for the parameters that indicated a statistical significant change. IDEM will be provided the ground water sampling results and statistical analysis report which documents the verification sampling event within sixty (60) days of the verification sample date. The ground water quality report will be submitted to IDEM as 2 bound hard copies and one electronic copy (document provided according to the Commissioner's requirements). The hydraulic evaluation report will be submitted to IDEM annually by March 1 each year.

D-5 Compliance Monitoring Program

This section is not applicable at this time.

Post-Closure Permit

Appendix E: Contingency Plan

USEPA INR000021436

Prepared for:
Motors Liquidation Company

Prepared by:
ARCADIS
251 E. Ohio Street
Suite 800
Indianapolis
Indiana 46204
Tel 317 231 6500
Fax 317 231 6514
Our Ref.:
IN000297.0018

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Purpose

The purpose of this contingency plan is to comply with the submitted Post-Closure Permit Application Attachment C-3, to address requirements in section 40 CFR 264, Subpart C. The facility is designed, constructed, maintained and operated to minimize the possibility of any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil or surface water which could threaten human health or the environment.

Facility Identification and General Information

Name: Former General Motors Allison Gas Turbine Division
Address: 2701 West Raymond Street
Indianapolis, Indiana

Owner/ Operator:
Motors Liquidation Company
500 Renaissance Drive, Suite 1400
Detroit, MI 48243
Attn: James M. Redwine

Emergency Coordinators:

David Favero
Favero Geosciences
1210 South 5th Street
Springfield, Illinois 62703
First Phone Number: (217) 522-6714
Second Phone Number: (217) 793-1695

Sarah Fisher
ARCADIS
251 East Ohio Street, Suite 800
Indianapolis, Indiana 46204
First Phone Number: (317) 236-5213
Second Phone Number: 317-691-4011

Type of Facility:

The closed surface impoundment (Site) is an unmanned 10.269 acre grass-covered field. The Site is surrounded by a 6 foot tall chain-linked fence with access gates in the northeast, northwest, and southwest comers of the fence which are kept locked at all times except during maintenance and monitoring activities.

Facility Site Map is on next page (Drawing 1).

Description of Generator Activities

No hazardous waste is generated from the various processes at the Site.

Emergency Coordinators

Principle (24-Hour Emergency Contact):	David Favero, Favero Geosciences First Phone Number: 217-522-6714 Second Phone Number: 217-793-1695
Alternate 1	Sarah Fisher, ARCADIS First Phone Number: 317-236-5213 Second Phone Number: 317-691-4011
Alternate 2	Eric Moosbrugger, ARCADIS First Phone Number: 317-236-5212

The emergency coordinator or alternate are responsible for coordinating all emergency response measures for the facility required under this plan. They are thoroughly familiar with:

- The facility's contingency plan
- All operations and activities at the facility.
- The location and characterization of waste handled.
- The location of all records within the facility.
- The physical layout of the facility.

Implementation of the Contingency Plan

The Contingency Plan will be implemented if an incident might threaten human health or the environment. The emergency coordinator has full authority to make this decision.

The contingency plan must be implemented whenever an incident might involve hazardous waste anywhere at the Site. Depending on the degree of seriousness the following potential emergencies might call for the implementation of the contingency plan:

Spills

- A release of any on-Site generated waste resulting from broken piping which cannot be contained on-Site resulting in off-Site soil contamination and/or ground or surface water pollution.

Emergency Response Procedures for Spills

Immediately Upon Discovery of an Emergency

An employee discovering a spill involving hazardous waste will call:

Emergency Procedure

Rolls Royce Plant 5 Security (adjacent facility formerly owned by General Motors Corporation) 230-5555

Emergency Coordinators:

Principle: Dave Favero
1210 South 5th Street
Springfield, Illinois 62703
First Phone Number: (217) 522-6714
Second Phone Number: (217) 793-1695

Alternate:

Alternate: Sarah Fisher
ARCADIS
251 East Ohio Street, Suite. 800
Indianapolis, Indiana 46204
First Phone Number: (317) 236-5213
Second Phone Number: (317) 691-4011

Alternate: Eric Moosbrugger
ARCADIS
251 East Ohio Street, Suite. 800
Indianapolis, Indiana 46204
Phone Number: (317) 236-5212

The emergency coordinator or alternate will respond immediately to the call and assess the situation. The emergency response contractors are:

ARCADIS
251 East Ohio Street., Suite. 800
Indianapolis, Indiana 46204
(317) 231-6500

The emergency coordinator will assess the situation by identifying the character, exact source, amount and extent of released material. He or she will also make an assessment of possible threats to human health and the environment.

If an incident could threaten the environment or human health outside the Motors Liquidation Company (MLC) property, the emergency coordinator will contact the following:

In the unlikely event that an incident occurs that adversely impacts the Site the following local resources are available and should be contacted immediately if required to address an emergency situation:

Local Fire Department:	317-327-6091
Indianapolis Fire Department:	317-327-6041
St. Frances Hospital:	317-787-3311
Local Police:	317-327-3811
Indianapolis Police:	911
Marion County LEPC:	317-252-3230

The emergency coordinator will call and report the incident to the National Response Center at:

800-424-8802

The report will include the following:

- Name and telephone number of the reporter.
- Name and address of the facility.
- Time and type of incident.
- Identification and quantity of materials involved.
- The possible hazards to the environment and human health outside the facility.

In addition, the emergency coordinator will contact Indiana Department of Environmental Management (IDEM), Office of Emergency Response at:

888-233-7745

During the Emergency Control Phase:

The emergency coordinator will take all necessary measures to contain the hazard within the facility property and to prevent its spread to other nearby properties, with the assistance of emergency contractors and local emergency personnel. The emergency coordinator or designee will monitor for leaks, pressure build-up, gas generation, or ruptures in valves, pipes, or other equipment, wherever appropriate. Emergency personnel will be provided details concerning the on-Site types of emergency equipment to be used and the need for personal protective equipment.

Immediately After the Emergency

The emergency coordinator must provide for the storage and disposal of recovered waste, contaminated soil or surface water, or any other material. The material must be handled as a hazardous waste unless it is a characteristic hazardous waste only, which is analyzed and determined not to be hazardous.

All emergency equipment must be cleaned and made fit for its intended use before operations are resumed.

The emergency coordinator will investigate the cause of the emergency and will take steps to prevent recurrence of such or similar incidents.

The emergency coordinator will make sure that cleanup and restoration have progressed at least to the point of not jeopardizing the health and safety of the employees, and that the EPA and local authorities have been notified prior to permitting the resumption of the operation affected by the emergency.

Emergency Equipment

Fire extinguishers are present in the two buildings located on Site. Additionally, personnel entering the Site will have a first-aid kit available.

Coordination Agreements and Telephone Numbers

ARCADIS
251 East Ohio Street, Suite. 800
Indianapolis, Indiana 46204
(317) 231-6500

The above recipient has been sent a copy of the contingency plan and has agreed to provide emergency services to MLC in the event there is an emergency.

Evacuation Plan

Contract employees will be evacuated if the emergency coordinator decides that their personal safety is in danger.

If evacuation is necessary, the contract employee will exit through the northeast gate. Drawing 1 contains the evacuation plan for the Site.

Required Reports

Within fifteen (15) days of any incident requiring the implementation of the contingency plan, the emergency coordinator will file a report with the EPA Regional Administrator and the Assistant Commissioner of the Office of Solid Waste and Hazardous Waste Management (OSHWM). The report will include the following:

- Name, address and telephone number of the owner/operator.
- Name, address and telephone number of the facility.
- Date, time and type of incident.
- Name and quantity of material involved.
- An assessment of actual or potential hazards to human health and the environment.
- Estimated quantity and disposition of recovered material that resulted from the incident.

The emergency coordinator will note in the operating record the time, date and details of any incident that requires implementation of the contingency plan.

Amendment of Contingency Plan

MLC, or its representatives, will review and amend this contingency plan whenever the following situations apply:

- Applicable regulations are revised.
- The plan fails in emergency.
- The facility changes in its design, construction, operation, maintenance or other circumstances in a way that materially increases the potential for releases.
- The list of emergency coordinators changes.

The list of emergency equipment changes.

Motors Liquidation Company

Post-Closure Permit

Appendix H: Sampling & Analysis Plan

USEPA INR000021436

Revised February 2010

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Acronym List

ANOVA	Analysis of Variance
BSL	Background Screening Level
DO	Dissolved Oxygen
EQL	Estimated Quantitation Limit
GM	General Motors Corporation
GOF	Goodness of Fit
IAC	Indiana Administrative Code
IDEM	Indiana Department of Environmental Management
IQR	Interquartile Range
KM	Kaplan-Meier
MLC	Motors Liquidation Company
MSL	Mean Sea Level
mL/min	milliliters per minute
mS/cm	millisiemens per centimeter
mV	millivolts
NTU	Nephelometric Turbidity Units
ORP	Oxidation Reduction Potential
PQL	Practical Quantitation Limit
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
ROS	Rank-Ordered Statistics
SAP	Sampling and Analysis Plan
SK	Seasonal-Kendall
UPL	upper prediction limit
USEPA	United States Environmental Protection Agency
UTL	upper tolerance limit
µg	microgram

3.1 Hydraulic Monitoring Program

Six monitoring well pairs (MW-201 A/B and 204 A/B through MW-208 A/B), two three-well groups (MW-202 A/B/C and MW-203 A/B/C) and one individual well (MW-200C) will be gauged semi-annually for depth to groundwater and total depth. The well pairs are screened in the upper sand and gravel unit/aquifer on either side (interior or "A" wells and exterior or "B" wells) of the slurry wall containment installed during the closure activities at the Site. The well groups are screened in the upper sand and gravel unit on either side of the slurry wall containment ("A" and "B" wells) and in the lower sand and gravel unit outside of the slurry wall containment ("C" wells). A summary of procedures that will be followed in completing post-closure care hydraulic monitoring activities is discussed in Section 4.1. In addition, the following items will be checked every 90 days during inspection: 1) if the integrity of the concrete pads for the monitoring wells is adequate, 2) if the protective casings for the monitoring wells are damaged, 3) if the locks for the protective casings are in adequate condition and 4) if monitoring well labels are in place and readable. During each semi-annual sampling and gauging event, each well will be checked for sediment accumulation in the monitoring wells. Sediment accumulation and well redevelopment is described in Section 5 below.

Hydraulic monitoring data and related data analysis will be included in the annual report to be submitted to the Commissioner of IDEM in accordance with a schedule established by the Commissioner covering the previous calendar year. The reports will consist of the following hydraulic monitoring information:

- Groundwater elevation data and calculation of groundwater flow rate
- Potentiometric surface maps
- Hydraulic gradient data for each monitoring well pair and calculation of rise rates
- Groundwater withdrawals from Rolls-Royce production wells
- Site dewatering volumes

- Groundwater Collection, Packaging and Chain-of-Custody Procedures
- Decontamination Procedures
- Water Level Indicator Maintenance

4.1 Groundwater and Total Depth Gauging Procedures

Water levels and total depths will first be measured in all exterior monitoring wells (i.e. "B" and "C" wells) beginning with the hydraulically upgradient wells (southwest to northeast). Following measurements of water level and total depth in each of the exterior wells, the water level indicator will be decontaminated. Water level and total depth will then be measured in each of the interior wells (i.e. "A" wells). The water level indicator will be decontaminated after measurements in each well. Static water level and total depth in each monitoring well will be measured with a contact electronic water level indicator with 0.01 foot measuring increments and recorded to the nearest 0.01 foot using a Solinst Model Number 101 (or equivalent). The data will be recorded on a standard form specific to the Site that is provided as Table 2.

The level indicator consists of a graduated tape, sensory probe, and a buzzer and/or light. The graduated tape provides an electrical connection between the sensory probe and the buzzer and/or light. The tape is unwound to lower the sensory probe into the monitoring well. When the probe makes contact with the water, the electrical circuit is completed and the buzzer sounds and/or the lamp lights up. The depth is recorded from the graduated tape at the reference notch on the top of the riser for each of the monitoring wells.

The total depth will be measured by allowing the probe to rest at the bottom of the well. The graduated tape is pulled so there is no slack in the tape and the tape is gently resting on the bottom of the well. The depth on the graduated tape is recorded at the reference notch on the top of the riser for each monitoring well. The water level and total depth can then be assigned an elevation according to means sea level (MSL) elative to the surveyed MSL elevation of the north lip of the casing at the relative monitoring well.

4.2 Groundwater for Chemical Analysis

One sample from the upgradient well (MW-206B) and each of the three downgradient wells (MW-201B, MW-202B, and MW-203B) will be collected for analysis. Sampling of groundwater from the selected monitoring wells will be conducted following the gauging activities described above at the respective well. Based on the historical depth to groundwater data, the limited volume of water expected to be present in each of the wells, and the chemical parameters to be measured, a submersible variable rate pump (i.e., bladder pump or equivalent) will be utilized to purge and sample each of the wells.

One set of quality assurance/quality control (QA/QC) samples (MS/MSD, field duplicate, and field equipment blank) will be collected for analysis during each sampling event.

To commence sampling activities, personnel will record the appropriate well information and current gauging data on the Well Purging Field Information Form and Monitoring Well Record for Low-Flow Purging that is provided as Figure Nos. 2 and 3. The pump, safety cable, tubing and electrical lines will be lowered into the well so that the pump intake will be at the mid-point of the saturated portion of the well screen to prevent disturbance and resuspension of any sediment in the screen base. Prior to starting the pump, the water level will be measured again with the pump in the well leaving the water level measuring device in the well when completed. The well will be purged at a rate of 100 to a maximum of 500 milliliters per minute (mL/Min). During purging, the water level will be monitored approximately every 5 minutes, or as appropriate. A steady flow rate will be maintained that results in a drawdown of 0.3 feet or less. The rate of the pumping will not exceed the natural flow rate conditions of the well being sampled. Adjustments made to the pumping rates and water levels immediately after each adjustment will be recorded. The field indicator parameters (pH, temperature, conductivity, ORP, DO and turbidity) will be measured through a flow-through cell and monitored every five minutes during the purging of the well. Stabilization is considered to be achieved when the final groundwater flow rate is achieved, and three consecutive readings for each parameter are within the following limits:

- pH: +/- 0.1 pH units of the average value of the three readings;
- temperature: +/- three percent of the average value of the three readings;,
- conductivity: +/- 0.005 milliSiemen per centimeter (mS/cm) of the average value of the three readings for conductivity <1 mS/cm and +/-0.01 mS/cm of the average value of the three readings for conductivity >1 mS/cm.
- ORP: +/- ten millivolts (mV) of the average value of the three readings
- DO: +/- ten percent of the average value of the three readings; and
- Turbidity: +/- ten percent of the average value of the three readings, or a final value of less than 5 nephelometric turbidity units (NTU).

Should stabilization not be achieved for all field parameters, purging will be continued until a maximum of 3 standing water volumes have been purged from the well. The pump will not be removed from the well between purging and sampling. Water removed during the purging process will be temporarily contained, and (based on analytical data) disposed of properly.

The Well Purging Field Information Form (Figure 2), Monitoring Well Record for Low-Flow Purging (Figure 3), data deliverable requirements as described in Table 1, and Chain-of-Custody forms will be included in the annual report submitted to the Commissioner.

4.3 Data Analysis

The statistical procedure for the comparison of the background well to compliance wells will be conducted in accordance with USEPA (1989, 1992, 2006, 2007a) and Indiana state (IDEM 1997, Indiana Administrative Code [IAC] 2004) guidance. These documents provide guidelines for the evaluation of groundwater quality that are protective of both human health and the environment. The first step in this process is conducting exploratory data analysis of both the background and compliance well datasets to ensure that observations within each dataset are representative of single populations and follow consistent temporal trends. There are multiple statistical techniques to compare concentrations in background and compliance wells depending on sample size, degree of censoring (i.e., the presence of nondetects), and probability distribution. The first technique relies on a point-by-point comparison of individual compliance wells to a single background screening level (BSL), which is based on a statistic such as an upper tolerance limit (UTL). The second technique involves hypothesis testing to compare the central tendencies or upper tails of distributions in background and compliance wells. These approaches are detailed below along with recommendations for their implementation.

4.3.1 Exploratory Data Analysis

The exploratory data analysis techniques described below will be used to evaluate distribution and temporal trends within both the background well and compliance wells. As previously described, the purpose of this analysis is to ensure that observations within each dataset (i.e., background versus compliance) are representative of single populations and follow consistent temporal trends. The techniques described below are consistent with current practice and statistics guidance (e.g., USEPA 2006; 2007a). However, the existing data have a high percentage of nondetects, which limits the types of statistical evaluations that can be performed. These limitations are discussed were appropriate, in the following sections.

4.3.1.1 Data Processing

Prior to conducting a statistical analysis of the background and site data, data processing may be needed. If a sampling event for a well/analyte/day includes replicates, the following steps will be used to generate a single composite result:

1. Where all replicates are nondetect, the maximum reporting limit is used;

same constituent, this graphic can help to determine if each well is representative of the same hydrostratigraphic unit. Box plots can also help to identify potential outliers based on the product of the interquartile range (IQR = 75^{th} - 25^{th} percentiles) added to the 75^{th} percentile. Commonly, values that exceed the 75^{th} percentile plus 1.5 times IQR are considered moderate outliers, whereas values that exceed 75^{th} percentile plus 3.0 times IQR are extreme outliers. Side-by-side box plots will be generated to compare background and compliance wells. These box plots will include a tabular summary of selected statistics, including sample sizes (detects, nondetects, and total), the minimum, maximum, arithmetic mean, median, and standard deviation of detected results, and a range of percentiles (25^{th}, 50^{th}, 75^{th}).

4.3.1.4 Trend Analysis

In general, trend plots show the concentrations over time within a well or within all background or compliance wells. These plots can reveal patterns in the data, such as periodic fluctuations (e.g., seasonality), or a consistent trend (increasing or decreasing) in the data. These plots are particularly useful for evaluating data from wells in unimpacted areas because reporting limits for nondetects may change over time, thereby masking any real changes in groundwater quality.

Two statistical tests will be used to evaluate trends for wells in background and compliance wells: Mann-Kendall Test and Sen's Slope Estimator. Each test has the flexibility to accommodate any particular distribution form, and each is relatively insensitive to outliers and nondetects (values less than reporting limits). For the Mann-Kendall Test, a series of pairwise slopes are calculated to determine the change in the concentration divided by the time interval between sequential sampling events. A test statistic "S" is computed based on the difference between the number of pairwise slopes that are strictly positive differences and negative differences. The null hypothesis of no trend (equal numbers of positive and negative differences) is evaluated at a 95% confidence interval, which for Sen's Slope is based on a calculation of the 95% confidence interval for the median of the pairwise slopes.

Sample size requirements for characterizing background conditions depend on the number of wells and the number of observations per well. USEPA (1989) recommends a full year (n= 4 quarters) of sampling per well for units represented by at least four wells, or n=8 per well for units represented by fewer than four wells. A minimum of four sampling events per well is needed to run the Mann-Kendall and Sen's Slope Tests. If the data contain nondetects, a minimum of four detects is needed and the reporting limits of nondetects are closely evaluated to determine the influence of nondetects on the slopes (e.g., historical data with high reporting limits). For these tests, nondetects are included at one-half the reporting limit and nondetects greater than twice the maximum detected concentration are excluded in order to minimize potential biases in the trend analysis due to differences in reporting limits over time.

greater than 40%[1,2]. By contrast, hypothesis tests are implemented to determine if differences in the central tendency (mean/median) or upper tails of the distributions are statistically significant. Two-sample hypothesis tests are not subject to high error rates, and Type I error rates for multiple sample comparisons (through a one-way analysis of variance [ANOVA]) can be easily corrected (e.g., Bonferroni adjusted $\alpha \approx$ (desired /n)). Furthermore, applying both evaluations of central tendency and upper tails ensures that the approach is protective.

Statistical guidance on implementing point-by-point comparisons and hypothesis testing is available from 329 IAC 10-21-6 (2004) and USEPA (USEPA 1992, 2006, 2007a). USEPA (2007b) indicates that methods that compare the distributions, and in particular hypothesis tests, are preferred, provided sufficient sample sizes (e.g., 8-10 observations with at least 5 detects) are available in both the site and background datasets. The remainder of this section addresses statistical procedures for both of these techniques and offers recommendations for their implementation.

4.3.2.1 Goodness-of-Fit Testing

Goodness-of-fit testing is performed to determine if parametric or nonparametric statistical methods are most appropriate for calculating BSLs or conducting hypothesis testing. Consistent with USEPA guidance (USEPA 2007a, 2007b), data will be evaluated for fits to normal, lognormal, and gamma distributions using methods appropriate for the sample size and degree of censoring. Data will be evaluated for fits to normal and lognormal distributions at α=0.05 significance levels using Shapiro Wilks test for $n \leq 50$ and Lilliefors test for $n > 50$. Anderson Darling and K-S tests will be used to evaluate fits to gamma distributions. Nondetects introduce uncertainty in GOF testing and many methods have been proposed to conduct GOF testing of left-censored data (refer to Helsel, 2005 and USEPA, 2007b for comprehensive overviews). Methods that rely on substitution of a constant (e.g., ½ reporting limit) have been shown to yield unreliable results, even for censoring levels as low as 5% (Helsel, 2005; USEPA, 2007b). Therefore, two alternate methods will be applied in this analysis: 1) GOF on detects only; and 2) GOF on rank-ordered statistics (ROS)

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[1] Type I error rate is a function of the sample size (n) of the Site data set. The probability that at least one Site observation is greater than a one-sided 95% UTL of the background distribution (a Type I error rate) is given by $\alpha = Pr(Y \geq UTL) = 1 - Pr(Y < UTL) = 1 - 0.95^n$, assuming the UTL is equivalent to the 95th percentile. For n=1, α=0.05, but for n=10, $\alpha = 1 - 0.95^{10} = 0.401$.

[2] USEPA (1992) acknowledges high rates of false positives, but cautions against reducing α to achieve an overall Type I error rate due to the loss of power (increase in Type II error rate – probability of identifying the site as uncontaminated when, in fact, it is). Ideally, additional site data would be collected (USEPA1992, 2007a).

- If the data excluding suspected outlier(s) are not approximately normally distributed (or cannot be transformed to a normal distribution), Walsh's test is used if $n \geq 60$ and IQR test is used if $n<60$. Note that Walsh's test will be performed at $\alpha=0.10$ if $n<220$.

These tests alone cannot determine whether a statistical outlier should be discarded or corrected within a data set. Removing accurate data with high values and failing to remove outliers that arise from erroneous measurement are opposite kinds of errors that can both lead to a distorted estimate of summary statistics (USEPA, 2006). Therefore, the decision to evaluate BSLs and hypothesis tests with and without statistical outliers will be based on both professional judgment and results of the statistical analysis.

4.3.2.3 Calculation of Background Screening Levels

State and federal guidance indicate BSLs for a groundwater dataset can be based on one of several representative statistics, commonly an upper tolerance limit (UTL) or upper prediction limit (UPL) (329 10-21-6(f)(3) [IAC 2004]; ASTM, 1998; USEPA 1989, 1992, 2006, 2007a). A UTL contains a proportion of the population, whereas a UPL contains one or more future observations. In general, a UTL is the appropriate statistic when the intent is to compare data from unimpacted areas with data from potentially impacted areas (USEPA, 1989 – Section 5). Since this is the goal of the compliance monitoring effort for this site (i.e., comparison of concentrations from upgradient and downgradient wells), a UTL is used in this analysis. UTLs provide an interval within which at least a certain proportion of the population is "contained", sometimes referred to as "coverage" or percentile (USEPA 2006). This coverage can be achieved "on average" or with a specified probability or level of confidence:

- Average coverage – a tolerance interval is constructed so that it contains *on average* $\beta 100\%$ of the population (i.e., the average coverage is $\beta 100\%$).[3, 4]

- Confidence limit on coverage – a tolerance interval with confidence level $(1-\alpha)100\%$ is constructed so that it contains *at least* $\beta 100\%$ of the population (i.e., the coverage is at least $\beta 100\%$) with probability $(1-\alpha)100\%$.

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[3] Note that there is no explicit confidence level associated with this tolerance interval; for purposes of comparison with tolerance limits with confidence intervals, this type of approach is sometimes described as yielding a tolerance interval with a confidence level of about 50%.

[4] A tolerance interval with average coverage of $\beta 100\%$ is equivalent to a prediction interval for $k=1$ future observations with associated confidence level $\beta 100\%$.

Nonparametric methods based on the maximum detect require very large sample sizes (i.e., n ≥299) to achieve 95% confidence of 99% coverage (see Table A-5 of Conover, 1999).

The distribution of the background dataset will be assessed as discussed in Section 4.3.2.1. For full datasets, parametric UTLs will be calculated for normal, lognormal, and gamma distributions. For full datasets that do not follow a discernable distribution, either a nonparametric 95/99 UTL or Poisson 95/99 UTL will be calculated. A nonparametric UTL may be based on a rank-ordered value in the dataset. For sample sizes less than 299, the nonparametric 95/99 UTL is equivalent to the maximum detect (Conover 1999). If the rank-ordered statistic selected to represent the nonparametric 95/99 UTL does not achieve the appropriate coverage (i.e., 99%) for a given sample size on average, then the Poisson UTL will be calculated based on a methods described by Gibbons (1987, 1994) and USEPA (1992). For left-censored data, the Poisson parameter will be determined by Kaplan-Meier (KM) methods, which are recommended by USEPA (2007a) as the most robust nonparametric maximum likelihood estimation technique. Specifically, the sum of the concentrations will be estimated by the product of the KM mean and the total sample size (detects and nondetects).

For censored datasets that follow a normal or lognormal distribution the choice of method will depend on the skewness, as determined by the standard deviation of the log-transformed data (detects only) (σ). Datasets with $\sigma \leq 1.0$ are considered mildly skewed, whereas datasets with $\sigma > 1.0$ are considered moderately to highly skewed (USEPA, 2007b). UTLs for mildly skewed datasets will be approximated using the Kaplan-Meier 95/99 UTL, while UTLs for moderately to highly skewed datasets will be approximated using the nonparametric or Poisson 95/95 UTL (as described above).

With parametric methods applied to background data (with or without nondetects), sometimes a calculated UTL is greater than the maximum detected concentration. This represents a source of uncertainty in the BSL, and usually occurs when the sample size is low and the variance is high. In such cases, the BSL will be based on the UTL, and it will be noted that the UTL exceeds the maximum detected concentration.

Comparisons will be made on a point-by-point basis to determine if one or more site observations exceeds the BSL. For this analysis, the comparison of site data to BSLs will serve as a preliminary screening step. As indicated above, this type of analysis is prone to high Type I error rates. Therefore, constituents for which one or more exceedances are noted in the site dataset will be subsequently evaluated using hypothesis test, as described in the following section.

paper towel. The decontaminated water level meter shall not be placed directly" on the ground surface prior to insertion in a monitoring well, or if it is necessary to place it on the ground, it will be placed on a clean surface such as the meter's carrying case, a plastic bucket, or a plastic garbage bag.

Either separate dedicated purging and sampling pumps will be supplied for each well, or one pump will be used to purge and sample all wells. If dedicated pumps are supplied for each well, the pump will remain in the well between sampling events and decontamination will not be required. If a single submersible pump is used to purge and sample all wells, the pump will be thoroughly decontaminated between each well. Decontamination information such as time/date/method for reusable well pumps will be completed in the 'Notes' section of Figure 2. New tubing will be used for each well and all used tubing will be properly discarded. The submersible pump will be decontaminated by submerging the pump in a 5-gallon bucket of diluted non-phosphate detergent, and pumping the detergent solution through the pump. The pump will then be submerged into a bucket of deionized water to rise out the pump. Rinse water will be drained from the pump. The suspension cable and electrical line will be decontaminated as described above for the water level indicator.

4.5 Water Level Indicator Maintenance

The water level indicator will be maintained to perform as the manufacturer warrants. The probe will be kept clean and dry. Batteries will be charged, electrical connections will be tested, and the buzzer and lights will function properly. All maintenance will be performed prior to the monitoring activities. The initial 50 foot portion of the water level indicator (approximately 10 feet more than the deepest groundwater elevation) will be inspected for stretch-in-tape before each monitoring event. It will be measured using a graduated survey tape that measures in 0.01 foot increments. The survey tape will not be used in the field, and its sole purpose will be for comparison to the water level indicator tape. The water level indicator tape will be replaced when stretch exceeds 0.01 feet anywhere along the tape. Tape that cannot be cleaned to a visibly acceptable appearance or that is excessively bent or kinked, will not be used.

4.6 Calibration Methods for Field Equipment

Field indicator parameter sensors (pH, ORP, conductivity and DO) will be calibrated the start of the sampling event using an appropriate calibration fluid. Calibration methods will be completed each subsequent day the sampling event extends. Documentation of calibration activities will be completed on the Instrument Calibration Record attached as Figure 5. The turbidity sensor is required to be calibrated once per year and is completed by the equipment supplier.

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