COMMONWEALTH of VIRGINIA

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Secretary of Natural Resources

David K. Paylor
Director

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September 18, 2012

Mr. Rocky Martin
Environmental Health and Safety Manager
Federal-Mogul Corporation
300 Industrial Park Road SE
Blacksburg, Virginia 24060-6699

VIA Electronic Mail

Re: Class 2 Modification, Hazardous Waste Management Permit – Approval
Site-Wide RCRA Corrective Action Remedy Selected
Federal-Mogul Corporation, Blacksburg
EPA ID Number: VAD054039961

Dear Mr. Martin:

The Department of Environmental Quality, Office of Waste Permitting and Compliance (DEQ) received the Class 2 modification request from URS Corporation (URS), on behalf of Federal-Mogul Corporation, located in Blacksburg, Virginia (F-M Blacksburg) to modify its Hazardous Waste Management Permit (Permit). This Class 2 modification request, received on July 9, 2012, included the modified pages of the Permit that would incorporate DEQ's decision of "Corrective Action Remedy Selected".

The DEQ has reviewed available facility data and has determined that remediation is necessary for F-M Blacksburg to satisfy its RCRA Corrective Action obligations. The DEQ prepared a Statement of Basis detailing the selected remedy for the F-M Blacksburg site. The proposed remedy includes the operation and maintenance of a solar powered soil vapor extraction (SVE) system, continued operation of the existing groundwater pump and treat (P&T) system, long term groundwater monitoring, and implementation of institutional controls. Below is a list of permit modifications incorporating the selected remedy:

- Table of Contents – Modified;
- Module VI Corrective Action Program – Modified;
- Module VIII Site-Wide Corrective Action – Modified;
- Attachments M through P – Modified; and

- Attachments Q through V – Removed.

Additionally, several permit attachments required changes to reflect updated site information, as indicated below:

- Module V Compliance Monitoring Program – Modified to reflect updated groundwater monitoring list language from the October 2011 Class 1 permit modification;
- Attachment E Post-Closure Care Plan – Modified to reflect updated facility contact information and updated cost estimate;
- Attachment H Personnel and Training – Modified to reflect updated facility post-closure care training director title; and
- Attachment I Groundwater Monitoring Program Sampling and Analysis Plan – Modified to reflect updated groundwater monitoring list language from the October 2011 Class 1 permit modification, associated container/preservation tables, and updated statistical guidance reference.
- (DEQ modification) Module I Standard Conditions – Section E modified to indicate that one (1) copy of submissions be sent by certified mail or hand-delivered and to revise the contact information.

A public notice of the Class 2 permit modification was published in the Roanoke Times on July 9, 2012. The 60-day public comment period began on July 9, 2012 and ended on September 7, 2012. A public meeting was held at the Blacksburg Public Library on August 16, 2012. No comments were received during the public meeting and one (1) comment was received during the public comment period, which did not require any changes to the draft permit. Furthermore, the required Class 2 modification permit fee in the amount of $2400.00 was received by the DEQ.

Therefore, the DEQ approves this Class 2 Modification of the Permit which is in accordance with of 40 CFR 270.42(b). The DEQ has changed its copy of F-M Blacksburg's Permit with the enclosed modified pages. Please ensure that your facility's Permit copies are also updated accordingly.

In addition, the DEQ will notify all persons on the facility mailing list of this modification approval within 10 days in accordance with 40 CFR 270.42(f)(1). Evidence of this mailing will be forwarded to the facility when available.

As provided by Rule 2A:2 of the Supreme Court of Virginia, you have 30 days from the date of service of this decision to initiate an appeal by filing a notice of appeal with:

David K. Paylor
Director, Virginia Department of Environmental Quality
P.O. Box 1105
Richmond, Virginia 23218

In the event that this decision is served to you by mail, three days are added to this period. Please refer to Part 2A of the rules of the Supreme Court of Virginia, which describes the required contents of the Notice of Appeal, including specification of the Circuit Court to which the appeal is taken, and additional requirements governing appeals from decisions of administrative agencies.

If you have questions concerning the information provided in this letter, please contact Angela Alonso of my staff at 804-698-4328 or by e-mail at Angela.Alonso@deq.virginia.gov.

Sincerely,

Leslie A. Romanchik
Hazardous Waste Program Manager
Office of Waste Permitting and Compliance

Enclosure

cc: Andrea Barbieri – EPA, Region III (3LC50)
Luis Pizarro – EPA, Region III (3LC50)
Aziz Farahmand – DEQ, BRRO
Angela Alonso, Jutta Schneider, Ryan Kelly, Vince Maiden – DEQ, CO
Julia King-Collins, Cynthia Houchens – DEQ, CO
CO File

Mark Bauer, P.E. – Federal-Mogul Corporation
Kelly Hicks, P.G. – URS Corporation

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MODULE I

STANDARD CONDITIONS

A. EFFECT OF PERMIT

This Post-Closure Care Permit (the permit) authorizes only the management of hazardous waste expressly described in this permit and does not authorize any other management of hazardous waste. Compliance with this permit generally constitutes compliance, for the purposes of enforcement, with Chapter 14, Section 10.1-1426, Code of Virginia (1950), as amended. 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, an invasion or other private rights, or any infringement of State or local laws or regulations. Compliance with the terms of this permit may not constitute a defense to any action brought under Chapter 14, Section 10.1-1455, Code of Virginia (1950), as amended, or any other law governing protection of the public or the environment.

B. PERMIT ACTIONS

This permit may be modified, revoked and reissued, or terminated for cause as specified in the Virginia Hazardous Waste Regulations 9 VAC 20-60-270.30.f, -270.41, -270.42, and -270.43. The filing of a request for 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 this 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.

D. DEFINITIONS

For the purpose of this permit, terms used herein shall have the same meaning as those in 40 CFR Sections 124.2, 260.10, 264.141, 270.2, 9 VAC 20-60-12, 9 VAC 20-60-14, and 9 VAC 20-60-17, unless this permit specifically states otherwise; where terms are not otherwise defined, the meaning associated with such terms shall be as defined by a standard dictionary reference or the generally accepted scientific or industrial meaning of the term.

E. REPORTS, NOTIFICATIONS, AND SUBMISSIONS TO THE DIRECTOR

One (1) complete copy of all reports, notifications or other submissions which are required by this permit to be sent or given to the Director of the Department of Environmental Quality should be sent certified mail or be hand-delivered to:

Department of Environmental Quality
Attn: Ms. Jutta Schneider
Groundwater/Corrective Action Program Manager
Office of Remediation Programs
PO Box 1105
Richmond, Virginia 23218
(804) 698-4099

Street Address:
629 East Main Street
Richmond, Virginia 23219

And one (1) copy to:

Director, Blue Ridge Regional Office
Department of Environmental Quality
3019 Peters Creek Road
Roanoke, Virginia 24019
(540) 562-6700

F. SIGNATORY REQUIREMENTS

All reports or other information requested by the Director shall be signed and certified pursuant to 40 CFR § 270.11.

G. DOCUMENTS TO BE MAINTAINED AT THE FACILITY SITE

1. The Permittee shall maintain at the facility, until post-closure care is completed and certified by the owner/operator and an independent professional engineer registered in Virginia, the following documents and amendments, revisions and modifications to these documents:

   a. Personnel training documents and records required by 40 CFR 264.16 and this permit.

   b. Annually adjusted cost estimate for facility post-closure care required by 40 CFR 264.144(b).

   c. Operating record required by 40 CFR 264, Permit Module II.F.1. and Permit Module III.

   d. Inspection schedules and logs required by 40 CFR 264.15(d). and Permit Attachment H.

   e. Groundwater sampling and analysis plan required by 40 CFR 264.92 and this permit.

   f. Groundwater monitoring results required by 40 CFR 264.73(b)(6) and this permit.

   g. All other documents required by Permit Module I.H.9. and I.H.13. through 15.

H. DUTIES AND REQUIREMENTS

1. Duty to Comply

   The Permittee shall comply with all conditions of this permit, except to the extent and for the duration such noncompliance is authorized by an emergency permit (see 40 Code of Federal Regulations (CFR) § 270.61). Any other permit noncompliance constitutes a violation of Title 10.1, Code of Virginia (1950), as

MODULE V

COMPLIANCE MONITORING PROGRAM

A. HIGHLIGHTS

The Permittee determined that a statistically significant release had occurred at the point of compliance for their Waste Management Unit. The release included trichloroethylene (TCE), a listed hazardous waste constituent; therefore, the Permittee shall implement the Corrective Action Program specified in Permit Module VI, in accordance with the requirements of 40 CFR 264.100 and 9 VAC 20-60-264.100.

If the Permittee demonstrates to the Director's satisfaction that the Corrective Action Program specified in Permit Module VI has achieved compliance with the groundwater protection standard (GPS) before the end of the Compliance Period by preventing the hazardous constituents listed in the GPS from exceeding their respective concentration limits at the point of compliance by removing the contaminants or treating them in place, in accordance with 40 CFR 264.100(b), then the Permittee shall implement the Compliance Monitoring Program specified in Permit Module V, in accordance with 40 CFR 264.99.

B. HISTORICAL OVERVIEW

During operations, the Permittee's two surface impoundments and two sludge drying beds received wastewater originating from the their electroplating department. Metal hydroxide sludge was precipitated in two (2) sedimentation ponds (surface impoundments); the sludge was later deposited for drying and storage in one of the two sludge drying beds (surface impoundments). The wastewater treatment sludge, spent plating bath solutions, plating bath sludge, and spent stripping and cleaning bath solutions were listed hazardous wastes with EPA Hazardous Waste Numbers F006, F007, and F009.

In accordance with the requirements of Permit Module IV (Detection Monitoring), the Permittee verbally, and in writing, notified the Director on June 6, 1995, that they had determined that there was a statistically significant increase above background levels for pH, specific conductance, total organic carbon, total organic halogen, chloroform, and trichloroethylene (TCE) at the point of compliance of the Waste Management Unit. The Permittee resampled on June 27-29, 1995 and confirmed the release. On August 14, 1995, the Permittee informed the Director of their intent to pursue an alternate source demonstration pursuant to 9 VAC 20-60-790 I 7 (formerly VHWMR § 10.5.I.7).

On February 6, 1996, the Permittee submitted a groundwater monitoring report that identified potential alternate sources for the specific conductance and specific conductance exceedances. The Permittee determined that these exceedances were related to a mound in the water table near the northeast corner of the plant, possibly as a result of process water leakage. An alternate source for chloroform was also identified in the 1995 Annual Groundwater Report, dated February 6, 1996. Samples of municipal water at the site indicated that the local public water supply contained greater than 40 ppb chloroform which is significantly higher than levels discovered on-site in groundwater. Municipal water was used historically at the site and a recent municipal water line leak has also been documented.

From October 1995 to July 1997 the Permittee conducted a hydrogeologic site investigation designed to determine the extent of the groundwater contamination. The Permittee determined that several nearby residential drinking water wells had been contaminated with TCE and provided those residences with carbon treatment water purification units. The Permittee was unable to determine an alternate source for the contamination, and on July 15, 1996, the Permittee informed the Director that they were no longer pursuing an alternate source demonstration.

The Permittee conducted a terrain conductivity survey in October 1995 in order to help define the subsurface hydrogeology and potential contaminant pathways. In November 1995 the Permittee installed a total of three (3) piezometers to define the groundwater flowpaths. From November 1996 through April 1997 the Permittee installed five (5) monitoring wells to define the extent of the contaminant plume and the subsurface hydrogeology. The Permittee conducted a series of slug tests and an aquifer performance test to define the relevant hydraulic properties of the aquifer.

On June 23, 1997, the Permittee submitted a final *Hydrogeolgic Site Investigation Report* that detailed the results of their field investigations and documented the horizontal and vertical extent of the TCE plume. The Permittee also submitted one additional cross-section, as requested by the Department. The Permittee characterized the major hydrogeologic characteristics of the site as follows:

- Groundwater and contaminant migration occurs primarily along the north-south bedrock strike orientation and is concentrated within the weathered zone aquifer less than 200 feet below ground surface (bgs);

- Groundwater and contaminant migration occurs primarily within fractures and solution features at the interface between the residual soil and the weathered bedrock within the weathered zone aquifer;

- The weathered zone aquifer is thickest within valley features and is effectively bounded by the adjacent ridge features;

- A small amount of contamination migrate within the unweathered zone beneath the weathered zone aquifer;

- Groundwater and contaminant migration within the weathered zone is also affected locally by the presence of faults; and,

- The local-scale hydraulic characteristics of the groundwater system vary over a wide range (e.g., measured hydraulic conductivities of the groundwater system vary over a range of more than 5 orders of magnitude).

The Permittee's hydrogeologic investigations identified the most significant pathways of groundwater and contaminant migration. Zones downgradient of the suspected source area with relatively high yield and high contaminant concentrations are likely to represent significant contaminant migration pathways, and therefore, also represent the most promising pathways of groundwater recovery. The Permittee has concluded that the zone to be targeted for remediation is located between 50 and 190 feet below ground surface, within the weathered zone aquifer, and is located along strike from the regulated unit.

The Permittee has determined that the TCE plume extends approximately 3200 feet downgradient from the closed surface impoundments, is as much as 1200 feet wide,

extends to at least 400 feet below grade, and periodically discharges to the surface at two known spring areas. The Permittee reported that the maximum subsurface concentration of TCE was approximately 4400 µg/L (equivalent to parts per billion), and the maximum surface concentration at the springs was approximately 2400 µg/L.

On July 31, 1997, the Permittee submitted a request for a major permit modification to implement a corrective action program designed to reduce the concentrations of all hazardous constituents to concentrations at or below background concentrations and/or groundwater protection standards, and to contain the TCE plume. The Maximum Concentration Limit for TCE specified in the Groundwater Protection Standard is 5 µg/L (see Permit Attachment K). The Permittee's request considered, in detail, several remediation alternatives, including: no action, limited action, containment, and remediation.

The Permittee's proposed corrective action program of groundwater extraction and treatment consists of a network of recovery wells designed and configured to capture contaminated groundwater and to prevent further migration. All recovered groundwater will be treated at the surface by air stripping and/or liquid-phase activated carbon filtration treatment. The advantages of the proposed extraction and treatment system include removal of the TCE contamination and hydraulic containment of impacted groundwater. The disadvantages of the proposed extraction and treatment system include the recovery of large volumes of contaminated groundwater that must be treated. In addition, contaminated groundwater from zones with low hydraulic conductivity (i.e. unweathered bedrock, see discussion above) may migrate very slowly to the recovery wells; therefore, significant time and expenses may be required before the site can be remediated.

C. COMPLIANCE MONITORING REQUIREMENTS

The Compliance Monitoring Program requires monitoring at the downgradient point of compliance and at all wells designated as compliance monitoring wells at least semiannually. Static groundwater elevations will be measured at all wells during each sampling event.

1. The Permittee shall maintain the compliance monitoring system, specified below, in accordance with 40 CFR 264.99. The upgradient well shall be MW-5; the four downgradient, point of compliance (POC) wells shall be MW-8b, MW-9, MW-10, and MW-11; monitoring wells MW-A, DW-1, DW-2, DW-4, and DW-3 shall be additional compliance monitoring wells. Wells DW-6, MW-1, MW-7, MW-12, MW-13 and piezometers PZ-B, PZ-C, PZ-D, PZ-E, PZ-F, PZ-G, and PZ-H shall be used to measure the static water level only. Boring logs and the completion diagrams for the above specified monitoring wells and piezometers are included as Permit Attachment I, Appendix 8.

2. The POC wells, background well, and compliance monitoring wells will be sampled in accordance with the Sampling and Analysis Plan (Permit Attachment I) and the following schedule:

    a. The background well and POC wells specified in Permit Module V.C.1. will be sampled at least semiannually for the constituents listed in Permit

Attachment J. Samples for each constituent will be collected using the methods specified in Permit Attachment I and analyses shall be obtained using the EPA SW-846 Methods specified in Permit Attachment J.

b. The compliance monitoring wells will be sampled at least semiannually for the constituents listed in Permit Attachment J. Samples for each constituent will be collected using the methods specified in Permit Attachment I and analyses shall be obtained using the EPA SW-846 Methods specified in Permit Attachment J.

c. POC wells listed in Permit Module V.C.1. will be sampled annually for the 40 CFR Part 264 Appendix IX constituents listed in Permit Attachment L and analyses shall be obtained using the EPA SW-846 Methods specified in Permit Attachment L.

d. Alternate SW-846 analytic methods may be approved by the Director, provided the request is in writing and submitted 30 days prior to the sampling event. Proposed alternate methods must achieve the same Limit of Quantitation (or lower) as the specified method.

D. WELL LOCATION, INSTALLATION AND CONSTRUCTION

The Permittee shall maintain the groundwater monitoring system as specified below:

1. The Permittee shall maintain groundwater monitoring wells MW5, MW-8b, MW-9, MW-10, MW-11, MW-A, DW-1, DW-2, DW-4, DW-3, DW-6, MW-1, MW-7, MW-12, MW-13 and piezometers PZ-B, PZ-C, PZ-D, PZ-E, PZ-F, PZ-G, and PZ-H at the locations specified on the map presented in Permit Attachment B. The Permittee shall install additional groundwater monitoring wells to further define the vertical and horizontal extent of contamination if required in accordance with the requirements of 40 CFR 264.97.

2. All groundwater monitoring wells required by this permit shall be maintained in conformance with the following:

   a. The groundwater monitoring system shall yield samples in upgradient well(s) that represent the quality of the background that has not been affected by leakage from a regulated unit, and, in downgradient wells, yield samples that represent the quality of groundwater passing the point of compliance

   b. The number and location of monitoring wells shall be sufficient to identify and define all logical release pathways from the regulated units to the uppermost aquifer based on site specific hydrogeologic characterization.

3. The Permittee shall maintain the monitoring wells identified in Permit Module V.C.1. of the Permit in accordance with the plans and specifications presented in Permit Attachment I, Appendix 8.

4. The Director must approve the addition or removal of all monitoring wells prior to installation or decommissioning.

   a. All wells which are to be abandoned shall be plugged and abandoned in accordance with Permit Attachment I, Appendix 7 after the Permittee has obtained prior approval from the Director. Well plugging methods and abandonment certification shall be submitted to the Director within thirty (30) days from the date the wells are removed from the monitoring program.

   b. All monitoring wells added to the existing groundwater monitoring system described in Permit Module V.C.1. must be constructed in accordance with the requirements of EPA's *RCRA Groundwater Monitoring Technical Enforcement Guidance Document* (TEGD) and approved by the Department (Permit Attachment I, Appendix 5).

E. GROUNDWATER PROTECTION STANDARD

1. The Permittee shall monitor the groundwater to determine whether regulated units are in compliance with the Groundwater Protection Standard under 40 CFR 264.92. The GPS is based in part upon upgradient concentrations from the facility's initial background monitoring, EPA MCLs, and Alternate Concentration Limits (ACLs). ACLs are health-based standards calculated by DEQ. The hazardous constituents and their concentration limits listed in Permit Attachment K comprise the GPS.

2. For any additional hazardous constituents detected during the annual analysis of all monitoring wells at the point of compliance, as specified above in Permit Module V.C., for the constituents listed in Permit Attachment L for which no accurate background values have been established at the time the Permit is issued, the Permittee shall establish accurate background values as specified below:

a. Background groundwater quality for a monitoring parameter or constituent shall be based on data from quarterly sampling of a properly installed well (or wells) upgradient from the Waste Management Unit for one (1) year.

3. The Compliance Period, during which the Groundwater Protection Standard applies, is equal to the period of time from the beginning of the Waste Management Unit's active life until the end of the closure period and begins when the Permittee initiates a Compliance Monitoring Program meeting the requirements of 40 CFR 264.99. The Compliance Period began on May 9, 1998 and shall continue until September 9, 2010. If the Permittee is required to

conduct corrective action at the end of the specified compliance period, then the compliance period shall be automatically extended until the Permittee demonstrates that the GPS has not been exceeded for three consecutive years (40 CFR 264.96(c)).

F. SAMPLING AND ANALYSIS PROCEDURES

The Permittee shall use the following techniques and procedures when obtaining and analyzing samples from the groundwater monitoring wells described in Permit Module V.C.1.:

1. Samples shall be collected using the techniques described in the Sampling and Analysis Plan (Permit Attachment I).

2. Samples shall be preserved, packed and shipped off-site for analysis if an off-site laboratory is being utilized to perform analyses in accordance with the procedures specified in the Sampling and Analysis Plan (Permit Attachment I).

3. Samples shall be analyzed in accordance with the procedures specified in Permit Attachments J and L.

4. Samples shall be tracked and controlled using the chain-of-custody procedures specified in the Sampling and Analysis Plan (Permit Attachment I).

5. The Permittee shall determine the concentration of hazardous constituents and parameters specified in Permit Attachment J at all monitoring wells specified in this permit at least semiannually during the Compliance Period specified in Permit Module V.E.3.

6. The Permittee must analyze samples from the point of compliance monitoring wells for all constituents contained in Appendix IX to 40 CFR Module 264 (Permit Attachment L) at least annually during the compliance period.

G. ELEVATION OF THE GROUNDWATER SURFACE

1. The Permittee shall determine the groundwater surface elevation at each monitoring well and piezometer listed in Permit Module V.C.1. each time the groundwater is sampled, in accordance with Permit Module V.F. This information shall be submitted to the Director no later than March 1 of each year.

2. The Permittee shall report the surveyed elevation of any additional or replacement monitoring well(s), piezometers, or remediation wells when installed with as-built drawings. For any additional wells, the total depth of wells and the elevation of the following shall be recorded: top of the inner casing, ground surface and/or apron elevation, and the protective casing.

H. STATISTICAL PROCEDURES

1. When evaluating the monitoring results in accordance with Permit Module V.I., the Permittee shall determine whether there is statistically significant evidence of increased contamination for any hazardous constituent or parameters specified in the Groundwater Protection Standard (Permit Attachment K) using the statistical procedures specified in use the procedures in Permit Attachment I, Appendix 6.

2. The Permittee may elect to perform a simple empirical comparison of Point of Compliance data to the GPS (Permit Attachment K) instead of the statistical procedures specified in Permit Attachment I, Appendix 6.

3. The Permittee shall conduct all statistical procedures as specified in Permit Attachment I, Appendix 6.

I. COMPLIANCE MONITORING PROGRAM AND DATA EVALUATION

The Permittee shall determine groundwater quality as follows:

1. The Permittee shall collect, preserve, and analyze groundwater samples taken from all monitoring wells specified in this permit, at least semiannually.

2. The Permittee shall determine the concentration of hazardous constituents and/or parameters, as specified in Permit Attachment J in the groundwater at each monitoring well specified in Permit Module V.C.1. at least semiannually, in accordance with 40 CFR 264.99(a).

3. The Permittee shall determine the groundwater flow rate and direction in the uppermost aquifer at least annually.

4. The Permittee shall analyze samples from all monitoring wells at the point of compliance as specified in Permit Module V.C.1., for the constituents contained in Permit Attachment L at least annually to determine whether additional hazardous constituents are present in the uppermost aquifer.

    a. If the Permittee finds additional constituents present (i.e. not listed in Attachment J), the Permittee shall notify the Director within seven (7) days of the data being available from the laboratory. The Permittee may resample within (60) days from date of the original sampling and repeat the analysis for the detected Appendix IX to 40 CFR Part 264 constituents listed Permit Attachment L constituent(s). If resampling is intended, the Permittee shall include the proposed sampling date with the notification.

    b. If the second analysis confirms the presence of new constituents, the Permittee shall report the concentration of these constituents to the Director in writing within seven (7) days after the data is available from

the laboratory and add them to the Compliance Monitoring Program Constituent List (Permit Attachment J).

c. If the Permittee chooses not to resample, then the Permittee shall report the concentrations of these additional constituents to the Director within seven (7) days after the data is available from the laboratory and add them to the Compliance Monitoring Program Constituent List.

d. As a result of detected Appendix IX to 40 CFR Part 264 constituent(s), the Permittee may demonstrate that a source other than the Regulated Unit caused the detection pursuant to 40 CFR 264.99(i). The Director shall be notified of the Permittee's intent to make the demonstration in conjunction with either the initial notification that a new constituent was detected or with the confirmation notice after the resampling. The results of the demonstration will be submitted to the Director within ninety (90) days of the notification.

5. If the second analysis (Permit Module V.I.4.b.) confirms the presence of constituents not included in the Compliance Monitoring program or if the Permittee chooses not to resample (Permit Module V.I.4.c.), the Permittee shall establish the background values for each additional Appendix IX to 40 CFR Part 264 constituent listed in Permit Attachment L found in the groundwater in accordance with the following procedures:

   Background groundwater quality for a newly listed monitoring parameter or constituent shall be based on data from at least quarterly sampling of the specified upgradient monitoring well, as specified by Permit Module V.C.1., for one (1) year.

6. For each additional Appendix IX to 40 CFR Part 264 constituent confirmed in accordance with Permit Module V.I.4., the Director shall establish a Groundwater Protection Standard and amend Permit Attachment K. The background value determined through Permit Module V.I.4. will be utilized as the GPS under 40 CFR 264.92 if no applicable MCL is listed in the EPA Safe Drinking Water Act for that constituent or the background concentration in the upgradient well exceeds the listed MCL. The Director may establish an ACL in accordance with 40 CFR 264.94(b).

7. For each hazardous constituent identified in Permit Attachment J, the Permittee shall determine whether there is statistically significant evidence of increased contamination for any parameter or chemical constituent each time the concentration of hazardous constituents is monitored in groundwater at the compliance point; pursuant to Permit Module V.H. In determining whether such an increase has occurred, the Permittee shall compare, either statistically or empirically, the groundwater quality at each monitoring well specified in Permit Module V.C.1. of the Permit, to the background concentration for that

constituent, in accordance with the procedures specified in Permit Attachment I, Appendix 6**,** if appropriate.

a. If the appropriate statistical test indicates that the difference between the established background concentration and the downgradient well concentration is statistically significant, the Permittee shall notify the Director in writing within seven (7) days of the determination.

b. The Permittee shall perform the statistical evaluation required by Permit Module V.H**.** within 30 days from the date the analytical results are available from the laboratory performing the analyses.

8. Analytical Data Presentation
The Permittee shall present the groundwater quality at each monitoring well in a form appropriate for the determination of statistically significant increases, in accordance with 40 CFR 264.97(h). The Permittee's report shall include at least the following information: the constituents analyzed; the SW-846 test methods; method detection limits; level of quantitation; estimated quantitation limits; the internal laboratory quality assurance/quality control (QA/QC); matrix spike duplicates; percent recovery; duplicate analyses; dilution factors; any lab specific limit of detection and/or limit of quantitation; and, the results of any screening analyses.

9. Constituent Removal
If a monitoring constituent added to the semiannual monitoring list in accordance with Permit Conditions V.I.4.(b) and (c) has not been detected over a period of four consecutive sampling periods in two years, the facility may notify the Department and request to remove the constituent from the semi-annual monitoring list. The Department will consider approval of such a request, provided the detection limit for the reported data is below the applicable groundwater protection standard for the constituent. The Director's approval would be subject to the standard in 40 CFR 264.93(b).

J. COMPARISON TO GROUNDWATER PROTECTION STANDARD

At least semiannually, the Permittee shall compare the groundwater concentration of each Compliance Monitoring Program Constituent contained in Permit Attachment J from each Point of Compliance Well to the Groundwater Protection Standard (Permit Attachment K) for that constituent. The following procedures shall be used.

1. Methods of Comparison
   a. If a single independent sample was collected at the monitoring well, the Permittee shall conduct a simple empirical comparison of the GPS and the measured value.

   b. If multiple independent samples were collected from each monitoring well, a statistical comparison to the GPS, which has been approved by the

Director, shall be conducted. Guidelines for method selection are contained in Permit Attachment I, Appendix 6.

2. For constituents that have not exceeded the Groundwater Protection Standard during previous sampling events, the Permittee shall submit written notification to the Director within seven (7) days of determining that the GPS has been exceeded. The notification shall include the following:

   a. Concentration of the constituent(s) exceeding the GPS.

   b. Identification of the monitoring well where the GPS was exceeded.

   c. Map showing the extent of the groundwater contaminant plume with concentrations mapped.

3. The Permittee may make a demonstration that the groundwater protection standard as indicated in Permit Attachment K was exceeded due to sources other than the unit; errors in sampling, analysis, and evaluation; or natural variation in the groundwater. The demonstration shall be conducted as follows:

   a. Notify the Director in writing, within seven (7) days, that a demonstration will be made The Permittee shall include in the notification to the Director in Permit Module V.J.2., that the demonstration will be attempted.

   b. Resampling must be conducted within thirty (30) days of receipt of original laboratory data, not to exceed sixty days (60) from date of original sample collection.

   c. Four (4) independent samples shall be collected from the well for each constituent the Permittee includes in the demonstration. A statistical evaluation of the data shall be conducted using a statistical method approved by the Director.

   d. The Permittee must submit a report to the Director within 90 days of the notification that demonstrates a source other than the regulated unit caused the groundwater protection standard to be exceeded or that the apparent non-compliance was a result of an error in sampling, analysis, or evaluation. The Permittee must also submit to the Director within 90 days of the notification in Permit Module V.J.2. an application for a permit modification to make any appropriate changes in the Compliance Monitoring Program.

   e. The Permittee must continue to monitor in accordance with the Compliance Monitoring Program established under 40 CFR 264.99.

4. The Permittee shall specify all Groundwater Protection Standard exceedances from the reported sampling event in the Semiannual Monitoring Report.

K. REPORTING AND RECORDKEEPING

1. The Permittee shall enter all monitoring, testing, and analytical data obtained pursuant to Permit Module V.I. in the operating record. The data shall include all computations, calculated means, variances, and results of statistical tests, and shall be submitted to the Director at least annually, no later than March 1 of the calendar year, pursuant to 9 VAC 20-60-264.75.

2. The Permittee shall submit the required analytical results (Permit Parts V.E., V.I.4., and V.I.7.), whenever there is a change in flow rate or direction, or statistically significant evidence of increased contamination in one or more of the hazardous constituents being monitored, or at least annually with the groundwater annual report.

3. Pursuant to Permit Module V.J., if the Permittee determines there is a statistically significant evidence of increased contamination above the concentration limits specified in Permit Attachment K for the constituents specified in Permit Module V.C. (indicating that the groundwater protection standard is being exceeded), at any monitoring well at the point of compliance, the Permittee shall notify the Director in writing within seven (7) days.

4. The Permittee shall submit the data on static groundwater surface elevations and potentiometric contour maps with flows paths, as specified in Permit Module V.I.3., to determine whether the requirements for locating the monitoring wells continue to be satisfied at least annually. If the evaluation shows that the performance standards specified in Permit Module V.D.2. are no longer satisfied, the owner or operator shall, within ninety (90) days, submit a major permit modification request to the Director to modify the number, location, or depth of the monitoring wells to bring the groundwater monitoring system into compliance with this requirement, pursuant to 9 VAC 20-60-270.42.

L. ASSURANCE OF COMPLIANCE

The Permittee shall demonstrate to the Director that groundwater monitoring and corrective action measures necessary to achieve compliance with the groundwater protection standard under 40 CFR 264.92 are taken during the term of the Permit.

M. SPECIAL REQUIREMENT IF THE GROUNDWATER PROTECTION STANDARD IS EXCEEDED

1. The Permittee shall notify the Director, in writing, within seven (7) days if the Groundwater Protection Standard (Permit Attachment K) has been exceeded at any well for any constituent contained in Permit Attachment J pursuant to Permit

Module V.J.2. The notification must indicate specifically which concentration limits have been exceeded.

2. If the Permittee has terminated the Corrective Action Program specified in Permit Module VI.K. and Permit Attachment V with the permission of the Director, in accordance with Permit Module VI.K., and has implemented the Compliance Monitoring Program specified in Permit Module V, and the Permittee has determined that the Groundwater Protection Standard (Permit Attachment K) has been exceeded at any monitoring well, then the Permittee may request permission from the Director to re-implement the Corrective Action Program specified in Permit Module VI. The Permittee shall, within 90 days, submit to the Director a permit modification request to revise the Corrective Action Program specified in Permit Module VI in order to meet the performance standards specified in Permit Module VI.K.

3. The Permittee may make a demonstration that the groundwater protection standard as indicated in Permit Attachment K was exceeded due to sources other than a regulated unit or errors in sampling, analysis, evaluation, or natural variation in the groundwater pursuant to Permit Module V.J.3.

4. The Permittee must submit to the Director a permit modification to establish a corrective action program meeting 40 CFR 264.100 requirements within 180 days, or within 90 days if the Permittee has previously submitted an engineering feasibility study. The application shall at a minimum include the following information:

   a. A detailed description of corrective actions that will achieve compliance with the groundwater protection standard specified in Permit Module V.E.1.; and

   b. A plan for a groundwater monitoring program that will demonstrate the effectiveness of the corrective action. Such a groundwater monitoring program may be based on a compliance monitoring program developed to meet the requirements of 40 CFR 264.99.

N. REQUESTS FOR PERMIT MODIFICATION

1. If the Permittee or the Director determines the Compliance Monitoring Program no longer satisfies the requirements of 40 CFR 264.99, then within 90 days the Permittee must submit an application for a permit modification to make any appropriate changes.

2. If the Permittee or the Director determines the groundwater protection standard presented in Permit Attachment K is being exceeded, the Permittee shall submit to the Director an application for a permit modification to establish a Corrective Action Program meeting the requirements of 40 CFR 264.100 within 180 days of

receipt of the Director's determination that corrective action is required or within 90 days if the Permittee has previously submitted an engineering feasibility study.

MODULE VI

CORRECTIVE ACTION PROGRAM

A. HIGHLIGHTS

The Permittee determined that a statistically significant release had occurred at the point of compliance for their Waste Management Unit. The release included trichloroethylene (TCE), a listed hazardous waste constituent; the TCE is present at concentrations greater than the applicable groundwater protection standard (i.e. 5 µg/L). In 1998 the Permittee implemented a Base Corrective Action Program specified in Permit Attachment O in accordance with the requirements of 40 CFR 264.100 (formerly VHWMR 9 VAC 20-60-790.K).

The Base Corrective Action Program included the operation of three on-site recovery wells, the operation of an on-site air stripping and carbon filtration treatment unit, a corrective action groundwater monitoring program, acquisition of water rights of residents whose property is underlain by groundwater in which TCE has been detected and connection of these residents to a public water system, and semi-annual reports to the Director reporting the effectiveness of the Corrective Action Program.

The Base Corrective Action Program has been incorporated as an element of the final remedy for site-wide corrective action as described in Permit Module VIII.

B. UNIT IDENTIFICATION

The two sedimentation ponds and two sludge drying beds, all classified as S04 surface impoundments, were closed and shall be monitored as a single Waste Management Unit for the purposes of post-closure care, groundwater monitoring, and corrective action. The combined area of the Waste Management Unit is approximately 3/4 of an acre (see Facility Location Map, Permit Attachment B).

C. GROUNDWATER MONITORING AND REMEDIATION SYSTEM

The Corrective Action Monitoring Program requires monitoring at the downgradient point of compliance and at all wells designated as compliance monitoring wells at least semiannually. Static groundwater elevations will be measured at all wells during each sampling event.

1. The Permittee shall maintain the monitoring system, specified below, in accordance with 40 CFR 264.99. The upgradient well shall be MW-5; the four downgradient, point of compliance (POC) wells shall be MW-8b, MW-9, MW-10, and MW-11; monitoring wells MW-A, DW-1, DW-2, DW-4, and DW-3 shall be additional compliance monitoring wells. Wells DW-6, MW-1, MW-7, MW-12, MW-13 and piezometers PZ-B, PZ-C, PZ-D, PZ-E, PZ-F, PZ-G, and PZ-H shall be used to measure the static water level only. Boring logs and the completion diagrams for the above specified monitoring wells and piezometers are included as Permit Attachment I, Appendix 8.

2. The POC wells, background well, and compliance monitoring wells will be sampled in accordance with the Sampling and Analysis Plan (Permit Attachment I) and the following schedule:

   a. The background well and POC wells specified in Permit Module V.C.1. will be sampled at least semiannually for the constituents listed in Permit Attachment J. Samples for each constituent will be collected using the methods specified in Permit Attachment I and analyses shall be obtained using the EPA SW-846 Methods specified in Permit Attachment J.

   b. The compliance monitoring wells will be sampled at least semiannually for the constituents listed in Permit Attachment J. Samples for each constituent will be collected using the methods specified in Permit Attachment I and analyses shall be obtained using the EPA SW-846 Methods specified in Permit Attachment J.

   c. POC wells listed in Permit Module V.C.1. will be sampled annually for the 40 CFR Part 264 Appendix IX constituents listed in Permit Attachment L and analyses shall be obtained using the EPA SW-846 Methods specified in Permit Attachment L.

   d. Alternate SW-846 methods may be approved by the Director, provided the request is in writing and submitted 30 days prior to the sampling event. Proposed alternate methods must achieve the same Limit of Quantitation (or lower) as the specified method.

D. WELL LOCATION, INSTALLATION AND CONSTRUCTION

The Permittee shall maintain the groundwater monitoring system as specified below:

1. The Permittee shall maintain groundwater monitoring wells MW-5, MW-8b, MW-9, MW-10, MW-11, MW-A, DW-1, DW-2, DW-4, DW-3, DW-6, MW-1, MW-7, MW-12, MW-13 and piezometers PZ-B, PZ-C, PZ-D, PZ-E, PZ-F, PZ-G, and PZ-H at the locations specified on the map presented in Permit Attachment B. The Permittee shall install additional groundwater monitoring wells to further define the vertical and horizontal extent of contamination if required in accordance with the requirements of 40 CFR 264.97.

2. All groundwater monitoring wells required by this permit shall be maintained in conformance with the following:
   a. The groundwater monitoring system shall yield samples in upgradient well(s) that represent the quality of the background that has not been affected by leakage from a regulated unit, and, in downgradient wells, yield samples that represent the quality of groundwater passing the point of compliance.

b. The number and location of monitoring wells shall be sufficient to identify and define all logical release pathways from the regulated units to the uppermost aquifer based on site specific hydrogeologic characterization.

3. The Permittee shall maintain the monitoring wells identified in Permit Module V.C.1. of the Permit in accordance with the plans and specifications presented in Permit Attachment I, Appendix 8.

4. The Director must approve the addition or removal of all monitoring wells prior to installation or decommissioning.

a. All wells which are to be abandoned shall be plugged and abandoned in accordance with Permit Attachment I, Appendix 7 after the Permittee has obtained prior approval from the Director. Well plugging methods and abandonment certification shall be submitted to the Director within thirty (30) days from the date the wells are removed from the monitoring program.

b. All monitoring wells added to the existing groundwater monitoring system described in Permit Module V.C.1. must be constructed in accordance with the requirements of EPA's *RCRA Groundwater Monitoring Technical Enforcement Guidance Document* (TEGD) and approved by the Department (Permit Attachment I, Appendix 5).

E. GROUNDWATER PROTECTION STANDARD

1. The Permittee shall monitor the groundwater to determine whether regulated units are in compliance with the Groundwater Protection Standard (GPS) under 40 CFR 264.92. The GPS is based in part upon upgradient concentrations from the facility's initial background monitoring, EPA MCLs, and Alternate Concentration Limits (ACLs). ACLs are health-based standards calculated by DEQ. The hazardous constituents and their concentration limits listed in Permit Attachment K comprise the GPS.

2. For any additional hazardous constituents detected during the annual analysis of all monitoring wells at the point of compliance, as specified above in Permit Module V.C., for the CFR Appendix IX to Part 264 constituents listed in Permit Attachment L for which no accurate background values have been established at the time the Permit is issued, the Permittee shall establish accurate background values as specified below:

a. Background groundwater quality for a monitoring parameter or constituent shall be based on data from quarterly sampling of a properly installed well (or wells) upgradient from the Waste Management Unit for one (1) year.

3. The Compliance Period, during which the Groundwater Protection Standard applies, is equal to the period of time from the beginning of the Waste Management Unit's active life until the end of the closure period and begins when the Permittee initiates a Compliance Monitoring Program meeting the requirements of 40 CFR 264.99. The Compliance Period began on May 9, 1998 and shall continue until September 9, 2010. If the Permittee is required to conduct corrective action at the end of the specified compliance period, then the compliance period shall be automatically extended until the Permittee demonstrates that the GPS has not been exceeded for three consecutive years (40 CFR 264.96(c)).

F. SAMPLING AND ANALYSIS PROCEDURES

The Permittee shall use the following techniques and procedures when obtaining and analyzing samples from the groundwater monitoring wells described in Permit Module VI.C.1.:

1. Samples shall be collected using the techniques described in the Sampling and Analysis Plan (Permit Attachment I).

2. Samples shall be preserved, packed and shipped off-site for analysis if an off-site laboratory is being utilized to perform analyses in accordance with the procedures specified in the Sampling and Analysis Plan (Permit Attachment I).

3. Samples shall be analyzed in accordance with the procedures specified in Permit Attachments J and L.

4. Samples shall be tracked and controlled using the chain-of-custody procedures specified in the Sampling and Analysis Plan (Permit Attachment I).

5. The Permittee shall determine the concentration of hazardous constituents and parameters specified in Permit Attachment J at all monitoring wells specified in this permit at least semiannually during the Compliance Period specified in Permit Module VI.E.3.

6. The Permittee must analyze samples from the point of compliance monitoring wells for the Appendix IX to 40 CFR Part 264 constituents listed in Permit Attachment L at least annually during the compliance period.

G. ELEVATION OF THE GROUNDWATER SURFACE

1. The Permittee shall determine the groundwater surface elevation at each monitoring well and piezometer listed in Permit Module VI.C.1. each time the groundwater is sampled, in accordance with Permit Module VI.F. This information shall be submitted to the Director no later than March 1 of each year.

2. The Permittee shall report the surveyed elevation of any additional or replacement monitoring well(s), piezometers, or remediation wells when installed with as-built

drawings. For any additional wells, the total depth of wells and the elevation of the following shall be recorded: top of the inner casing, ground surface and/or apron elevation, and the protective casing.

H. STATISTICAL PROCEDURES

1. When evaluating the monitoring results in accordance with Permit Module VI.I., the Permittee shall determine whether there is statistically significant evidence of increased contamination for any hazardous constituent or parameters specified in the Groundwater Protection Standard (Permit Attachment K) using the statistical procedures specified in use the procedures in Permit Attachment I, Appendix 6.

2. The Permittee may elect to perform a simple empirical comparison of Point of Compliance data to the GPS (Permit Attachment K) instead of the statistical procedures specified in Permit Attachment I, Appendix 6.

3. The Permittee shall conduct all statistical procedures as specified in Permit Attachment I, Appendix 6.

I. GROUNDWATER MONITORING PROGRAM AND DATA EVALUATION

The Permittee shall determine groundwater quality as follows:

1. The Permittee shall collect, preserve, and analyze groundwater samples taken from all monitoring wells specified in this permit, at least semiannually.

2. The Permittee shall determine the concentration of hazardous constituents and/or parameters, as specified in Permit Attachment J in the groundwater at each monitoring well specified in this permit at least semiannually, in accordance with 40 CFR 264.99(a).

3. The Permittee shall determine the groundwater flow rate and direction in the uppermost aquifer at least annually.

4. The Permittee shall analyze samples from all monitoring wells at the point of compliance as specified in Permit Module VI.C.1., for all constituents contained in Permit Attachment L at least annually to determine whether additional hazardous constituents are present in the uppermost aquifer.

    a. If the Permittee finds additional constituents present (i.e. not listed in Attachment J), the Permittee shall notify the Director within seven (7) days of the data being available from the laboratory. The Permittee may resample within (60) days from date of the original sampling and repeat the analysis for the detected Appendix IX to 40 CFR Part 264 constituent(s). If resampling is intended, the Permittee shall include the proposed sampling date with the notification.

b. If the second analysis confirms the presence of new constituents, the Permittee shall report the concentration of these constituents to the Director in writing within seven (7) days after the data is available from the laboratory and add them to the Compliance Monitoring Program Constituent List (Permit Attachment J).

c. If the Permittee chooses not to resample, then the Permittee shall report the concentrations of these additional constituents to the Director within seven (7) days after the data is available from the laboratory and add them to the Compliance Monitoring Program Constituent List.

d. As a result of detected Appendix IX to 40 CFR Part 264 constituent(s), the Permittee may demonstrate that a source other than the Regulated Unit caused the detection pursuant to 40 CFR 264.99(i). The Director shall be notified of the Permittee's intent to make the demonstration in conjunction with either the initial notification that a new constituent was detected or with the confirmation notice after the resampling. The results of the demonstration will be submitted to the Director within ninety (90) days of the notification.

5. If the second analysis (Permit Module VI.I.4.b.) confirms the presence of constituents not included in the Compliance Monitoring program or if the Permittee chooses not to resample (Permit Module VI.I.4.c.), the Permittee shall establish the background values for each additional Appendix IX to 40 CFR Part 264 constituent listed in Permit Attachment L found in the groundwater in accordance with the following procedures:

   Background groundwater quality for a newly listed monitoring parameter or constituent shall be based on data from at least quarterly sampling of the specified upgradient monitoring well, as specified by Permit Module VI.C.1., for one (1) year.

6. For each additional Appendix IX to 40 CFR Part 264 constituent confirmed in accordance with Permit Module VI.I.4., the Director shall establish a Groundwater Protection Standard and amend Permit Attachment K. The background value determined through Permit Module VI.I.4. will be utilized as the GPS under 40 CFR 264.92 if no applicable MCL is listed in the EPA Safe Drinking Water Act for that constituent or the background concentration in the upgradient well exceeds the listed MCL. The Director may establish an ACL in accordance with 40 CFR 264.94(b).

7. For each hazardous constituent identified in Permit Attachment J, the Permittee shall determine whether there is statistically significant evidence of increased contamination for any parameter or chemical constituent each time the concentration of hazardous constituents is monitored in groundwater at the compliance point; pursuant to Permit Module VI.H. In determining whether such

an increase has occurred, the Permittee shall compare, either statistically or empirically, the groundwater quality at each monitoring well specified in Permit Module VI.C.1. of the Permit, to the background concentration for that constituent, in accordance with the procedures specified in Permit Attachment I, Appendix 6**,** if appropriate.

a. If the appropriate statistical test indicates that the difference between the established background concentration and the downgradient well concentration is statistically significant, the Permittee shall notify the Director in writing within seven (7) days of the determination.

b. The Permittee shall perform the statistical evaluation required by Permit Module VI.H**.** within 30 days from the date the analytical results are available from the laboratory performing the analyses.

8. Analytical Data Presentation

The Permittee shall present the groundwater quality at each monitoring well in a form appropriate for the determination of statistically significant increases, in accordance with 40 CFR 264.97(h). The Permittee's report shall include at least the following information: the constituents analyzed; the SW-846 test methods; method detection limits; level of quantitation; estimated quantitation limits; the internal laboratory quality assurance/quality control (QA/QC); matrix spike duplicates; percent recovery; duplicate analyses; dilution factors; any lab specific limit of detection and/or limit of quantitation; and, the results of any screening analyses.

9. Constituent Removal

If a monitoring constituent added to the semiannual monitoring list in accordance with Permit Conditions VI.I.4.(b) and (c) has not been detected over a period of four consecutive sampling periods in two years, the facility may notify the Department and request to remove the constituent from the semiannual monitoring list. The Department will consider approval of such a request, provided the detection limit for the reported data is below the applicable groundwater protection standard for the constituent. The Director's approval would be subject to the standard in 40 CFR 264.93(b). The preceding relief does not preclude the continued requirement of Permit Conditions VI.I.4.(b) and (c) to sample for the Appendix IX constituents listed in Permit Attachment L at least annually.

J. REPORTING AND RECORD KEEPING

1. The Permittee shall enter all monitoring, testing, and analytical data obtained pursuant to Permit Module VI.I. in the operating record. The data shall include all computations, calculated means, variances, and results of statistical tests, and shall be submitted to the Director at least annually, pursuant to 40 CFR 264.100(g).

2. The Permittee shall submit the required analytical results (Permit Parts VI.E. and VI.I.), whenever there is a change in flow rate or direction, or statistically significant evidence of increased contamination in one or more of the hazardous constituents being monitored, or at least annually with the groundwater annual report.

3. The Permittee shall submit the data on static groundwater surface elevations and potentiometric contour maps with flows paths, as specified in Permit Module VI.I.3., to determine whether the requirements for locating the monitoring wells continue to be satisfied at least annually. If the evaluation shows that the performance standards specified in Permit Module VI.D.2. are no longer satisfied, the owner or operator shall, within ninety (90) days, submit a major permit modification request to the Director to modify the number, location, or depth of the monitoring wells to bring the groundwater monitoring system into compliance with this requirement, pursuant to 9 VAC 20-60-270.42.

K. CORRECTIVE ACTION PROGRAM

1. The Permittee has implemented the Corrective Action Program specified in Permit Attachment O, pursuant to 40 CFR 264.100.

2. The Permittee's Corrective Action Program shall prevent hazardous constituents listed in the Groundwater Protection Standard (Permit Attachment K) from exceeding their respective Maximum Concentration Limits, as specified in Permit Module VI.E., at the point of compliance by removing the hazardous waste constituents or by treating them in place, pursuant to 40 CFR 264.100 (b).

3. The Permittee shall conduct a corrective action program to remove or treat in place any hazardous constituents that exceed their respective Maximum Concentration Limits, as specified in Permit Module VI.E., in the groundwater between the point of compliance and the downgradient facility property boundary, in accordance with 40 CFR 264.100(e).

4. In accordance with 40 CFR 264.100(f), the Corrective Action Program specified in Permit Attachment O, as modified, undertaken pursuant to 40 CFR 264.100, and this permit, may be terminated with the prior approval of the Director if the Maximum Concentration Limits, as specified in Permit Module VI.E and Permit Attachment K, have not been exceeded for a period of three consecutive years.

5. The owner or operator shall continue corrective action measures during the compliance period to the extent necessary to ensure that the Groundwater Protection Standard (see Permit Attachment K) is not exceeded. If corrective action is required beyond the compliance period, it shall continue for as long as necessary to achieve compliance with the Groundwater Protection Standard (see Permit Attachment K) (40 CFR 264.100(f)).

6. The Permittee shall report in writing to the Director on the effectiveness of the Corrective Action Program, and shall propose all appropriate modifications and/or additional corrective action measures. The owner or operator shall submit these reports annually (40 CFR 264.100(g)).

L. REQUESTS FOR PERMIT MODIFICATION

If the Permittee determines that their Corrective Action Program no longer satisfies the requirements of the 40 CFR 264.100, then the Permittee shall, within ninety (90) days of the determination, submit an application for a permit modification to make all appropriate changes to the program in accordance with 40 CFR 264.100(h).

MODULE VIII

SITE-WIDE CORRECTIVE ACTION

A. CORRECTIVE ACTION FOR CONTINUING RELEASES; PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

1. Section 3004(u) of RCRA, 42 United States Code (USC) § 6924(u), and regulations codified at 40 CFR § 264.101, provide that all permits issued after November 8, 1984 must require corrective action as necessary to protect human health and the environment for all releases of hazardous waste or hazardous constituents from any solid waste management unit (SWMU), regardless of when waste was placed in the unit.

2. Under Section 3004(v) of RCRA, 42 USC § 6924(v), and 40 CFR § 264.101(c), the Department may require that corrective action at a permitted facility be taken beyond the facility boundary where necessary to protect human health and the environment, unless the owner or operator of the facility concerned demonstrates to the satisfaction of the Department that, despite the owner or operator's best efforts, the owner or operator was unable to obtain the necessary permission to undertake such action.

3. Section 3005(c)(3) of RCRA, 42 USC § 6925(c)(3), and 40 CFR § 270.32(b) provide that each permit shall contain such terms and conditions as the Department determines necessary to protect human health and the environment.

B. CORRECTIVE MEASURES IMPLEMENTATION

1. Background

   a. The permittee was issued a Post-Closure Permit in 1994 for two closed hazardous waste management units (HWMUs). In 1998, the Post-Closure Permit was modified to implement a Base Corrective Action Program for groundwater at the Facility to address concentrations of TCE above the groundwater protection standard (GPS). In 2001, the DEQ issued a Hazardous and Solid Waste Amendments (1984) Corrective Action Permit (HSWA Permit) for facility-wide corrective action at solid waste management units and areas of concern (AOCs) identified at the Facility by the EPA. The HSWA Permit required the permittee to complete a RCRA Facility Investigation, implement interim measures as necessary, and complete a Corrective Measures Study (CMS). This permit was superseded in 2006 by a Hazardous Waste Management Post-Closure Permit (Permit) issued by the DEQ, which included the Base Corrective Action Program for the two (2) closed hazardous waste management units (HWMUs) and facility-wide corrective action for 39 SWMUs, two (2) HWMUs, and six (6) AOCs identified in the Facility's 2004 post-closure permit application. The RFI for all known units has been effectively

completed, and the Final RFI dated March 2004 was submitted to the Department. The CMS has been effectively completed, and the Final CMS was submitted to the Department in June 2010. In April 2010, a full scale soil vapor extraction (SVE) pilot test was initiated for the CMS using 18 extraction wells and 16 vapor monitoring points. In June 2012 an addendum to the CMS was submitted to the Department to address additional constituents of concern (COCs).

2. Final Remedy Selection

a. Based on the findings of the RFI and CMS, DEQ concluded that past operations at the Facility resulted in soil and groundwater contamination. COCs in soil and groundwater above clean up targets include the VOCs TCE and cis-1,2-dichloroethene. Additional COCs in soil above clean up targets include metals, Polycyclic Aromatic Hydrocarbons (PAHs), and PCB-1254. The permittee implemented a Base Corrective Action Program in 1998 to treat COCs in groundwater. A full scale SVE pilot study was implemented the Site in April 2010 to treat VOCs in soil in and around the identified source areas located between exterior HWMUs 9 and 3. The Final CMS evaluated the pilot study results. Documentation for completion of site-wide investigation reports and studies has been compiled by the Department, entitled Administrative Record. Based on the CMS results and the Administrative Record, the final remedy for the facility was developed and is described in the Statement of Basis dated 07/09/2012. The requirements of this Permit provide for the operation and maintenance of the remedy described in the Statement of Basis.

b. The goal of the remedy for site-wide corrective action is to ensure protection of human health and the environment. The final remedy for the Site consists of active remediation, long term groundwater monitoring, and implementing Institutional Controls and Engineering Controls. Institutional Controls (ICs) are generally non-engineered mechanisms such as administrative and/or legal controls that minimize the potential for human exposure to contamination and/or protect the integrity of a remedy. Engineering Controls (ECs) are generally engineered mechanisms such as a landfill cap.

c. The details of the final remedy are summarized below and will be described in more detail in the site specific Corrective Measures Implementation (CMI) Work Plan required by this Permit. Minor modifications in the activities, studies, techniques, procedures, and designs or schedules utilized in carrying out the requirements of this Permit and necessary for the O&M and/or completion of the remedy may be made by written agreement of the Project Coordinators. Remedial goals and clean up targets are contained in Attachment P of this Permit.

1. Continued operation of the existing onsite groundwater pump and treat system until groundwater remedial goals and clean up targets are achieved.

2. Continued long-term performance monitoring of groundwater to verify the effectiveness and progress of the groundwater remedy in achieving remedial goals and clean up targets.

3. Continued operation of the existing SVE system until soil remedial goals and clean up targets are achieved for VOCs.

4. Implementation and maintenance of ICs and ECs including property use restrictions for soil and groundwater in accordance with Permit Section VIII.B.3 below until soil and groundwater remedial goals and clean up targets are achieved.

3. Final Remedy Implementation

a. Within ninety (90) days of the effective date of Permit modification incorporating the final remedy, the Permittee shall submit to the DEQ for approval a CMI Work Plan for operation and maintenance of both the SVE system and the groundwater pump and treat system, long-term groundwater monitoring, remedial effectiveness monitoring for soil and groundwater, and implementation of ICs, ECs, and additional property use restrictions. ICs, ECs, and additional restrictions to be used at the Site shall;

1. Notify prospective buyers of the property of the environmental conditions at the Site and of DEQ's selected corrective measures as part of the final remedy under RCRA Corrective Action;

2. Prohibit use of the property for residential purposes (including single family homes, multiple family dwellings, schools, day care facilities, child care centers, apartment buildings, dormitories, other residential style facilities, hospitals, and in-patient health care facilities) until soil remedial goals and clean up targets are achieved;

3. Prohibit the use of groundwater beneath the property except for non-contact cooling water and purposes to support selected corrective measures. No new wells will be installed on Facility property unless it is demonstrated to VDEQ that such wells are necessary to implement the final remedy and VDEQ provides prior written approval to install such wells;

4. Require vapor barriers be utilized in or beneath new, totally enclosed structures designed for occupation within the foot print of the VOC soil remediation area;

5. Restrict subsurface soil excavation within the footprint of the VOC soil remediation area, the footprint of the soil management area identified in the CMS, and within any areas with contaminants in soil above residential levels except in conformance with an appropriate soil management plan that has been approved by VDEQ. All earth moving activities, including excavation, drilling and construction activities, in the areas at the Facility where any contaminants remain in soils above EPA's Screening levels for residential use or groundwater above Federal MCLs/Tap Water RBCs, shall be prohibited unless it is demonstrated to VDEQ that such activity will not pose a threat to human health or the environment or adversely affect or interfere with the selected remedy, and VDEQ provides prior written approval for such use;

6. Maintain any current soil cover (concrete floor, asphalt, etc.) in the soil management area identified in the CMS;

7. Continue to administer and maintain off-site institutional and engineering controls specified in the Statement of Basis;

8. Owner agrees to provide VDEQ with a "Certified, True and Correct Copy" of any instrument that conveys any interest in the Facility property or any portion thereof; and

9. Restrict activities that would interfere with or adversely impact the remedy.

b. The Permittee shall, at a minimum, include notice of the property use restrictions in the deed for the property and notify the local health authority utilizing mechanisms specified in the Statement of Basis, and shall notify the DEQ in writing of any proposed changes in the use of the property or proposals for any site work that affects the contamination or its disposition on the property.

c. The Permittee shall, at a minimum, provide coordinate surveys for applicable property use restrictions that meet the following requirements:
   - Define the boundary of each use restriction as a polygon
   - Establish the longitude and latitude of each polygon vertex as follows
     - Decimal degrees format
     - At least seven decimal places
     - Negative sign for west longitude
     - WGS 1984 datum

C. EVALUATION OF THE SELECTED REMEDY

Commencing one year from the effective date of this modified Permit, the Permittee shall submit an annual progress report on the corrective measure(s) remedy performance and continue to submit annual groundwater monitoring and remedial measures reports until remedial goals and clean up requirements have been met. If the Department determines that the selected corrective measure(s) remedy will not comply with the media clean up requirements, the Department may require the Permittee to perform additional studies and/or perform modifications to the existing corrective measure(s) remedy. If necessary, the Department or the Permittee may seek modification of this Permit pursuant to 40 CFR § 270.41 or § 270.42 and § 124.5 to implement modifications to the existing Corrective Measures Remedy.

D. EMERGENCY RESPONSE; RELEASE REPORTING

1. Emergencies

   If, at any time during the term of this Permit, the Permittee discovers that a release of hazardous waste or hazardous constituents at or from the Facility is presenting or may present an imminent and substantial endangerment to human health or the environment, and such release is not subject to Contingency Plan and Emergency Procedures as defined in the portion of the RCRA Permit issued by the Department, the Permittee shall:

   a. Notify the Department as soon as practicable of the source, nature, extent, location and amount of such release, the endangerment posed by such release and the actions taken and/or to be taken, to the extent known, to address such release. Such notification shall be confirmed in writing within three (3) days of discovery of such release.

   b. Unless otherwise directed by the Department, immediately take such actions as are necessary and appropriate to address such release.

2. Releases

   The Permittee shall notify the Department in writing of the nature, source, extent, location of a release of hazardous waste or hazardous constituents at or from the Facility within seven (7) days of discovery of such release which:

   a. Is not being addressed by corrective measures at the time of such discovery.

   b. Is not being addressed pursuant to permit conditions VIII.D.1., Emergencies.

   c. Is not subject to the Contingency Plan and Emergency Procedures as set forth in the portion of the RCRA Permit issued by the Department.

3. Based on the information submitted in permit conditionVIII.D.2 (Releases), the Department may require the SWMU and/or AOC to be included in an ongoing RCRA Facility Investigation or may require Interim Measures.

4. Nothing in this Permit shall limit the Department's authority to undertake or require any person to undertake response action or corrective action under any law, including but not limited to, Sections 104 or 106 of CERCLA, 42 USC § 9604 or 9606, and Section 7003 of RCRA, 42 USC § 6973. Nothing in this Permit shall relieve the Permittee of any obligation it may have under any law, including, but not limited to, Section 103 of CERCLA, to report releases of hazardous waste, hazardous constituents or hazardous substances to, at or from the Facility.

E. GUIDANCE DOCUMENTS

Any corrective action performed at the facility shall be in general accordance with applicable EPA RCRA corrective action guidance available at: http://www.epa.gov/reg3wcmd/ca/ca_resources.htm.

F. SOLID WASTE MANAGEMENT UNIT (SWMU) ASSESSMENT

1. The Permittee shall notify the Department and the EPA Region 3, in writing, of any newly identified SWMU at the Facility, no later than thirty (30) days after the date of discovery. The notification shall include, but is not limited to, the following known information:

   a. A description of the SWMUs type, function, dates of operation, location (including a map), design criteria, dimensions, materials of construction, capacity, ancillary systems (e.g., piping), release controls, alterations made to the unit, engineering drawings, and all closure and post-closure information available, particularly whether wastes were left in place.

   b. A description of the composition and quantities of solid wastes processed by the units with emphasis on hazardous wastes and hazardous constituents.

   c. A description of any release (or suspected release) of hazardous waste or hazardous constituents originating from the unit. Include information on the date of release, type of hazardous waste or hazardous constituents, quantity released, nature of the release, extent of release migration, and cause of release (e.g., overflow, broken pipe, tank leak, etc.). Also, provide any available data that quantifies the nature and extent of environmental contamination, including the results of soil and/or groundwater sampling and analysis efforts. Likewise, submit any existing monitoring information that indicates releases of hazardous waste or hazardous constituents has not occurred or is not occurring.

d. A discussion of the need for and feasibility of implementing interim measures immediately.

2. Upon receipt of the notification of any newly identified SWMU, the Department will determine the need for corrective action at such SWMU. If corrective action is necessary to protect human health or the environment, the Department will determine whether a RCRA Facility Investigation will be performed and the need for and scope of any Interim Measures for a newly identified SWMU.

3. Within sixty (60) days after receipt of the Director's determination that a RCRA Facility Investigation or Interim Measures is necessary, the Permittee shall submit a RCRA Facility Investigation Work Plan or Interim Measures Work Plan that meets the applicable guidance. The Department's determination shall either specify the media and/or parameters to be investigated or shall require the Permittee to propose and justify the selection of media and/or parameters.

4. Within the time specified in the approved RCRA Facility Investigation Work Plan or Interim Measures Work Plan, the Permittee shall submit the RCRA Facility Investigation Report or Interim Measures Report. The reports will provide all data necessary for the Department to determine whether a Corrective Measures Study or additional Interim Measures Work Plan is required.

5. In lieu of a separate RCRA Facility Investigation, the Permittee may propose either to incorporate any newly identified SWMU into ongoing corrective measures. Any such proposal shall be submitted to the Department along with the notification of the discovery of the SWMU(s).

G. FINANCIAL ASSURANCE

1. Initial Cost Estimate

Assurances of financial responsibility for corrective action must be provided in accordance with conditions herein. Within ninety (90) calendar days of receipt of the Department's written approval of the final remedy, the Permittee shall submit an initial cost estimate for completing the approved remedy(ies). The initial estimate may be based on the Corrective Measure Study, the approved remedy(ies), or any other available information.

2. Cost Estimate Updates

The initial cost estimate for the approved remedy(ies) shall be updated pursuant to any changes or modifications to the final remedy approved by the Department. Within ninety (90) calendar days of receipt of Department's written approval of modifications to the final remedy, the Permittee shall submit an updated cost estimate to the Department.

3. Financial Assurance Demonstration

Within thirty (30) calendar days of approval of the initial cost estimate for financial assurance, the Permittee shall demonstrate compliance with financial

assurance to the Department for completing the approved remedies in accordance with 40 C.F.R. § 264.101(b). Within thirty (30) calendar days of approval of any updated and/or revised cost estimate, the Permittee shall demonstrate to the Department financial assurance for the updated cost estimates.

H. RECORDKEEPING

Upon completion of closure of any SWMU, the Permittee shall maintain in the Facility operating record, documentation of the closure measures taken.

I. ACCESS FOR CORRECTIVE ACTION OVERSIGHT

The Department and its authorized representatives shall have access to the Facility at all reasonable times for the purpose of monitoring compliance with the provisions of this Permit. The Permittee shall use its best efforts to obtain access to property beyond the boundaries of the Facility at which corrective action is required by this Permit (see Section 3004(v) of RCRA, 42 USC § 6924(v) and 40 CFR § 264.101(c)); (1) for itself and any contractor of the Permittee for the purpose of taking corrective action required by this Permit, and (2) for Department and its authorized representatives for the purposes described in this paragraph.

J. COMPLETION OF REMEDY

If any of the institutional or engineering controls are no longer necessary to protect human health and the environment, the Permittee shall submit a written notification and certification to the Department by registered mail, stating that the remedy has been completed in accordance with requirements of this Permit and requesting removal of the controls from the Permit. The certification must be signed by the Permittee and by an independent registered professional engineer.

In cases where no other Permit conditions remain, the Permit may be modified not only to reflect the determination that remedy controls are no longer necessary, but also to change the expiration date of the Permit to allow for earlier permit expiration in accordance with 40 CFR § 124, § 270.41, and § 270.42 as applicable.

ATTACHMENT E

POST-CLOSURE CARE PLAN:
HAZARDOUS WASTE LANDFILL

(CLOSED SURFACE IMPOUNDMENTS AND SLUDGE DRYING BEDS)

ATTACHMENT E

POST-CLOSURE CARE PLAN: HAZARDOUS WASTE LANDFILL (CLOSED SURFACE IMPOUNDMENTS AND SLUDGE DRYING BEDS)

A. INTRODUCTION

1. The post-closure care shall continue for 30 years after certification of closure (June 14, 1983) and consists of the following:

   a. Monitoring and reporting in accordance with the requirements of 40 CFR 264 Subpart F and this permit.

B. INSPECTION AND MAINTENANCE SCHEDULE

1. Benchmarks

   Benchmarks must be installed to act as points of reference for locating the boundaries of the hazardous waste landfill and to detect any changes such as subsidence that may impact the facility. Benchmarks must be installed by a certified land surveyor. Their location and elevation must be tied into the property boundary and are recorded in the deed to the property. The location and elevation of the benchmarks shall be determined annually and any changes noted in the log book. The benchmark shall be inspected monthly for any disturbance and maintained as necessary to sustain their intended use.

2. Groundwater monitoring wells

   At least monthly, inspect and maintain all monitoring wells and piezometers to sustain their original intended purpose. Monitoring well locking caps shall be locked at all times except when the monitoring wells are being sampled or maintained. Protective concrete aprons shall be inspected for subsidence and breakage. Monitoring wells shall be replaced or repaired as necessary.

3. Inspection of air stripping and/or carbon filtration units.

   At least daily, when in use, inspect all air stripping and/or carbon filtration units to detect deterioration or malfunction. Air stripping and/or carbon filtration units shall be replaced or repaired as necessary.

4. Security

   Adequate security shall be maintained to prohibit unauthorized access to the closed landfills and sludge drying beds. Fencing exists across portions of the northern property boundary and along the western property boundary. Security of the waste management area is maintained by security cameras and by on-site security personnel during off-shift periods and during weekends. The facility operator shall inspect the fencing at least monthly.

5. Records

   All inspections shall be logged and detailed inspection reports written. The logged reports of each inspection shall be maintained at the Permittee's Blacksburg Plant during the entire post-closure care period. The inspection results and groundwater sampling and analysis results shall be available at the facility for the Department of Environmental Quality representatives during periodic on-site inspections of the facility.

C. FACILITY CONTACT

The Federal-Mogul Corporation contact during the post-closure care period shall be:

Mr. Rocky Martin
Environmental Health and Safety Manager
Federal-Mogul Corporation
300 Industrial Park Road SE
Blacksburg, Virginia 24060-6699
Phone: (540)557-3344
Rocky.Martin@federalmogul.com

D. LANDFILL POST-CLOSURE CARE COST ESTIMATE

The following cost data has been calculated over a 8.5-year period utilizing an appropriate schedule of events for the two closed surface impoundments and two sludge drying beds of approximately 3/4 acres.

Activity	Unit Rate ($)		Units	Cost Per Year ($)	Number of Years	Total Cost for Post-Closure Period ($)
Final Cover Care and Maintenance						
Mowing	125	event	12	1,500	2.5	3,750
Fertilizing	200	event	1	200	2.5	500
Erosion Repair (1 events in 2.5 yrs)	1200	event	1	343	2.5	857
Vegetation Repair (1 event in 2.5 yrs)	500	event	1	143	2.5	357
Post-Closure Care						
Monthly Inspection	15.5	hour	12	186	2.5	465
Monthly Clerical	15.5	hour	6	93	2.5	233
Annual Post-Closure Training	500	year	1	500	2.5	1,250
Annual Benchmark Survey	1800	event	1	1,800	2.5	4,500
Monitoring Well Maintenance						
Maintenance and Repair	150	event	1	150	2.5	375
Replacement and Abandon (1 Well in 2.5 yrs)	4000	well	1	1,143	2.5	2,857
Post-Closure Groundwater Monitoring						
Dedicated Pump System O&M	3000	event	1	462	2.5	1,154
Semi-Annual Groundwater Sampling (10 Wells)	10400	event	2	20,800	2.5	52,000
Semi-Annual Lab Analysis of 10 Wells + QA/QC with App IX	25000	year	1	25,000	2.5	62,500
Offsite Monitoring						

Activity	Unit Rate ($)		Units	Cost Per Year ($)	Number of Years	Total Cost for Post-Closure Period ($)
Groundwater and Surface Water Sampling	6000	year	1	6,000	2.5	15,000
Laboratory Analysis	2800	year	1	2,800	2.5	7,000
Data Analysis and Reporting						
Federal Mogul Permit Administration and Reporting	250	month	12	3,000	2.5	7,500
Data Review and Analysis	3000	year	1	3,000	2.5	7,500
Semi-Annual Report	10700	report	1	10,700	2.5	26,750
Annual Report	11500	report	1	11,500	2.5	28,750
Groundwater Remediation System O&M						
Electricity	7600	year	1	7,600	2.5	19,000
VPDES Permit Weekly Monitoring for TCE & pH	87	event	52	4,500	2.5	11,250
VPDES Permit Semi-Annual Monitoring	450	event	2	900	2.5	2,250
VPDES Permit Quarterly Toxics Monitoring	7000	year	1	7,000	2.5	17,500
VPDES Permit - Once per Term Sampling (1 event in 4.5 yrs)	1700	event	1	378	2.5	944
GAC Replacement	7000	year	1	7,000	2.5	17,500
Daily O&M Inspection	15.5	hour	182.5	2,829	2.5	7,072
System O&M Labor, Equip, Supplies, Repairs, Sampling, Data Mgt	31500	year	1	31,500	2.5	78,750
Laboratory Analysis of System Samples	850	event	12	10,200	2.5	25,500
Post Closure Total Costs				**$161,226**		**$403,064**

Modified June 2011

ATTACHMENT H

PERSONNEL AND TRAINING

ATTACHMENT H

PERSONNEL AND TRAINING

A. PERFORMANCE STANDARDS

1. Facility personnel shall successfully complete a program of classroom instruction or on-the-job training that teaches them to perform their duties in a way that ensures the facility's compliance with the post-closure care, monitoring requirements, and corrective actions specified in this permit.

2. This program shall be directed by a person trained in hazardous waste management procedures, and shall include instruction that teaches facility personnel procedures (including contingency plan implementation) relevant to the positions in which they are employed.

3. The Permittee shall ensure that this program includes, where applicable: training in hazardous waste management procedures, effective response to emergencies to include knowledge of emergency procedures, emergency equipment, emergency systems, monitoring equipment, communications or alarm systems, response to fires or explosions, response to groundwater contamination incidents, and shutdown of operations.

4. All personnel, including contractors, who are actively associated, or may be associated, with the groundwater monitoring program are required to read the Permittee's Post-Closure Plan and/or Sampling and Analysis Plan as appropriate. The personnel shall be trained to properly perform their assigned duties including, but not limited to, conducting inspections required by this permit, obtaining samples from groundwater monitoring wells, and maintaining documentation in accordance with the requirement of this permit.

B. REQUIREMENT TO COMPLETE TRAINING PROGRAM WITHIN SIX MONTHS

Facility personnel shall successfully complete the training program within six months after the date of their employment or assignment to a facility, or to a new position at a facility, whichever is later. New employees shall not work in unsupervised positions until they have completed the training requirements of this part and shall complete required training program within six months of their employment start date.

C. ANNUAL REVIEW REQUIREMENTS

Facility personnel shall take part in an annual review of the required initial training.

D. RECORDKEEPING FOR THE TRAINING PROGRAM

The Permittee shall maintain the following documents and records at the facility:

1. The job title for each position at the facility related to hazardous waste management, and the name of the employee filling each job;

2. A written job description for each position listed under this part. This description may be consistent in its degree of specificity with descriptions for other similar positions in the same company location or bargaining unit, but shall include the requisite skill, education, or other qualifications, and duties of facility personnel assigned to each position.

3. A written description of the type and amount of both introductory and continuing training that will be given to each person filling a position listed under this part;

4. Records that document that the training or job experience required by this part has been given to, and completed by, facility personnel.

E. REQUIREMENT TO MAINTAIN RECORDS

Training records on current personnel shall be kept until closure of the facility. Training records on former employees shall be kept for at least three years from the date the employee last worked at the facility. Personnel training records may accompany personnel transferred within the same company.

F. POSITION DESCRIPTIONS

Appendix 1 of Permit Attachment I provides a summary of the position descriptions for personnel who have or may be given tasks associated with post-closure care and monitoring activity.

G. POST-CLOSURE CARE TRAINING DIRECTOR

The Permittee's Environmental, Health, and Safety Manager shall be responsible for the overall training program, scheduling and documentation of such training, and shall serve as the post-closure care Training Director.

ATTACHMENT I

GROUNDWATER MONITORING PROGRAM
SAMPLING AND ANALYSIS PLAN

ATTACHMENT I

GROUNDWATER MONITORING PROGRAM SAMPLING AND ANALYSIS PLAN

I. SAMPLING

A. INTRODUCTION

Federal regulations at 40 CFR§270.14(c)(5), 270.14(c)(6)(iv), and 270.14(c)(7)(vi) require a description of the sampling, analysis, and statistical comparison procedures proposed for evaluating groundwater monitoring data. In addition, §§264.97(d) and 264.97(e) outline minimum procedures and techniques for groundwater monitoring programs implemented pursuant to 40 CFR Part 264 Subpart F. These regulations require that groundwater monitoring programs include measurement, sampling, and analytical methods that accurately assess groundwater quality, and that provide early detection of hazardous constituents released to groundwater.

The Monitoring Program requires monitoring at the downgradient point of compliance and at all wells designated as compliance monitoring wells at least semiannually. Static groundwater elevations will be measured at all wells during each sampling event.

The Permittee shall maintain the monitoring system, specified below, in accordance with 40 CFR 264.99. The upgradient well shall be MW5; the four downgradient, point of compliance (POC) wells shall be MW-8b, MW 9, MW 10, and MW 11; monitoring wells MW A, DW 1, DW 2, DW 4, and DW 5 shall be additional compliance monitoring wells. Wells DW-6, MW-1, MW-7, MW-12, MW-13 and piezometers PZ B, PZ C, PZ D, PZ-E, PZ-F, PZ-G, and PZ H shall be used to measure the static water level only. Boring logs and the completion diagrams for the above specified monitoring wells and piezometers are included as Permit Attachment I, Appendix 8.

B. SAMPLING FREQUENCY

Background, point of compliance wells, and compliance wells will be sampled semiannually for the constituents in Permit Attachment J.

Groundwater samples will be collected and analyzed for the Appendix IX to 40 CFR § 264 constituents listed in Permit Attachment L at least annually at each point of compliance well. Permit Attachment L lists the parameters, constituents, and test methods required for the Appendix IX analyses. The Permittee may resample for any newly detected Appendix IX constituent within 30 days to confirm or refute the detection. All newly confirmed Appendix IX constituents must be added to the Monitoring List (Permit Attachment J) and be analyzed semiannually.

C. FIELD METHODS

The following activities should be performed prior to collecting ground-water samples for analysis:

- Measurement of static water level elevation;
- Detection and sampling of immiscible layers; and
- Well purging.

1. Measurement of Static Water Level Elevations:
Prior to purging each well, both the static water level (SWL) and the depth to the bottom of the well shall be measured to ±0.01 foot. Well measurements will be made using an electronic water level probe, referenced to a predetermined mark at the top of the well casing. The elevation of the top of the well casing (with locking cap removed) will be established to an elevation ±0.01 foot, in relation to the existing landfill datum, which will be established from a National Geodetic Vertical Datum.

   The static groundwater surface elevations obtained prior to each sampling event shall be used to create potentiometric maps to determine whether the requirements for locating the monitoring wells continues to be satisfied. If the potentiometric maps reveal that the depths, location, or number of wells is insufficient to monitor hazardous waste constituents migrating from the waste management area, new well locations and depths will be submitted to the Department for their approval and subsequent installation and monitoring. Any new wells will be installed prior to the next regularly scheduled groundwater sampling event.

   Upgradient wells and wells where constituents have not historically been noted will be measured first, followed by wells where constituents have been noted. All measurements for each well will be recorded in the Groundwater Log. Measurements that do not correlate with the previous trends will be verified in the field with different measurement technology, if necessary.

2. Calculation of Static Water Volume:
The static water level and total depth will be used to calculate the volume of stagnant water in the well and provide a check on the integrity of the well (e.g., identify siltation problems), as well as characterize changes in hydraulic conditions that may occur over time. The static water level measuring device used will be constructed of inert materials and thoroughly decontaminated prior to each use to prevent cross contamination from one well to another. The meter will be decontaminated by washing with non-phosphate detergent and rinsing three times with de-ionized water prior to air-drying. Decontamination fluid will be containerized and disposed of in an on-site wastewater treatment system if available or a publicly owned treatment facility with approval. Sampling members will wear clean gloves during sampling and shall change gloves between sampling each well at a minimum.

3. Immiscible Layers:
Each well shall be tested for the presence of immiscible fluids prior to well evacuation and sample collection. The procedures for testing for immiscible fluid layers are as follows:

   a. Air in the wellhead will be screened for organic vapors using a photo ionization detector or other appropriate device.

   b. An electronic interface probe or other appropriate device capable of detecting light and dense immiscible fluids will be lowered into the well to determine the existence of any immiscible layers.

   c. If immiscible layers are detected, immiscible phases will be collected prior to any purging activities.

4. Well Purging
The volume of stagnant water in each well will be determined prior to well evacuation based on the static water level, well depth, well diameter, filter pack length, and borehole diameter. Three volumes of the pore space of the screen filter pack and three volumes of the well casing will be purged prior to sampling if possible. The volume of stagnant water to be purged shall be calculated according to the formulae presented in Appendix 2 of this Attachment. Purge volume calculations will be recorded in the Groundwater Log shown in Appendix 1 of this Attachment.

   a. If the wells prove to be low yield, wells will be evacuated to dryness once and will be purged at a rate which will not cause recharge water to be excessively agitated. Dry and low recharge rates will be noted in the field observations.

   b. All purge water will be containerized and disposed of in an on-site wastewater treatment system if available or a publicly owned treatment facility with approval.

   Stabilization parameters pH, temperature, conductivity, and turbidity will be measured at the start and end of sampling as a check on the stability of the water samples over time. Four (4) replicate measurements of pH and specific conductivity will be recorded in the Groundwater Log shown in Attachment 1 for each groundwater sample. In addition to the start and end measurements, additional measurements will be taken for each well volume. All purging equipment that has been or will be in contact with groundwater should be decontaminated prior to use (See Section I.C.6.). Decontamination water should be stored in appropriate containers and disposed of per I.C.4.b.

5. Groundwater Sampling Equipment:

The DEQ prefers that all sampling equipment be dedicated to a particular well. The following recommendations apply to the selection of sampling equipment:

- Sampling equipment should be chosen based on the analytes of interest and the characteristics and depth of the saturated zone from which the sample is withdrawn. For example, the choice of sampling equipment should reflect consideration of the potential for LNAPLs and DNAPLs.

- Sampling equipment should be constructed of inert material. Sample collection equipment should not alter analyte concentrations, cause loss of analytes via sorption, or cause gain of analytes via desorption, degradation, or corrosion.

- Sampling equipment should be designed such that Viton®, Tygon®, silicone, or neoprene components do not come into contact with the ground-water sample.

- Sampling equipment should cause minimal sample agitation and should be selected to reduce/eliminate sample contact with the atmosphere during sample transfer. Sampling equipment should not allow volatilization or aeration of samples to the extent that analyte concentrations are altered.

6. <u>Decontamination:</u>

When dedicated equipment is not used for sampling (or well purging) or when dedicated equipment is stored outside of the well, it will be thoroughly decontaminated between wells by disassembling and washing with (non-phosphate) detergent, thoroughly rinsed with de-ionized water, and air dryed. All equipment coming in contact with media suspected of being contaminated will be decontaminated before it contacts a media which is likely to be less contaminated or uncontaminated.

All non-dedicated groundwater sampling equipment will be cleaned over a decontamination pad after each use in the following manner:

- Rinse with tap water.
- Wash with a non-phosphate laboratory detergent and tap water.
- Rinse with distilled water
- Wash with laboratory-grade methanol or isopropanol
- Triple rinse with de-ionized, distilled water
- Allow to air dry.

If the equipment is not to be used again immediately, it should be packaged and properly stored to protect it from dust and dirt. Equipment may be wrapped in aluminum foil (shiny side on the outside) and placed in a plastic bag. A label should be affixed to the outside wrapping summarizing the decontamination

procedure and stating the date of decontamination. Decontaminated sampling equipment should not be placed on the ground or on other contaminated surfaces prior to insertion in the well.

The decontamination pad will be lined with polyethylene sheeting and sloped to promote drainage towards one corner into an in-ground container. This will facilitate removal of any potentially contaminated decontamination fluids. The fluids will be collected, contained, labeled, and stored in U.S. Department of Transportation (DOT)-approved 55 gal drums. All decontamination fluids will be managed and disposed of in accordance with the DEQ Investigation-Derived Waste Policy. Disposable items will be disposed of as solid waste in an approved, permitted landfill.

7. Groundwater Sample Collection

Monitoring well sampling should always progress from the well that is the least contaminated to the well that is the most contaminated, to minimize the potential for cross-contamination of samples that may result from inadequate decontamination of sampling equipment. Samples should be collected and containerized according to the volatility of the target analytes. The preferred collection order for some of the more common groundwater analytes is as follows:

- Volatile organics and total organic halogens
- Dissolved gases and total organic carbon
- Semi-Volatile Organics
- Pesticides/herbicides
- PCBs
- Metals and cyanide
- Total Phenols
- Major water quality cations and anions (sulfate, chloride, etc.)
- Nitrate

A sample collecting bottle kit should be prepared from the sample parameter list in accordance with approved sample analysis methods (see Appendix 4). The sample kit should be stored in clean coolers for transport to the site. To preserve sample integrity, all samples should be collected in precleaned containers, preserved when required, and stored at the appropriate temperature. The containers shall be shipped with caps that are securely fastened. Samples shall be transferred directly from the sampling device to the sample containers.

The following recommendations apply to the use and operation of groundwater sampling equipment:

- Check valves should be designed and inspected to ensure that fouling problems do not reduce delivery capabilities or result in aeration of samples.

- Sampling equipment should never be dropped into the well, as this will cause degassing of the water upon impact.

- Contents of the sampling device should be transferred to sample containers in a controlled manner that will minimize sample agitation and aeration.

- Decontaminated sampling equipment should not be allowed to come into contact with the ground or other contaminated surfaces prior to insertion into the well.

- Ground-water samples should be collected as soon as possible after the well is purged. Water that has remained in the well casing for more than about 2 hours has had the opportunity to exchange gases with the atmosphere and to interact with the well casing material.

- The rate at which a well is sampled should not exceed the rate at which the well was purged. Low sampling rates, approximately 0.1 L/min, are suggested. Pumps should be operated at rates less than 0.1 L/min when collecting samples for volatile organics analysis.

- Pump lines should be cleared at a rate of 0.1 L/min or less before collecting samples for volatiles analysis so that the samples collected will not be from the period of time when the pump was operating more rapidly.

- Pumps should be operated in a continuous, non-pulsating manner so that they do not produce samples that are aerated in the return tube or upon discharge.

- When sampling wells that contain LNAPLs, a stilling tube should be inserted in the well. Groundwater samples should be collected from the screened interval of the well below the base of the tube.

- Groundwater samples collected for analysis for organic constituents or parameters should not be filtered in the field.

D. FIELD AND LABORATORY QA/QC PROGRAM

Field Quality Assurance/Quality Control (QA/QC) requires the routine collection and analysis of blanks to verify that the sample collection and handling process has not affected the quality of the samples. Both field and laboratory QC samples should be

prepared during the sampling event. It is recommended that the following samples be analyzed with each batch of samples (a batch may not exceed 20 samples):

- One field duplicate;
- One equipment rinsate (required only when non-disposable equipment is being used);
- One matrix spike (when appropriate for the method); and
- One duplicate sample (either a matrix duplicate or a matrix spike duplicate).

A trip blank should be prepared and analyzed when samples are being analyzed for volatile organic analytes. A trip blank should be submitted with samples each day that samples are collected.

1. All field QC samples should be prepared exactly as regular investigation samples with regard to sample volume, containers, and preservation. The concentrations of any contaminants found in blank samples should not be used to correct the groundwater data. The contaminant concentrations in blanks should be documented, and if the concentrations are more than an order of magnitude greater than the field sample results, the Permittee should resample the groundwater. Other QA/QC practices such as sampling equipment calibration, equipment decontamination procedures, and chain-of-custody procedures are discussed in other sections of this Attachment.

2. Laboratory QA/QC Program
   The permitte's laboratory should provide for the use of control samples. The Permittee should use appropriate statistical procedures to monitor and document performance and to implement an effective program to resolve testing problems (e.g., instrument maintenance, operator training). Data from control samples (e.g., spiked samples, duplicates, and blanks) should be used as a measure of performance or as an indicator of potential sources of cross-contamination. All QC data should be submitted to the Department with the groundwater monitoring sample results.

3. At a minimum, all field instruments should be calibrated at the beginning of each use and in accordance with the frequency suggested by the manufacturer. Field instruments should be calibrated using at least two calibration standards spanning the range of results anticipated during the sampling event. For example, if groundwater pH is expected to be near pH 7, the two standards used to calibrate the pH meter should be pH 4 and pH 10, respectively.

E. SAMPLE HANDLING AND CHAIN-OF-CUSTODY

Sample handling will be strictly controlled to prevent sample contamination. Chain-of-Custody control for all samples will consist of the following:

1. Labels will be placed on individual sample containers while sampling indicating the sampler's name, date and time of sample collection, place of collection, and preservation method used for the sample.

2. A custody seal should be placed on the shipping container or on the individual sample bottles. Custody seals provide prevention or easy detection of sample tampering. The custody seal should bear the signature of the collector and the date signed. The custody seal can be placed on the front and back of a cooler, around the opening of a polyethylene overpack bag or on the lid of each sample container.

3. No sample should be brought back to the laboratory for preservation. It is recommended that two polyethylene overpack bags be used in shipping. The first will contain the sample bottles, the second the ice needed to keep the samples at 4^{o} C. A temperature history of the samples should be maintained as a quality control measure. Upon receipt of the shipment, the laboratory should record the temperature on the chain-of-custody record. Holding time refers to the period that begins when the sample is collected from the well and ends with its extraction or analysis.

4. A chain-of-custody record should be completed and should accompany every sample shipment. The chain-of-custody record should contain enough copies so that each person possessing the shipment receives his/her own and should be designed to allow the Permittee to reconstruct how and under what circumstances a sample was collected, including any problems encountered. An example of a chain-of-custody form that includes the necessary information is included as Appendix 3.

5. Samples will be packaged and labeled for shipment in compliance with current U.S. Department of Transportation regulations. All samples will be shipped priority/overnight via commercial carrier or hand delivered to the lab.

6. Samples will arrive at the laboratory via the overnight delivery service or hand delivery. Upon delivery to the laboratory, the ice chests will be checked for intact custody seals and the samples will be unpacked and the information on the accompanying chain of custody records will be examined. If the samples shipped match those described on the chain-of-custody form, the laboratory sample coordinator will sign the form and assume responsibility for the samples. If problems are found with the sample shipment, the laboratory sample custodian will sign the form and record the problems in the "remarks" section.

7. Any missing samples, missing sample tags, broken sample bottles, or unpreserved samples will be noted on the chain-of-custody record. If there are problems with individual samples, the sample custodian will inform the laboratory coordinator of such problems. The laboratory custodian will then contact the Permittee to determine a viable solution to the problem.

8. All information relevant to the sample will be secured at the end of each business day. All samples will be stored in a designated sample storage refrigerator, access to which will be limited to laboratory employees.

F. FIELD LOGBOOK

Field technicians will keep an up-to-date field logbook documenting information pertaining to field activities. Appendix 1 of this Attachment provides an example of a Groundwater Log that includes the minimum information that must be completed for each monitoring well sampled.

II. LABORATORY ANALYSIS

A. INTRODUCTION

The groundwater parameters and constituents to be analyzed include organic and inorganic constituents which have been used at the facility or have been detected in the facility's waste, sludge, and/or groundwater (**Permit Attachment J**). **Permit Attachment J** also lists analytical methods that must be used in the analysis of groundwater samples.

B. LABORATORY QA/QC

QA/QC procedures will be used at all times. The laboratory shall assure the accuracy and precision of all analytical determinations.

1. Internal quality control:
   Internal quality control checks shall be undertaken regularly to assess the precision and accuracy of analytical procedures. Internal quality control checks shall include use of calibration standards, standard references, duplicates and spiked/fortified samples.

2. Calibration:
   Calibration standards shall be verified against standard reference from an outside source. Calibration curves shall be comprised of a minimum of one blank and three standards. Samples shall be diluted if necessary to ensure analytical measurements fall on the linear portion of the calibration curve.

3. Duplicate samples:
   Duplicate samples shall be processed at an average frequency of ten percent to assess the precision of testing methods, and standard references shall be processed monthly to assess accuracy of analytical procedures. Spiked/fortified samples shall be carried through all stages of sample preparation and measurement to validate the accuracy of analysis. During the course of analysis, quality control data and sample data shall be reviewed to identify questionable data.

III. DATA EVALUATION

A. ANALYTICAL DATA REVIEW

The Permittee and/or its representative will review and validate the analytical data to ensure that the laboratory followed proper analytical protocols. The data review will be performed in general accordance with the following United States EPA guidance documents:

- *Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses*, April 1993, and
- *Region III Modifications to National Functional Guidelines for Organic Data Review Multi-Media, Multi-Concentration*, September 1994.

B. STATISTICAL EVALUATION

In the event that a constituent concentration exceeds the groundwater protection standard (GPS) for the individual constituent, statistical evaluation of the analytical data will be performed in accordance with 40 CFR § 264.97 using a tolerance or prediction interval procedure. In the event that no constituents exceed their respective GPS, no statistical evaluation will be performed. Statistical evaluations will be performed in general accordance with Appendix 6 to Attachment I.

C. DATA QUALITY OBJECTIVE

High-quality data collection implies data of sufficient accuracy, precision, and completeness (i.e., ratio of valid analytical results to the minimum sample number called for in the permit) to meet the program objectives. It is the Permittee's responsibility to report sufficient valid analytical results for each semi-annual event. Reported data will, at a minimum, be of such quality to immediately detect a release from the regulated unit. Laboratory methods will be selected to yield reporting limits (Limit of quantitation, or LOQ) values that are equal to or below human health-based standards for the target analytes. The human health-based standards are established as Maximum Contaminant Levels (MCLs) under the Safe Drinking Water Act, or as Alternate Concentration Limits (ACLs) whenever MCLs are not available. ACLs are calculated by the Risk Exposure and Analysis Modeling System (REAMS) using a residential groundwater ingestion-modeling scenario. Facility GPS for each constituent are listed in Attachment K.

IV. RECORD KEEPING AND REPORTING

A. INTRODUCTION

Copies of all groundwater analytical results, groundwater annual reports, groundwater level elevations, Groundwater Sampling and Analysis Plan, Post-Closure Care Permit, etc. shall be maintained at the facility throughout the active life of the facility and post-closure care period. The Permittee shall report the groundwater monitoring information to the Director described in Sections IV.B and IV.C below.

B. ANNUAL REPORT

The Permittee shall submit an Annual Groundwater Monitoring Report to the Virginia Department of Environmental Quality by March 1st of the following year for the year beginning January 1st and ending December 31st containing:

1. Static groundwater level elevations;

2. Potentiometric surface maps reflecting each sampling event;

3. Groundwater flow rate and direction in the uppermost aquifer calculated after each sampling event;

4. Statistical evaluations of the concentrations or values of the parameters and constituents listed in Permit Attachment J to the Groundwater Protection Standard listed in Permit Attachment K;

5. The calculated or measured rate of migration of hazardous waste or hazardous waste constituents in the groundwater; and

6. Results of the evaluations of groundwater surface evaluations to determine whether the requirements for locating the monitoring wells continue to meet the criteria set forth in 40 CFR § 264.97.

APPENDIX I.4.

RECOMMENDED SAMPLE CONTAINERS AND PRESERVATIVES

CONSTITUENT	CONTAINER TYPES[A]	PRESERVATIVE	HOLDING TIMES (day)
pH	T, P, G	Field determined	None
Specific conductance	T, P, G	Field determined	None
Volatile organics compounds	40-mL, G, T-lined cap or septum	HCL to pH<2, cool to 4 ±2^{o} C	14
Metals (except mercury)	500-ml P	HNO3 to pH<2	6 months
Mercury	500-ml P	HNO3 to pH<2	28

Container Types:

P= Plastic (polyethylene)
G= Glass
T= Fluorocarbon resins

APPENDIX I.6

STATISTICAL PROCEDURES

A. HIGHLIGHTS

In accordance with 40 CFR 264.97(g), the Permittee will collect an appropriate number of samples from upgradient well(s) and an appropriate number of samples from each of the point of compliance wells specified in Permit Section V.C.1. Appropriate background sample sizes for the preferred method of statistical analysis will be collected prior to the scheduled date of the statistical analysis.

Statistical analysis of the groundwater data will include the following:

1. Outliers
2. Testing of normality
3. Missing data
4. Evaluation of data below detection limits or quantitation limits
5. Selection of statistical method
6. Verification sampling strategy (optional)
7. Comparison of point of compliance well data to the Groundwater Protection Standard (GPS) specified in Permit Attachment K.

B. OUTLIERS

An outlier refers to a data point which is an inconsistently large or small value. An outlier can be observed due to sampling, laboratory, transportation, or transcription errors. To remove the possibility of including data with this type of error, the historical data should be screened for each well and constituent for the existence of outliers (USEPA 2009 Chapter 12) using Dixon's or Rosner's Tests or another method approved by the VADEQ. Background observations, which are considered to be outliers, should not be included in the statistical analysis. If an extreme value occurs in a point-of-compliance well or during a compliance sampling event, the facility should collect a re-sample during the compliance period of the initial sample. Any elimination of an outlier must be approved by the Department.

C. TESTING NORMALITY OF DATA DISTRIBUTION

The Permittee shall verify that the distribution of monitoring data for the Hazardous Constituents is consistent with the assumptions of the selected statistical test method. A multiple group version of the Shapiro-Wilk test shall be applied to determine if the distribution of the data is normal or lognormal. To test for log normality, the natural logarithms of original data are taken and if the distribution of the transformed concentrations is normal then the data are considered to be log-normally distributed. The Permittee may use any other appropriate method for testing the distributional assumptions (see USEPA 2009). However, the Permittee shall demonstrate that the alternative method can detect deviations from normality with similar power as the Shapiro-Wilk and Shapiro-Francia methods. No testing of normality is required when the percentage of non-detects or non-quantified values is greater than 50%. Once the distribution of the data is determined, the Permittee should apply statistical tests as follows:

When the detection frequency is less than 50% and/or transformation fails to bring about normality, a non-parametric method should be used.

When the detection frequency is between 50%-85%, a parametric test can be performed with an adjustment for non-detects. Cohen's adjustment is recommended. Determination of the appropriate adjustment to be applied should be based on the properties of the data set (USEPA, 2009, chapter 15).

When the detection frequency is 85% or greater, an appropriate parametric test may be applied without adjusting for non-detects. Non-detects should be analyzed using one half the laboratory limit of detection or quantitation.

D. MISSING DATA

If a sampling event results in a missing data value, an attempt to resample for the missing value shall be made within two weeks.

E. DATA BELOW DETECTION LIMITS

For data where the non-detects or non-quantified values are less than 15 percent, the Permittee shall replace the non-detects or non-quantified values with one half the laboratory limit of detection or quantitation. However, when the percentage of non-detects or non-quantified values is greater than 15 percent and less than 50 percent the mean and standard deviation should be adjusted using the methods describe in USEPA 2009 chapter 15.

F. SELECTION OF STATISTICAL METHOD

The Permittee shall use an appropriate statistical method consistent with the Virginia Hazardous Waste Management Regulations. As specified in these regulations, the level

of significance for individual well comparison shall be no less than 0.01 and no less than 0.05 for multiple comparisons. However, these performance standards do not apply for prediction intervals, tolerance intervals and control charts. The false positive rate for these interval methods or control charts can depend on the number of data points available from the background wells at the time of statistical comparison. A larger number of background data points can decrease the false positive rate for these tests. In the event the Permittee has decided to use an interval or other statistical method, and if the selected method requires additional samples, the Permittee shall collect the additional samples prior to the date specified in this permit for conducting appropriate statistical analysis. The statistical comparison shall not be delayed due to collection of an inadequate number of samples. The false positive rate for a single constituent/well comparison shall not be lower than .01 unless the Permittee can demonstrate that an alternative false positive rate will provide at least 50% power to detect a 3 standard deviation increase above background levels and 80% power to detect a 4 standard deviation increase above background levels.

1. Interval Method

   If the Permittee uses an interval method and the percentage of detects is greater than 50%, the Permittee shall test the data from the background wells for normality. If the background well data are normally or log-normally distributed the Permittee shall use a parametric interval method. Table 1 provides the suggested minimum number of samples for calculation of parametric interval methods that are acceptable to VADEQ. In the event the background data are not normally or log-normally distributed the Permittee shall use a non-parametric interval method . Suggested test methods and recommended minimum sample size requirements are provided in Table 1. However, a statistical analysis can be conducted with a smaller data set than the suggested size at any time. Please note that these methods can lead to higher false positive or false negative rates with smaller samples sizes. For each sampling event, the Permittee shall calculate the appropriate interval for the background data set based on the method selected, and compare each data point from the point of compliance well to the upper limit. If the point of compliance well data exceeds the upper limit, the Permittee shall report that there has been a statistical increase of contaminants in the groundwater.

2. Other Methods

   In the event the Permittee has selected any other method listed in the Virginia Hazardous Waste Management Regulations, the Permittee shall collect the appropriate number of samples and shall maintain the appropriate level of significance specified above.

G. VERIFICATION SAMPLING (OPTIONAL)

Verification resampling can be an integral part of the statistical methodology; however, it should be considered as a part of the statistical test and based on the site-specific condition. Since the probability of an initial exceedance is very high for the site as a whole (considering only test wise false positive rates), the verification sample is considered as a part of the evaluation to conclude a statistically significant exceedance. A pre-planned verification sample can be incorporated into the calculation of the statistical limits to calculate an upper limit using a smaller false positive rate. Without verification resampling, an attempt to minimize the false positive rates will lead to very large prediction limits. This will increase the false negative rates and decrease the power of the test to detect a release from the facility. All verification samples must be collected at the earliest time possible (prior to next scheduled sampling event) or as approved by the DEQ or as specified in this permit. Note that the Department must be informed of any planned verification resampling in advance.

Verification resampling can involve one or two samples. DEQ's preferred strategy includes passing one verification resample or passing one of two verification resamples. Statistical analyses which incorporate verification samples must provide at least 50% power to detect a 3 standard deviation increase above background levels and 80% power to detect a 4 standard deviation increase above background levels.

H. COMPARISON OF POINT OF COMPLIANCE WELL DATA TO A STANDARD DURING COMPLIANCE OR CORRECTIVE ACTION MONITORING

In accordance with the Virginia Hazardous Waste Management Regulations, the point of compliance data shall be compared to the GPS. If a maximum contaminant level (MCL) is promulgated or alternate concentration limit (ACL) is established for a constituent, and the ACL or MCL is greater than the background limit (or statistically determined background level), the ACL or MCL is the groundwater protection standard. All new concentrations in the point of compliance wells should be compared to the standard (i.e., ACL or MCL) using the lower 95% confidence limit computed from the last four sampling values (collected during the last 12 months).

If an upper limit based on a tolerance or prediction limit calculated from naturally occurring background data exceeds the MCL or ACL, then the background limit will be the groundwater protection standard. If the groundwater protection standard is based on a tolerance or prediction limit, the point of compliance samples shall be compared to the GPS using a point comparison. If the point of compliance sample exceeds the background based GPS, a statistical exceedance above the GPS shall be reported to the Department.

However, for all constituents analyzed, if the established groundwater protection standard is less than the Department-accepted Limit of Quantitation (LOQ) then the LOQ becomes the standard, and the new point of compliance well data will be compared to the LOQ.

Comparisons of point of compliance well data to a groundwater protection standard based on a MCL or ACL should be performed by a parametric or non-parametric confidence interval. If data are normally or log-normally distributed a 95% lower confidence limit on the last four samples (collected during the last 12 months) can be calculated for comparison to the MCL or ACL. If data are not normally or log-normally distributed the minimum concentration from the last four samples (collected during the last 12 months) should be compared to the groundwater protection standard (based on a MCL or ACL). Alternative statistical methods for comparing lower limits of compliance well data to a groundwater protection standard based on a MCL or ACL should be approved by the Department prior to implementation. If the lower confidence limit or minimum concentration exceeds the groundwater protection standard based on a MCL or ACL then the Permittee has shown a statistical exceedance above the groundwater protection standard.

Please note that a point comparison (non-statistical) to the GPS (based on a MCL or ACL) may be performed if only one data point exists for a sampling event. If the point comparison indicates that the given data point is above the groundwater protection standard, and the GPS is based on a MCL or ACL, and the facility chooses not to use data from the previous three sampling events, then additional samples (at least three additional samples will be required to calculate a confidence interval) may be collected within the next 3 months and a statistical comparison to the GPS (based on a MCL or ACL) may be performed.

I. REFERENCES

1. USEPA, Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities. Unified Guidance. EPA 530/R-09-007. Office of Resource Conservation and Recovery, March 2009.

Table 1

Suggested Minimum Samples*			
	Parametric	Non-Parametric	Non-Parametric Interval %Confidence
CABF T-test	4	NA	NA
Wilcoxon Rank Sum	NA	5	NA
Confidence Interval	4	NA	NA
Tolerance Interval	8	19	95%
Prediction Interval	8	13	99%#
Shewhart CUSUM Chart+	8	NA	NA

* The above tests can be used with fewer samples; however it will increase the false positive rate.

Includes one verification re-sample, use 19 samples for a 95% Prediction Interval with no verification re-samples.

+ For Intra-well testing only.

NA Not Applicable.

ATTACHMENT M

FACILITY BACKGROUND, ENVIRONMENTAL HISTORY, SWMUs, HWMUs, AND AOCs

ATTACHMENT M

FACILITY BACKGROUND, ENVIRONMENTAL HISTORY, SWMUs, HWMUs, AND AOCs

FACILITY DESCRIPTION

The Facility is located in the southeastern portion of the Town of Blacksburg, Virginia, approximately 0.5 mile north of the intersection of U.S. Route 460 and Business Route 460. The approximate 58-acre Facility is located on the south side of Industrial Park Road, within an industrial park complex. The Facility has been owned and operated by Federal-Mogul Corporation (F-M) for the production of high specification-engine-crankshaft and piston rod bearings for the automotive and industrial engine industries since 1971. Current major customers include General Motors, Chrysler, Caterpillar, and John Deere.

A one story 140,000 square foot main building houses the manufacturing plant, offices, a cafeteria, a boiler room, a hazardous waste accumulation area, and the current wastewater treatment plant. Separate production activities in the main building include casting, bonding, pressing, flanging, and finishing. The manufacturing process involves aluminum alloy casting, aluminum-to-steel bi-metal bonding, and metal machining of bearings and bushings.

The physical address and facility contact information is provided below:

Facility Address

Federal-Mogul Corporation
Powertrain Production Operation
300 Industrial Park Road, SE
Blacksburg, VA 24060-6699

Facility Contact
Mr. Mark Bauer
Director, Global EHS
26555 Northwestern Highway
Southfield, MI 48033
(248) 354-8912

SUMMARY OF CORRECTIVE ACTIONS

Prior to June 1983, hazardous waste management operations at the Facility included collection of electroplating wastewater for treatment with chlorine, pH adjustment, and precipitation of metal hydroxides in two surface impoundments. Sludge from the ponds was pumped into two sludge-drying beds for dewatering and disposal. Wastewater from the ponds was discharged into Cedar Run under the authority of a National Pollutant Discharge Elimination System (NPDES) permit until 1983, at which time the two surface impoundments and two sludge-drying beds were closed. The wastewater treatment sludge, spent plating bath solutions, plating bath sludge, and spent stripping bath solutions were Environmental Protection Agency (EPA) listed hazardous wastes F006, F007, and F009.

The two surface impoundments (Hazardous Waste Management Unit [HWMU] 2) and two sludge-drying beds (HWMU 3), classified as S04 surface impoundments, were closed in 1983. For purposes of post-closure care, groundwater monitoring, and corrective action, these RCRA units were combined into a single unit (HWMU 2/3).

The original Hazardous Waste Management Post-Closure Permit for the Facility, dated September 1994, required monitoring of groundwater to demonstrate compliance with groundwater protection standards (GPS) established in the Permit. In accordance with the requirements of Part IV (Detection Monitoring) of the Permit, the Facility notified the Virginia Department of Environmental Quality (VDEQ) on June 6, 1995 that it had determined that there was a statistically significant increase above background levels for pH, specific conductance, total organic carbon, total organic halogen, chloroform, and trichloroethene (TCE) at the point of compliance (POC). F-M resampled on June 27-29, 1995 and confirmed the background level exceedances.

In the 1995 Annual Groundwater Monitoring Report dated February 6, 1996, the Facility identified a potential alternative source for specific conductance (process water leakage from the northeast corner of the plant) and chloroform (municipal water). On July 15, 1996, F-M notified the VDEQ that it was terminating their efforts to identify an alternative offsite TCE source.

During subsequent hydrogeological site investigations conducted from October 1995 to July 1997, F-M identified several down gradient residential drinking water wells that were impacted with TCE. Accordingly, the affected residences were provided with carbon-based water purification systems, and were subsequently connected to the municipal water supply.

On July 31, 1997, F-M submitted a request for a major permit modification to the Permit, to implement a Base Corrective Action Program (CAP). The request was granted, and on April 13, 1998, the VDEQ issued a modified Permit to include a Base CAP consisting of corrective action monitoring of groundwater at 10 monitoring locations and contaminated groundwater recovery and treatment. The Facility implemented the Base CAP on August 21, 1998 with the startup of an onsite groundwater recovery system consisting of two groundwater recovery wells (RW-1 and RW-2) and a treatment system to remove TCE by air stripping and liquid phase granular activated carbon (LGAC).

On March 15, 2001, the VDEQ issued the Facility a Hazardous and Solid Waste Amendments of 1984 (HSWA) Permit for completion of a facility-wide RCRA Facility Investigation (RFI). This HSWA permit identified for investigation 24 interior solid waste management units (SWMUs), HWMUs, and areas of concern (AOCs), and 20 exterior SWMUs and HWMUs. As required by the HSWA Permit, F-M submitted a Draft RFI Work Plan to the VDEQ in July 2001. The RFI Work Plan identified one additional SWMU and five additional AOCs not identified in the HSWA Permit.

In a May 30, 2002 letter to the Facility, the VDEQ requested that F-M install a third recovery well (RW-3) to enhance capture of the onsite portion of the TCE plume. Based on the results of a pumping test and existing data, F-M installed a new recovery well (RW-3) in the area of wells MW-A and DW-2 in August 2002 to extract groundwater from the higher yielding weathered bedrock zone present to a depth of approximately 190 feet (ft). Installation of RW-3 was completed during the second week of August 2002 and subsequently connected to the existing remediation system after updated plans and specifications were completed. Pumping of RW-3 commenced on October 22, 2002.

A revised RFI Work Plan was submitted to the VDEQ on August 13, 2002. Prior to the submission of the revised work plan, URS Corporation, Inc. (URS) completed an offsite sampling program for the RFI, which

included the sampling of identified water wells, springs, and surface water in the Jennelle Road area south of the Facility. This offsite sampling effort was conducted to support the completion of Environmental Indicator (EI) forms for the RFI by September 30, 2002. The VDEQ indicated approval of the revised RFI Work Plan in a June 13, 2003 letter to the Facility.

In December 2002, F-M completed public-water connections to 680 Jennelle Road and 662 Jennelle Road. F-M completed the public-water connection to 758 Jennelle Road on April 21, 2003. On July 18, 2003, the Facility installed a locking cover on the 646 Jennelle Road spring box on Jennelle Road and at the same time removed the well pump from the well and completed public-water connections. F-M also acquired water rights to these properties as part of the agreement to provide public water connections and thereby preventing the future use of groundwater and surface water. As a precautionary measure, water rights were also acquired at 715 and 781 Jennelle Road in 2004 after ensuring these properties were connected to public water.

URS completed the initial phase of the RFI from April 22 through April 30, 2003, and the final phase from August 4 through September 19, 2003. RFI activities included completion of 36 soil borings using a membrane interface probe (MIP), completion of offsite sampling of selected surface water, springs, and residential well locations, onsite sampling of soil, sediment, and surface water, and installation of two monitoring wells. The Facility's EI forms CA725 and CA750 were updated and submitted to VDEQ in September. These revised forms incorporated additional data collected since September of 2002 and summarize actions taken by F-M to protect human health and the environment. The Draft RFI Report was submitted to the VDEQ in March 2004.

On February 18, 2004, F-M and URS met with the VDEQ to discuss the remediation system (zone of influence and capture zone) and the pending submittal of the new Hazardous Waste Management Permit (Part A/B), which expired on September 28, 2004. At this meeting, the Facility requested an extension for submitting the permit application from the original due date of March 28, 2004. A formal request for an extension was submitted to the VDEQ on February 23, 2004 and was subsequently approved by the VDEQ on March 26, 2004.

In May 2004, F-M submitted a new Hazardous Waste Management Permit Application (post-closure) to the VDEQ for the two closed hazardous waste surface impoundments and two closed sludge-drying beds. On January 9, 2006, VDEQ reissued a Hazardous Waste Management Post-Closure permit (Permit) for the Facility. The Permit requires that F-M implement a Base CAP at the Site to reduce TCE concentrations present in groundwater.

A focused Corrective Measures Study (CMS) was prepared and submitted to the VDEQ in May 2007 to address an identified source area of volatile organic compounds (TCE) in soil. This CMS proposed implementation of an interim measure consisting of soil vapor extraction (SVE). As part of the request for preparation of an Interim Measures Work Plan, the VDEQ requested revision of the CMS Report for soil to incorporate groundwater in support of selecting and implementing a final remedy for site-wide corrective action. A revised CMS was submitted to the VDEQ in May 2008, which recommended implementation of SVE as a final remedy for soil as described in an Interim Measures Work Plan submitted to the VDEQ in August 2008.

In September 2009, F-M withdrew its proposal for interim measures as described in the August 2008 Interim Measures Work Plan and proceeded with additional evaluations and pilot tests beginning in October 2009 to implement a modified SVE remedy for soil.

A final CMS was approved by VDEQ on September 16, 2010. The final CMS included results of full scale pilot testing of a solar-powered, SVE system and associated revisions to implement the final remedy which will consist of the following:

- Operation of the existing solar-powered, SVE system as the final remedy for soil;
- Operation of existing onsite groundwater pump and treat system as an element of the final remedy for groundwater;
- Maintenance of the previously implemented institutional controls and engineering controls at offsite properties to prevent uncontrolled human health exposure to groundwater; and
- Long-term performance monitoring of groundwater to verify the effectiveness and progress of the groundwater remedy in achieving remedial goals and corrective measures objectives.

A full-scale pilot test of the solar-powered SVE system was initiated on May 25, 2010, and has provided evidence of system effectiveness by reducing the toxicity, mobility, and leaching of the VOCs from soil to groundwater.

DESCRIPTION OF SWMUs AND AOCs

The HSWA Permit for the Facility identified 39 SWMUs, 4 HWMUs, and 1 AOC. The RFI identified five additional AOCs and a recent incident in 2010 resulted in an additional AOC. All identified SWMUs, HWMUS, and AOCs are listed below. Figures M-1 and M-2 show the location of the interior and exterior SWMUs, HWMUs, and AOCs, respectively. Figure M-3 shows additional AOCS and environmental incident locations.

Interior SWMU 1 – Satellite Accumulation Area for scrape chrome and bimetal chips

Interior SWMU 1 is located inside the plant building near the tool room. This area consists of a plastic, 50-gallon rolling waste container used for disposal of scrap chrome and bi-metal chips. This area has an 8-inch thick epoxy-coated concrete floor. Free liquids and mobile non-liquids (i.e., dust) are not associated with this SWMU. Based on the lack of evidence for a release in this area, the RFI Work Plan determined that no further evaluations were required.

Interior AOC 2 – Leakage from process machines to floor

Interior AOC 2 is located inside the plant building near the flange area and tool room. The AOC consists of minor process machine leakage of lubricants. Releases from this area consist of minor drippage into a steel-walled (about 1-inch high) secondary containment and concrete floor area surrounding the machine. Contained lubricants are typically collected using absorbents. This area has an 8-inch thick epoxy-coated concrete floor. Based on the lack of evidence for significant releases in this area, the RFI Work Plan determined that no further evaluations were required.

Interior SWMU 3 – Bimetal chips awaiting recycling

Interior SWMU 3 is located inside the plant building in the flange area. The SWMU consists of storage containers used for bi-metal chips associated with production. Free liquids and mobile non-liquids (i.e., dust) are not associated with this SWMU. Releases in this area consist of bi-metal chips that sometimes fall outside of the intended storage containers. This area has an 8-inch thick epoxy-coated concrete floor. Based on the lack of evidence for significant releases in this area, the RFI Work Plan determined that no further evaluations were required.

Interior SWMU 4 – Lip machine-cleans process machines of aluminum chips and stores them in a small container

Interior SWMU 4 is located inside the plant building in the flange area. The SWMU consists of a small container that stores aluminum chips. The lip machine presses a dent into bearings to facilitate physical alignment and cleans process machines of aluminum chips. Free liquids and mobile non-liquids (i.e., dust) are not associated with this SWMU. Releases from this area consist of aluminum chips that sometimes fall outside of the intended storage containers. This area has an 8-inch thick epoxy-coated concrete floor. Based on the lack of evidence for significant releases in this area, the RFI Work Plan determined that no further evaluations were required.

Interior SWMU 5 – Bimetal chips awaiting recycling

Interior SWMU 5 is located inside the plant building in the flange area. The SWMU consists of storage containers used for bi-metal chips awaiting recycling. Free liquids and mobile non-liquids (i.e., dust) are not associated with this SWMU. Releases from this area consist of bi-metal chips that sometimes fall outside of the intended storage containers. This area has an 8-inch thick epoxy-coated concrete floor. Based on the lack of evidence for significant releases in this area, the RFI Work Plan determined that no further evaluations were required.

Interior SWMU 6 – Used coolant awaiting recycling

Interior SWMU 6 is located inside the plant building in the flange area. The SWMU consists of two used synthetic oil storage tanks with sizes of 1,800 gallons and 5,400 gallons and associated piping (less than 90 day storage). Oil in these tanks is transferred to waste disposal trucks for offsite disposal. This area has an 8-inch thick epoxy-coated concrete floor.

An investigation of SWMU 6 was included in the RFI report and did not indicate concentrations of metals or organics in soil above background levels or industrial screening criteria. However, a “scrape” sample of exterior pipe drippings on concrete indicated elevated levels of polynuclear aromatic hydrocarbons (PAHs). Because “scrape” results were not related to site media (i.e., soil or groundwater), the RFI recommended no further action at this SWMU. This area will be included in the corrective measures soil management area, which will restrict soil cover disturbance and subsurface soil excavation, except in conformance with an appropriate soil management plan.

Interior SWMU 7 – Bimetal chips awaiting recycling

Interior SWMU 7 is located inside the plant building in the flange area. The SWMU consists of storage containers used for bi-metal chips awaiting recycling. Free liquids and mobile non-liquids (i.e., dust) are not associated with this SWMU. Releases from this area consist of bi-metal chips that sometimes fall outside of the intended storage containers. This area has an 8-inch thick epoxy-coated concrete floor. Based on the lack of evidence for significant releases in this area, the RFI Work Plan determined that no further evaluations were required.

Interior SWMU 8 – Roto clone sludge accumulation area

Interior SWMU 8 is located inside the plant building in the bonding line area. This area is located in an area with an 8-inch thick epoxy-coated concrete floor. The SWMU consists of a 55-gallon drum storage area on pallets for sludges awaiting recycling from the RotoClone dust control machine. Free liquids and mobile non-liquids (i.e., dust) are not associated with this SWMU. The collected sludge is moist and not prone to dispersal in the air. Releases from this area consist of small amounts of sludge that occasionally fall onto the concrete floor. Based on the lack of evidence for significant releases in this area, the RFI Work Plan determined that no further evaluations were required.

Interior SWMU 9 – Bimetal scrap awaiting recycling

Interior SWMU 9 is located inside the plant building in the flange area. This area has an 8-inch thick epoxy-coated concrete floor. The SWMU consists of rolling metal storage containers used to store bi-metal scrap awaiting recycling. Free liquids and mobile non-liquids (i.e., dust) are not associated with this SWMU. Releases from this area consist of bi-metal scrap that occasionally falls to the concrete floor. Based on the lack of evidence for significant releases in this area, the RFI Work Plan determined that no further evaluations were required.

Interior SWMU 10 – Vacuum collector of aluminum chips with container

Interior SWMU 10 is located inside the plant building in the flange area. This area has an 8-inch thick epoxy-coated concrete floor. The SWMU consists of an aluminum chip vacuum collector and associated drum containers. Free liquids and mobile non-liquids (i.e., dust) are not associated with this SWMU. Releases from this area consist of aluminum chips that occasionally fall to the concrete floor. Based on the lack of potential and evidence for significant releases in this area, the RFI Work Plan indicated that no further evaluations were required.

Interior SWMU 11 – Scrap copper and lead broachings awaiting recycling

Interior SWMU 11 is located inside the plant building in the flange area. This area has an 8-inch thick epoxy-coated concrete floor. This SWMU formerly consisted of storage containers used to store copper and lead broachings awaiting recycling. This activity no longer exists at this location. Free liquids and mobile non-liquids (i.e., dust) were not associated with this SWMU. Releases from this area consisted of scrap copper and lead from the broaching machine that occasionally fell to the concrete floor. Based on the lack evidence for significant releases in this area, the RFI Work Plan determined that no further evaluations were required.

Interior SWMU 12 – Major air pickup system of bimetal broaching for flange lines A-D

Interior SWMU 12 is located inside the plant building in the flange area. This area has an 8-inch thick epoxy-coated concrete floor. The SWMU consists of an air pickup system and associated 55-gallon drums for storage of bi-metal broachings from flange lines A through D. Free liquids and mobile non-liquids (i.e., dust) are not associated with this SWMU. Releases from this area consist of bi-metal broachings that occasionally fall to the concrete floor. Based on the lack of evidence for significant releases in this area, the RFI Work Plan determined that no further evaluations were required.

Interior SWMU 13 – Scrap copper and lead bearings awaiting recycling

Interior SWMU 13 is located inside the plant building in the flange area. This area has an 8-inch thick epoxy-coated concrete floor. This SWMU formerly consisted of storage containers used to store scrap copper and lead bearings awaiting recycling. This activity no longer exists at this location. Free liquids and mobile non-liquids (i.e., dust) were not associated with this SWMU. Releases from this area consisted of scrap copper and lead bearings that occasionally fell to the concrete floor. Based on the lack of evidence for significant releases in this area, the RFI Work Plan determined that no further evaluations were required.

Interior SWMU 14 – Baghouse collector for copper

Interior SWMU 14 is located inside the plant building in the spa autoline area. This area has an 8-inch thick epoxy-coated concrete floor. This SWMU formerly consisted of 55-gallon drums used to store copper dust from the baghouse collector. Free liquids were not associated with this SWMU. This activity no longer exists at this location. Releases from this area consisted of dust that occasionally fell

to the concrete floor during drum change-outs. Based on the lack of evidence for significant releases in this area, the RFI Work Plan determined that no further evaluations were required.

Interior SWMU 15 – Bimetal chips awaiting recycling

Interior SWMU 15 is located inside the plant building between the flange area and the spa autoline area. This area has an 8-inch thick epoxy-coated concrete floor. The SWMU consists of storage containers used for bi-metal chips awaiting recycling. Free liquids and mobile non-liquids (i.e., dust) are not associated with this SWMU. Releases from this area consist of bi-metal chips that occasionally fall to the concrete floor. Based on the lack of evidence for significant releases in this area, the RFI Work Plan determined that no further evaluations were required.

Interior SWMU 16 – Aluminum chips awaiting recycling

Interior SWMU 16 is located inside the plant building between the flange area and the spa autoline area. This area has an 8-inch thick epoxy-coated concrete floor. The SWMU consists of storage containers used for aluminum chips awaiting recycling. Free liquids and mobile non-liquids (i.e., dust) are not associated with this SWMU. Releases from this area consist of aluminum chips that occasionally fall outside of the intended storage containers. Based on the lack of evidence for significant releases in this area, the RFI Work Plan indicated that no further evaluations were required.

Interior SWMU 17 – Central baghouse for spa lines

Interior SWMU 17 was located inside the plant building in the spa autoline area. This area has an 8-inch thick epoxy-coated concrete floor. This SWMU formerly consisted of a 55-gallon drum used to collect dust directly from the baghouse for the spa lines. Free liquids were not associated with this SWMU. This activity no longer exists at this location. Releases from this area consisted of minor dust that fell on the concrete floor proximate to the collection drum. Based on the lack of evidence for significant releases in this area, the RFI Work Plan determined that no further evaluations were required.

Interior SWMU 18 – Aluminum chips awaiting recycling

Interior SWMU 18 is located inside the plant building in the spa autoline area. The SWMU consists of storage containers used for aluminum chips awaiting recycling. Free liquids and mobile non-liquids (i.e., dust) are not associated with this SWMU. This area has an 8-inch thick epoxy-coated concrete floor. Releases from this area consist of aluminum chips that occasionally fall outside of the intended storage containers. Based on the lack of evidence for significant releases in this area, the RFI Work Plan determined that no further evaluations were required.

Interior SWMU 19 – Scrap aluminum awaiting recycling

Interior SWMU 19 is located inside the plant building between the final area and finished goods area. The SWMU consists of storage containers used for scrap aluminum awaiting recycling. Free liquids and mobile non-liquids (i.e., dust) are not associated with this SWMU. This area has an 8-inch thick epoxy-coated concrete floor. Releases from this area consist of scraps of aluminum that occasionally fall outside of the intended storage containers. Based on the lack of evidence for significant releases in this area, the RFI Work Plan determined that no further evaluations were required.

Interior SWMU 20 – Central coolant system-location of mop rinse water from floor cleaning

Interior SWMU 20 is located inside the plant building near the spa autoline area. The SWMU consists of a closet housing the central coolant system, mops, yellow wheeled mop buckets, and mop rinse water

from plant floor cleaning activities. This area has an 8-inch thick epoxy-coated concrete floor. An investigation of SWMU 20 was included in the RFI report and did not indicate concentrations of metals or organics above background or industrial screening criteria. The RFI recommended that no further evaluation was warranted for this SWMU.

Interior SWMU 21 – Waste ink satellite accumulation area

Interior SWMU 21 is located inside the plant building in the final area. This area has an 8-inch thick epoxy-coated concrete floor. The SWMU consists of a single 55-gallon drum used to contain waste ink, prior to offsite disposal. Releases from this area consist of minor staining to the concrete floor. Based on the lack of evidence for significant releases in this area, the RFI Work Plan indicated that no further evaluations were required.

Interior SWMU 22 – Back brush accumulation area

Interior SWMU 22 is located inside the plant building in the former plating department area. The SWMU consists of a 55-gallon drum that is used to store back brush materials. This area has an 8-inch thick epoxy-coated concrete floor. Based on the lack of evidence for releases in this area, the RFI Work Plan determined that no further evaluations were required.

Interior HWMU 23 – Hazardous waste storage area (less than 90 day storage)

Interior SWMU 23 is located inside the plant building and serves as the primary hazardous waste container accumulation storage area for the facility. Containers in this area are managed so that they are only stored on site for less than 90 days prior to shipment off-site to an approved, RCRA permitted facility. Also associated with the Hazardous Waste Storage Area are: 1) bulk caustic soda storage tank, and 2) floor pit used to temporarily collect small quantities of used oil, coolant, and mop water, and 3) 5,400-gallon 'coolant tank' into which are transferred: a) floor pit contents, and b) used oil, coolant, parts washing fluid, and mop water subsequent to on site processing by ultrafiltration. This area has an 8-inch thick epoxy-coated concrete floor.

An investigation of interior SWMU 23 was included in the RFI report indicated detections of PAHs at concentrations above industrial screening levels in exterior surface soils adjacent to the plant wall. This area will be included in the corrective measures soil management area, which will restrict soil cover disturbance and subsurface soil excavation, except in conformance with an appropriate soil management plan.

Interior SWMU 24 – Wastewater treatment plant

The former wastewater treatment plant (WWTP) was constructed in 1983 in the interior of the plant building. The WWTP was designed to treat liquid electroplating wastes that were formerly treated at the former holding ponds (Exterior HWMU 2) and sludge drying beds (Exterior HWMU 3). Numerous floor drains were located throughout the former plating area of the plant that routed water to the WWTP.

Components of the WWTP were above and below ground, both inside and outside the building. Specific components included acid and alkaline dump tanks, cyanide destruction tanks (eastern end of exterior SWMU 4), a chrome reduction unit, a pre-reaction basin, a pH adjuster unit, flocculation tanks, a lamella settling unit, a sludge holding tank and filter press, a sand filter, a final pH adjuster unit, and emergency holding tanks (including exterior SWMU 1), and the overflow emergency lead and cyanide wastewater tanks adjacent to external SWMU 5. The water treatment process involved wastewater pH adjustment to precipitate metal hydroxides, then dewatering and collection of the sludge for off-site disposal. The

treatment process also involved cyanide destruction using chlorine. Inside the WWTP, the sludge derived from the wastewater treatment process was collected and temporarily stored in a plastic-lined roll-off referred to as WWTP F006 Sludge 90-day Storage Area.

According to EPA, an emergency cyanide tank used to contain spills associated with electroplating machines cracked in December 1981 and leaked water containing cyanide into the gravel layer under the concrete slab of the main building. The precise location of this tank is not known but likely was proximate to the WWTP. Based on this incident and further investigation, the emergency cyanide holding tank/basin was cleaned out and its use was discontinued.

In January of 2002, F-M observed water entering into the basement of the WWTP from the annular space between the outside of the unused portion of a pipe and the hole in the southern basement wall through which the pipe extended. The leak was investigated and it was concluded that if water leakage from the WWTP was contributing to the shallow groundwater situation at the WWTP, it did not impact local groundwater quality proximate to the monitoring wells and piezometer located near the SWMU.

In 2004, an ion-exchange WWTP facility was constructed at the Facility in response to the decommissioning of the plating lines and replaced the former WWTP installed in 1983. Plating lines are no-longer in operation and were decommissioned in 2005. The new WWTP became operational in 2005 and is located within the interior hazardous waste storage area on the east side of the facility. The ion-exchange treatment system is the only wastewater treatment operation currently conducted at the Facility and all process wastewater streams generated at the facility are directed to the ion-exchange treatment system prior to discharge to the publically owned treatment works. It should be noted, that the former holding tanks (Exterior SWMU 1) associated with the exterior treatment plant in the northeast portion of the property are still maintained as emergency overflow containment devices, if the need should arise.

An investigation of interior SWMU 24 was included in the RFI report and indicated groundwater impact from chlorinated VOCs. Further, the RFI determined that the investigation did not reveal impacts to groundwater that would warrant groundwater management actions beyond those already being implemented at the site.

Interior AOC – 1992 Broken Cyanide Rinse water Pipe

On February 3, 1992, a construction worker accidentally dislodged an underground pipe that carried cyanide rinse water from the former electroplaters to the former WWTP. The electroplater was shut down and a bucket was used to collect the remaining water in the pipe. Soil samples collected from around the piping were analyzed to assess the extent of contamination. Based on the analytical results, soil and rock within a 5.5-foot radius around the source of the leak was removed to a depth of 3 to 12 inches below bedrock. Additional soil was removed if traces of cyanide were detected by perimeter sampling. The contaminated soil and rock was disposed offsite by Laidlaw Environmental Services. The RFI did not investigate this area as it was determined that contamination from the release was previously addressed.

Interior AOC – Hoist Anchor Bolts Leak

This interior AOC was identified in 2002 during the RFI process. The AOC is located inside the plant building and is associated with the former 003 plater in the plating department. In this area, a hoist was used to remove and replace filter plates in the copper filter. In addition to the filter plates, this area included the main plating tank, side tank, three rinse tanks. Secondary containment surrounded the copper process on the 003 plater and the hoist was located within the secondary containment area. The hoist was removed because the anchor bolts were loose and there was concern that the bolt holes could

serve as a pathway for release of plating liquids through the concrete floor and into soil underlying the plant concrete slab. Plating lines are no-longer in operation and were decommissioned in 2005. The RFI Work Plan determined that environmental sampling and analysis was not required as soil sampling was previously conducted and the assessment of the analytical results supported no further action.

Interior AOC – Former Main Degreaser

This interior AOC was identified in 2002 during the RFI process. The AOC is located inside the plant building in the area of the former plating department. At this location metal parts were historically degreased using TCE. A concrete floor sump was present to collect minor spillage of TCE. Occasionally the TCE was removed from the sump for disposal. This area was investigated as part of the RFI, in conjunction with adjacent interior HWMU 23.

Interior AOC – 005 Plater

The 005 plater was located inside the plant building, in the former plating department area. In early September 2002, plater 005 was converted into a lead-free plater. During the conversion process, the previous hot rinse (third rinse after then lead bath) drain was rerouted to accommodate the new anticipated wastewaters. During this activity, a leak was discovered in the elbow joint of the hot rinse drain. A concern that process liquids could have compromised the integrity of the concrete and may have infiltrated through the concrete plant floor, prompted plant personnel to collect a clay soil sample from immediately below the concrete floor slab. The drain was repaired, rerouted and sealed in new concrete. Plating lines are no-longer in operation and were decommissioned in 2005.

This area was investigated as part of the RFI and indicated arsenic and lead impacts to soils directly below the slab. This area will be included in the corrective measures soil management area, which will restrict soil cover disturbance and subsurface soil excavation, except in conformance with an appropriate soil management plan.

Exterior SWMU 1 – Emergency overflow tank for wastewater treatment plant

Exterior SWMU 1 is located northeast of the plant building between Exterior HWMU 2 (former location of holding ponds) and Exterior HWMU 3 (former location of sludge drying beds). The SWMU consists of an above ground storage tank used for emergency overflow from the WWTP surrounded by an unlined partial earthen containment berm. The tank was also used as part of the old treatment plant that was closed in 1983. This tank is of high integrity and is not routinely used to contain waste water. Based on the lack of evidence for releases in this area, the RFI Work Plan determined that no further evaluations were required.

Exterior HWMU 2 – Former location of holding ponds

Exterior HWMU 2 is located north of the plant building on F-M property. Prior to 1983, the electroplating wastewater was treated by pH adjustment and discharged into the former wastewater holding ponds. Here, metal hydroxide complexes formed in response to the pH adjustment and the complexes precipitated out of the wastewater to form a high-water content sludge at the bottom of the ponds. The sludge was removed by pumping and discharge into external HWMU 3 (Former location of sludge drying beds). The treatment process was not intended to remove TCE and TCE was not expected to be associated with the treated wastewater.

During operation of the former holding ponds they were known to lose wastewater into the porous (karst) subsurface. The porosity of the subsurface was so severe that in 1972 grout was injected into the subsurface at the ponds in an effort to reduce infiltration. The unit was closed in 1983, involving

removal of residual sludge and contaminated soil. Residual groundwater contamination in this area continues to be treated by the onsite groundwater extraction and treatment system. This area will be included in the corrective measures soil management area, which will restrict soil cover disturbance and subsurface soil excavation, except in conformance with an appropriate soil management plan.

Exterior HWMU 3 – Former location of sludge drying beds

Exterior HWMU 3 is located northwest of the plant building on F-M property. Prior to 1983, sludge derived from wastewater neutralization was pumped from the former holding ponds into the former sludge drying beds. During operation of the former sludge beds sludge was exposed to precipitation, resulting in leachate that contaminated underlying soil and groundwater, confirmed by historic sampling and analysis of the soil and groundwater. The unit was closed in 1983, involving removal of residual sludge and contaminated soil.

The RFI and CMS investigations identified and delineated an area of soil containing TCE and cis-1,2-DCE extending from Exterior HWMU 9 (Former Location of Drum Storage Pad) east toward HWMU 3. Arsenic was also detected in several subsurface samples at concentrations exceeding industrial screening criteria. Groundwater in the area of HWMU is impacted with TCE and TCE related constituents. Residual soil and groundwater contamination continues to be treated with the onsite SVE system and the groundwater pump and treat system. This area will be included in the corrective measures soil management area, which will restrict soil cover disturbance and subsurface soil excavation, except in conformance with an appropriate soil management plan.

Exterior SWMU 4 – Wastewater treatment plant underground holding tanks

Exterior SWMU 4 is located north of the plant building adjacent to the former WWTP. This SWMU consisted of a system of in-ground concrete vaults used as holding tanks, concrete sumps, and associated piping for wastewater, treated water, and treatment chemicals/solutions. The cyanide treatment tanks at the east end of the unit were secondarily contained within concrete vaults. In 1990, a release of wastewater containing cyanide from the concrete sumps was noted inside the pump room during operation of the concrete tank for cyanide destruction. Cracks along the tank were observed and tank walls were repaired until the replacement fiber glass tank could be installed. Soil investigations of the release area indicated detections of cyanide. The holding tanks were removed during the 2004-2005 WWTP decommissioning and installation of new ion-exchange WWTP. This SWMU was investigated in the RFI in association with interior SWMU 24.

Exterior SWMU 5 – LTC solution tank

Exterior SWMU 5 is located north of the plant building adjacent to the former WWTP. This SWMU consisted of an above ground tank (referred to as Lead Rinse Tank) secondarily contained within a concrete vault, and two adjacent underground tanks secondarily contained within concrete sumps. The tank was removed during the 2004-2005 WWTP decommissioning and installation of new ion-exchange WWTP. This SWMU was investigated in the RFI in association with interior SWMU 24.

Exterior SWMU 6 – Cafeteria grease awaiting disposal

Exterior SWMU 6 is located east of the plant building on F-M property. The SWMU consists of a rolling metal grease waste container from the plant's cafeteria. Releases from the SWMU consist of soil staining beneath the container. The RFI Work Plan determined that no further investigation was required based on the rationale that the released material derives from non-hazardous, eatable material.

Exterior SWMU 7 – Scrap aluminum awaiting recycling

Exterior SWMU 7 is located outside the plant, on a concrete pad in a covered area adjacent to the eastern portion of the plant building. This area consists of a roll-off container containing aluminum scraps awaiting recycling. Free liquids and mobile non-liquids (i.e., dust) are not associated with this SWMU. A residual film of lubricant / coolant may be associated with the aluminum and could have leached to the ground in the past when the scrap aluminum may have been exposed to precipitation.

This SWMU and surrounding exterior SWMU 8 and SWMU 11 through SWMU 18 were included in the RFI investigation. Surface soils near two concrete flumes, which receive surface water runoff from the SWMUs, indicated concentrations of PAHs above industrial screening criteria. This area will be included in the corrective measures soil management area, which will restrict soil cover disturbance and subsurface soil excavation, except in conformance with an appropriate soil management plan.

Exterior SWMU 8 – Scrap aluminum compactor

Exterior SWMU 8 is located outside the plant, on a concrete pad in a covered area adjacent to the eastern portion of the plant building. In this area, scrap aluminum is compacted and then moved to adjacent SWMU 7 for storage until recycling. This SWMU was investigated in the RFI in association with exterior SWMU 7.

Exterior HWMU 9 – Former location of drum storage pad

The former drum storage pad was located outside the plant, adjacent to the southeast corner of the plant building. The area consisted of a concrete pad to store drums. The drum storage pad was certified closed in 1985 and included contaminated soil excavation and disposal. Since closure of the pad, the plant building was expanded and portions of the original drum storage pad are now located underneath the plant.

The gravel ground cover was not an effective barrier when the former drum storage pad was active. Consequently, soils were impacted by drummed materials and the impacted soil was excavated and disposed offsite during closure of the pad. Currently, the asphalt roadway, concrete scrap metal pad, and the plant building represent excellent barriers. However, hazardous wastes are no longer stored here. The following elements of the former drum storage pad that could have acted as chemical sources have been removed: drums, contaminated gravel, and contaminated surface and subsurface soil.

Site investigations for the RFI and CMS have identified and delineated an area of soil containing TCE and TCE degradation by products extending from Exterior HWMU 9 east toward HWMU 3 (Former Location of Sludge Drying Beds). Residual impacts to soil and groundwater in this area are currently being addressed using the SVE system and the groundwater pump and treat system. Further, this area will be included in the corrective measures soil management area, which will restrict soil cover disturbance and subsurface soil excavation, except in conformance with an appropriate soil management plan.

Exterior SWMU 10 – Refuse awaiting disposal

Exterior SWMU 10 is located outside the plant, on a concrete pad adjacent to the eastern portion of the plant building. The SWMU consists of plant refuse in roll-off containers awaiting disposal or recycling. Only non-hazardous refuse is handled by this SWMU. Based on the lack of evidence for releases in this area, the RFI Work Plan determined that no further evaluations were required.

Exterior SWMU 11 – Scrap metal / steel awaiting recycling

Exterior SWMU 11 is located outside the plant, on a concrete pad adjacent to the eastern portion of the plant building. The SWMU consists of roll-off containers of scrap metal and steel awaiting recycling. Free liquids and mobile non-liquids (i.e., dust) are not associated with this SWMU. Releases from this area include scraps of metal or steel occasionally present on the concrete pad. This SWMU was investigated in the RFI in association with exterior SWMU 7.

Exterior SWMU 12 – Gaylord boxes / aluminum scrap awaiting recycling

Exterior SWMU 12 is located outside the plant, on a concrete pad in a covered area adjacent to the eastern portion of the plant building. In this area, scrap aluminum is stored in triple wall corrugated pallet boxes for eventual recycling. This SWMU was investigated in the RFI in association with exterior SWMU 7.

Exterior SWMU 13 – Bimetal ribbon scrap awaiting recycling

Exterior SWMU 13 is located outside the plant, on a concrete pad adjacent to the eastern portion of the plant building. The SWMU consists of roll-off containers of bi-metal ribbon scrap awaiting recycling. Free liquids and mobile non-liquids (i.e., dust) are not associated with this SWMU. Releases from this are include bi-metal scraps occasionally present on the concrete pad. This SWMU was investigated in the RFI in association with exterior SWMU 7.

Exterior SWMU 14 – Copper / lead scrap awaiting recycling

Exterior SWMU 14 is located outside of the plant, adjacent to the eastern portion of the plant building. This SWMU formerly consisted of containers used for storage of copper and lead scrap awaiting recycling. Free liquids and mobile non-liquids (i.e., dust) were not associated with this SWMU. Releases from this SWMU included scraps of copper and lead occasionally present on the concrete pad. This activity no longer exists at this location. This SWMU was investigated in the RFI in association with exterior SWMU 7.

Exterior SWMU 15 – Aluminum dross awaiting recycling

Exterior SWMU 15 is located outside of the plant, adjacent to the eastern portion of the plant building. This SWMU formerly consisted of containers used for storage of aluminum dross awaiting recycling. Free liquids and mobile non-liquids (i.e., dust) were not associated with this SWMU. Releases from this SWMU included scraps of aluminum dross occasionally present on the concrete pad. This activity no longer exists at this location. This SWMU was investigated in the RFI in association with exterior SWMU 7.

Exterior SWMU 16 – Scrap pallets awaiting recycling

Exterior SWMU 16 is located outside the plant, on a concrete pad in a covered area adjacent to the western portion of the plant building. In this area, scrap wooden pallets are stored for eventual recycling. This SWMU was investigated in the RFI in association with exterior SWMU 7.

Exterior SWMU 17 – Chemical pallets awaiting recycling

Exterior SWMU 17 is located outside the plant, on a concrete pad in a covered area adjacent to the western portion of the plant building. In this area, scrap wooden pallets that were previously used for chemicals are stored for eventual recycling. Pallets contaminated by chemicals are managed as

hazardous waste and are not associated with this SWMU. This SWMU was investigated in the RFI in association with exterior SWMU 7.

Exterior SWMU 18 – Scrap from gaylords awaiting recycling

Exterior SWMU 18 is located outside the plant, on a concrete pad in a covered area adjacent to the western portion of the plant building. In this area, scrap aluminum from gaylord box storage is stored for eventual recycling. This SWMU was investigated in the RFI in association with exterior SWMU 7.

Exterior SWMU 19 – Synthetic oil collector system

Exterior SWMU 19 is located outside the plant, adjacent to the southern portion of the plant building. This SWMU formerly consisted of an oil separator associated with a metal chip collection system. Synthetic oil from the chip collection system drained into a 55-gallon drum placed below the system. The drum contents were then manually transferred to an adjacent tank. The adjacent tank had a capacity of approximately 750 to 1,000 gallons and was used to store used synthetic oil. The tank had no plumbing attached to it. Used synthetic oil was poured into the tank via a funnel fitted with a lid. The lid was intended to prevent rain water from entering the tank. This chip collection system was used for eight years prior to its removal. The SWMU area was located on a concrete pad with a five inch high containment berm and sump. Based on the lack of evidence for releases in this area, the RFI Work Plan determined that no further evaluations were required.

SWMU 20 – Aluminum dust baghouse

Exterior SWMU 20 is located outside the plant, on a concrete pad adjacent to the eastern portion of the plant building. The SWMU consists of two bag houses that collect aluminum dust (one unit) and steel dust (one unit). Historical releases have occurred and include an instance in April 1993 where a particulate filter failed and resulted in the spilling of 'soil' containing cadmium and lead onto the roof of the building, an adjacent concrete pad and bag house structure, and a grassy area. Remediation included vacuuming and pressure washing from affected areas. This SWMU was included in the RFI and investigation results did not identify constituents above industrial screening criteria; therefore, the RFI recommended no further action.

Exterior AOC – 1993 Baghouse Fire

On January 4, 1993, a fire occurred in a dust collection baghouse located adjacent and west of the plant building. The dust in this area contained elevated levels of aluminum, lead, and cadmium. The fire was extinguished and foam and water generated were collected and drummed. Contaminated soil was excavated to a depth of 6 inches and staged on plastic liners. The bag house structure was disassembled, decontaminated, and scraped. Residual dust and debris were drummed. Soil sampling was conducted during the remediation to identify contaminated areas and determine the extent of required cleanup. Soil, upon being determined hazardous, was moved to two roll-off containers. It was then transported and disposed at permitted hazardous waste facilities. The RFI did not investigate this area as it was determined that any contamination derived from the incident was addressed at the time of the release.

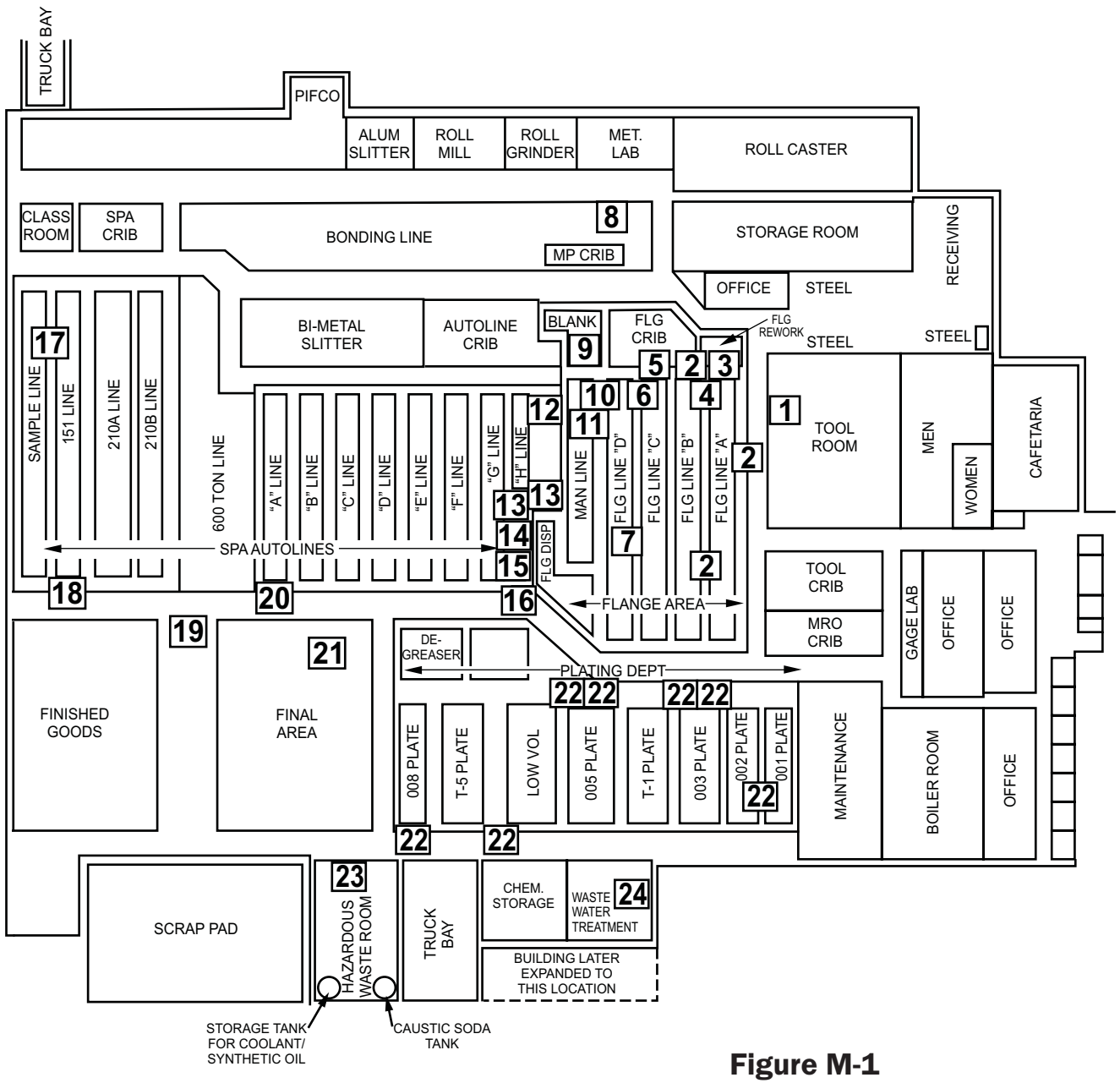
Exterior AOC – Staging area for soil from the 1993 Baghouse Fire

This exterior AOC is located southeast of the plant building, on F-M property and is associated with the 1993 baghouse fire. Soil excavated as a result of the baghouse fire was temporarily staged here by placing it in a "plastic cocoon" to prevent any migration of contaminants prior to transfer of the soil into

two roll-off containers for offsite disposal at a permitted hazardous waste facility. The area was not investigated as part of the RFI as it was determined to not be an area with potential releases.

Exterior AOC – 2010 Ductwork Explosion

On December 31, 2010, an explosion took place within interior air exhaust ductwork and an external baghouse connected to an aluminum brushing process located in the southwest portion of the plant. According to facility records, aluminum oxide, copper and lead are hazardous constituents associated with the aluminum brushing process and dust collection system. At the time of the explosion, the immediate area was cleaned of residue and related materials. URS conducted a soil investigation in the area of the explosion and determined that surface soils from 0 to 3 inches bgs in the area were impacted with lead from the explosion. The impact area was estimated to be approximately 1,300 square feet with an estimated maximum depth of 6 inches for a total in-place volume of approximately 23-25 cubic yards. In August 2011, soils were excavated and confirmation soil samples were collected to ensure that all impacted soils were removed. Based on a soil sampling results it was determined that soil were non-hazardous and were appropriately disposed of at the Brunswick Waste Management Facility in Lawrenceville, Virginia. The results of the investigation and subsequent remediation were submitted to VDEQ in a letter dated October 5, 2011.



LEGEND:

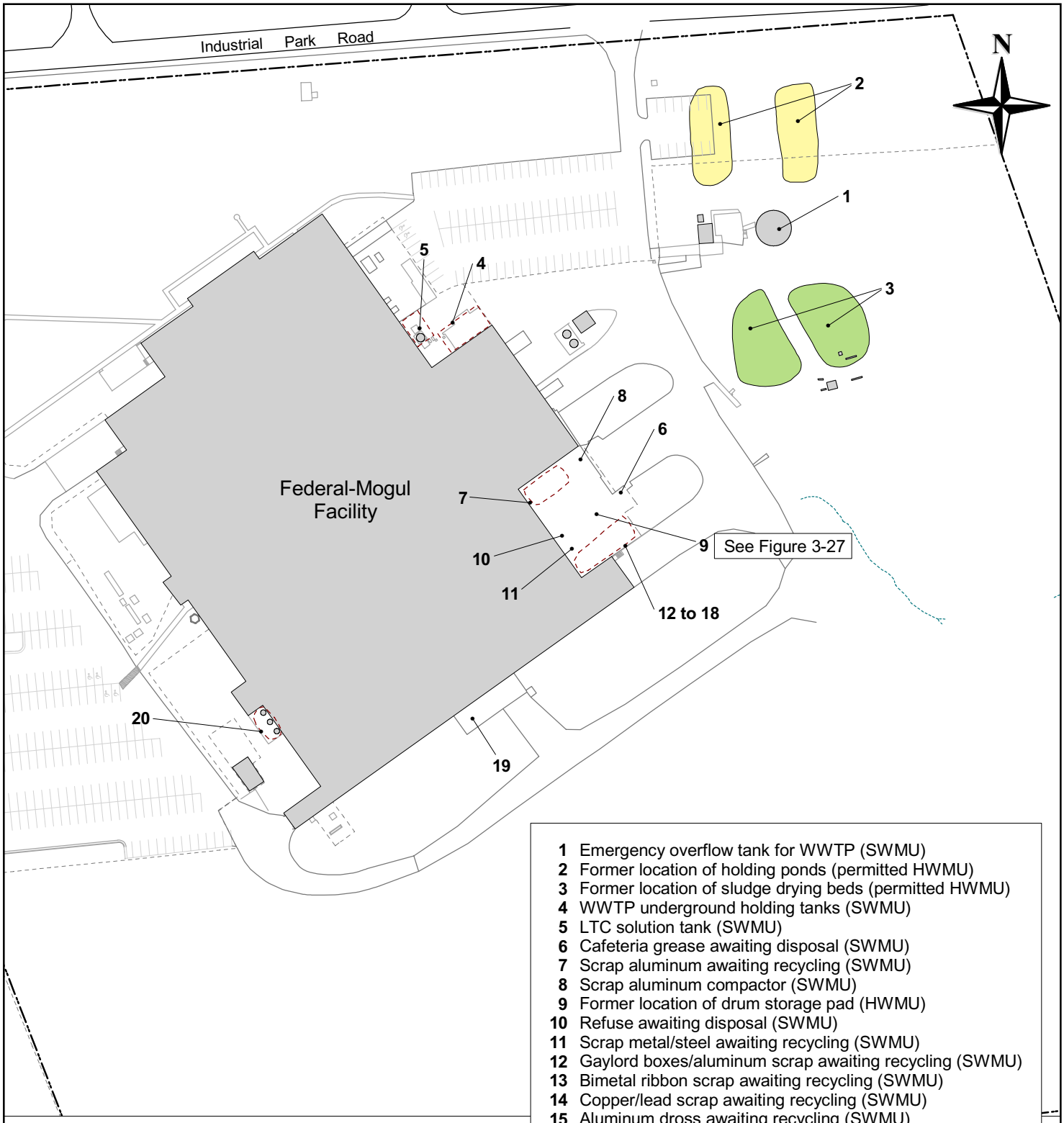
1. SATELLITE ACCUMULATION AREA (SWMU)
2. LEAKAGE FROM PROGRESS MACHINE TO FLOOR (AOC)
3. BIMETAL CHIPS AWAITING RECYCLING (SWMU)
4. LIP MACHINE - CLEANS PROCESS MACHINE OF ALUMINUM CHIPS AND STORES THEM IN A SMALL CONTAINER (SWMU)
5. BIMETAL CHIPS AWAITING RECYCLING (SWMU)
6. USED COOLANT AWAITING RECYCLING (SWMU)
7. BIMETAL CHIPS AWAITING RECYCLING (SWMU)
8. ROTO CLONE SLUDGE ACCUMULATION AREA (SWMU)
9. BIMETAL SCRAP AWAITING RECYCLING (SWMU)
10. VACUUM COLLECTOR OF ALUMINUM CHIPS WITH DRUM (SWMU)
11. SCRAP COPPER AND LEAD BROACHINGS AWAITING RECYCLING (SWMU)
12. MAJOR AIR PICKUP SYSTEM OF BIMETAL BROACHINGS FOR FLANGE LINES A - D (SWMU)
13. SCRAP COPPER AND LEAD BEARINGS AWAITING RECYCLING (SWMU)
14. BAGHOUSE COLLECTOR FOR COPPER (SWMU)
15. BIMETAL CHIPS AWAITING RECYCLING (SWMU)
16. ALUMINUM CHIPS AWAITING RECYCLING (SWMU)
17. CENTRAL BAGHOUSE FOR SPA LINES (SWMU)
18. ALUMINUM CHIPS AWAITING RECYCLING (SWMU)
19. SCRAP ALUMINUM AWAITING RECYCLING (SWMU)
20. CENTRAL COOLANT SYSTEM - LOCATION OF MOP RINSE WATER FROM FLOOR CLEANIN (SWMU)
21. WASTE INK SATELLITE ACCUMULATION AREA (SWMU)
22. BACK BRUSH ACCUMILATION AREA (SWMU)
23. HAZARDOUS WASTE STORAGE AREA (LESS THAN 90-DAY STORAGE)(HWMU)
24. WASTEWATER TREATMENT PLANT (SWMU)

NOTES:

1. SPA = SPECIAL PROCESS AREA
2. MP = MATERIAL PREPARATION
3. FLG = FLANGE
4. MRD= MAINTENANCE & REPAIR ORGANIZATION
5. THE INDICATED SWMU LOCATIONS ARE PER THE PERMIT. ACTUAL LOCATIONS FREQUENTLY DIFFER DUE TO THE MOBIL NATURE OF MOST OF THE SWMUs.
6. THE PERMIT INDICATES SEVEN DIFFERENT LOCATIONS FOR SWMU 22 (BACK BRUSH ACCUMULATION AREA); HOWEVER, THIS CURRENTLY HAS BEEN REDUCED TO A SINGLE AREA.

Figure M-1
Interior SWMUs, HWMUs, and AOC Identified in the HSWA Permit

URS



1 Emergency overflow tank for WWTP (SWMU)
2 Former location of holding ponds (permitted HWMU)
3 Former location of sludge drying beds (permitted HWMU)
4 WWTP underground holding tanks (SWMU)
5 LTC solution tank (SWMU)
6 Cafeteria grease awaiting disposal (SWMU)
7 Scrap aluminum awaiting recycling (SWMU)
8 Scrap aluminum compactor (SWMU)
9 Former location of drum storage pad (HWMU)
10 Refuse awaiting disposal (SWMU)
11 Scrap metal/steel awaiting recycling (SWMU)
12 Gaylord boxes/aluminum scrap awaiting recycling (SWMU)
13 Bimetal ribbon scrap awaiting recycling (SWMU)
14 Copper/lead scrap awaiting recycling (SWMU)
15 Aluminum dross awaiting recycling (SWMU)
16 Scrap pallets awaiting recycling (SWMU)
17 Chemical pallets awaiting recycling (SWMU)
18 Scrap from gaylords awaiting recycling (SWMU)
19 Synthetic oil collector system (SWMU)
20 Aluminum dust baghouse (SWMU)

Base Map Source:
Federal-Mogul property:
Draper Aden Associates,
Blacksburg, VA, February, 2001

Federal-Mogul Property Boundary
Building, Structure
Fence
Paved, Parking
Road
Intermittent Surface Water
Former Location of Holding Ponds
Former Location of Sludge Drying Beds

1:1800
50 0 50 100 150 Feet

URS

File: W:\48800\329\GISData\
\projects\section3.apr
Date: 07/22/02
Created: JMW
Checked:
Senoir: BE

Figure M-2
Exterior SWMUs and HWMUs Identified in the Permit

Legend

- Property Line
- Approximate Location of Area of Concern (AOC)

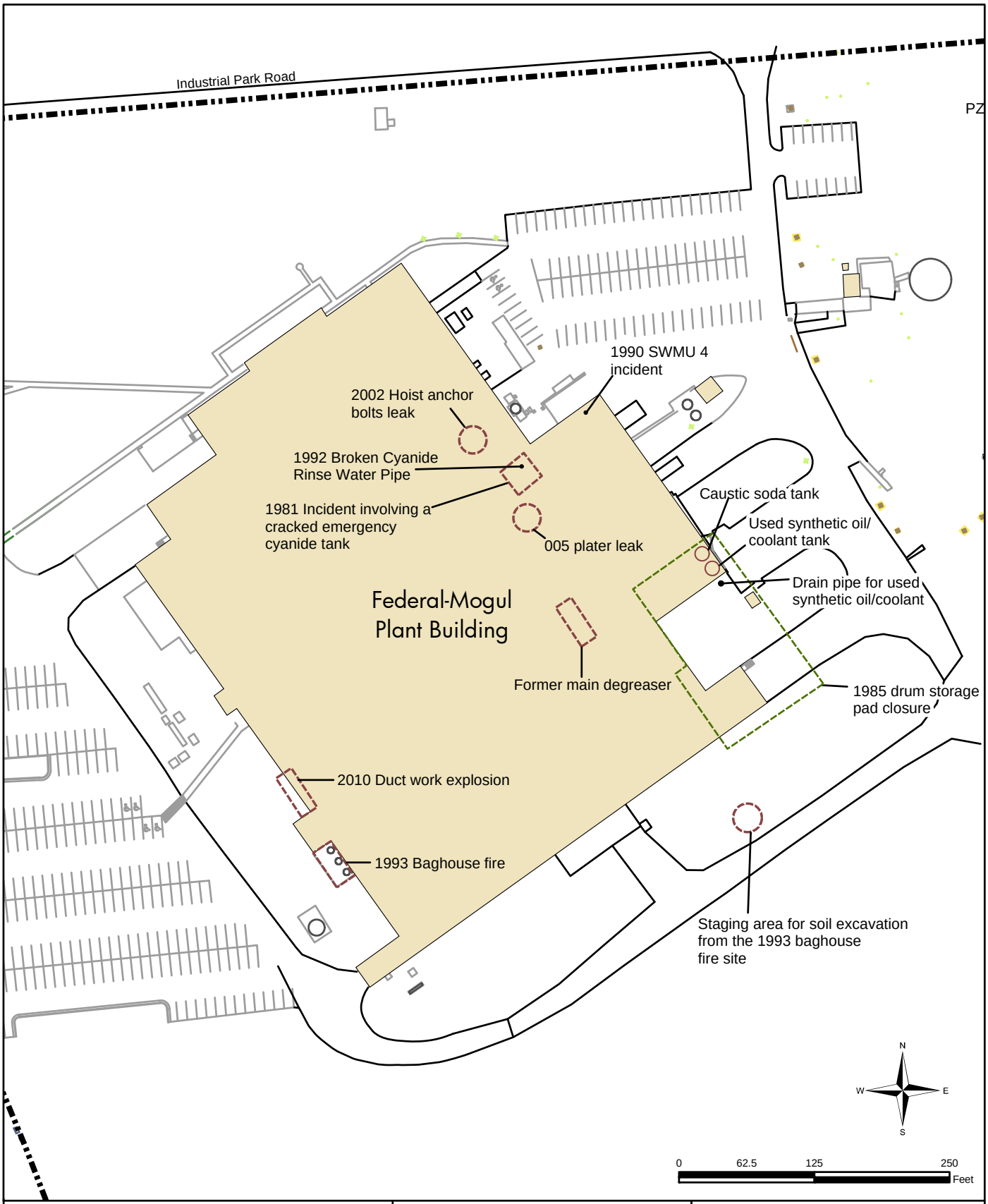
Figure M-2B

AOCs Not Identified in Figures M-1 and M-2

Date: June 28, 2012	Job Number: 13651392
Prepared By: KAH	Reviewed By: JOS
Scale: 1" = 125'	File Name: Fig.2B AOCs Additional

Federal - Mogul Corporation
Blacksburg, Virginia
EPA ID No. VAD054039961

URS Corporation
4905 Dickens Road
Suite 106
Richmond, Virginia 23230



Legend

- Property Line
- Approximate Location of Area of Concern (AOC)

Figure M-3

Environmental Incidents Locations

Date: June 28, 2012	Job Number: 13651392
Prepared By: KAH	Reviewed By: JOS
Scale: 1" = 125'	File Name: Fig.A-3 Env Incidents

Federal - Mogul Corporation
Blacksburg, Virginia
EPA ID No. VAD054039961

URS Corporation
4905 Dickens Road
Suite 106
Richmond, Virginia 23230

ATTACHMENT N

HEALTH AND SAFETY PLAN REQUIREMENTS

ATTACHMENT N

HEALTH AND SAFETY PLAN REQUIREMENTS

The Permittee shall prepare a facility Health and Safety Plan for Corrective Measures Implementation activities at the Permitted facility and shall submit to the Department and the EPA Region 3. Compliance with the Occupational Safety and Health Administration (OSHA) Regulations is not under the jurisdiction or the authority of the Department or the EPA in the Commonwealth of Virginia. Therefore, the Health and Safety Plan submittal to the Department and the EPA Region 3 is for the administrative record only and the submittal will not receive approval nor disapproval by the Department or the EPA.

In the Commonwealth of Virginia, compliance and enforcement of the OSHA regulations under 29 C.F.R. 1910.120, falls under the authority of the Virginia Office of Safety and Health, the Virginia Department of Labor and Industry. Therefore, the above office should be contacted to determine the major elements and requirements for a Health and Safety Plan under the OSHA Regulations.

ATTACHMENT O

BASE CORRECTIVE ACTION PROGRAM

ATTACHMENT O

BASE CORRECTIVE ACTION PROGRAM

A. HIGHLIGHTS

The Permittee has implemented this Base Corrective Action Program in accordance with Permit Module VI.K and 40 CFR 264.100. The Base Corrective Action Program includes the operation of three on-site groundwater recovery wells, the operation of an on-site air stripping and carbon filtration treatment unit, a corrective action groundwater monitoring program, acquisition of water rights of residents whose property is underlain by groundwater in which TCE has been detected and connection of these residents to a public water system, and annual reports to the Director reporting the effectiveness of the Corrective Action Program.

This Base Corrective Action Program has been incorporated as an element of the final remedy for site-wide corrective action as described in Permit Module VIII.

B. EXTRACTION SYSTEM

Three groundwater extraction wells, RW-1, RW-2B, and RW-3, are positioned to capture groundwater within an identified area of the on-site TCE plume. RW-1 is installed immediately south of the hazardous waste management unit to control TCE affected groundwater in the original source area associated with the former location of drum storage pad (HWMU 9).

RW-2B was converted from former monitoring well DW-5 located near the southern border of the site approximately 650 feet south of RW-1. RW-3 is installed at the southeast corner of the site approximately 25 feet west of DW-2 and 53 feet south of MW-A. Drawing C-1 in the attached appendix illustrates the location of each recovery well.

Extracted groundwater is pumped through below ground piping to a manifold vault, and then to the treatment system trailers.

1. Scheduled Maintenance and unplanned downtime.

    a. Maintenance and repair of the recovery wells, including the dedicated pumps and associated piping, shall be recorded in the Operating Record. This information shall also be included in the semiannual report. Departmental approval is not required for actions taken for maintenance of system which do not modify the approved system design.

    b. The Director shall be notified verbally and in writing if the system is to be taken off-line for equipment repair, replacement, or upgrade, and the anticipated or actual duration is greater than thirty (30) days. Periods of less than thirty (30) days shall be noted in the Operating Record and included in the semiannual report.

C. ON-SITE TREATMENT UNIT

The groundwater treatment system is designed to remove total suspended solids and volatile organic compounds from extracted groundwater. The treatment facility includes the following:

1. Flow equalization (2,600-gallon HDPE tank)
   Equalization ensures a constant and generally uniform flow to the treatment units. An equalization tank, with a retention time of approximately 45 minutes is in use. The groundwater is pumped from the recovery wells to the equalization tank.

2. Total suspended solids filtration
   Following equalization, groundwater is pumped through a filtration system to remove solids from the water to prevent fouling of downstream treatment units. The filtration system consists of 2 single element, 100-micron filters installed in parallel.

3. Chemical sequestering
   The groundwater is chemically sequestered with dilute polyphosphate to keep dissolved iron and/or hardness in solution to minimize scaling of treatment units.

4. Air stripping
   Following pretreatment, the groundwater passes through an air stripping unit designed to reduce TCE concentrations in the groundwater. A four tray, low profile, tray stripper, with a 900 scfm blower capable of treating the maximum flow rate of 80 gpm is installed.

   a. Maintenance and repair of the recovery wells, including the dedicated pumps and associated piping, shall be recorded in the Operating Record. This information shall also be included in the semiannual report. Departmental approval is not required for actions taken for maintenance of system which do not modify the approved system design.

   b. The Director shall be notified verbally and in writing if the system is to be taken off-line for equipment repair, replacement, or upgrade, and the anticipated or actual duration is greater than thirty (30) days. Periods of less than thirty (30) days shall be noted in the Operating Record and included in the semiannual report.

5. Liquid-phase granular activated carbon adsorption (two Carbonair MPC-13 units containing 1,500 pounds of GAC each)
   Carbon filtration treatment capable of treating the maximum flow rate of 80 gpm is used in addition to the air stripping system for final polishing of the effluent prior to discharge.

6. Discharge

   a. Treated groundwater is discharged via a 6-inch diameter polyvinyl chloride (PVC) underground pipe to the local publicly owned treatment works (POTW - Blacksburg-VPI Sanitation Authority). Discharge from the treatment system into the main sanitary sewer line (Outfall 003) is regulated by the Town of Blacksburg Industrial Wastewater Discharger Permit No. 7.

b. The permittee has a Virginia Pollutant Discharge Elimination System (VPDES No. VA0089991), which allows for treated effluent discharge to the Virginia Department of Transportation Wilson Creek Outfall at the southeast corner of the site. A 6-inch diameter PVC underground pipe extends from the treatment system area to a temporary termination point approximately 75 feet from the Wilson Creek Outfall. Drawings C-1, C-3, and C-4 in Appendix V.1 show the piping layout, details, and profiles for the system discharge piping to both outfalls.

7. Scheduled Maintenance and unplanned downtime.

a. Maintenance and repair of the on-site air stripping and/or carbon filtration treatment unit shall be recorded in the Operating Record. This information shall also be included in the semiannual report. Departmental approval is not required for actions taken for maintenance of system which do not modify the approved system design.

b. The Director shall be notified verbally and in writing if the system is to be taken off-line for equipment repair, replacement, or upgrade, and the anticipated or actual duration is greater than thirty (30) days. Periods of less than thirty (30) days shall be noted in the Operating Record and included in the semi-annual report.

8. Inspections

a. The Permittee shall inspect the on-site air stripping and/or carbon filtration treatment unit at least daily in accordance with 9 VAC 20-60-750 F d 2.

b. The Permittee shall inspect the on-site air stripping and/or carbon filtration treatment unit to determine whether any malfunctions, deterioration, operator errors, and discharges have occurred that may be causing or may lead to a release of hazardous waste constituents to the environment, or a threat to human health.

c. The Permittee shall record inspections in an inspection log or summary and in the Operating Record. At a minimum, these records shall include the date and time of the inspection, the name of the inspector, a notation of the observations made, and the date and nature of any repairs or other remedial actions.

D. CORRECTIVE ACTION GROUNDWATER MONITORING PROGRAM

The Permittee shall operate and maintain the groundwater monitoring system, specified in Permit Module VI.D. In addition, the Permittee shall implement the following:

The Permittee shall determine whether the established zones of capture and influence are adequate to remediate and contain the TCE plume, and shall report their determinations to the Director. The Permittee shall also determine whether the groundwater monitoring system is adequate to determine the zones of influence and capture. The report shall include at least the following information: potentiometric maps with flow paths, the pumping rates for each well, the influent and effluent TCE concentrations, and the

calculated zones of influence and capture clearly depicted on potentiometric contour maps.

1. If the demonstrated zone of capture indicates that the TCE plume is being contained, then the Permittee shall report the optimal sustainable pumping rates for each recovery well to the Director, and shall continue to operate the recovery wells at the optimum rates.

2. If the demonstrated zone of capture indicates that the TCE plume is not being contained, then the Permittee shall either modify the pumping rates and/or propose additional recovery well(s). If the pumping rates are modified, the Permittee shall justify how much additional time shall be required to determine whether the modifications are effective. The Permittee shall justify all recommendations with appropriate displays, such as maps, cross-sections, or computer models.

3. If the groundwater monitoring system is not adequate to determine the zone of capture, then the Permittee shall propose an additional number of piezometers sufficient to determine the zone of capture.

4. The Permittee shall make all appropriate recommendations for modifications to improve the performance of the operation of three recovery wells, the on-site air stripping and carbon filtration treatment unit, and the groundwater monitoring system.

E. ANNUAL REPORTS

Pursuant to 40 CFR 264.100(g), the Permittee shall determine the effectiveness of the corrective action measures, by measuring the static water levels to determine the zone of influence and the zone of capture, and by sampling the groundwater, the treated effluent, and well water at the tap at impacted residences (if necessary). At least annually, the Permittee shall report to the Director on the effectiveness of the corrective measures and shall make recommendations for modifications to the corrective action measures as necessary to improve the performance of the systems.

The Permittee shall include at least the following information in the annual report:

1. Estimated volume of contaminated groundwater actually treated;

2. Maintenance and operation information on the recovery wells, on-site air stripping and/or carbon filtration treatment unit, and off-site drinking water carbon treatment units;

3. Delineation of zones of influence and capture on potentiometric contour maps;

4. Analytical data at monitoring wells and springs, if possible, over time;

5. Influent and effluent analytical results;

6. TCE analyses at the tap for each off-site drinking water carbon treatment unit; and

7. Proposed modifications to the Corrective Action Program.

To determine the effectiveness of the treatment system, the influent and effluent shall be monitored for TCE at least quarterly. The Permittee may have additional monitoring requirements under other regulatory programs.

If the TCE concentrations increase to greater than 10 mg/l (ppm), as measured at the influent point, or if the influent flow increases to greater than 350 gpm, the Permittee shall, pursuant to 40 CFR 264 Subpart AA, either reduce total organic emissions from all affected process vents at the facility below 1.4 kilograms per hour (kg/hr or 3 lb/hr) and 2.8 metric tonnes per year (Mg/yr or 3.1 tons/yr), or reduce total organic emissions from all affected process vents at the facility by 95 weight percent by use of a control device.

ATTACHMENT P

REMEDIAL GOALS AND CLEAN UP TARGETS

ATTACHMENT P

REMEDIAL GOALS AND CLEAN UP TARGETS

A. REMEDIAL GOALS

The following remedial goals have been established for the Site based on the results of the RFI and CMS:

1. To the extent possible, reduce COC concentrations and VOC mass in soil to prevent leaching to groundwater at concentrations that would result in groundwater concentrations above clean up targets, which consist of EPA maximum contaminant levels (MCLs).
2. Reduce concentrations of COCs in soil to levels that are protective of future use of the Facility.
3. Reduce concentrations of COCs in groundwater to levels at or below groundwater clean up targets (EPA MCLs).
4. Prevent uncontrolled human exposure to onsite and offsite groundwater with COC concentrations above groundwater clean up targets (EPA MCLs).
5. Prevent uncontrolled human exposure to on-site soil with constituent concentrations above risk-based concentrations.

B. SOIL CLEAN UP TARGETS

Clean up targets for VOCs in soil have been developed for soil and consist of the calculated site-specific soil screening levels for the soil-to-groundwater migration pathway presented in the May 2007 CMS Report prepared by URS, as approved by the DEQ. Clean up targets are concentrations of VOCs in soil that would prevent leaching to groundwater at concentrations that would potentially result in concentrations in groundwater above the groundwater clean up target (EPA MCLs.)

Clean up Targets for VOCs in Soil

VOC	Clean up Targets for Soil
Tetrachloroethene	20 µg/kg
Trichloroethene	4.8 µg/kg
cis-1,2-dichloroethene	41 µg/kg
trans-1,2-dichloroethene	69 µg/kg
Vinyl chloride	0.93 µg/kg
Total mass of VOCs	Reduce VOC mass by 90% until asymptotically low rate of mass removal is achieved

The clean up targets for VOCs in soil were used along with other data to identify the area and volume of soil targeted for remediation by the final corrective measure. However, given the Site soil conditions (clay and chemical characteristics), it is unlikely that any remedy can achieve nearly 100% reduction of the VOC and TCE mass in soil necessary to meet the low-level clean up targets, which are at or close to the limits of quantitation in soil. A portion of the TCE and 1,2-cis-1,2-DCE (estimated at 10%) is expected to remain absorbed to the soil while the remainder of the VOC mass is removed (volatized) by the SVE system(s). Based on the results of the SESOIL modeling and chemical properties of the COCs, an additional clean up target of 90% reduction in the VOC mass in soil has been established with operation of the SVE system continued until an asymptotically low rate of mass removal is achieved.

Implementation of soil corrective measures with SVE also will achieve risk-based clean up targets for human exposure to Site soil under an industrial or residential land use scenario as shown on the following table.

Comparison of Selected VOC Soil Clean up Targets to Risk-Based Clean up Targets for Human Health Soil Exposure

VOC	Type	Selected Numerical RG for Soil (Soil-to-Groundwater Pathway) (µg/kg)	RG for Human Health Exposure to Soil	
			Residential (µg/kg)	Industrial (µg/kg)
Tetrachloroethene	C	20	550	2,600
Trichloroethene	C	4.8	2,800	14,000
cis-1,2-dichloroethene	NC	41	390,000	5,000,000
trans-1,2-dichloroethene	NC	69	75,000	345,000
Vinyl chloride	C	0.93	60	1,700

Notes:

Type = Constituent type: carcinogenic (C) or non-carcinogenic (NC)
Carcinogenic RSLC: target risk for carcinogenic compounds = 1E-06
Non-carcinogenic RSL: target hazard = 5E-01 for target organs.

Clean-up levels for non-VOC constituents (metals, PAHs, PCB) were developed for soil in the CMS – Addendum No.1 and consist of EPA Region 3 Residential RBCs (the most current version of the EPA Region 3 RSL table available shall be utilized) . The additional constituents are listed below. These constituents have not been found in groundwater above their respective MCL/GPS and therefore calculated site-specific SSLs as remedial goals are not warranted since leaching to groundwater is not evident. The facility retains the option to also evaluate these COCs through a quantitative risk assessment at such time as the remedies for VOCs in soil and groundwater are completed.

The facility shall supply VDEQ with a request and the details of the risk assessment prior to performing the evaluation.

Additional Constituents in Soil

Metals	PCB	PAHs
Arsenic	PCB-1254	Benzo(a)anthracene
Chromium		Benzo(a)pyrene
Lead		Benzo(a)fluoranthene
Thallium		Dibenzo(a,h)anthracene
Vanadium		Indeno (1,2,3-cd)pyrene

C. GROUNDWATER

The following table identifies the numerical clean up targets established for groundwater, which reflect the regulatory goal of restoring groundwater to its most beneficial use (drinking water). Selected clean up targets for groundwater consist of the EPA MCLs under the Safe Drinking Water Act, which also correspond to the Groundwater Protection Standards established in the RCRA Permit.

Clean up Targets for Groundwater

Constituent of Concern	Remedial Goal (µg/L)	Basis
Tetrachloroethene	5	EPA Drinking Water MCL
Trichloroethene	5	EPA Drinking Water MCL
Cis-1,2-dichloroethene	70	EPA Drinking Water MCL
Trans-1,2-dichloroethene	100	EPA Drinking Water MCL
Vinyl chloride	1	EPA Drinking Water MCL