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KLI INCORPORATED

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MODULE V
GROUNDWATER COMPLIANCE MONITORING

V.A. HIGHLIGHTS

In 1997 The Virginia Department of Environmental Quality had determined that KLI's closed surface impoundment had affected groundwater quality beneath the RCRA unit. KLI's Post-Closure permit, issued on October 19, 1997, contained a Compliance Monitoring Program as required under 40 CFR 264.99. The compliance period during which compliance monitoring is required began on October 19, 1997, and subject to 40 CFR § 264.96(c), ends on October 19, 2012. Upon conclusion of the compliance period, the Permittee may be able to return to detection monitoring for any remaining period of post-closure care, provided that corrective action is not required, the constituent levels are at or below background, and the Permittee applies for a permit modification.

V.B. HISTORICAL OVERVIEW

The Compliance Monitoring Program is based upon data collected during several phases of a Groundwater Quality Assessment Program completed at the Facility in 1994. In 1989, the *Phase I Groundwater Quality Assessment Program* (GWQAP) was initiated at the site to assess impact the unit has had on the groundwater quality at the Facility. The *Phase II GWQAP* was initiated in 1991 to determine the lateral and vertical extent of the contaminant plume caused by the unit. A *Phase III GWQAP* was initiated in 1994 which completed the lateral and vertical delineation of the plume at the closed impoundment. The final phase of Groundwater Quality Assessment was completed in July 1995. The final phase included recommendations, which were accepted by the Department, to change the sample collection procedures and designate a new upgradient well.

V.C. COMPLIANCE MONITORING REQUIREMENTS

V.C.1. The Compliance Monitoring Program requires monitoring at the downgradient point of compliance wells and at the well designated as a compliance monitoring well at the frequencies specified in **Permit Attachment J**. Static groundwater elevations will be measured at all specified wells during each sampling event.

a. The groundwater beneath the closed surface impoundment shall be monitored with one upgradient (background) groundwater monitoring well and three downgradient point of compliance wells located as specified on the map presented in **Permit Attachment B**. Monitoring well SP-4 is the upgradient background monitoring well for the closed surface impoundment and

monitoring wells MW-7S, SP-6, and SP-8 are the point of compliance wells.

b. In addition to the wells specified in **Permit Section V.C.1.a.**, compliance monitoring well, MW-7I, will be used to evaluate the potential migration of contaminants in the uppermost aquifer underlying the unit.

c. SS-4, SP-1, SP-2, SP-3, SP-7, and SP-9 will be used only to measure groundwater elevations during each sampling event.

V.C.2. The downgradient point of compliance wells (MW-7S, SP-6, and SP-8) upgradient well (SP-4), and compliance monitoring well (MW-7I) will be sampled in accordance with the Sampling and Analysis Plan (**Permit Attachment I**) and the following schedule:

a. The upgradient well and downgradient point of compliance wells specified in **Permit Section V.C.1.a.** will be sampled for the constituents and at the frequencies 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 well (MW-7I) will be sampled annually 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. Downgradient point of compliance wells listed in **Permit Section V.C.1.a.** 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 Quanititation (or lower) as the specified method.

V.D. WELL LOCATION, INSTALLATION, AND CONSTRUCTION

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

V.D.1. The Permittee shall maintain groundwater monitoring wells/piezometers SS-4, SP-1, SP-2, SP-3, SP-4, SP-6,SP-7, SP-8, SP-9, MW-7S, and MW-7I 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 9 VAC 20-

60-270.14(c)(4) if monitoring data indicate that downgradient groundwater conditions have changed since the completion of the Groundwater Quality Assessment Program.

a. Boring logs for monitoring wells/piezometers SS-4,SP-1, SP-2, SP-3, SP-4, SP-6, SP-7, SP-8, SP-9, MW-7S, and MW-7I are included as **Permit Attachment I, Appendix 8**.

b. Monitoring well design and construction details for monitoring wells SS-4, SP-1, SP-2, SP-3, SP-4, SP-6, SP-7, SP-8, SP-9, MW-7S, and MW-7I are included as **Permit Attachment I, Appendix 8**.

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

a. The groundwater monitoring system must: yield samples in upgradient well(s) that represent the quality of the background groundwater unaffected by leakage from any 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 must be sufficient to identify and define all logical release pathways from the regulated unit to the uppermost aquifer based on site specific hydrogeologic characterization.

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

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

a. All wells deleted from the monitoring program shall be plugged and

abandoned in accordance with **Permit Attachment I, Appendix 7**. 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 Section V.D.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**).

V.E. GROUNDWATER PROTECTION STANDARD

V.E.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.

V.E.2. The Permittee shall monitor all compliance and point of compliance wells as described in **Permit Sections V.C.1 and V.C.2.** for all parameters and constituents specified in **Permit Attachment J**.

V.E.3. The fifteen (15) year compliance period during which the GPS applies began with the effective date of the initial permit, October 21, 1997. If the Permittee is conducting corrective action at the end of the compliance period specified, then the compliance period shall be automatically extended until the Permittee demonstrates that the groundwater protection standard has not been exceeded in any point of compliance well for three (3) consecutive years (40 CFR 264.96(c)).

V.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 Sections V.C.1.** and **V.C.2.**:

V.F.1. Samples shall be collected using the techniques described in **Permit Attachment I**.

V.F.2. Samples shall be preserved, packed, and shipped off-site for analysis in

accordance with the procedures specified in **Permit Attachment I**.

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

V.F.4. Samples shall be tracked and controlled using the chain-of-custody procedures specified in **Permit Attachment I**.

V.F.5. Pursuant to Permit Section V.C.2.a, the Permittee must determine the concentration of hazardous constituents and parameters listed in **Permit Attachment J** in the groundwater at the point of compliance at the frequencies specified in **Permit Attachment J** during the compliance period specified in **Permit Section V.E.3**.

V.F.6. The Permittee must analyze samples from the point of compliance monitoring wells for all constituents contained in **Permit Attachment L** at least annually during the compliance period.

V.G. ELEVATION OF THE GROUNDWATER SURFACE

V.G.1. The Permittee shall determine the groundwater surface elevation at each monitoring well or piezometer (SS-4, SP-1, SP-2, SP-3, SP-4, SP-6, SP-7, SP-8, SP-9, MW-7S, and MW-7I) each time groundwater is sampled in accordance with **Permit Section V.C.2**. The groundwater surface elevation map shall be submitted with ~~the semiannual~~ each monitoring report.

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

V.H. STATISTICAL PROCEDURES

V.H.1. When evaluating the monitoring results in accordance with **Permit Section V.I.**, the Permittee shall use the procedures in **Permit Attachment I, Appendix 6**.

a. If the appropriate statistical test (specified in **Permit Attachment I, Appendix 6** and/or approved by the Director) indicates that the difference between the established background (or upgradient well concentration) and the downgradient well concentration is significant, the Permittee may resample within thirty (30) days of receipt of original laboratory data, not to exceed sixty days (60) from date of original sample collection.

b. If the second round of analyses specified in **Permit Section V.H.1.a.** indicates that the difference is significant, the Permittee shall conclude that a statistically significant change has occurred and the constituent shall be added to the Compliance Monitoring Program Constituent List (**Permit Attachment J**).

c. If no second round of analysis is collected, then the statistical increase is confirmed and the constituent shall be added to the Compliance Monitoring Program Constituent List (**Permit Attachment J**).

V.H.2. The Permittee may elect to perform a simple empirical comparison of Point of Compliance data to the GPS or Compliance Well data to the established background concentration instead of the statistical procedures specified in **Permit Attachment I, Appendix 6**.

V.I. MONITORING PROGRAM AND DATA EVALUATION

The Permittee shall determine groundwater quality as follows:

V.I.1. The Permittee shall collect, preserve, and analyze groundwater samples collected from all monitoring wells specified in **Permit Section V.C.1.a**. at the frequencies specified in **Permit Section V.C.2.a**.

V.I.2. The Permittee shall determine the concentration of hazardous constituents and/or parameters, as specified in **Permit Attachment J** at the frequencies specified in **Permit Section V.C.2.a** in accordance with 40 CFR 264.99(a).

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

V.I.4. The Permittee shall analyze samples from all monitoring wells at the point of compliance as specified in **Permit Section V.C.1.a**., for all constituents contained in **Permit Attachment L** 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 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 Attachment L 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.

V.I.5. If the second analysis (**Permit Section 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 Section 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 Section V.C.1.a.**, for one (1) year.

V.I.6. For each additional Attachment L constituent confirmed in accordance with **Permit Section V.I.4.**, the Director shall establish a Groundwater Protection Standard and amend **Permit Attachment K**. The background value determined through **Permit Section 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).

V.I.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 Section 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 Section V.C.1.a.** 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 Section V.H.** within 30 days from the date the analytical results are available from the laboratory performing the analyses.

V.I.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.

V.I.9. Constituent Removal
If a monitoring constituent added to the compliance monitoring list (Attachment J) in accordance with **Permit Conditions V.I.4(b) and (c)** has not been detected over a period of four consecutive sampling periods, the facility may notify the Department and request to remove the constituent from the compliance 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 V.I.4(b) and (c)** to sample for the entire Attachment L annually.

V.J. **COMPARISON TO GROUNDWATER PROTECTION STANDARDS**

~~At least semiannually~~ For each sampling event, 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.

V.J.1 Methods of Comparison

a. If a single independent sample was collected at each monitoring well during a specific monitoring event, 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 during a specific monitoring event, 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**.

V.J.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, and

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

V.J.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. The Permittee shall include in the notification to the Director in **Permit Section 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 Section 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.

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

V.K. **REPORTING AND RECORDKEEPING**

V.K.1. The Permittee shall enter all monitoring, testing, and analytical data obtained pursuant to **Permit Section V.I.** in the operating record. The data must include all computations and results of approved statistical.

V.K.2. The Permittee shall submit the required analytical results (**Permit Sections V.E., V.I.4., and V.I5.**) ~~at least semiannually~~ for each sampling event, or 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.

V.K.3. Pursuant to **Permit Section 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 Section V.C.2.** (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.

V.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 by

submitting all required reports, documentation, and notifications.

V.M. **SPECIAL REQUIREMENT IF THE GROUNDWATER PROTECTION STANDARD IS EXCEEDED**

V.M.1. The Permittee must 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 Section V.J.2**. The notification must indicate specifically which concentration limits have been exceeded.

V.M.2. 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.

V.M.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 Section V.J.3**.

V.N. **REQUESTS FOR PERMIT MODIFICATION**

V.N.1. 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 request 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.

V.N.2. 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 a request for a permit modification to make any appropriate changes.

MODULE VI
SITE-WIDE CORRECTIVE ACTION

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

VI.A.1. Section 3004(u) of RCRA, 42 U.S.C. § 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.

VI.A.2. Under Section 3004(v) of RCRA, 42 U.S.C. § 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.

VI.A.3. Section 3005(c)(3) of RCRA, 42 U.S.C. § 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.

VI.A.4. The Permittee conducted a RCRA Facility Investigation (RFI) for potential releases of hazardous waste or hazardous constituents at specified SWMUs and Areas of Concern (AOCs) identified at the Facility. The evaluated SWMUs and AOCs are described and shown in Permit Attachment M. The field activities were conducted from December 2007 through July 2009. Groundwater monitoring and use ~~restrictions~~ limitations were identified as the final remedy for the Facility and are further discussed in Section VI.B. below.

VI.B. CORRECTIVE MEASURES IMPLEMENTATION

VI.B.1. Final Remedy Selection

a. The goal of the selected remedy for site-wide corrective action is to ensure the overall protection of human health and the environment. The final remedy for the Facility is groundwater monitoring and activity and use limitations ~~the implementation of Institutional and Engineering Controls~~ as described in the following:

1) Operation and maintenance of the closed surface impoundment and associated groundwater monitoring system as required by Permit Modules II, III, and V.

A Notification of Hazardous Waste Activity was filed with the Clerk of the

Circuit Court of Caroline County on December 29, 1988 in Deed Book 333, Page 019, describing the approximate 21.329 acre Facility by a metes and bounds description and indicating that hazardous waste had been managed at the Facility. A Plat showing the location of the closed surface impoundment and the property boundaries at the Facility was filed by the Clerk of the Circuit Court of Caroline County in Plat Cabinet A, Page 262-A when the Notification of Hazardous Waste Activity was filed.

2) ~~Operation, maintenance and monitoring of groundwater monitoring well, SP-5 until concentrations of COCs are below groundwater clean-up targets as provided in Permit Attachment N.~~ A groundwater monitoring program pursuant to a groundwater monitoring plan submitted to and approved by the Department in accordance with Permit Section VI.B.2 below.

3) Implementation of additional activity and use limitations ~~use restrictions for groundwater and soil~~ at the Facility in accordance with Permit Section VI.B.2 below.
~~The details of the groundwater monitoring program for SP-5 shall be provided in accordance with Permit Section VI.B.2 below.~~

b. The Department reserves the right to require additional investigation and remediation if new data indicate a change in conditions at the Facility.

VI.B.2. Final Remedy Implementation

a. Within ninety (90) days of receipt of the Department's written approval of a permit modification incorporating the final remedy, the Permittee shall submit to the Department for approval a Corrective Measure Implementation (CMI) Work Plan for groundwater monitoring ~~of monitoring well SP-5~~ and for implementation of activity and use limitations at the Facility ~~restrictions on the property~~ as follows:

1) a groundwater monitoring program that, at a minimum, proposes the groundwater monitoring wells to be monitored and the constituents for which monitoring shall be performed.

2) a Declaration of Restrictive Covenants that contains the following:

~~i) a land use restriction to be made applicable to the area adjacent to the closed surface impoundment where concentrations of thallium exceed the residential screening level. The land use restriction shall 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) unless it is demonstrated to the Department that such use will not pose an unreasonable threat to human health or the environment and~~

~~the Department agrees in writing to modify or terminate the land use restriction. The Permittee shall have the area subject to this land use restriction surveyed with the boundary of the area indicated as a polygon on a plat of the property to be attached to the Declaration of Restrictive Covenants. The longitude and latitiude of the polygon shall be established as follows:~~

~~o Decimal degrees format~~
~~o At least seven decimal places~~
~~o Negative sign for west longitude~~
~~o WGS 1984 datum~~

~~2) a restriction that earth moving activities, including drilling, and construction activities are prohibited in the area adjacent to the closed surface impoundment unless it is demonstrated to the Department that such activity use will not pose a threat to human health or the environment and the Department provides prior written approval for such activity;~~

~~iii~~) a groundwater use restriction preventing the use of groundwater ~~from the~~ for potable purposes, unless it is demonstrated to the Department that use for such purposes will not pose an unreasonable threat to human health or the environment and the Department agrees in writing to modify or terminate the groundwater use restriction. ~~other than environmental monitoring for as long as the groundwater clean-up targets are not met;~~

ii) Activity restriction on the property prohibiting well drilling without prior written approval by the Department, to prevent

inadvertent exposure to the contaminated groundwater and adverse affects to the Final Remedy.

~~4) a restriction on well drilling on the property without prior written approval by the Department, to prevent inadvertent exposure to the contaminated groundwater and adverse affects to the Final Remedy, and~~

~~5) coordinate surveys for both use restrictions that meet the following requirements:~~

- ~~define the boundary of each activity and use restriction as a polygon~~
- ~~establish the longitude and latitude of each polygon vertex as follows:~~
  - ~~o Decimal degrees format~~
  - ~~o At least seven decimal places~~

~~o Negative sign for west longitude~~
~~o WGS 1984 datum~~

b. Upon approval by the Department, the Permittee shall record the Declaration of Restrictive Covenants in the Clerk's Office of the Circuit Court of Caroline County, provide a copy of the same to the Department, and shall implement the groundwater monitoring program. ~~, at a minimum, include notice of the use limitations in the deed for the property and shall notify the Department in writing of any proposed changes in the use of the property or proposals for any site work affecting the contamination on the property.~~

VI.C. **EVALUATION OF THE SELECTED REMEDY**

Commencing one year from the approval of the ~~final~~ CMI Work Plan, or concurrent with the annual groundwater monitoring report required by Module V, the Permittee shall submit ~~an annual progress~~ a report to the Department containing the results of the groundwater monitoring program. These reports shall be filed annually until the earlier of termination of the groundwater monitoring program in accordance with the approved groundwater monitoring plan or the Department otherwise provides approval in writing. ~~On the remedy performance.~~ If the Department determines that the selected ~~remedy~~ groundwater monitoring remedy is not sufficient to protect human health or the environment, ~~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 Action remedy. If necessary, the Department or the Permittee may seek modification of this Permit pursuant to 40 C.F.R. § 270.41 or § 270.42 and § 124.5 to implement modifications to the existing Final Remedy.

VI.D. **EMERGENCY RESPONSE; RELEASE REPORTING**

VI.D.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, and 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.

VI.D.2. Releases

The Permittee shall notify 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 Section VI.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.

VI.D.3. Based on the information submitted in Permit Section VI.D.2, the Department may require the SWMU/AOC to be included in an ongoing RCRA Facility Investigation or may require Interim Measures.

VI.D.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 U.S.C. §§ 9604 or 9606, and Section 7003 of RCRA, 42 U.S.C. § 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.

VI.E. GUIDANCE DOCUMENTS

All corrective action work performed at the Facility to meet the requirements of this Permit shall follow the EPA's applicable corrective action guidance documents.

VI.F. SOLID WASTE MANAGEMENT UNIT (SWMU) ASSESSMENT

VI. F1. 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 not be limited to, the following known information:

a. A description of the SWMU 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,in accordance with applicable guidance.

VI.F.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.

VI.F.3. Within sixty (60) days after receipt of the Director's determination that a RCRA Facility Investigation or Interim Measure is necessary, the Permittee shall submit a RCRA Facility Investigation Plan or Interim Measures Workplan 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.

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

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

VI.G. FINANCIAL ASSURANCE

VI.G.1. Initial Cost Estimate

Within ninety (90) days after receiving a request for initial cost estimate from the Department, the Permittee shall submit to the Department for approval detailed written estimates, in current dollars, of the cost of hiring a third party to perform the work under Module VI – "Site-Wide Corrective Action". For purposes of this Permit Section, "work" shall be the work to be performed under Module VI. The cost estimate must account for the costs of all foreseeable work, including all investigations and reports,

construction work, monitoring, and other long term care work, etc. All cost estimates shall be consistent with the requirements of 40 C.F.R. § 264.142 and § 264.144. References in these regulations to closure and post-closure shall mean the work to be performed under Module VI of this Permit.

VI.G.2. Cost Estimate Updates

Within sixty (60) days prior the anniversary date of the establishment of the financial instrument(s) used to comply with Section VI.G. of this Permit, the Permittee shall submit to the Department an updated cost estimate adjusted for inflation and for changes in the scope of the work to be performed until the work required by this Permit is completed.

VI.G.3. Financial Assurance Demonstration

Within thirty (30) calendar days of approval of the initial cost estimate for financial assurance and annually thereafter, the Permittee shall demonstrate compliance with financial assurance to the Department in accordance with 40 CFR § 264.143 for completing the work in accordance with 40 CFR § 264.101(b).

VI.H. RECORDKEEPING

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

VI.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 U.S.C. § 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.

VI.J. COMPLETION OF REMEDY AND REMOVAL OF CONTROLS

If the Permittee believes that the groundwater use restriction is ~~any of the institutional or engineering controls are~~ no longer necessary to protect human health and the environment or should otherwise be modified, then the Permittee may ~~shall~~ submit a written notification and certification to the Department requesting termination or modification and stating why the applicable restriction is no longer necessary or why it should be modified. The Department shall then consider the request and take appropriate action. Any termination or modification shall not be effective unless and until it is set forth in a writing signed by the Department and recorded in the Clerk's Office of the Circuit Court of Caroline County. ~~remedy has been completed in accordance with the 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.~~

The groundwater monitoring program required as part of the Final Remedy shall continue until such time as it is terminated in accordance with the requirements of the approved groundwater monitoring plan set forth in the CMI Work Plan.

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 earlier permit expiration in accordance with 40 CFR §124, §270.41 or §270.42 as applicable.

B.2. Cap/Cover

The original configuration shall be maintained throughout the entire post closure care period (Permit Attachment E, Appendix 1). Within 30 days of the detection of significant subsidence or erosion, repair work shall be accomplished to bring the lines and grades back to at least their original configuration. Significant subsidence or erosion shall be defined as any deterioration which may reduce the performance of the cover from its original intended design performance. Soils, materials, and repair work shall meet minimum standards set forth in the closure cover design.

B.3. Drainage

Site drainage shall be maintained as designed in the closure plan (Permit Attachment E, Appendix 1). Swales and gullies shall be maintained, repaired, and kept free from debris and brush as necessary to provide the appropriate slope. Appropriate maintenance and repair shall be accomplished to ensure drainage is directed towards the outfall or retention structure as indicated in the approved closure design.

B.4. Benchmarks

A benchmark was installed after closure to act as a point of reference for locating the boundaries of the hazardous waste landfill and to detect any changes such as subsidence that may impact the Facility. 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.

a. The benchmarks was installed by a certified land surveyor. The location and elevation are tied into the property boundary and are recorded in the deed to the property.

b. The benchmark is a railroad spike set in a concrete joint, 15 feet east and 8.5 feet south of the southeast corner of the main facility building, near the primary water supply well.

B.5. Groundwater monitoring wells

At ~~least semiannually~~each sampling event, inspect and maintain the exterior fittings of all monitoring wells and piezometers to sustain their original intended purpose. 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. Inspection and maintenance of the inner casing and or/pumps shall be performed in conjunction with the sampling. Wells shall be replaced or repaired as necessary (for diagram see Permit Attachment I, Appendix 4).

B.6. Security

Adequate security shall be maintained to prohibit unauthorized access to the landfill, and warning signs shall be maintained at all entrances and at 50 foot intervals along the fenceline. Six foot security fences surround the hazardous waste landfill. The fence, locks, and gates shall be maintained and replaced as necessary to impede unauthorized access to the Facility. The

Facility operator shall inspect the security fence at least monthly. Regularly scheduled inspections shall be conducted to ensure that the gates and locks are secure.

B.7. Records

All inspections shall be logged and detailed inspection reports written. The logged reports of each inspection shall be maintained at the Facility 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 representatives during periodic on site inspections of the Facility.

C. FACILITY CONTACT

The Facility contact during the post closure care period shall be:

William W. Webb, Jr., LS, PE
Milford Investment Properties, LLC
11903 Bowman Drive, Suite 106
Fredericksburg, VA 22408
(T) (540) 371-1209
~~Mr. William B. Demeritt~~
~~KLI, Inc.~~
~~777 S. Flagler Drive, Suite 1100~~
~~West Palm Beach, Florida 33401-6172~~
~~(T) 561-514-3838~~

C. POST-CLOSURE CARE COST ESTIMATE

(following page)

ATTACHMENT C

FACILITY MAP SHOWING GROUND~~T~~WATER USE RESTRICTIONS

ATTACHMENT G

INSPECTION REQUIREMENTS

ATTACHMENT G

INSPECTION REQUIREMENTS

A. HIGHLIGHTS

In accordance with 40 CFR-264.15, the Permittee is to follow a written inspection schedule observing malfunction, deterioration, operational errors, and discharges from the hazardous waste landfill; implement remedial action when necessary; and maintain a signed and dated inspection log (at the Facility and available to the DEQ upon request) which provides inspection observations, deficiencies noted, and corrective action taken (an example of inspection logs containing the minimum information are depicted in Appendices 1 through 3 of this Attachment). The Permittee is to inspect, at the frequency specified (or within 24 hours following a storm in which the rain fall exceeds 1 inch), for the following as noted below:

B. 24-HOUR SECURITY:

The Permittee shall inspect the landfill monthly for unlocked and/or open security fence gates to maintain 24-hour security.

C. MONTHLY INSPECTIONS:

The Permittee shall inspect the landfill monthly or more frequently as needed for the physical condition of the fences and gates.

C.2. The Permittee shall inspect monthly for deterioration, malfunction or improper operation of landfill and immediate area run off and run on control systems (i.e., benched slopes, swales and gullies, outfall or retention structure, let down structures, diversion ditches).

C.3 The Permittee shall inspect monthly for structural deformity or deterioration of final cover as evidenced by ponding of rain water, rodent and vector activity, deep rooted vegetation, leachate seeps, unauthorized vegetation, food chain crops, vegetative stress, water or wind erosion, potholes, cracks, slump structures, subsidence, etc.

C.4. The Permittee shall inspect monthly for broken, damaged or structurally defective security fence structure and missing or deteriorated warning signs.

C.5. The Permittee shall inspect monthly for defective or disturbed benchmarks.

D. ~~SEMIANNUAL~~ MONITORING WELL INSPECTIONS

The Permittee shall inspect ~~semiannually~~ during each sampling event for damage to groundwater monitoring wells and piezometers (i.e., unlocked protective cover, unsecured protective casing, damaged well and/or defective concrete pad).

APPENDIX 2
EXAMPLE ~~SEMIANNUAL~~ MONITORING WELL INSPECTION LOG

Note: a separate inspection sheet is required for each monitoring well.

MONITORING WELL: _____

A. Inspected by (full name): _____

B. Date/Time of Inspection: _____

C. Inspection Observations: _____
C.1. Locking protective casing: _____
_____
_____
C.2. Concrete well Pad: _____
_____
_____
C.3. Lock: _____
_____
_____
C.4. Erosion: _____
_____
_____
C.5. Exterior well identification number: _____
_____

Inspection Comments: _____
_____
_____
_____
_____
Repair/remediation Comments: _____
_____
_____
_____
_____

F. Repair/remediation Date: _____

KLI INCORPORATED, SAMPLING AND ANALYSIS PLAN

I. SAMPLING

I.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.

Groundwater beneath the closed RCRA unit will be monitored with a single upgradient background monitoring well and three downgradient point of compliance monitoring wells located as specified on the map presented in **Permit Attachment B**. Monitoring well SP-4 is the background well for the unit. Monitoring wells SP-6, SP-8, and MW-7s are the point of compliance wells for the unit. Monitoring wells MW-7I is a compliance monitoring well for the unit. Monitoring wells SS-4, SP-1, SP-2, SP-3, SP-7, and SP-9 are utilized to measure groundwater elevations during each ~~semiannual~~ sampling event.

I.B. SAMPLING FREQUENCY

Background, point of compliance wells, and compliance wells will be sampled ~~semiannually~~ for the constituents and at the frequencies listed in **Permit Attachment J**.

Groundwater samples will be collected and analyzed for all 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~~.

I.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.

I.C.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 ground water 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.

I.C.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.

I.C.3. Immiscible Layers

Immiscible layers have not been observed and are not anticipated. Wells are not required to be tested for the presence of immiscible layers.

I.C.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. A piece of plastic sheeting approximately 4'x4' will be placed over the concrete apron. A bucket will be placed on top of the sheeting so that spilled purge (and sampling) water will remain on the plastic. When purging (and sampling) is complete, spilled purge water should be containerized.

b. Wells will be purged using low-flow techniques to reduce the turbidity of the samples. At least three well borehole volumes will be removed

c. 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.

d. All purge water will be containerized and disposed of in a publicly owned treatment facility with approval, and meet the requirements of Appendix 9 of this Attachment.

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 ground water 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.

I.C.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 groundwater 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.

- Fluorocarbon (teflon) resin bailers with dual check valves, dedicated submersible pumps, peristaltic pumps with dedicated tubing, or other equipment approved by the Director will be used to evacuate wells and for sample collection.

I.C.6. Decontamination:

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 ground water 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.

I.C.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 intergrity, 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.

I.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.

I.D.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 ground water. 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.

I.D.2. Laboratory QA/QC Program

The permitte's laboratory should provide for the use of control samples. The level of the laboratory QA/QC program should be "Level II." 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. QA/QC data should be submitted to the

Department with the groundwater monitoring sample results.

I.D.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.

I.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°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.

4. 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.

5. 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.

6. 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.

7. 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.

I.E. 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

II.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.

II.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.

II.B.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.

II.B.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.

II.B.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

III.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.

III.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. Statistical evaluations will be performed in general accordance with Appendix 6 to **Attachment I**.

III.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 ~~semiannual~~ sampling 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 ground water ingestion-modeling scenario. Facility GPS for each constituent are listed

in **Attachment K**.

IV. RECORD KEEPING AND REPORTING

IV.A. INTRODUCTION

Copies of all groundwater analytical results, ~~groundwater semiannual reports,~~ 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.

IV.B. GROUNDWATER MONITORING RESULTS

The Permittee shall report concentrations or values of the parameters and constituents listed in **Permit Attachments J and L** for each required groundwater monitoring well within 30 days after completing each analysis.

IV.C. 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.

7. groundwater sampling results collected during the previous calendar year;

8. laboratory certificates from the previous calendar year;

9. copies of all notifications and reports submitted as required by this Permit; and

10. recommendations for any changes to the existing groundwater monitoring program.

PERMIT ATTACHMENT J

MONITORING CONSTITUENT LIST

PERMIT ATTACHMENT J

MONITORING CONSTITUENT LIST

Constituents	Analytical Method	Sampling & Analysis Frequency
Barium	6010B, 6020A	Annual
Cadmium	6010B, 6020A	Annual
Chromium	6010B, 6020A	Annual
Cobalt	6010B, 6020A	Annual
Copper	6010B, 6020A	Annual
Lead	6010B, 6020A	Annual
Mercury	7470A	Annual
Nickel	6010B, 6020A	Annual
Selenium	6010B, 6020A	Annual
Silver	6010B, 6020A	Annual
Vanadium	6010B, 6020A	Annual
Zinc	6010B, 6020A	Annual
Isobutyl alcohol	6010B, 6020A	Annual
Formaldehyde	8315A	Annual
1,1-Dichloroethane	8260	Annual
1,1-Dichloroethene	8260	Annual
Tetrachloroethene	8260	Annual
1,1,1-Trichloroethane	8260	Annual
Trichloroethene	8260	Annual

Notes:

1. Alternate SW-846 Methods may be approved by the Department if the request is in writing and submitted at least 30 days prior to the sample collection event. Proposed alternative methods must achieve the appropriate Data Quality Objective (i.e. at least a Department approved health-based concentration limit).

PERMIT ATTACHMENT K

GROUNDWATER PROTECTION STANDARDS

PERMIT ATTACHMENT K

GROUNDWATER PROTECTION STANDARDS

Constituents	Groundwater Protection Standard (ug/L)	Source
Metals (Total)		
Barium	2000	MCL
Cadmium	5.0	MCL
Chromium	100	MCL
Cobalt	4.68	ACL
Copper	~~626~~1300	~~ACL~~MCL
Lead	15.0	MCL
Mercury	2.0	MCL
Nickel	~~313~~312	ACL
Selenium	50	MCL
Silver	78.~~25~~0	ACL
Vanadium	~~109.6~~ 78.0	ACL
Organic Compounds		
Isobutyl alcohol	~~670.7~~ 4680	ACL
Formaldehyde	~~3130~~ 3120	ACL
1,1-Dichloroethane	2.42	ACL
1,1-Dichloroethene	7.0	MCL
Tetrachloroethene	5.0	MCL
1,1,1-Trichloroethane	200	MCL
Trichloroethene	5.0	MCL

Ground water protection standard concentration limits are based on:

1. Maximum Contaminant Levels (MCLs derived from EPA's *Drinking Water Regulations and Health Advisories*).

2. Alternate Concentration Limits (ACLs derived from REAMS).

3. (ug/L) equals micrograms per liter.

PERMIT ATTACHMENT L

GROUNDWATER MONITORING CONSTITUENTS FROM APPENDIX IX TO 40 CFR 264 AND ANALYTICAL METHODS LIST

PERMIT ATTACHMENT L

GROUNDWATER MONITORING CONSTITUENTS FROM APPENDIX IX TO 40 CFR 264 AND ANALYTICAL METHODS LIST

PARAMETERS	ANALYTICAL METHODS SW-846, 3RD EDITION
~~acenaphthene~~	~~8270C~~
~~acenaphthylene~~	~~8270C~~
~~acetone~~	~~8260B~~
~~acetophenone~~	~~8270C~~
~~acetonitrile~~	~~8015B~~ ~~8260B~~
~~2-acetylaminofluorene~~	~~8270C~~
~~acrolein~~	~~8260B~~
~~acrylonitrile~~	~~8260B~~ ~~8316~~
~~aldrin~~	~~8081A~~
~~allyl chloride~~	~~8260B~~
~~4-aminobiphenyl~~	~~8270C~~
~~aniline~~	~~8270C~~
~~anthracene~~	~~8270C~~ ~~8310~~
~~antimony~~	~~6010B~~ ~~6020A~~
~~aramite~~	~~8270C~~
~~arsenic~~	~~6010B~~ ~~6020A~~
barium	6010B 6020A
~~benzene~~	~~8260B~~
~~benzo[a]anthracene~~	~~8270C/8310~~
~~benzo[b]fluoranthene~~	~~8270C/8310~~
~~benzo[k]fluoranthene~~	~~8270C/8310~~
~~benzo[ghi]perylene~~	~~8270C/8310~~
~~benzo[a]pyrene~~	~~8270C/8310~~
~~benzyl alcohol~~	~~8270C~~
~~beryllium~~	~~6010B~~ ~~6020A~~

PARAMETERS	ANALYTICAL METHODS SW-846, 3RD EDITION
~~BHC-alpha~~	~~8081A~~
~~BHC-beta~~	~~8081A~~
~~BHC-delta~~	~~8081A~~
~~BHC-gamma; Lindane~~	~~8081A~~
~~bis(2-chlorethoxy)methane~~	~~8270C~~
~~bis(2-chloroethyl)ether~~	~~8270C~~
~~bis(2-chloro-1-methylethyl)ether~~	~~8270C~~
~~bis(2-ethylhexyl)phthalate~~	~~8270C~~
~~bromodichloromethane~~	~~8021B~~ ~~8260B~~
~~bromoform; tribromomethane~~	~~8260B~~
~~4-bromophenyl-phenyl ether~~	~~8270C~~
~~butyl benzyl phthalate~~	~~8061~~ ~~8270C~~
cadmium	6010B 6020A
~~carbon disulfide~~	~~8260B~~
~~carbon tetrachloride~~	~~8021B~~ ~~8260B~~
~~chlordane~~	~~8081A~~
~~p-chloroaniline~~	~~8270C~~
~~chlorobenzene~~	~~8021B~~ ~~8260B~~
~~chlorobenzilate~~	~~8270C~~
~~p-chloro-m-cresol~~	~~8041~~ ~~8270C~~
~~chloroethane; ethyl chloride~~	~~8021B~~ ~~8260B~~
~~chloroform; trichloromethane~~	~~8021B~~ ~~8260B~~
~~2-chloronaphthalene~~	~~8121~~ ~~8270C~~
~~2-chlorophenol~~	~~8041~~ ~~8270C~~

PARAMETERS	ANALYTICAL METHODS SW-846, 3RD EDITION
~~4-chlorophenyl phenyl ether~~	~~8111~~ ~~8270C~~
~~chloroprene~~	~~8260B~~
chromium	6010B 6020A 7191
~~chrysene~~	~~8270C~~ ~~8310~~
cobalt	6010B 6020A 7201
copper	6010B 6020A 7211
~~m-cresol~~	~~8270C~~
~~o-cresol~~	~~8270C~~
~~p-cresol~~	~~8270C~~
~~cyanide~~	~~9010B~~ ~~9012A~~
~~2,4-D;~~ ~~2,4-dichlorophenoxy acetic acid~~	~~8151A~~
~~4,4'-DDD~~	~~8081A~~ ~~8270C~~
~~4,4'-DDE~~	~~8081A~~
~~4,4'-DDT~~	~~8081A~~
~~diallate~~	~~8270C~~
~~dibenz(a,h)anthracene~~	~~8310~~ ~~8270C~~
~~dibenzofuran~~	~~8270C~~
~~dibromochloromethane~~	~~8021B~~ ~~8260B~~
~~1,2-dibromo-3-chloropropane;~~ ~~DBCP~~	~~8011~~
~~1,2-dibromoethane;~~ ~~ethylene dibromide~~	~~8011~~
~~di-n-butyl phthalate~~	~~8061~~ ~~8270C~~
~~di-n-octyl phthalate~~	~~8270C~~

PARAMETERS	ANALYTICAL METHODS SW-846, 3RD EDITION
~~o-dichlorobenzene; benzene, 1,2-dicholoro-~~	~~8021B~~ ~~8121~~ ~~8260B~~ ~~8270C~~
~~m-dichlorobenzene; benzene, 1,3-dicholoro-~~	~~8021B~~ ~~8121~~ ~~8260B~~ ~~8270C~~
~~p-dichlorobenzene; benzene, 1,4-dicholoro-~~	~~8021B~~ ~~8121~~ ~~8260B~~ ~~8270C~~
~~3,3'-dichlorobenzidine~~	~~8270C~~
~~trans-1,4-dichloro-2-butene~~	~~8260B~~
~~dichlorodifluoromethane~~	~~8021B~~ ~~8260B~~
1,1-dichloroethane	8021B 8260B
~~1,2-dichloroethane~~	~~8021B~~ ~~8260B~~
1,1-dichloroethylene	8021B 8260B
~~trans-1,2-dichloroethylene~~	~~8021B~~ ~~8260B~~
~~2,4-dichlorophenol~~	~~8041~~ ~~8270C~~
~~2,6-dichlorophenol~~	~~8270C~~
~~1,2-dichloropropane~~	~~8021B~~ ~~8260B~~
~~cis-1,3-dichloropropene~~	~~8260B~~
~~trans-1,3-dichloropropene~~	~~8260B~~
~~dieldrin~~	~~8081A~~
~~diethyl phthalate~~	~~8061~~ ~~8270C~~
~~O,O-diethyl O-2-pyrazinylphosphorothioate~~	~~8141~~ ~~8270C~~
~~dimethoate~~	~~8141~~ ~~8270C~~
~~p-dimethylaminoazobenzene~~	~~8270C~~

PARAMETERS	ANALYTICAL METHODS SW-846, 3RD EDITION
~~7,12-dimethylbenz(a)anthracene~~	~~8270C~~
~~3,3'-dimethylbenzidine~~	~~8270C~~
~~alpha, alpha-dimethyl phenethylamine~~	~~8270C~~
~~2,4-dimethylphenol~~	~~8041~~ ~~8270C~~
~~dimethyl phthalate~~	~~8061~~ ~~8270C~~
~~m-dinitrobenzene;~~ ~~benzene, 1,3-dinitro-~~	~~8270C~~
~~4,6-dinitro-o-cresol~~	~~8041~~ ~~8270C~~
~~2,4-dinitrophenol~~	~~8041~~ ~~8270C~~
~~2,4-dinitrotoluene~~	~~8091~~ ~~8270C~~
~~2,6-dinitrotoluene~~	~~8091~~ ~~8270C~~
~~2-sec-butyl-4,6-dinitrophenol;~~ ~~Dinoseb; DNBP~~	~~8151A~~
~~di-n-octyl phthalate~~	~~8061~~ ~~8270C~~
~~1,4-dioxane~~	~~8015B~~ ~~8260B~~
~~diphenylamine~~	~~8270C~~
~~disulfoton~~	~~8141A~~ ~~8270C~~
~~Endosulfan I~~	~~8081A~~
~~Endosulfan II~~	~~8081A~~
~~Endosulfan sulfate~~	~~8081A~~
~~Endrin~~	~~8081A~~
~~Endrin aldehyde~~	~~8081A~~
~~ethylbenzene~~	~~8021B~~ ~~8260B~~
~~ethyl methacrylate~~	~~8015B~~ ~~8260B~~ ~~8270C~~
~~ethyl methanesulfonate~~	~~8270C~~
~~famphur~~	~~8270C~~

PARAMETERS	ANALYTICAL METHODS SW-846, 3RD EDITION
~~fluoranthene~~	~~8270C~~ ~~8310~~
~~fluorene~~	~~8270C~~ ~~8310~~
~~heptachlor~~	~~8081A~~
~~heptachlor epoxide~~	~~8081A~~
~~hexachlorobenzene~~	~~8121~~ ~~8270C~~
~~hexachlorobutadiene~~	~~8021B~~ ~~8121~~ ~~8260B~~
~~hexachlorocyclopentadiene~~	~~8121~~ ~~8270C~~
~~hexachloroethane~~	~~8121~~ ~~8270C~~
~~hexachlorophene~~	~~8270C~~
~~hexachloropropene~~	~~8270C~~
~~2-hexanone~~	~~8260B~~
~~indeno(1,2,3-cd)pyrene~~	~~8310~~ ~~8270C~~
isobutyl alcohol	8015B 8260B
~~isodrin~~	~~8270C~~
~~isophorone~~	~~8091~~ ~~8270C~~
~~isosafrole~~	~~8270C~~
~~kepone~~	~~8081A~~ ~~8270C~~
~~lead~~	~~6010B~~ ~~6020A~~
~~Lindane~~	~~8081A~~
mercury	7470A
~~methacrylonitrile~~	~~8015B~~ ~~8260B~~
~~methapyrilene~~	~~8270C~~
~~methoxychlor~~	~~8081A~~ ~~8270C~~

PARAMETERS	ANALYTICAL METHODS SW-846, 3RD EDITION
~~methyl bromide; bromomethane~~	~~8260B~~
~~methyl chloride; chloromethane~~	~~8021B~~ ~~8260B~~
~~3-methylcholanthrene~~	~~8270C~~
~~methylene bromide~~	~~8021B~~ ~~8260B~~
~~methylene chloride; dichloromethane~~	~~8021B~~ ~~8260B~~
~~methyl ethyl ketone; MEK; 2-butanone~~	~~8015B~~ ~~8260B~~
~~methyl iodide; iodomethane~~	~~8260B~~
~~methyl methacrylate~~	~~8015B~~ ~~8260B~~
~~methyl methanesulfonate~~	~~8270C~~
~~2-methylnaphthalene~~	~~8270C~~
~~methyl parathion~~	~~8141A~~ ~~8270C~~
~~4-methyl-2-pentanone; MIBK~~	~~8015B~~ ~~8260B~~
~~methylene bromide; dibromomethane~~	~~8260B~~
~~2-methylnaphthalene~~	~~8270C~~
~~naphthalene~~	~~8021B~~ ~~8260B~~
~~1,4-naphthoquinone~~	~~8270C~~
~~1-naphthylamine~~	~~8270C~~
~~2-naphthylamine~~	~~8270C~~
nickel	6010B 6020A
~~o-nitroaniline~~	~~8270C~~
~~m-nitroaniline~~	~~8270C~~
~~p-nitroaniline~~	~~8270C~~
~~nitrobenzene~~	~~8091~~ ~~8270C~~
~~o-nitrophenol~~	~~8041~~ ~~8270C~~

PARAMETERS	ANALYTICAL METHODS SW-846, 3RD EDITION
~~p-nitrophenol~~	~~8041~~ ~~8270C~~
~~4-nitroquinoline-1-oxide~~	~~8270C~~
~~n-nitrosodi-n-butylamine~~	~~8270C~~
~~n-nitrosodiethylamine~~	~~8270C~~
~~n-nitrosodimethylamine~~	~~8070A~~ ~~8270C~~
~~n-nitrosodiphenylamine~~	~~8070A~~ ~~8270C~~
~~n-nitrosodi-n-propylamine;~~ ~~di-n-propylnitrosamine~~	~~8070A~~ ~~8270C~~
~~n-nitrosomethylethylamine~~	~~8270C~~
~~n-nitrosomorpholine~~	~~8270C~~
~~n-nitrosopiperidine~~	~~8270C~~
~~n-nitrosopyrrolidine~~	~~8270C~~
~~5-nitro-o-toluidine~~	~~8270C~~
~~Parathion~~	~~8270C~~
~~pentachlorobenzene~~	~~8270C~~
~~pentachloroethane~~	~~8260B~~ ~~8270C~~
~~pentachloronitrobenzene~~	~~8270C~~
~~pentachlorophenol~~	~~8041~~
~~phenacetin~~	~~8270C~~
~~phenanthrene~~	~~8270C~~ ~~8310~~
~~phenol~~	~~8041~~ ~~8270C~~
~~p-phenylenediamine~~	~~8270C~~
~~phorate~~	~~8141A~~ ~~8270C~~
~~2-picoline~~	~~8260B~~ ~~8270C~~
~~polychlorinated biphenyls (1242)~~	~~8082~~
~~polychlorinated dibenzo-p-dioxins; PCDDs~~	~~8280A~~
~~polychlorinated dibenzofurans; PCDFs~~	~~8280A~~
~~pronamide~~	~~8270C~~

PARAMETERS	ANALYTICAL METHODS SW-846, 3RD EDITION
~~propionitrile~~	~~8015B~~ ~~8260B~~
~~pyrene~~	~~8270C~~ ~~8310~~
~~pyridine~~	~~8260B~~ ~~8270C~~
~~safrole~~	~~8270C~~
selenium	6010B 6020
silver	6010B 6020
~~Silvex;~~ ~~2,4,5-TP~~	~~8151A~~
~~styrene~~	~~8021B~~ ~~8260B~~
~~sulfide~~	~~9030A~~
~~1,2,4,5-tetrachlorobenzene~~	~~8270C~~
~~2,3,7,8-tetrachlorodibenzo-p-dioxin~~	~~8280A~~
~~1,1,1,2-tetrachloroethane~~	~~8021B~~ ~~8260B~~
~~1,1,2,2-tetrachloroethane~~	~~8021B~~ ~~8260B~~
tetrachloroethylene; PCE; tetrachloroethene	8260B
~~2,3,4,6-tetrachlorophenol~~	~~8270C~~
~~tetraethyl dithiopyrophosphate; Sulfotep~~	~~8141~~ ~~8270C~~
~~thallium~~	~~6010B~~ ~~6020~~
~~tin~~	~~6010B~~ ~~6020~~
~~toluene~~	~~8021B~~ ~~8260B~~
~~o-toluidine~~	~~8270C~~
~~Toxaphene~~	~~8081A~~
~~1,2,4-trichlorobenzene~~	~~8021B~~ ~~8121~~ ~~8260B~~

PARAMETERS	ANALYTICAL METHODS SW-846, 3RD EDITION
1,1,1-trichloroethane	8021B 8260B
~~1,1,2-trichloroethane~~	~~8260B~~
trichloroethylene; trichloroethene	8021B 8260B
~~trichlorofluoromethane~~	~~8021B~~ ~~8260B~~
~~2,4,5-trichlorophenol~~	~~8270C~~
~~2,4,6-trichlorophenol~~	~~8041A~~ ~~8270C~~
~~2,4,5-trichlorophenoxyacetic acid; 2,4,5-T~~	~~8151A~~
~~1,2,3-trichloropropane~~	~~8021B~~ ~~8260B~~
~~O,O,O-triethyl phosphorothioate~~	~~8270C~~
~~1,3,5-trinitrobenzene~~	~~8270C~~
vanadium	6010B 6020
~~vinyl acetate~~	~~8260B~~
~~vinyl chloride~~	~~8021B~~ ~~8260B~~
~~xylene (total)~~	~~8021B~~ ~~8260B~~
zinc	6010B 6020A

Alternate SW-846 Methods may be approved by the Director if the request is in writing and submitted at least 30 days prior to the sampling event. Proposed alternated methods must achieve the same PQL (or lower) as the specified method.

PERMIT ATTACHMENT N

GROUNDWATER CLEANUP TARGETS

PERMIT ATTACHMENT N

GROUNDWATER CLEAN UP TARGETS

Constituent of Concern	Clean-up Target	Source
1,1-dihloroethane	24 ug/L	10-5 Risk Level
Tetrachloroethene	5 ug/L	MCL

~~HAZARDOUS CONSTITUENT SAMPLING LIST AND RISK BASED CONCENTRATION SCREENING~~

~~1. The Permittee shall analyze media for constituents listed in 40 CFR Part 261, Appendix VIII, Hazardous Constituents, and 40 CFR Part 264, Appendix IX, Groundwater Monitoring List, which have been adopted by reference in the Virginia Hazardous Waste Management Regulations (VHWMR), as codified in Title 9 of the Virginia Administrative Code, Agency 20, Chapter 60 (9 VAC 20-60). Based on site-specific considerations (e.g., the contaminated media, sampling and analysis of waste from the unit, or facility-specific information), the Permittee may propose to the Department for approval of a reduced list of constituents for analyses. Likewise, the above list shall not preclude the Permittee from analyzing constituents, chemical parameters or physical parameters not otherwise specified.~~

~~2. The Permittee shall either screen analytical data against Risk-Based Screening Levels (RBSLs) or, in lieu of screening, carry forward a SWMU/AOC, constituent, media and/or exposure pathway through the RFI. By use of a risk-based concentration screen, the corrective action process (including any risk assessment) can be made more efficient by focusing on media, significant units, dominant contaminants and routes of exposure at the earliest feasible stage. The levels specified below represent screening levels, which are intended to guide the Permittee in recommending further action (e.g., conducting a RFI/CMS). These values are not intended to be remedial cleanup levels.~~

~~A. The RBSLs will be developed from the following sources as appropriate:~~

~~i. *U.S. EPA Region III Technical Guidance Manual, Risk Assessment,"Selecting Exposure Routes and Contaminants of Concern by Risk-Based Screening,"* U.S. EPA/903/r-93-001, January 1993.~~

~~ii. U.S. EPA Region III Risk-Based Concentration (RBC) Table (most recent update)~~

~~iii. Current Federal Primary Drinking Water Standards~~

~~iv. *Soil Screening Guidance*, U.S. EPA/540/R-95/128, May 1996.~~

~~v. Ambient Water Quality Criteria (AWQC).~~

~~vi. Other guidance documents as appropriate and approved by the Department.~~

B. For a given medium containing a constituent with more than one risk-based concentration (i.e., one based on carcinogenic risk, one based on noncarcinogenic effects), the lower concentration shall be used. RBSLs for noncarcinogenic constituents will be based on a hazard quotient of 0.1. RBSLs for carcinogenic constituents will be based on a risk level of 1×10^{-6}.

C. If health-based criteria are not available for a constituent detected at the site, the Department may require that provisional RBSLs be proposed based conservatively on toxicity data reported in literature and/or health-based criteria for similar constituents. As additional toxicological data of adequate quality becomes available, the Permittee may incorporate such data into the RBSLs, subject to the Department's approval.

3. The Permittee may use existing data (i.e. data collected prior to the effective date of the permit) or data collected during the RFI to characterize the nature and extent of contamination for a SWMU/AOC, constituent, media and/or exposure pathway. Data collected prior to the Department's approval of a Quality Assurance Project Plan must have documentation supporting its quality. For either existing data or data collected during the RFI, the detection limits for the analytical methods used must meet the various screening criteria outlined below. Standard SW-846 method detection limits will not meet the various screening criteria outlined below for all constituents. For those constituents, the Permittee may choose to carry them forward through the RFI at one-half the detection limit, or use a more sensitive method, which can meet the screening criteria.

4. The requirement to implement Corrective Measures at the Facility is not contingent upon exceedances of these screening levels. That is, if the Department determines that a constituent(s) present in a concentration below screening levels may pose a threat to human health or the environment, given site-specific exposure conditions, and there is reason to believe that the constituent(s) has been released from the facility, the Department may require Corrective Measures. Likewise, the Department may deem no further action is necessary despite exceedances of these screening levels, with appropriate rationale.

5. The Permittee shall screen each pathway described below. A SWMU/AOC, constituent, and/or medium with sufficient quantity and quality of data, that does not exceed screening concentrations for any of the pathways may generally be eliminated from further investigation. A SWMU/AOC, constituent or medium for which analytical data exceeds screening levels for a given pathway shall require further investigation or evaluation under the RFI. Based upon all the available information (e.g. number of samples, nature of contamination, location of SWMU/AOC), the Permittee shall recommend a course of action.

A. Soil screening concentrations shall be developed for each of the following exposure pathways; direct contact, inhalation, migration to groundwater, and ecological receptors.

i. For direct contact, RBSLs shall be developed so that contaminants remaining in soil would be safe for incidental ingestion assuming residential exposure. If the Permittee has submitted documentation supporting industrial (or other non-residential) future land use scenarios (See Condition 6 of this Attachment),

~~the Permittee may also develop RBSLs for soils in accordance with the scenario under the Department's consideration. The Permittee may conduct the industrial screening prior to the residential screening so that, if contaminant concentrations at the unit exceed the industrial RBSLs, further investigation or evaluation is required, and the residential screening is not required. If a unit does not exceed the industrial RBSLs, then the residential screening must be conducted, so that soils at the site can be classified for direct contact exposure as follows:~~

~~a. Below Residential – A SWMU/AOC or constituent for which analytical data is below residential RBSLs can generally be eliminated from further investigation for the direct contact pathway.~~

~~b. Above Industrial – A SWMU/AOC or constituent for which analytical data is above industrial RBSLs shall be carried forward for additional investigation or evaluation under the RFI or CMS.~~

~~c. Between Residential and Industrial – For a SWMU/AOC or constituent for which analytical data is below industrial and above residential RBSLs, the Permittee shall recommend whether further investigation or evaluation is warranted under the RFI or CMS for the direct contact pathway, based upon all available information (e.g., data quality, number of samples, nature of contamination, location of the SWMU/AOC, location and nature of actual/potential pathways and receptors, and potential for exposure).~~

~~ii. For inhalation, RBSLs shall be developed so that contaminants remaining in soil would be safe for inhalation of volatilized constituents or of soil-bound contaminants suspended in the air.~~

~~iii. For migration to groundwater, RBSLs shall be developed so that contaminants remaining in soil would not; (1) increase contamination in groundwater to concentrations that exceed RBSLs (see Condition 5.B. below); and (2) increase contamination in surface water to concentrations that exceed RBSLs (see Condition 5.C. below).~~

~~iv. For ecological receptors, if ecological exposure has occurred or is potentially occurring, the Permittee shall quantitatively screen analytical data against the appropriate ecological screening criteria below. If it is not known if ecological exposure has occurred or is potentially occurring, the Permittee must collect sufficient biotic survey data to make such a determination.~~

~~a. Toxicological Benchmarks for Wildlife: 1996 Revision. Sample, B.E., D.M. Opresko, and G.W. Suter II, Oak Ridge National Laboratory, Oak Ridge, TN, 1996.~~

b. Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revision. Efroymson, R.A., M.E. Will, G.W. Suter II, and A.C. Wooten, Oak Ridge National Laboratory, Oak Ridge, TN, 1997.

c. Toxicological Benchmarks for Potential Contaminants of Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Processes. Will, M.E. and G.W. Suter II, Oak Ridge National Laboratory, Oak Ridge, TN, 1995.

B. Groundwater screening shall be conducted both for potential human health exposure and for protection of surface water considering the nature of the groundwater/surface water interaction.

i. For the protection of human health, groundwater samples shall be screened based on the current or potential use of the aquifer as follows:

a. If the aquifer is a current or potential source of drinking water, or is hydraulically connected to an aquifer which could be a drinking water supply, then the Permittee shall screen groundwater against the lower of the Maximum Contaminant Levels (MCLs) established under the Safe Drinking Water Act, Region III RBCs or similarly derived RBSLs.

b. If the aquifer is not a current or potential future source of drinking water, as designated by the Department or through an EPA-endorsed CSGWPP[1], and the aquifer is not hydraulically connected to an aquifer which could be a drinking water supply, then RBSLs appropriate for the groundwater use that could apply (e.g., agricultural) may be proposed by the Permittee and submitted for the Department's approval.

ii. For the protection of surface water, groundwater, which discharges to surface water, shall also be screened against the surface water criteria listed below in Condition 5.C.

C. Surface water screening shall be conducted both for human health exposure and for protection of aquatic life. Surface water screening for human health will be based on the surface water body use, as designated by the applicable state. For drainage systems (e.g. storm water channels), the designation shall be based on the designation of the

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1 In interpreting whether the aquifer is a current or potential source of drinking water, DEQ will generally use the approach outlined in the Ground-Water Protection Strategy (August 1984) and/or a site specific decision making rationale included in an EPA endorsed Comprehensive State Ground Water Protection Program (CSGWPP). Currently, there are no states in Region III with an EPA endorsed CSGWPP, consequently the RCRA Program must rely on the Federal classification. It is Region III RCRA Program experience that most RCRA facilities in Region III will probably be either a current or potential drinking water supply and will not meet the requirements to be classified as a non-potable (i.e., Class III) aquifer. In Virginia, all aquifers are considered potential drinking water sources for RCRA Program objectives.

surface water body which ultimately receives the discharge. Screening for the protection of aquatic life shall also include screening of sediment.

i. For the protection of human health, surface water samples will be screened based on the state designation as follows:

a. If the state surface water designation includes use as drinking water, the Permittee shall use the available human health Ambient Water Quality Criteria (AWQC) for ingestion of water and organisms. Where AWQC are not available, the Permittee shall screen against the lower of MCLs, Region III RBCs or similarly derived RBSLs.

b. If the state surface water designation does not include use as drinking water, the Permittee shall use the available human health AWQC for ingestion of organisms. Where AWQC are not available, the Permittee may develop similarly derived RBSLs.

ii. For protection of aquatic life, surface water and sediment shall be screened as follows:

a. Surface water samples shall be screened against Chronic AWQC for the protection of aquatic organisms, or, if not available, the screening values in *Toxicological Benchmarks for Screening of Potential Contaminants of Concern for Effects on Aquatic Biota on Oak Ridge Reservation: 1996 Revision* (Suter, G.W. II and C.L. Tsao, Oak Ridge National Laboratory, Oak Ridge, TN, 1996).

b. Sediment samples shall be screened against the screening values in Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Sediment-Associated Biota: 1997 Revision (Jones, D.S., G.W. Suter II, and R.N. Hull, Oak Ridge National Laboratory, Oak Ridge, TN, 1997).

6. If the Permittee believes that a future industrial land-use scenario is applicable to the Facility, the Permittee must submit the land use information specified in the OSWER Directive No. 9355.7-04 Land Use in the CERCLA Remedy Selection Process. The Department will make a final land use determination after review of the Permittee's submittal and consultation with state and local land use planning authorities, elected officials, and the public. This determination will be independent of the screening procedures specified above.

~~ATTACHMENT O~~

~~RCRA FACILITY INVESTIGATION REQUIREMENTS~~

~~ATTACHMENT O~~

~~RCRA FACILITY INVESTIGATION REQUIREMENTS~~

~~1. Phase I RCRA Facility Investigation (RFI) Plan Requirements~~

~~a. The Phase I RFI Sampling Plan shall include:~~

~~(1) Background – The Permittee shall identify current and historical site information which may affect the proposed sampling and data collection effort.~~

~~(2) Maps – The Permittee shall include all pertinent locations of sampling and/or data collection on maps and shall locate all groundwater, soil, surface water, sediment, and runoff sampling points.~~

~~(3) Rationale for sample locations, number and type of samples. The Permittee shall:~~

~~(a) Identify the specific sampling points for each SWMU/AOC for each potentially affected environmental media.~~

~~(b) Provide the rationale and selection process utilized for the selection of final sampling points.~~

~~(c) Identify the objective of the sampling plan:~~

~~(i) A limited, biased sampling effort such that detection of hazardous waste or hazardous constituents triggers a Phase II RFI; or~~

~~(ii) An adequate number of samples will be taken to demonstrate that no releases from the SWMU/AOC exceed a risk-based number.~~

~~(4) The Permittee may elect to perform appropriate screening (geophysics, soil gas, immunoassay) prior to selecting specific sampling points:~~

~~(a) Screening methods shall not be used as a substitute for direct sampling.~~

~~(b) Within 90 calendar days of the effective date of this permit, the Permittee shall notify the Department and the EPA Region 3, in writing, whether or not screening methods will be performed.~~

~~(c) Should the Permittee elect to perform screening prior to sampling, the time to submit the Phase I RFI Plan shall be extended by sixty (60) calendar days, beyond the time specified in permit section VI.C.1.~~

~~(d) The Phase I RFI Sampling Plan shall include the results of the screening procedures.~~

~~(5) The unit-specific groundwater sampling points identified for each SWMU/AOC may either be existing monitoring wells, new monitoring wells installed specifically for the SWMU/AOC, or a method appropriate for one-time sampling of the groundwater.~~

~~The Permittee may elect a phased groundwater investigation where Phase I is a soil gas investigation which may be used to demonstrate the need for a Phase II RFI but may not be used to rule out the Phase I RFI. Groundwater samples must be obtained from wells on-site (potable and non-potable) at the Facility in the Phase I RFI.~~

~~(6) Soil and sediment (where feasible) sampling points must be selected where contamination is most likely to have occurred, considering topography, unit characteristics, waste mobility, runoff characteristics, and receiving stream characteristics, and all other relevant information.~~

~~Where soil sampling is designed to assess the migration of hazardous waste and/or hazardous constituents from a SWMU or AOC structure by runoff or seepage, then the soil sampling plan and sampling points shall be established based upon the evaluation of the SWMU or AOC structure for cracks (or other failure points in a unit) or other migration pathways from the unit(s). Surface soil samples and sub-soil samples shall be conducted in the vicinity of these potential migration pathways.~~

~~Where soil sampling is designed to assess the releases or suspected releases of hazardous waste or hazardous constituents into the air from a SWMU or AOC, then the soil sampling regime should be based upon the wind rose for the facility and air dispersion modeling and the potential air deposition from the SWMU or AOC being assessed. The soil sampling plan to assess the potential air deposition of hazardous waste and/or hazardous constituents shall include all of the supporting information utilized to establish the potential areas of deposition and the surface soil sampling points. Soil sampling shall be sufficient in areal extent and scope to provide a statistically comprehensive evaluation of the presence of hazardous waste and/or hazardous constituents due to the potential releases of hazardous waste and/or constituents to the atmosphere from the SWMUs or AOC units. Soil sampling locations shall include all areas identified as the maximum impacted receptors in the risk assessment completed for the air emissions modeling for any combustion units.~~

~~Where surface water and sediment sampling is designed to assess the potential migration of hazardous waste or hazardous constituents by the surface water pathway, the surface water and sediment sampling plan and sampling points shall be sufficient to collect surface water and sediment from areas of the receiving drainageways, stream, ponds, wetlands, etc. Sediment samples shall be from areas of sediment deposition. Sediment samples shall also include~~

~~testing and analysis and an evaluation of the sediment characteristics of each sediment sampling point and include, but not be limited to: a description of the surface water sampled, surface water flow (cfs, etc., at the time of sampling and mean cfs for stream), the sediment deposition area (nature and size), sediment thickness profile, and the physical and chemical parameters (e.g. grain size, particle distribution analyses, organic carbon content, cation exchange capacity, pH, etc.). The surface water and sediment sampling shall be sufficient in areal extent and scope to provide a statistically comprehensive evaluation of the presence of hazardous waste and/or hazardous constituents due to the potential releases of hazardous waste and/or constituents to the environment by the surface water pathway from the operations of the SWMU or AOC units.~~

~~b. The Phase I RFI Sampling Plan shall include a Sample Collection Methods and Procedures Plan and a Quality Assurance Project Plan (Attachment R), which conforms to the analytical requirements set forth in IV.C.2. The Permittee shall also furnish to the Department the Laboratory Data Package as specified in Attachment R. The Sampling Plan shall provide for the analysis of the constituents as specified in Attachments L and N.~~

~~c. The Department reserves the right to require the Permittee to furnish the Department with split samples for any samples taken by the Permittee pursuant to this permit. Where split samples are taken and analyzed, the Department will provide the results to the Permittee for evaluation in the Release Assessment Report. The Permittee shall identify a procedure in the Sampling Plan for giving the Department at least two weeks notice of any planned sampling or field activities.~~

~~d. The Phase I RFI Sampling Plan must identify the disposition of any wastes generated as a result of the investigation. All such wastes shall be managed in accordance with applicable State, local and federal regulations, including the Land Disposal Restrictions set forth in 40 C.F.R. Part 268 and 9 VAC 20-40-268.~~

~~e. Concurrent with submission of a Phase I RFI Plan, the Permittee shall include a Health and Safety Plan in accordance with Attachment S, and a Sample Collection Methods and Procedures Plan, a Quality Assurance Project Plan, a Laboratory Data Package(s) and Data Management Plan as specified in Attachment R of this Permit.~~

~~f. Schedule~~

~~In the Phase I RFI, the Permittee shall include a schedule for the implementation of the Phase I RFI and submission of the Phase I RFI Report.~~

~~g. Community Relations Plan~~

~~(1) The Permittee shall prepare a community relations plan for the RFI. The Permittee shall prepare a fact sheet which describes the scope and objectives of the Phase I and Phase II RFI and submit to the Department and the EPA Region 3 for comment. The community relations plan shall include a public notice and public meeting that announces and describes the forthcoming RFI to~~

the community. The Permittee shall publish this notice in major local newspaper of general circulation. The public notice shall include the name and telephone numbers of the contact person of the Permittee and the Department. The public notice shall include the announcement of the availability of a fact sheet which describes the scope and objectives of the RFI. The fact sheet shall be mailed by the Permittee to all persons on the Facility mailing list compiled under 40 C.F.R. § 124.10(c)(1)(ix) and 9 VAC 20-60-1200.C, to the appropriate units of State and local governments, to all individuals who own or reside on the land that are contiguous to the Facility, and to individuals who own or reside on land in the other nearby areas to be investigated under the RFI. The mailing to the aforementioned individuals is to be made at least thirty (30) business days prior to start of the RFI field activities. The meeting shall be held to the extent practicable in the vicinity of the permitted facility. The public meeting shall be held no sooner than fifteen days after the date of the public notice announcement in the local paper. The Permittee shall provide sufficient copies of the fact sheet to the public at the Public Meeting and shall have a copy of the RFI Plan available for review and comment.

(2) An executive summary shall be included with the Phase I RFI Report. Within ten (10) business days of receipt of the Department's approval of the Phase I RFI Report, the executive summary report shall be mailed to all individuals on the facility mailing list compiled under 40 C.F.R. § 124.10(c)(1)(ix) and 9 VAC 20-60-1200.C, to the appropriate units of State and local governments, to all individuals who own or reside on the land that are contiguous to the Facility, and to individuals who own or reside on land in the other nearby areas to be investigated under the RFI.

(3) Notification of groundwater contamination.

If at any time the Permittee discovers that hazardous constituents, which may have been released from a SWMU or AOC at the Facility, in groundwater, or by surface water, have migrated beyond the Facility boundary in concentrations that exceed exceed health-based levels specified in Attachment N, the Permittee shall, within fifteen (15) calendar days of such discovery:

(a) Provide written notice to the Department and the EPA Region 3.

(b) Provide notice to all individuals who own or reside on the land which overlies the contaminated groundwater.

(4) Notification of soil or sediment contamination. If at any time the Permittee discovers that hazardous constituents, which may have been released from a SWMU or AOC at the Facility, in air have migrated or are migrating to areas beyond the facility boundary and have resulted in soil or sediment concentrations that exceed health-based levels[1], and that residences or other

[1] The health-based levels for such hazardous waste or hazardous constituents as derived in a manner consistent with EPA guidelines set

~~places at which continuous, long-term exposure to such constituents might occur are located within such areas, the Permittee shall, within fifteen (15) calendar days of such discovery:~~

~~(a) Provide written notification to the Department and the EPA Region 3.~~

~~(b) Provide notice to all individuals who own or reside on the land have or who may have been subject to such exposure.~~

~~(5) Notification of air contamination. If at any time the Permittee discovers that hazardous waste or hazardous constituents, which may have been released from a SWMU or AOC at the Facility, in air have migrated or are migrating to areas beyond the facility boundary in concentrations that exceed risk-based concentrations, and that residences or other places at which continuous, long-term exposure to such constituents might occur are located within such areas, the Permittee shall, within fifteen (15) calendar days of such discovery:~~

~~(a) Provide written notification to the Department.~~

~~(b) Provide notice to all individuals who have or may have been subject to such exposure.~~

~~2. Phase I RCRA Facility Investigation Report~~

~~a. The Phase I RFI Report shall contain all data from the Phase I RFI organized in a logical sequence and shall include summaries of all findings, a description of the problems encountered during the investigation, actions taken to correct such problems, and copies of laboratory or monitoring data, etc. The Phase I RFI shall contain conclusions and recommendations regarding the need for future investigation. The recommendations shall be adequately justified. The Phase I RFI may recommend, among other things:~~

~~(1) No further action required, if the analytical results of sampling do not indicate the presence of hazardous waste or hazardous constituents, and the present physical condition and operating conditions of the SWMU/AOC are such that there is no likelihood of a release or additional release of hazardous waste or hazardous constituents from such SWMU.~~

~~(2) Continued monitoring, where analytical results are below the practical quantitation limits (e.g., identified in 40 C.F.R. Part 264, Appendix IX, and 9 VAC 20-60-264, Appendix IX) and the presence of hazardous waste or hazardous constituents, together with the present physical condition and operating conditions of the SWMU, indicate a threat of a release of a hazardous~~

~~forth in 51 Federal Register 33992, 34006, 34014, and 34028. The health-based level for carcinogens represents a concentration associated with an excess upper bound lifetime risk of 1 x 10^{-6} due to continuous constant lifetime exposure, and for systemic toxicants represents a concentration to which the human population, exposed to on a daily basis, is not likely to suffer an appreciable risk of deleterious effect during a lifetime. Any list prepared by EPA according to these procedures may be used. As these lists may be revised at any time based on new information, contact the VADEQ for guidance.~~

~~waste or hazardous constituents in the future.~~

~~(3) The recommendations of the nature and scope of a Phase II RFI to characterize the rate and extent of identified releases of hazardous waste, hazardous constituents, or hazardous constituent degradation products from SWMUs, groups of SWMUs/AOCs, or other areas of contamination.~~

~~(4) Planning and implementing interim measures at the Facility. See permit section VI.B.~~

~~b. Except as otherwise specified below in this section, the Permittee must conduct a Phase II RFI if the analytical results of sampling indicate a release of hazardous waste or hazardous constituents from a SWMU/AOC to groundwater, surface water, soil or sediment. A Phase II RFI need not be conducted for a SWMU/AOC if:~~

~~(1) The analyses of an adequate number of samples demonstrate that concentrations of detected hazardous waste or constituents do not exceed the levels specified in Attachment N, where the Department has approved this approach in the Phase I RFI Plan, and either:~~

~~(a) Future releases will not occur, e.g., wastes have been removed from the unit; or~~

~~(b) A monitoring program approved by the Director has been established; or~~

~~(2) The Permittee can demonstrate to the satisfaction of the Department that a specific concentration of a constituent in a medium at the Facility is naturally occurring. The demonstration for a naturally occurring constituent must show no statistically significant increase of contamination above background. The determination of background levels must be approved by the Department prior to instituting this option.~~

~~c. If the Permittee recommends further investigation for any SWMU in the form of a Phase II RFI and believes that certain requirements identified in permit section VI.D., RCRA Facility Investigation – Phase II, are not appropriate, the specific requirements shall be identified and the rationale for inappropriateness may be provided in the Phase I RFI Report. The term "requirements" as used in this paragraph refers to substantial requirements of Attachment O, e.g., the media to be investigated.~~

~~d. If the Permittee recommends the continued monitoring of any medium, the Permittee shall:~~

~~(1) Within ninety (90) calendar days of the Department's approval of the continued monitoring recommendation, the Permittee shall submit to the Department for approval a plan for continued monitoring. A copy of the plan shall also be sent to the EPA Region 3. The plan shall include, but not be limited to, the following:~~

~~(a) An expanded monitoring network of any medium, if required. If an expanded groundwater monitoring network is required, an expanded groundwater monitoring plan which includes provisions for establishing concentration limits, groundwater sampling locations, sampling and analysis procedures, data evaluation procedures, and reporting adequate to determine the presence and extent of a release from a SWMU/AOC or group of SWMUs/AOCs that are subject to continued monitoring.~~

~~(b) The list of the proposed monitoring parameters for the specified medium. For groundwater monitoring the proposal shall include, in addition to the appropriate indicator parameters and hazardous constituents, the basis for selecting each proposed indicator parameter or hazardous constituent. The basis for selection shall, where possible, include the results of previous investigations, chemical analysis of the facility's wastes, emissions, and/or leachate as appropriate.~~

~~(c) Proposed reporting requirements which shall be no less than annually; and~~

~~(d) A schedule for implementation of the tasks identified in the expanded monitoring plan.~~

~~(2) In the event of a determination of a release to groundwater above the Department-approved risk-based screening criteria during the period of continued monitoring, the Permittee shall notify the Department and the EPA Region 3. The Permittee shall either provide an explanation for the groundwater results or propose an investigation subject to Department approval.~~

~~(a) Submit a report to the Department and the EPA Region 3 within sixty (60) days of such determination which demonstrates that a source other than the SWMU caused the contamination or that the contamination resulted from error in sampling, analysis, or evaluation (40 C.F.R. §264.98(g)(6)(ii) and 9 VAC 20-60-264.98(g)(6)(ii));~~

~~(b) As directed by the Department:~~

~~(i) Sample the groundwater in monitoring wells and determine whether constituents in the list of Appendix IX of Part 264 are present, and if so, in what concentrations, and submit a report to the Department;~~

~~(ii) Submit a Phase II RFI Plan within ninety (90) calendar days as specified in permit section VI.D.1.; or~~

~~(iii) Submit a modified groundwater monitoring for approval.~~

~~e. If the Permittee recommends the continued monitoring option, for any other type of~~

~~monitoring other than groundwater, the Permittee shall:~~

~~(1) Within ninety (90) calendar days of the Director's approval of the continued monitoring recommendation, the Permittee shall submit a plan for the Department's approval and provide a copy to the EPA Region 3. The plan shall include, but not be limited to, the following:~~

~~(a) Proposed monitoring activities.~~

~~(b) Criteria with which to determine if a release has occurred.~~

~~(c) Proposed reporting requirements which shall be no less than annually.~~

~~(d) A schedule for implementation.~~

~~(2) In the event of a determination of release, the Permittee shall notify the Director within seven calendar days of such determination and either:~~

~~(a) Submit reports to the Department and EPA Region 3 within sixty (60) days of such determination, which demonstrates that a source other than the SWMU caused the contamination or that the contamination resulted from error in sampling, analysis, or evaluation; or~~

~~(b) Submit a Phase II RFI Plan within 90 calendar days to the Department and the EPA Region 3 as specified in permit section VI.D.1.~~

~~3. Phase II RCRA Facility Investigation (RFI) Plan requirements:~~

~~a. General Description of Current Conditions Section~~

~~The Permittee shall provide background information pertinent to the facility, contamination, and interim measures as set forth below. The data gathered during any previous investigations or inspections and other relevant data that shall be included.~~

~~(1) Facility Background~~

~~The Permittee shall summarize the regional location, pertinent boundary features, general facility physiography, hydrogeology, and historical use of the facility for the treatment, storage, or disposal of solid and hazardous waste. The Permittee shall include in this section the following:~~

~~Map(s) depicting the following:~~

~~(a) General geographic location:~~

~~(i) Property lines, with the owners of all adjacent property clearly indicated.~~

~~(ii) The location of all known past solid or hazardous waste treatment, storage, or disposal areas and the site of all known spills, fires or other accidental or intentional release locations, including the approximate locations of any groundwater contamination plumes presently identified.~~

~~(iii) All known past and presently operating product and hazardous or solid waste underground tanks or piping.~~

~~(iv) The location of all production and groundwater monitoring wells, whether or not they are associated with the particular SWMU under investigation. These wells shall be clearly labeled. Ground, top of casing and screened-interval elevations shall also be provided, if available.~~

~~(v) Topography (with a contour interval of 10 feet and a scale of 1 inch = 100 feet), waterways, all wetlands, floodplains, water features, drainage patterns.~~

~~(vi) All tanks, buildings, utilities, paved areas, easements, right-of-way, and other features.~~

~~(vii) Surrounding land uses (residential, commercial, agricultural, and recreational).~~

~~All maps shall be consistent with the requirements set forth in 40 CFR § 270.14(b)(19) and be of sufficient detail and accuracy to locate and report all current and future work performed at the site.~~

~~(b) A history and description of ownership and operation, solid and hazardous waste generation, and treatment, storage, and disposal activities at the facility.~~

~~(c) Approximate dates or periods of past product and waste spills, identification of the materials spilled, the amount spilled, the location of the spills, and a description of the response actions conducted (local, State, or Federal response units or private parties), including any inspection reports or technical reports generated as a result of the response.~~

~~(d) A summary of past permits requested and/or received any enforcement actions and their subsequent responses.~~

~~(2) Nature and Extent of Contamination~~

~~The Permittee shall submit information in this section, describing the existing nature and extent of contamination.~~

~~(a) The Permittee shall summarize all possible source areas of contamination. This, at a minimum, should include all regulated units, solid waste management units, spill areas, and other suspected source areas of contamination. For each area, the Respondent shall identify the following:~~

~~(i) Location of unit/area (which shall be depicted on a facility map).~~

~~(ii) Quantities of solid and hazardous wastes.~~

~~(iii) Hazardous waste or hazardous constituents, to the extent known.~~

~~(iv) Identification of areas where additional information is necessary.~~

~~(b) The Permittee shall prepare an assessment and description of the existing degree and extent of contamination. This should include:~~

~~(i) Available monitoring data and qualitative information on locations and levels of contamination at the facility.~~

~~(ii) All potential migration pathways including information on geology, pedology, hydrogeology, physiography, hydrology, water quality, meteorology, and air quality.~~

~~(iii) The potential impact(s) on human health and the environment, including demography, ground water and surface water use, and land use.~~

~~(3) Implementation of Interim Measures~~

~~The Permittee shall provide information documenting interim measures, which were or are being undertaken at the facility. This shall include:~~

~~(a) Objectives of the interim measures: how the measure is mitigating a potential threat to human health and the environment and/or is consistent with and integrated into any long term solution at the facility.~~

~~(b) Design, construction, operation, and maintenance requirements.~~

~~(c) Schedules for design, construction, and monitoring.~~

~~(d) Schedule for progress reports.~~

~~b. Potential Corrective Measure Technologies Section~~

~~Based on existing information, the Permittee shall identify:~~

(1) The potential corrective measure technologies that may be used at the Facility or beyond the boundaries of the Facility to respond to releases of hazardous waste or hazardous constituents at or from the Facility.

(2) Any field, laboratory, bench-scale or pilot-scale data that needs to be collected in the RFI to facilitate the evaluation and selection of the final corrective measure(s), if any, for releases at or from the Facility (e.g., compatibility of waste and construction materials, information to evaluate effectiveness, treatability of wastes, etc.).

c. Project Management Plan Section

The Permittee shall submit a Project Management Plan to the Department and the EPA Region 3, which shall include a discussion of the technical strategy, schedules, budget, and personnel that will be used for the study. The plan shall also include a description of the qualifications of personnel performing or directing the RFI, including contractor personnel, and document the overall management approach to the RFI.

d. Community Relations Plan Section

(1) The Permittee shall continue the Community Relations Plan established under the approved Phase I RFI Plan. The Permittee shall prepare a fact sheet describing the scope and objectives of the Phase II RFI and submit to the Department and the EPA Region 3 for comment. The Permittee shall mail this fact sheet to all persons on the Facility mailing list compiled under 40 CFR § 124.10(c)(1)(ix), to the appropriate units of State and local governments, to all individuals who own or reside on the land that are contiguous to the Facility, and to individuals who own or reside on land in the other nearby areas to be investigated under the RFI at least ten (10) business days prior to start of the field activities.

(2) All public notification requirements specified in the Community Relations Plan under the approved Phase I RFI Plan which pertain to off-site groundwater contamination, soil or sediment contamination, or air contamination shall be maintained throughout the Phase II RFI, the Corrective Measures Study (CMS), and the Corrective Measures Implementation (CMI) phases, if applicable.

(3) An executive summary of the RCRA Facility Investigation (RFI) Report shall be included with the RFI Report (permit section VI.D.5). Within ten (10) business days of receipt of the Department's approval of the RFI Report, the executive summary report shall be mailed to all individuals on the facility mailing list compiled under 40 CFR § 124.10(c)(1)(ix), to the appropriate units of State and local governments, and to all individuals who own or reside on the land that are contiguous to the Facility, and to individuals who own or reside on land in the other nearby areas investigated under the RFI.

e. Schedule

~~The Permittee shall provide a schedule for performance of the Phase II RFI tasks and the submission of a Phase II RFI Report, within the RFI Plan.~~

~~4. Phase II RCRA Facility Investigations~~

~~a. Environmental Setting Investigation~~

~~The Permittee shall collect information to supplement and verify existing information on the environmental setting at the Facility. The Permittee shall characterize the following:~~

~~(1) Geology and Hydrogeology~~

~~The Permittee shall conduct a program to evaluate the hydrogeologic conditions at the Facility. The program shall provide:~~

~~(a) A description of the regional and site-specific geologic units underlying the Facility, including:~~

~~(i) Stratigraphy: strike and dip, and identification of stratigraphic contacts.~~

~~(ii) Structural features: folding, fracturing, channeling, faulting, jointing.~~

~~(iii) Soil: classification, description of appearance, and consistency.~~

~~(b) A description of regional and site-specific hydrogeologic characteristics, including:~~

~~(i) Regional and Facility specific groundwater flow patterns.~~

~~(ii) A characterization of seasonal variations in the groundwater flow regime, including any perched groundwater zones.~~

~~(iii) Identification and characterization of areas of recharge and discharge.~~

~~(iv) An analysis of any topographic or geomorphic features that might influence the groundwater flow system.~~

~~(v) A description of the stratigraphic units including:~~

~~(a) Hydraulic conductivity.~~

~~(b) An interpretation of hydraulic interconnections between saturated zones, including any perched zones.~~

~~(c) Attenuation capacity and mechanisms of the soils (e.g., ion exchange capacity, organic carbon content, mineral content, redox potential, etc.).~~

~~(c) Using a topographic map as a base, and at least two, approximately perpendicular geologic cross-sections for each SWMU/AOC and the surrounding area, provide a description of the extent (depth, thickness, lateral extent) of each geologic unit including:~~

~~(i) Generalized soil (based on testing, grain size, water content, Atterburg limits, etc.) and rock profiles.~~

~~(ii) Encountered features such as faults, fractures, voids, stratum changes, lenses, pinch out zones, karst features, etc.~~

~~(iii) Location and type of sampling including blow counts, percent recovery, etc.~~

~~(iv) Location and type of in-situ testing performed (pressuremeter, packer permeability testing, slug tests, pump tests, etc.).~~

~~(v) Groundwater elevation and/or potentiometric elevation.~~

~~(d) A description of the Facility site flow system including:~~

~~(i) Water level contour and/or potentiometric maps.~~

~~(ii) The vertical and horizontal components of flow.~~

~~(iii) Any temporal changes in water levels or hydraulic gradients, for example, due to tidal or seasonal influences.~~

~~(iv) Active and inactive local water supply and production wells with an approximate schedule of pumping.~~

~~(v) Man-made hydraulic structures (pipelines, french drains, ditches, unlined ponds, septic tanks, NPDES outfalls, retention ponds, etc.).~~

~~(2) Soils~~

~~The Permittee shall conduct a program to evaluate the soil conditions at the Facility. The program shall provide the following information:~~

~~(a) Where remediation by removal of soils is the only corrective measures option, provide map(s) and perpendicular cross sections showing:~~

~~(i) The extent of contamination.~~

~~(ii) Depth to groundwater.~~

~~(iii) The consistency and distribution of soils using the Unified Soil Classification System (USCS) (ASTM D 2487).~~

~~(b) Where remediation by removal is the likely option but it is necessary to determine the extent of migration (for example, to assess the mobility of wastes from an unlined surface impoundment or landfill) provide the following in addition to the requirements immediately above:~~

~~(i) Depth to bedrock and the characteristics of the bedrock including lithologic variations, discontinuities such as faults, fissures, joints, fractures, sinkholes, karst features, etc.~~

~~(ii) A detailed soil survey conducted according to USDA Soil Conservation Service (SCS) procedures including:~~

~~(a) USDA Textural Soil Classification and soil profiles showing stratifications or zones, which may affect or direct the subsurface flow.~~

~~(b) Hydraulic conductivity and the SCS hydrologic group classification, A, B, C or D.~~

~~(c) Relative permeability (only if the waste may have changed the soil's hydraulic conductivity, such as concentrated organics.~~

~~(d) Storage capacity.~~

~~(e) Shrink-swell potential (where extreme dry weather could lead to the formation of cracks).~~

~~(f) Potential for contaminant transport via erosion, using the Universal Soil Loss Equation.~~

~~(g) Soil sorptive capacity.~~

~~(h) Cation exchange capacity.~~

~~(i) Soil organic content.~~

~~(j) Soil pH.~~

~~(iii) The following contaminant characteristics must be included (where properties have been estimated, include the basis for such estimations):~~

~~(a) Physical state.~~

~~(b) Viscosity.~~

~~(c) pH.~~

~~(d) pKa.~~

~~(e) Density.~~

~~(f) Water solubility.~~

~~(g) Henry's Law Constant.~~

~~(h) Kow.~~

~~(i) Biodegradability.~~

~~(j) Rates of hydrolysis, photolysis and oxidation.~~

~~(c) When in- situ soil treatment will likely be the remediation, the following additional information must be provided:~~

~~(i) Bulk density.~~

~~(ii) Porosity.~~

~~(iii) Grain size distribution.~~

~~(iv) Mineral content.~~

~~(v) Soil moisture profile.~~

~~(vi) Unsaturated hydraulic conductivity.~~

~~(vii) Effect of stratification on unsaturated flow.~~

~~(viii) Infiltration and evapotranspiration.~~

~~(3) Surface Water and Sediment~~

~~The Permittee shall conduct a program to characterize the surface water bodies in the vicinity of the Facility. Such characterization shall include, but not be limited to:~~

~~(a) Description of the temporal and permanent surface water bodies including:~~

~~(i) For lakes: location, elevation, surface area, inflow, outflow, depth, temperature stratification, and volume.~~

~~(ii) For impoundments: location, elevation, surface area, depth, volume, freeboard, and purpose of impoundment.~~

~~(iii) For streams, ditches, and channels: location, elevation, flow, velocity, depth, width, tidal and seasonal fluctuations, and flooding tendencies (i.e., 100-year event).~~

~~(iv) Drainage patterns.~~

~~(v) Evaporation rate.~~

~~(b) Description of the chemistry of the natural surface water and sediments. This includes determining the pH, total dissolved solids, total suspended solids, biochemical oxygen demand, alkalinity, conductivity, dissolved oxygen profiles, nutrients (ammonia, nitrate/nitrite nitrogen, phosphate), chemical oxygen demand, total organic carbon, specific contaminant concentrations, etc.~~

~~(c) Description of sediment characteristics including:~~

~~(i) Deposition area.~~

~~(ii) Thickness profile.~~

~~(iv) Physical and chemical parameters (e.g., grain size, density, organic carbon content, ion exchange capacity, pH, etc.).~~

~~(4) Air~~

~~If the Department requires an RFI for air releases from a SWMU/AOC, the Permittee shall provide information characterizing the climate in the vicinity of the Facility. Such information shall include, but not be limited to:~~

~~(a) A description of the following parameters: Annual and monthly rainfall averages; monthly temperature averages and extremes; wind speed and direction; relative humidity/dew point; atmospheric pressure; evaporation data; development of inversions; and climate extremes that have been known to occur in the vicinity of the Facility, including frequency of occurrence.~~

~~(b) A description of topographic and manmade features which affect air flow and emission patterns, including: ridges, hills, or mountain areas; canyons or valleys; surface water bodies (e.g., rivers, lakes, bays, etc.); wind breaks and forests; and buildings.~~

~~b. Source Characterization Investigation~~

~~The Permittee shall collect analytical data to completely characterize the wastes and the areas where wastes have been placed, including type; quantity; physical form; disposition (containment or nature of deposits); and Facility characteristics affecting release (e.g., Facility security, and engineered barriers). This shall include quantification of the following specific characteristics at each source area:~~

~~(1) Unit/Disposal Area Characteristics:~~

~~(a) Location of unit/disposal area.~~

~~(b) Type of unit/disposal area.~~

~~(c) Design features.~~

~~(d) Operating practices (past and present).~~

~~(e) Period of operation.~~

~~(f) Age of unit/disposal area.~~

~~(g) General physical conditions.~~

~~(h) Method used to close the unit/disposal area.~~

~~(2) Waste Characteristics:~~

~~(a) Type of waste placed in the unit, including but not limited to: Hazardous classification (e.g., flammable, reactive, corrosive, oxidizing, or reducing agent); quantity; and chemical composition.~~

~~(b) Physical and chemical characteristics, including but not limited to: Physical form (solid, liquid, gas); physical description (e.g., powder, oily sludge); temperature; pH; general chemical class (e.g., acid, base, solvent); molecular weight; density; boiling point; viscosity; solubility in water; cohesiveness of the waste; and vapor pressure.~~

~~(c) Migration and dispersal characteristics of the waste, including but not limited to biodegradability, bioconcentration, biotransformation; photodegradation rates; hydrolysis rates; sorption; and chemical transformations.~~

~~The Permittee shall document the procedures used in making the above characterizations.~~

~~c. Contamination Characterization Investigation~~

~~The Permittee shall collect analytical data on groundwater, soils, surface water, sediment, and subsurface gas contamination in the vicinity of the Facility. This data shall be sufficient to define the extent, origin, direction, and rate of movement of contaminant plumes. Data shall include time and location of sampling, media sampled, concentrations found conditions during sampling, and the identity of the individuals performing the sampling and analysis. The data must include the analyses of hazardous constituents as specified in Attachment N, at a minimum, unless otherwise approved by the Department prior to sampling. The Permittee shall address the following types of contamination at the Facility:~~

~~(1) Groundwater Contamination~~

~~The Permittee shall conduct a groundwater investigation to characterize any plumes of contamination at the Facility. This investigation shall provide, at a minimum, the following information:~~

~~(a) A description of the horizontal and vertical extent of any immiscible or dissolved plume(s) originating from the Facility.~~

~~(b) The horizontal and vertical direction of contamination movement.~~

~~(c) The velocity of contaminant movement.~~

~~(d) The horizontal and vertical concentration profiles of hazardous constituents in the plume(s).~~

~~(e) An evaluation of factors influencing the plume movement.~~

~~(f) An extrapolation of future contaminant movement.~~

~~(g) Each RFI Plan shall include the locations, design and installation procedures for any additional groundwater monitoring wells required to complete the monitoring well network at each area as necessary to meet the RFI objectives. These wells may be used in conjunction with existing wells in the area. All information required of the new wells shall also be required of the existing wells. The monitoring well network shall meet the following requirements:~~

~~(i) The upgradient wells must be capable of yielding samples that are representative of background water quality in the uppermost aquifer and are not affected by any solid waste management unit. The number and location of the wells must be sufficient to characterize the spatial variability of background water.~~

~~(ii) The downgradient wells must be capable of immediately detecting any statistically significant amounts of hazardous waste or hazardous constituents that migrate from each solid waste management unit into the groundwater.~~

~~(iii) The monitoring system shall be designed to operate for a period of long-term duration.~~

~~When developing this information, the Permittee shall refer to the "Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells," EPA/600/4-89/034, 1989 to determine methods and materials that are acceptable to the Department.~~

~~(h) Each RFI Plan shall provide a description of the groundwater monitoring wells including the following information:~~

~~(i) A description and map of well locations, including a survey of each well's surface reference point and the elevation of the top of its casing.~~

~~(ii) Size and depth of each well.~~

~~(iii) Description of well intake design, including screen slot size and length, filter pack materials and method of filter pack placement.~~

~~(iv) Type of well casing and screen materials. The choice of well materials shall consider the parameters to be monitored and the nature of the leachate that could potentially migrate from the facility. The well materials shall: (1) minimize the potential of absorption of constituents from the samples; and (2) maintain their integrity for the life of the system.~~

~~(v) Description of methods used to seal the well from the surface and prevent downward migration of contaminants through the well annulus.~~

~~(v) Description of the methods and procedures used to develop the well.~~

~~(i) The Permittee shall select a sampling regime and conduct sampling and analysis activities capable of yielding representative samples. The sampling program shall include, at a minimum, the following elements:~~

~~(i) The list of analytes as specified in Attachments L and N of this Permit (or as modified with prior approval by the Department).~~

~~(ii) If the groundwater investigation is phased (i.e., conducted based on the results of a soil investigation), a list of parameters capable of detecting releases of hazardous waste or hazardous constituents into groundwater. The parameters shall be representative of hazardous constituents at least as mobile as~~

~~the most mobile hazardous constituent that may be present after considering:~~

~~(a) The types, quantities, and concentrations of hazardous constituents in wastes managed at the SWMU/AOC. Incidental constituents which may be released into the unit area from process areas shall be included in this list of analyses.~~

~~(b) The mobility, stability, and persistence of hazardous waste constituents or their reaction products in the unsaturated zone beneath the waste management area.~~

~~(c) The detection ability of the indicator parameters, waste constituents of reactive products in groundwater.~~

~~(d) The concentration of and the natural variation (known or suspected) of the proposed monitoring parameters in background media.~~

~~(e) The list must include the basis for selecting each proposed indicator parameter, including any analysis or calculations performed. The basis for selection shall, where possible, include chemical analysis of the unit's waste and/or leachate as appropriate. The list shall also include parameters to characterize the site-specific chemistry of groundwater at the site including, but not limited to, the major anions and cations that make up the bulk of dissolved solids in water (i.e., Cl^-, Fe^{3+}, Mn^{2+}, Na^+, $(SO_4)^{2-}$, Ca^{2+}, Mg^{2+}, K^+, NO^{3-}, PO^{3-}, silicate, and ammonium).~~

~~(j) The Permittee shall document in the Phase II RFI Report the procedures used to characterize contaminant plume(s), for example, geophysics, modeling, pump tests, slug tests, nested piezometers, etc.~~

~~(2) Soil Contamination~~

~~The Permittee shall conduct an investigation to characterize the contamination of the soil and rock units above the water table in the vicinity of the contaminant release. The soil contamination investigation shall include:~~

~~(a) A description of the vertical and horizontal extent of contamination.~~

~~(b) A description of contaminant and soil chemical properties within the contaminant source area and plume. This includes contaminant solubility, speciation, adsorption, leachability, cation exchange capacity, biodegradability, hydrolysis, photolysis, oxidation, and other factors that~~

~~might affect contaminant migration and transformation.~~

~~(c) Specific contaminant concentrations according to the analyte list (or as modified with prior approval by the Department).~~

~~(d) The velocity and direction of contaminant movement.~~

~~(e) An extrapolation of future projected contaminant movement.~~

~~The Permittee shall document in the Phase II RFI Report the procedures used in making the above characterizations and determinations of future contaminant movement.~~

~~(3) Surface Water and Sediment Contamination~~

~~The Permittee shall conduct a surface water investigation to characterize contamination in surface water bodies resulting from contaminant releases at the Facility.~~

~~The investigation shall generate, at a minimum, the following information:~~

~~(a) A description of the horizontal and vertical extent of any immiscible or dissolved plume(s) originating from the Facility, and the extent of contamination in underlying sediments.~~

~~(b) The horizontal and vertical direction of contaminant movement.~~

~~(c) The contaminant velocity.~~

~~(d) An evaluation of the physical, biological, and chemical factors influencing contaminant movement.~~

~~(e) An extrapolation of future projected contaminant movement.~~

~~(f) A description of the chemistry of the contaminated surface waters and sediments. This includes determining the pH, total dissolved solids, specific contaminant concentrations, etc.~~

~~The Permittee shall document in the Phase II RFI Report the procedures used in making the above characterizations.~~

~~(4) Subsurface Gas Contamination~~

~~The Permittee shall conduct an investigation to characterize subsurface gases emitted from buried hazardous waste or hazardous constituents. This investigation shall generate, at a minimum the following information:~~

~~(a) A description of the horizontal and vertical extent of subsurface gases migration.~~

~~(b) The chemical composition of the gases being emitted.~~

~~(c) The rate, amount, and density of the gases being emitted.~~

~~(d) Horizontal and vertical concentration profiles of the subsurface gases emitted.~~

~~The Permittee shall document in the Phase II RFI Report the procedures used in making the above characterizations.~~

~~(5) Air Contamination~~

~~The Permittee shall conduct an investigation to characterize the particulate and gaseous contaminants released into the atmosphere. This investigation shall generate, at a minimum, the following information:~~

~~(a) A description of the horizontal and vertical dispersion of contaminants (vapors and particulates).~~

~~(c) The rate, chemical and physical concentrations, and loadings of the contaminants(s) released in both vapors and particulates.~~

~~(b) The rate, chemical and physical concentrations, and loadings of contaminants in the vapor and particulate phases at the points of exposure. This includes the development of contaminant concentration profiles for the gaseous and particulate phases and includes development of deposition profiles of contaminants.~~

~~The Permittee shall document in the Phase II RFI Report the procedures, models and methods used in making the above characterizations. All assumptions and factors used in the models and methods shall be documented.~~

~~d. Potential Receptors Investigation~~

~~The Permittee shall collect data describing the human populations and environmental systems that may be exposed to releases of hazardous waste or hazardous constituents from the Facility. Chemical analysis of biological samples may be required. Data on observable effects in ecosystems may also be required. The following characteristics shall be identified:~~

~~(1) Local uses and possible future uses of groundwater:~~

~~(a) Type of use (e.g., drinking water source: municipal or residential, agricultural, domestic/non-potable, and industrial).~~

~~(b) Location of groundwater users, including wells and discharge areas.~~

~~(2) Local uses and possible future uses of surface waters draining the Facility:~~

~~(a) Domestic and municipal (e.g., potable and lawn/garden watering).~~

~~(b) Recreational (e.g., swimming, fishing).~~

~~(c) Agricultural.~~

~~d) Industrial.~~

~~(e) Environmental (e.g., fish and wildlife propagation).~~

~~(3) Human use of or access to the Facility and adjacent lands, including, but not limited to:~~

~~(a) Recreation.~~

~~(b) Hunting.~~

~~(c) Residential.~~

~~(d) Commercial.~~

~~(e) Zoning.~~

~~(f) Relationship between population locations and prevailing wind direction.~~

~~(4) A demographic profile of the people who use or have access to the Facility and adjacent land, including, but not limited to: age, sex, and sensitive subgroups.~~

~~(5) A description of the biota in surface water bodies or wetlands on, adjacent to, or affected by the Facility. An evaluation of the pollutant impacts on the ecosystems/populations potentially exposed to contamination. This evaluation may be accomplished through the use of toxicity test (acute and chronic) population surveys and literature reviews.~~

~~(6) A description of the ecology overlying and adjacent to the Facility must include:~~

~~(a) The location and size of each identified habitat e.g. stream reaches, roads, wetlands of forested area, within the physical boundaries defined for the assessment.~~

~~(b) A listing and physical assessment of the ecosystems and population potentially exposed to contamination.~~

~~(c) A description of any endangered or threatened species near the Facility.~~

~~e. Laboratory and Bench Scale Studies~~

~~If specifically required by the Department at any time during the Phase II RFI, the Permittee shall conduct laboratory and/or bench scale studies to determine the applicability of corrective measure technology or technologies to facility conditions. The Permittee shall analyze the technologies, based on literature review, vendor contracts, and past experience to determine the testing requirements.~~

~~The Permittee shall develop a testing plan identifying the type(s) and goal(s) of the study(ies), the level of effort needed, and the procedures to be used for data management and interpretation.~~

~~Upon completion of the testing, the Permittee shall evaluate the testing results to assess the technology or technologies with respect to the site-specific questions identified in the test plan. The Permittee shall prepare a report summarizing the testing program and its results, both positive and negative.~~

~~f. Risk Assessment~~

~~The baseline risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these releases (under the assumption of no action).~~

~~The baseline risk assessment contributes to the site characterization and subsequent development, evaluation, and selection of appropriate response alternatives. There are four steps in the risk assessment process:~~

~~(1) Determine contaminants of concern: Data collection and evaluation involves the gathering and analyzing the site data relevant to the human health evaluation and identifying the substances present at the site that are the focus of the risk assessment process.~~

~~(2) Exposure assessment: Using the procedure outline in Section d for determining potential receptors, estimate the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways by which humans are potentially exposed. In the exposure assessment, reasonable maximum estimates of exposure are developed for both current and future land-use assumptions.~~

~~(3) Toxicity assessment: This component of the risk assessment considers the types of adverse health effects associated with chemical exposures and the relationship between the magnitude of exposure and adverse effects.~~

~~(4) Risk Characterization: This summarizes and combines outputs of the exposure and toxicity assessments to characterize baseline risk, both in quantitative expressions and qualitative statements.~~

~~5. Phase II RCRA Facility Investigation Report~~

~~The Phase II RFI Report shall be submitted for the Department's approval. A copy of the Phase II RFI Report shall be submitted to the EPA Region 3. The Phase II RFI Report shall include an analysis and summary of all Facility investigations and the results of such investigations.~~

~~a. Data Analysis~~

~~The Permittee shall analyze all Facility investigation data outlined in permit section VI.C, RCRA Facility Investigation, and prepare a report on the type and extent of contamination at the Facility, including sources and migration pathways. The report shall describe the extent of contamination (qualitative and quantitative) in relation to screening levels specified in Attachment N and background levels indicative of the area.~~

~~b. Media Cleanup Standards~~

~~The Permittee shall identify the following cleanup standards:~~

~~(1) Groundwater Cleanup Standards~~

~~The Permittee shall provide information to support selection/development of Groundwater Cleanup Standards for all of the hazardous constituents found in the groundwater during the RCRA Facility Investigation.~~

~~(a) The Groundwater Cleanup Standards shall consist of:~~

~~(i) The Maximum Contaminant Level (MCL) for any constituents with an EPA promulgated Maximum Contaminant Level (MCL), if the background level of the constituent is below the value of the EPA approved MCL.~~

~~(ii) The background level of that constituent in the groundwater.~~

~~(iii) A standard established according to the criteria for Other Media Cleanup Standards.~~

~~(2) Other Media Cleanup Standards~~

~~The Permittee shall identify concentration levels in the affected media, which protect human health and the environment.~~

~~Unless a lower concentration level is deemed necessary to protect environmental receptors, cleanup standards shall be established as follows:~~

~~(a) For any known or suspected carcinogens classified by EPA's weight of evidence classification as an A, B1 or B2 carcinogen, cleanup standards shall be established at concentration levels such that the cumulative~~

~~(total) excess upper bound lifetime risk from chemicals falls within the risk range of 1 x 10^{-4} to 1 x 10^{-6}.~~

~~(b) For systemic toxicants, cleanup standards shall represent concentration levels to which the human population (including sensitive subgroups) could be exposed on a daily basis without appreciable risk of deleterious effect during a lifetime.~~

~~(c) The Permittee shall recommend which SWMUs, or groups of SWMUs/AOCs, require a Corrective Measures Study. The Permittee shall also identify those corrective action alternative(s) the Permittee intends to investigate further. The Permittee may either investigate several alternatives or focus on a limited number of alternative.~~

~~ATTACHMENT P~~

~~CORRECTIVE MEASURES STUDY REQUIREMENTS~~

~~ATTACHMENT P~~

~~CORRECTIVE MEASURES STUDY REQUIREMENTS~~

~~The purpose of a Corrective Measures Study (CMS) is to develop and evaluate remedial alternative(s) and to recommend the remedy(ies) to be taken (refer to Permit Section VI.E.). The Permittee may elect either to screen a number of potential remedies prior to evaluating a smaller number of potential remedies or delete the screening step and proceed with evaluation of the expected remedy(ies), including any specified by the Department.~~

~~The Corrective Measures Study shall consist of:~~

~~1. Screening of Potential Remedies:~~

~~Should the Permittee elect to screen a number of potential remedies, any potential remedy specified in the Department's approval of the RFI Report shall also be screened. The Permittee shall document the reasons for eliminating any technology.~~

~~a. The characteristics which shall be used to screen inapplicable remedies or technologies include, but are not limited to:~~

~~(1) Site and Media Characteristics.~~

~~Site and media data shall be reviewed to identify conditions that may limit or promote the use of certain technologies. The use of technologies, which are clearly precluded by site or media characteristics, shall be eliminated from further consideration.~~

~~(2) Waste Characteristics.~~

~~Potential remedies clearly limited by the waste characteristics should be eliminated from consideration.~~

~~(3) Technology Limitations.~~

~~During the screening process, the level of technological development, performance record, and inherent construction, operation, and maintenance problems should be identified for each technology considered. Technologies that are unreliable, perform poorly, or are not fully demonstrated may be eliminated in the screening process.~~

~~b. The Permittee shall select remedy(ies) based on the above screening, together with any remedy(ies) specified by the Department, for further evaluation. Should potential remedy(ies) specified by the Department prove infeasible based on the above screening, the Permittee may request that the alternative(s) be dropped from further investigation. However, until approved, the request shall not stay the conditions of this Permit.~~

~~2. Evaluation of Potential Remedies~~

~~The Permittee shall evaluate the selected potential remedy(ies), including any specified by the Department.~~

~~The evaluation shall include a description of each potential remedy, which shall include, but is not limited to: preliminary process flow sheets; preliminary sizing and type of construction for buildings and structures; and rough quantities of utilities required. Each potential remedy shall be evaluated with respect to the following criteria:~~

~~a. Evaluations of alternative final remedial measures shall address the following considerations in the order that is presented below:~~

~~(1) Control of the sources of releases so to reduce or eliminate, to the extent practicable, further releases that may pose a threat to human health and the environment.~~

~~(2) Overall protection of human health and the environment.~~

~~(3) Compliance with standards and criteria for all media (i.e., for soils, subsoils, groundwater, sediment, surface water, and air) based upon State and Federal regulations, requirements, and guidance.~~

~~Compliance with State and Federal standards and criteria may be established by risk-based assessment of human health and the environment and the establishment of risk-based action levels. The risk-based action levels are to be established by a comprehensive risk assessment of the contaminants released and detected, in conjunction with modeling of fate and transport of the HCOCs at the site. A detailed evaluation and summary of findings associated with the toxicity, mobility, and volume of HCOCs needs to be provided.~~

~~Compliance with State standards for the restoration of state waters to such quality which allows for their most "Beneficial Use" shall be addressed in the evaluations of alternative final remedial measures. Restoration of groundwater to the most "Beneficial Use" shall be considered restoration of groundwater to conditions suitable for public water supply use for human consumption in accordance with State standards.~~

~~(4) The long term effectiveness and permanence of the remedial measure. This includes an evaluation of the persistence, toxicity, and mobility of the hazardous substances and constituents, and their propensity to bioaccumulate.~~

~~(5) Short-term effectiveness and potential for human exposure.~~

~~(6) Feasibility of using the technology.~~

~~(7) Capital costs and the operation and maintenance costs using the technology.~~

~~The evaluation also needs to consider the potential for future remedial action costs (based upon present worth costs) if the alternative remedial corrective action in question were to fail.~~

~~(8) State, EPA, and community acceptance.~~

~~The CMS shall evaluate the feasibility of reaching the action levels determined in accordance with Attachment O and to estimate the time frames of remediation based upon both a hydrogeochemical and engineering analyses. Various alternatives to address the contamination problems shall be presented and evaluated in the CMS. The proposed alternatives and evaluations in the CMS should be based upon similar case histories of contaminated sites, and/or findings by academia, research, etc.~~

~~b. Technical~~

~~(1) Assessment of the effectiveness of potential remedies in achieving adequate control of source and cleanup of the hazardous waste (including hazardous constituents) released from solid waste management units.~~

~~(2) Evaluation of the performance, reliability, ease of implementation, and potential impacts of the remedy, including safety impacts, cross media impacts, and control of exposure to any residual contamination.~~

~~(3) Assessment of the time required to begin and complete the remedy.~~

~~(4) Estimation of the costs of remedy implementation.~~

~~(5) Assessment of institutional requirements, such as state or local permits requirements, or other environmental or public health requirements which may substantially affect implementation of the remedy(ies).~~

~~c. Human health: The potential remedy(ies) shall be evaluated with respect to mitigation of short- and long-term potential exposure to any residual contamination and protection of human health, both during and after implementation.~~

~~d. Environmental: An evaluation of the facility conditions and pathways of contamination actually addressed by each potential remedy. The evaluation shall include the short-term and long-term beneficial and adverse effects, any adverse effects on environmentally sensitive areas, and an analysis of measures to mitigate such adverse effects.~~

~~e. Institutional: The Permittee shall evaluate the effects of federal, State, and local environmental and public health standards, regulations, guidance, advisories, ordinances, or community relations, including the requirements for construction and operating permits on the design, operation, and timing of the remedy(ies).~~

~~3. Cost Estimate~~

~~The Permittee shall develop a cost estimate for the remedy(ies) and for each phase or segment of the remedy(ies) including:~~

~~a. Capital costs consisting of direct (construction) and indirect (non-construction and overhead) costs.~~

~~b. Post-construction costs, including operation and maintenance) necessary to ensure continued effectiveness of the alternative(s).~~

~~4. Interim Reporting~~

~~The Permittee shall submit bi-monthly or alternate progress reports containing:~~

~~a. A description and estimate of the percentage of the CMS completed.~~

~~b. Summaries of all findings.~~

~~c. Summaries of all contacts with representatives of the local community, public interest groups, or State government during the reporting period.~~

~~d. Summaries of all problems or potential problems encountered during the reporting period.~~

~~e. Actions being taken to rectify problems.~~

~~f. Changes in personnel during the reporting period.~~

~~g. Projected work for the next reporting period.~~

~~5. Final Report~~

~~According to the approved schedule, the Permittee shall submit to the Department for approval a Corrective Measures Study Report. A copy of the CMS Report shall be submitted to the EPA Region 3. The report shall include:~~

~~a. An updated description of conditions at the Facility and the nature and extent of the contamination as documented by the RCRA Facility Investigation Report. The Permittee shall update the information with respect to any response activities or interim measures which have been implemented or are being implemented at the Facility.~~

~~b. Recommended objectives for corrective action for each SWMU, AOC, or group of SWMUs/AOCs. These objectives shall be based on public health and environmental criteria, information gathered during the RCRA Facility Investigation, EPA guidance, and the requirements of any applicable state and federal statutes or regulations.~~

~~c. The Permittee shall justify and recommend a remedy(ies) using technical, human health, and environmental standards and criteria. These recommendations shall include summary tables, which allow the alternative(s) to be understood easily. Trade-offs~~

among health risks, environmental effects, and other pertinent factors among the alternatives evaluated shall be highlighted. Information on all evaluated potential remedy(ies) shall be presented.

d. The Report shall, at a minimum, include:

(1) A description of the facility, site topographic map(s) and preliminary layouts.

(2) For the selected remedy(ies) include:

(a) Performance expectations, i.e., the selected remedy is expected to achieve the Media Cleanup Standards in the approved RCRA Facility Investigation Report.

(b) Preliminary design criteria and rationale.

(c) General operation and maintenance requirements.

(d) Long-term monitoring requirements.

(e) Design and Implementation Precautions:

(i) Special technical problems.

(ii) Additional engineering data required.

(iii) Permits and regulatory requirements.

(iv) Access, easements, right-of-way.

(v) Health and safety requirements.

(vi) Community relations activities.

(f) Cost Estimates and Schedules:

(i) Capital cost estimate.

(ii) Operation and maintenance cost estimate.

(iii) Project schedule (design, construction, and operation). including estimated operating time required to achieve the performance expectation.

e. Upon review of the Corrective Measures Study Report, the Department may require the Permittee to evaluate further, and report upon, one or more additional remedies, or develop particular elements of one or more proposed remedies. Such further requirements will, if necessary, be incorporated into this Permit via 40 C.F.R. §§ 270.41 or 270.42.

~~ATTACHMENT Q~~

~~INTERIM MEASURES REQUIREMENTS~~

~~ATTACHMENT Q~~

~~INTERIM MEASURES REQUIREMENTS~~

~~The purpose of Interim Measures is to implement corrective actions during the term of this Permit to control, abate or remove any known on-site or off-site contamination, and/or prevent the migration of contamination on, or beyond, the Facility boundary and to the extent practicable to protect human health and the environment. Interim Measures are to be consistent with, and integrated into any long-term remediation at the Facility.~~

~~1. Interim Measures Workplan~~

~~The Permittee shall prepare and submit to the Department and the EPA Region 3 an Interim Measures Workplan that includes the development of several plans, which shall be prepared concurrently. Upon the Department's approval, the Permittee shall implement the Workplan according to the schedules contained therein.~~

~~a. Interim Measures Project Management Plan~~

~~The Interim Measures Project Management Plan ("IMPMP") shall document the overall management approach to the Interim Measures. The IMPMP shall include, but not be limited to:~~

~~(1) Background information including a discussion of historical facility operations, the current conditions at the facility, including any interim measures which have, or are being implemented at the facility, pertinent geology, and the known nature and extent of contamination.~~

~~(2) A discussion of Interim Measures objectives, the technical approach to meet those objectives, and an explanation of how the interim measures will control, abate or eliminate releases and, to the extent possible, be consistent and integrated with any long-term solution at the facility.~~

~~(3) A description of the qualifications of personnel directing or performing the Interim Measures, including contractor and subcontractor personnel.~~

~~(4) A project schedule identifying dates for the anticipated completion of the project and the submission of all documents referenced in this Attachment, including, but not limited to an Interim Measures Design Program containing Design Plans and Specifications, an Operations and Maintenance Plan, a Sampling and Analysis Plan (if necessary), progress reporting, and an Interim Measures Implementation Report.~~

~~b. Community Relations Plan~~

~~The Permittee shall prepare a fact sheet describing the scope and objectives of the Interim Measures to be performed under the Interim Measures Workplan as approved by the Department. The Community Relations fact sheet shall be submitted to the~~

~~Department and the EPA Region 3. The Permittee shall mail this fact sheet to all persons on the Facility mailing list compiled under 40 C.F.R. § 124.10(c)(1)(ix) and to the appropriate units of State and local governments, to all individuals who own or reside on the land that are contiguous to the Facility, and to individuals who own or reside on land in the other nearby areas to be investigated under the RFI. The mailing of the fact sheet regarding Interim Measures should be at least ten (10) business days prior to the start of field activities for Interim Measures, unless immediate measures are needed to address an imminent threat to human health or the environment in accordance with Permit Section VI.H., Emergency Response; Release Reporting.~~

~~c. Health and Safety Plan~~

~~The Permittee shall develop a Health and Safety Plan in accordance with Attachment S to this Permit. The Health and Safety Plan shall be submitted to the Department and the EPA Region 3. If the Department deems it appropriate, Permittee may reference or amend a previous Health and Safety Plan submitted pursuant to this Permit.~~

~~2. Interim Measures Design Program~~

~~a. Design Documentation and Specifications. The Permittee shall submit to the Department and the EPA Region 3 the Interim Measures design documentation and specifications, which include, but are not limited to:~~

~~(1) The design strategy and the design basis, including measures of compliance with all applicable or relevant environmental and public health standards.~~

~~(2) The technical factors of importance, including but not limited to materials, equipment and specifications.~~

~~(3) The assumptions made and detailed justification of these assumptions.~~

~~(4) The possible sources of error, references to possible operation and maintenance problems and anticipated remedies.~~

~~(5) Detailed drawings including: facility layout, utility locations, engineering controls which aid in the safe operation of the IM, sample calculations, derivations of equations essential to understanding the report and results of laboratory or field tests.~~

~~b. Operation and Maintenance Plan~~

~~Permittee shall prepare an Operation and Maintenance Plan to cover both implementation and long-term maintenance of the Interim Measure(s). The Operations and Maintenance Plan shall be submitted to the Department and the EPA Region 3. The plan shall be composed of:~~

~~(1) Description of the equipment and its normal operation and maintenance (O&M), including a schedule showing frequency of each O&M task.~~

~~(2) Description of routine monitoring and laboratory testing, the required QA/QC, and a schedule of monitoring frequency and equipment replacement.~~

~~(3) Records and reporting mechanisms required, including daily operating logs, laboratory records, mechanism for reporting equipment breakdown, failure and emergencies related to the implementation of the interim measure, personnel and maintenance records and monthly/annual reports to Federal/state agencies.~~

~~c. Sampling and Analysis Plan~~

~~If any sampling and analysis is required to implement the interim measures, Permittee must include in the Interim Measure Workplan a Data Collection Quality Assurance Plan and a Data Management Plan. These two plans shall be submitted in accordance with the requirements of Attachment R to the Department and the EPA Region 3.~~

~~If the Department has previously approved a Sampling and Analysis Plan pursuant to a RFI or previous IM, and if the Department deems it appropriate, Permittee may reference or amend the relevant portions of the approved Plan. The Sampling and Analysis Plan shall describe the methods and frequency for collecting and analyzing samples for monitoring the effectiveness and efficiency of the ongoing Interim Measures. At a minimum it shall describe the number of samples collected, including QA/QC samples, the location of the samples collected the method of collection, frequency of sampling activities, decontamination procedures, and a constituent analysis list.~~

~~3. Reports~~

~~a. Interim Measures Workplan~~

~~Permittee shall submit an Interim Measures Workplan as described in this Attachment to the Department and the EPA Region 3.~~

~~b. Progress Reports~~

~~Permittee shall submit IM Progress Reports to the Department and the EPA Region 3 in accordance with an approved schedule described in the IMPMP of Section 1.a. of this Attachment. The progress reports shall contain:~~

~~(1) A description and estimate of the percentage of the interim measures completed.~~

~~(2) Summaries of all findings.~~

~~(3) Summaries of all changes made in the Interim Measures during the reporting period.~~

~~(4) Summaries of all contacts with representative of the local community, public interest groups, or state government during the reporting period.~~

(5) Summaries of all problems or potential problems encountered during the reporting period.

(6) Actions being taken to rectify problems.

(7) Changes in personnel during the reporting period.

(8) Projected work for the next reporting period.

(9) Copies of daily reports, inspection reports, laboratory/monitoring data, etc.

c. Interim Measures Implementation Report

At the "completion" of the construction of the project, Permittee shall finalize the Interim Measures Workplan, and submit for the Department's approval a Draft Interim Measures Implementation Report (IMIR) in accordance with the schedule described in Section 1.a.(4) of this Attachment. A copy of the IMIR shall be submitted to the EPA Region 3. The IMIR shall document that the project is consistent with the design specifications and that the interim measures are performing adequately. The IMIR shall include, but not be limited to:

(1) Synopsis of the interim measures and certification of the design and construction.

(2) Explanation of any modifications to the plans and why these were necessary for the project.

(3) Listing of the criteria, established before the interim measures were initiated, for judging the functioning of the interim measures and also for explaining any modification to these criteria.

(4) Results of facility monitoring, indicating that the interim measures will meet or exceed the performance criteria.

(5) Summary of the operation and maintenance (including monitoring) to be undertaken at the facility.

In addition to the above information, the IMIR shall include the inspection summary reports, inspection data sheets, problem identification and corrective reporting data sheets, design engineers' acceptance reports, deviations from design and material specifications (with justifying documentation), and as-built drawings.

(6) The Permittee shall respond to any comments received from the Department on the draft IMIR submission.

~~ATTACHMENT R~~

~~QUALITY ASSURANCE AND QUALITY CONTROL REQUIREMENTS~~

~~ATTACHMENT R~~

~~QUALITY ASSURANCE AND QUALITY CONTROL REQUIREMENTS~~

~~The Permittee shall submit a Sample Collection Methods and Procedures Plan(s), Quality Assurance Project Plan(s), Laboratory Data Package(s), and Data Management Plan as specified in this Attachment to the Department and the EPA Region 3. These plans must be approved by the Department in accordance with permit condition I.L.~~

~~1. Sample Collection Methods and Procedures Plan – The Permittee shall:~~

~~a.. Describe the samplers or sampling equipment for each environmental media and/or waste matrix to be sampled at each SWMU.~~

~~b. Describe the sampling procedure for each environmental media and/or waste matrix in explicit detail. Include, but not be limited to, procedures and methods for work such as bailing, drilling holes, etc.:~~

~~(1) Describe the sequence to be followed in conducting the field activities.~~

~~(2) Include quality assurance samples for analysis at the rate specified:~~

~~(a) Equipment Blank – One with each sampling event for each matrix type.~~

~~(b) Trip Blank – One with each analytical volatile batch for each matrix type.~~

~~(c) Field Blank – One with each analytical batch or every 20 samples, whichever is greater.~~

~~(d) Field Duplicates (see Figure 1) – One with each analytical batch or every 20 samples, whichever is greater.~~

~~(3). Identify the type and source of the sample containers to be used for each analytical parameter.~~

~~(4) Detail the sample preservation methods to be utilized and state the maximum permissible holding times to be allowed for each analytical parameter prior to analysis.~~

~~(5) Describe the sample custody procedures starting with the cleaning of sample containers to be used, and provide an example "chain-of-custody" form.~~

~~(6) Detail the sampling equipment decontamination procedures to be utilized.~~

(7) Describe what will be done with disposable equipment contaminated on site and how contaminated materials will be disposed of, including contaminated environmental media.

c. Identify the analytical laboratory to be used, which has a documented Quality Assurance Program, to be used.

d. Identify in the Quality Assurance Project Plan all sample preparation, cleanup (if any) and analytical methods to be used.

(1) Analytical methods utilized must be capable of achieving the screening levels specified in Attachment N, and the data quality requirements specified in the approved method. The need for deviation from any of these criteria must be fully documented in the Quality Assurance Project Plan and submitted to the Department for approval prior to conducting any sampling events.

(2) Test methods for analyses of hazardous constituents have been standardized by EPA in its publication, Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods (SW-846), 3rd Edition as updated. Any other appropriate standardized method may be used by the Permittee provided the alternate method is capable of producing the required level of data quality and so long as the method adheres to the quality assurance requirements in this Attachment. Non-standardized methods may be used with prior Department approval provided the Permittee submits a comprehensive description of the test method along with data from tests designed to evaluate equivalency with standard methods. This data shall include a statistical analysis of the equivalency test data.

e. Use, at a minimum, the quality control procedures found in Test Methods for Evaluating Solid Waste: Physical/Chemical Methods (SW-846), 3rd Edition as updated.

2. Quality Assurance Project Plan: the Quality Assurance Project Plan shall fulfill the following minimum requirements:

a. The Permittee shall have a Quality Assurance program for ensuring that all information, data and decisions resulting from the RCRA Facility Investigation, Interim Measures and/or Corrective Measure Study are technically sound and properly documented.

b. The Permittee shall use an analytical laboratory, which has a documented Quality Assurance Program.

c. The Permittee shall prepare a Quality Assurance Project Plan for each data collection project or continuing activity, utilizing guidelines and specifications found in EPA's document Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans - QAMS-005/80. The Plan shall address the 16 plan elements discussed in Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans - QAMS-005/80, which are as follows:

~~(1) Title page, introduction.~~

~~(2) Table of contents.~~

~~(3) Project description.~~

~~(4) Project organization.~~

~~(5) Quality assurance objectives for data measurement.~~

~~(6) Sampling procedure.~~

~~(7) Sample and document custody procedures.~~

~~(8) Calibration procedures and frequency.~~

~~(9) Analytical procedures.~~

~~(10) Data reduction, validation and reporting.~~

~~(11). Internal quality control checks.~~

~~(12) Performance and system audits.~~

~~(13) Preventive maintenance.~~

~~(14) Data measurement assessment procedures.~~

~~(15) Corrective Action.~~

~~(16) Quality assurance reports to management.~~

~~3. Laboratory Data Package – The Permittee shall ensure that the laboratory(s) analyzing samples required by this Permit shall use the methods identified in the Department's approved Quality Assurance Project Plan, and submit the required deliverables. The laboratory data package shall include:~~

~~a. A Quality Control Summary including:~~

~~(1) Methods Summary.~~

~~(2) Surrogate Recoveries.~~

~~(3) Matrix Spike/Matrix Spike Duplicate Recoveries.~~

~~(4) Method/Trip/Field/Blank Results.~~

~~(5) Storage.~~

~~b. A Sample Data Section including:~~

~~(1) Specific Compound Results.~~

~~(2) Results of Tentatively Identified Compound Analysis.~~

~~(3) Detection Limits.~~

~~(4) Sample Analysis Dates.~~

~~c. The Permittee shall provide data validation of analyses done by the laboratory(ies) (to be described in the Quality Assurance Project Plan). This data validation shall determine data acceptability and shall be performed in accordance with EPA's Functional Guidelines for Data Review for data derived by Contract Laboratory Procedure Methods (Region III Modifications to National Functional Guidelines for Organic Data Review, US EPA Region III Central Regional Laboratory, June 1992 and Laboratory Data Validation - Functional Guidelines for Evaluating Inorganic Analyses, Hazardous Site Evaluation Division, US EPA, June 13, 1988). If another method is used, the data validation shall be performed in accordance with the QA/QC data validation criteria set forth in that method. For methods lacking QA/QC data validation protocols, the Permittee must establish validation criteria such as those in Section 8 of the EPA Series Methods in 40 C.F.R. Part 136. The appropriate quality assurance data validation summary reports shall be submitted to the Department, along with sample data and summary sheets and final sample results.~~

~~4. Data Management Plan~~

~~The Permittee shall develop and initiate a Data Management Plan to document and track investigation data and results. This plan shall identify and set up data documentation materials and procedures, project file requirements, and project-related progress reporting procedures and documents. The plan shall also provide the format to be used to present the raw data and conclusions of the investigation.~~

~~a. Data Record - The Data Record shall include the following:~~

~~(1) Unique sample or field measurement code.~~

~~(2) Sampling or field measurement location and sample or measurement type.~~

~~(3) Sampling or field measurement raw data.~~

~~(4) Laboratory analysis ID Number.~~

~~(5) Property or component measured.~~

~~(6) Result of analysis (e.g., concentration).~~

~~b. Tabular Displays – The following data shall be presented in tabular displays:~~

~~(1) Unsorted (raw) data.~~

~~(2) Results for each medium, or for each constituent monitored.~~

~~(3) Data reduction for numerical analysis.~~

~~(4) Sorting of data by potential stratification factors (e.g., location, soil layer, topography).~~

~~(5) Summary data.~~

~~c. Graphical Displays – The following data shall be presented in graphical formats (e.g., bar graphs, line graphs, area or plan maps, isopleth plots, cross-sectional plots or transects, three dimensional graphs, etc):~~

~~(1) Display sampling location and sampling grid.~~

~~(2) Indicate boundaries of sampling area, and areas where more data are required.~~

~~(3) Display levels of contamination at each sampling location.~~

~~(4) Display geographical extent of contamination.~~

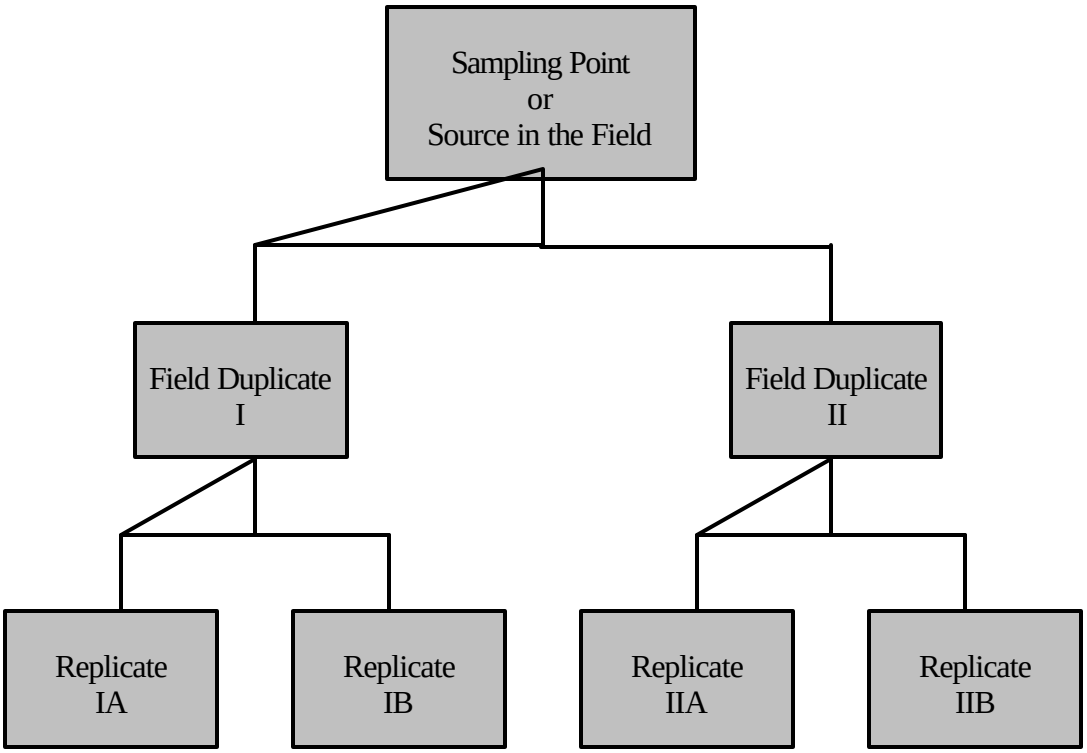
~~(5) Display contamination averages, and maximum levels.~~

~~(6) Illustrate changes in concentration in relation to distance from the source, time, depth or other parameters.~~

~~(7) Indicate features affecting transport between media and show potential receptors.~~

~~The Permittee shall ensure that the Department's personnel and/or authorized representatives are allowed reasonable access to the laboratory (ies), records and personnel utilized by the Permittee for analysis of samples collected pursuant to this Permit. Furthermore, nothing shall preclude the Department from requiring Permittee's laboratory to submit to a Performance Evaluation sample analysis, or from requiring the Permittee to furnish split samples to the Department during a sampling event.~~

~~Figure R-1 Duplicates vs Replicates~~



~~Duplicates are collected in the field~~
~~Replicates are analyzed in the laboratory~~

ATTACHMENT ~~S~~O

HEALTH AND SAFETY PLAN REQUIREMENTS

ATTACHMENT ~~S~~-O

HEALTH AND SAFETY PLAN REQUIREMENTS

The Permittee shall ~~prepare~~ comply with its existing ~~a~~ facility Health and Safety Plan for Corrective Action RCRA Facility Investigations (RFIs) and Corrective Measures activities at the Permitted facility ~~and shall~~ which has been already submitted 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 T~~

~~CORRECTIVE MEASURES IMPLEMENTATION SCOPE OF WORK REQUIREMENTS~~

~~ATTACHMENT T~~

~~CORRECTIVE MEASURES IMPLEMENTATION SCOPE OF WORK REQUIREMENTS~~

~~PURPOSE~~

~~This Scope of Work (SOW) requirements for the Corrective Measures Implementation (CMI) sets forth the requirements for the implementation of the design, construction, operation, maintenance, and monitoring of the corrective measures implementation in accordance with Permit Module VI Part F. The CMI is required if the Department determines that corrective measures for releases of hazardous waste or hazardous constituents are necessary to protect human health or the environment. The Department will advise the Permittee of a determination that corrective measures for releases of hazardous waste or hazardous constituents are necessary on the basis of the RFI or any other information and the reasons, in writing and any amendments thereto.~~

~~If Corrective Measures are deemed necessary to protect human health and the environment, the Permittee will perform work in accordance with the requirements specified in this SOW to implement the corrective measures that have been selected by the Department in the Final Decision and Response to Comments ("FDRTC"), and any amendments thereto. The Permittee will furnish all personnel, materials, and services necessary for the implementation of the corrective measure or measures.~~

~~SCOPE OF WORK~~

~~The Corrective Measure Implementation SOW consists of four tasks:~~

~~1. **Task I -Corrective Measure Implementation Work Plan:**~~

~~1. Management Plan.~~
~~2. Community Relations Plan.~~
~~3. Sampling and Analysis Plan.~~
~~4. Corrective Measures Permitting Plan.~~
~~5. Supplemental Field Investigation Work Plan.~~

~~2. **Task II - Corrective Measure Design:**~~

~~1. Design Plans and Specifications.~~
~~2. Operation and Maintenance Plan.~~
~~3. Cost Estimate.~~
~~4. Construction Quality Assurance Objectives.~~
~~5. Health and Safety Plan.~~
~~6. Sampling and Analysis Plan Revision.~~
~~7. Design Phases.~~

~~3. **Task III - Corrective Measure Construction:**~~

~~1. Preconstruction Inspection and Meeting.~~

~~2. Inspections.~~
~~3. CMI Report.~~

~~4. **Task IV- Reports:**~~

~~1. Progress Reports.~~
~~2. CMI Work Plan.~~
~~3. CMI 30% Design Report.~~
~~4. CMI 90% Design Report.~~
~~5. CMI 100% Design Report.~~
~~6. CMI Final Report.~~

~~Further specifications of the work outlined in this SOW will be provided in the Corrective Measures Implementation Work Plan and subsequent plans to be approved by the Department. Variations from the SOW will be made, if necessary, to fulfill the objectives of the Corrective Measures set forth in the FDRTC and any amendments thereto.~~

~~Additional studies may be needed as part of the Corrective Measures Implementation to supplement the available data. At the direction of VADEQ for any such studies required, the Respondent shall furnish all services, including field work, materials, supplies, plant, labor, equipment, investigations, and superintendence. Sufficient sampling, QA/QC procedures, testing and analysis shall be performed to optimize the required treatment and/or disposal operations system.~~

~~TASK I - CORRECTIVE MEASURE IMPLEMENTATION WORK PLAN~~

~~The Permittee shall prepare a Corrective Measure Implementation (CMI) Work Plan. The Permittee shall submit a CMI Work Plan to the Department for approval. A copy of the CMI Plan shall also be sent to the EPA Region 3.~~

~~The CMI Work Plan shall outline the design, construction, operation, maintenance and monitoring of all actions taken to implement the Corrective Measures as defined in the Order and the FDRTC and any amendments thereto. This CMI Work Plan will include the development and implementation of several plans, which require concurrent preparation. It may be necessary to revise plans as necessary during the performance of this Order. The CMI Work Plan includes the following:~~

~~A. Management Plan~~

~~The Permittee shall prepare a Management Plan which will include:~~

1. ~~Documentation of the overall management strategy for performing the design, construction, operation, maintenance, and monitoring of corrective measure(s).~~

2. ~~Description of the responsibility and authority of all organizations and key personnel involved with the implementation.~~

3. ~~Description of the qualifications of key personnel directing the CMI, including contractor personnel.~~

4. Conceptual design of the treatment and/or disposal system or any corrective measures to be installed as set forth in the requirements of the FDRTC.

5. An outline of proposed field activities necessary to complete the CMI Design.

6. Proposed locations of groundwater monitoring wells and a detailed well development plan.

7. Proposed discharge options for treated ground water, with a proposed option upon which the CMI Design will be based.

8. Proposed detailed performance criteria for groundwater treatment.

9. A description of how the conceptual design is expected to meet the technical requirements of the FDRTC and any amendments thereto.

10. Flow chart and schedule of work to be performed during the CMI.

B. Community Relations Plan

The Permittee shall prepare a Community Relations Plan for the CMI. The Permittee shall submit the Community Relations Plan for the CMI to the Department for approval. A copy of the Community Relations Plan shall also be sent to the EPA Region 3. The Permittee shall submit and/or revise the Community Relations Plan to include any material changes in the level of concern or information needs of the community during design and construction activities.

Specific activities which must be conducted during the design stage are the following:

1. The facility Community Relations Plan is to reflect knowledge of citizen concerns and involvement at this stage of the process.

2. Prepare and distribute a public notice and an updated fact sheet at the completion of engineering design.

C. Sampling and Analysis Plan

The Permittee shall prepare a Sampling and Analysis Plan. The Permittee shall submit the Sampling and Analysis Plan to the Department for approval. A copy of the Sampling and Analysis Plan shall also be sent to the EPA Region 3. The Permittee shall submit and/or revise the Sampling and Analysis Plan describing work to be performed during Corrective Measures Design, which shall be comprised of:

1. Data quality objectives for design phase activities.

2. A Quality Assurance Plan (QAP).

3. A Field Sampling Plan.

4. Data Management Plan describing the steps to be followed in compiling, organizing, and reviewing data collected in accordance with the Sampling and Analysis Plan and identifying the frequency of periodic data reviews and evaluations.

The Sampling and Analysis Plan will include the existing soil and well sampling and analysis program, with appropriate revisions as necessary.

D. Corrective Measures Permitting Plan

The Permittee shall prepare a Corrective Measures Permitting Plan. The Permittee shall submit the Corrective Measures Permitting Plan to Department for approval. A copy of the Corrective Measures Permitting Plan shall also be sent to the EPA Region 3.

The Corrective Measures Permitting Plan shall identify all federal, state, interstate and local permits and approvals required for the implementation of the Corrective Measures required by this Permit, and for the implementation of any institutional controls required by this Permit. The plan shall also identify all agreements or other arrangements with adjoining landowners, if any, known by Permittee to be necessary for the implementation of the Corrective Measures, including, but not limited to, site access and easement agreements. The plan shall include a schedule indicating the time needed to obtain all such approvals and permits and to enter into such agreements and arrangements (this may be integrated with the design/implementation schedule items).

E. Supplemental Field Investigation Work Plan

If any additional hydrogeologic investigations or other field work is necessary for the proper design any proposed remediation system, the Permittee shall prepare and submit to the Department a Supplemental Field Investigation Work Plan setting forth the protocols and methodologies for any additional hydrogeologic investigations or other field work. The Permittee shall submit the Supplemental Field Investigation Work Plan to the Department for approval. A copy of the Supplemental Field Investigation Work Plan shall also be sent to the EPA Region 3. The work plan shall include an expeditious schedule for the completion of any such supplemental fieldwork.

TASK II - CORRECTIVE MEASURE DESIGN

The Permittee shall prepare design plans and specifications to implement construction for the corrective measure at the facility as defined in the Corrective Measures set forth in the FDRTC and any amendments thereto.

The Permittee shall submit the comprehensive design plans and specifications to the Department for approval. A copy of the comprehensive design plans and specifications shall also be sent to the EPA Region 3.

A. Design Plans and Specifications

The Permittee shall develop clear and comprehensive design plans and specifications, which include, but are not limited to, the following:

1. Discussion of the design strategy and the design basis, including:

a. ~~Compliance with all applicable or relevant environmental and public health standards.~~

b. ~~Minimization of environmental and public health impacts.~~

c. ~~Update schedules, if necessary, from commencement through completion of construction of the CMI.~~

2. ~~Discussion of the technical factors of importance including:~~

a. ~~Use of currently accepted environmental control measures and technology.~~

b. ~~The feasibility of constructing the design.~~

c. ~~Use of currently acceptable construction practices and techniques.~~

3. ~~Description of assumptions made and detailed justification of these assumptions.~~

4. ~~Discussion of the possible sources of error and references to possible operation and maintenance problems.~~

5. ~~Detailed drawings of the proposed design including:~~

a. ~~Qualitative flow sheets.~~

b. ~~Quantitative flow sheets.~~

6. ~~Tables listing equipment and specifications.~~

7. ~~Tables giving material and energy balances.~~

8. ~~Appendices including:~~

a. ~~Sample calculations (one example presented and explained clearly for significant or unique design calculations).~~

b. ~~Derivation of equations essential to understanding the report.~~

c. ~~Results of laboratory or field tests.~~

~~B. Operation and Maintenance Plan~~

~~The Permittee shall prepare or revise the Operation and Maintenance ("O&M") Plan to cover both implementation and long term maintenance of the corrective measure. The O&M Plan is to identify the processes to occur, submissions during O&M, and schedule for O&M activities consistent with remedial objectives set forth in the FDRTC and any amendments thereto.~~

~~The Permittee shall submit the O&M Plan to the Department for approval. A copy of the~~

~~O&M Plan shall also be sent to the EPA Region 3. An initial O&M Plan shall be submitted simultaneously with the Preliminary Design document submissions, and the Final O&M Plan with the Final Design documents. The plan shall be composed of the following elements:~~

~~1. Description of normal O&M:~~

~~a. Description of tasks for operation.~~

~~b. Description of tasks for maintenance.~~

~~c. Description of prescribed treatment or operation conditions.~~

~~d. Schedule showing frequency of each O&M task, also to be included in the Management Plan.~~

~~2. Description of potential operating problems:~~

~~a. Description and analysis of potential operation problems.~~

~~b. Sources of information regarding problems.~~

~~c. Common and/or anticipated remedies.~~

~~3. Description of routine monitoring and laboratory testing:~~

~~a. Description of monitoring tasks.~~

~~b. Description of required laboratory tests and their interpretation.~~

~~c. Required QA/QC.~~

~~d. Schedule of monitoring frequency and date, if appropriate, when monitoring may cease.~~

~~4. Description of alternate O&M:~~

~~a. Should systems fail, alternate procedures to prevent undue hazard.~~

~~b. Analysis of vulnerability and additional resource requirements should a failure occur.~~

~~5. Safety plan:~~

~~a. Description of precautions, of necessary equipment, etc., for site personnel.~~

~~b. Safety tasks required in event of systems failure.~~

~~6. Description of equipment:~~

a. Equipment identification.

b. Installation of monitoring components.

c. Maintenance of site equipment.

d. Replacement schedule for equipment and installed components.

7. Records and reporting mechanisms required:

a. Daily operating logs.

b. Laboratory records.

c. Records for operating and maintenance costs.

d. Mechanism for reporting emergencies.

e. Personnel and maintenance records.

f. Contents of periodic progress reports described in Task IV.A and providing details on how Task IV.A. requirements will be met.

g. Monthly/annual reports to State agencies.

C. Cost Estimate

The Permittee shall develop cost estimates of the Corrective Measures for the purpose of assuring that the Respondent has the financial resources necessary to construct and implement the corrective measure. The cost estimate developed in the Corrective Measure Study shall be refined to reflect the more detailed/accurate design plans and specifications being developed. The cost estimate shall include both capital and operation and maintenance costs. The Permittee shall submit the cost estimates of the Corrective Measures to the Department for approval. A copy of the cost estimates of the Corrective Measures shall also be sent to the EPA Region 3.

D. Construction Quality Assurance Plan

The Permittee shall prepare and submit a Construction Quality Assurance (CQA) Plan to the Department for approval. A copy of the CQA Plan shall also be sent to the EPA Region 3. The CQA Plan shall identify and document the objectives and framework for the development of a construction quality assurance program including, but not limited to the following: responsibility and authority; personnel qualifications; inspection activities; sampling requirements, and documentation. The CQA Plan shall be based upon CQA requirements as specified under 40 CFR Part 264 §264.19, Construction quality assurance program, and other EPA guidance for such CQA activities.

E. Health and Safety Plan

The Permittee shall prepare a Health and Safety Plan or modify the Health and Safety Plan

~~developed for the RCRA Facility Investigation to address the activities to be performed at the facility to implement the corrective measures. The Health and Safety Plan shall be in accordance with the requirements specified in Attachment S of this permit. The Permittee shall prepare and submit a Health and Safety Plan to the Department and to the EPA Region 3.~~

~~Compliance with the OSHA Regulations is not under the jurisdiction of the Department. 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 or disapproval by the Department. 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.~~

~~F. Sampling and Analysis Plan Revision~~

~~The Permittee shall update the Sampling and Analysis Plan, including the QAPP, during each phase of Design, as appropriate, to reflect changes in the following: responsibility and authority; personnel qualifications; inspection activities; sampling requirements; documentation, and other changes to the sampling and analysis program. The updated Sampling and Analysis Plan, including the QAPP, shall be submitted to the Department for approval. A copy of the updated Sampling and Analysis Plan, including the QAPP, shall also be sent to the EPA Region 3.~~

~~G. Design Phases~~

~~The design of the corrective measure should include the phases outlined below:~~

~~1. Preliminary (30%) CMI Design~~

~~a. The Permittee shall submit the 30% CMI Design Report when the design effort is approximately 30% complete. At this stage the Permittee shall have field verified the existing conditions of the facility. The 30% design shall reflect a level of effort such that the specifications may be reviewed to determine if the final design will provide effective, operable and usable corrective measures. Supporting data and documentation shall be provided with the design documents defining the functional aspects of the program. The 30% construction drawings shall reflect organization and clarity. The Permittee shall include with the 30% design submission, calculations reflecting the same percentage of completion as the designs they support.~~

~~b. Correlating plans and specifications. The project specifications to be included in the 30% CMI Design Report shall demonstrate that the Permittee has:~~

~~i. Coordinated and crosschecked the specifications and drawings.~~

~~ii. Completed the proofing of the edited specifications and required crosschecking of all drawings and specifications.~~

~~c. Equipment start-up and operator training.~~

~~The Permittee shall prepare, and include in the technical specifications governing treatment and or disposal systems; contractor requirements for providing: appropriate service visits by experienced personnel to supervise the installation, training covering appropriate operational procedures once the startup has been successfully accomplished.~~

~~2. Final (90% and 100%) CMI Design~~

~~The Permittee shall execute the required revisions and submit the final documents as draft Final (90% complete) CMI Design Report and Final (100% complete) CMI Design Report with reproducible drawings and specifications.~~

~~The Final CMI Design submittal shall consist of the Final Design Plans and Specifications (100% complete), the Permittee's Final Cost Estimate, the Final Draft Operation and Maintenance Plan, Final Quality Assurance Plan, Final Project Schedule, and Final Health and Safety Plan specifications. The quality of the design documents should be such that the Permittee would be able to include them in a bid package and invite contractors to submit bids for the construction project.~~

~~TASK III - CORRECTIVE MEASURE CONSTRUCTION~~

~~Following the Department's approval of the Final CMI Design Report, the Permittee shall develop and implement construction in accordance with procedures, specifications, and schedules in the Department's approved Final CMI Design Report and the Department's approved CMI Work Plan. During the Construction Phase, Permittee will continue to submit periodic progress reports. The Permittee shall also implement the elements of the approved O&M plan.~~

~~The Permittee shall update the Sampling and Analysis Plan, including the QAPP, during the construction phase, as appropriate, to reflect changes in the following: responsibility and authority, personnel qualification, construction quality assurance, inspection activities, documentation, and other changes affecting quality assurance.~~

~~The updated Sampling and Analysis Plan, including the QAPP, shall be submitted to the Department and to the EPA Region 3. DEQ approval of the updated Sampling and Analysis Plan, including the QAPP, during the construction phase, is not required prior to implementation; however, the Department and the EPA must be notified of the updated changes by correspondence prior to implementation of such changes.~~

~~If the Department does not concur with changes to the Sampling and Analysis Plan, including the QAPP, then the DEQ will notify the Permittee and their representative of such non-concurrence and construction will be suspended until the Department formally approves of further changes to the Sampling and Analysis Plan, including the QAPP.~~

~~The Permittee shall conduct the following activities during construction:~~

~~A. Preconstruction Inspection and Meeting~~

~~The Permittee shall conduct a preconstruction inspection and meeting to:~~

1. ~~Review methods for documenting and reporting inspection data.~~

2. ~~Review methods for distributing and storing documents and reports.~~

3. ~~Review work area security and safety protocol.~~

4. ~~Discuss any appropriate modifications of the construction quality assurance plan to ensure that site-specific considerations are addressed.~~

5. ~~Conduct a site walk-around to verify that the design criteria, plans, and specifications are understood and to review material and equipment storage locations.~~

~~The preconstruction inspection and meeting shall be documented by a designated person of the Permittee or their representative and the minutes of the preconstruction inspection and meeting shall be transmitted to all parties in attendance and/or which request the minutes.~~

~~B. Inspections~~

1. ~~The Permittee will conduct inspections to monitor the construction and/or installation of components of the corrective measure. Inspections shall verify compliance with all environmental requirements and the Construction Quality Assurance Plan and include, but not limited to, review of air quality and emissions monitoring records, waste disposal records (e.g. RCRA transportation manifests), etc, as applicable. Inspections will also ensure compliance with all health and safety procedures. Treatment and/or disposal equipment will be operationally tested by the Permittee. The Permittee will certify that the equipment has performed to meet the purposes and intent of the specifications. Retesting will be completed where deficiencies are revealed.~~

2. ~~When all construction is complete, the Permittee shall notify VADEQ for the purposes of conducting a final inspection. The final inspection will consist of a walk through inspection of the project site. The inspection is to determine whether the project is complete and consistent with contract documents and the VADEQ approved corrective measures. Any outstanding construction items will be identified and noted. If necessary, Permittee shall notify VADEQ upon completion of any outstanding construction items and another final inspection consisting of a walk-through inspection of the project site to confirm all outstanding items have been resolved.~~

~~C. CMI Report~~

~~Upon completion of construction and also an initial period of performance monitoring after starting, and in accordance with the schedule included in the Management Plan, the Permittee will prepare and submit a CMI Report to the Department for approval. A copy of the CMI Report shall also be sent to the EPA Region 3.~~

~~TASK IV- REPORTS~~

~~The Permittee shall prepare plans, specifications, and reports as set forth in Tasks I through III to document the design, construction, operation, maintenance, and monitoring of the corrective measure.~~

~~The documentation shall include, but not be limited to the following:~~

~~**A. Progress Reports**~~

~~The Permittee shall provide the Department and the EPA Region 3 with signed, periodic progress reports, as defined by the approved workplan ,containing:~~

~~1. A description of the work performed during the preceding monitoring interval and estimate of the percentage of the CMI completed.~~

~~2. Summaries of all findings.~~

~~3. Summaries of all changes made in the CMI during the reporting period.~~

~~4. Summaries of all contacts with representative of the local community, public interest groups, or State government during the reporting period.~~

~~5. Summaries of system performance during the reporting period including a summary of all problems or potential problems encountered or anticipated during the reporting period.~~

~~6. Actions being taken to rectify problems.~~

~~7. Changes in personnel during the reporting period.~~

~~8. Projected work for the next reporting period.~~

~~9. Copies of daily reports, inspection reports, laboratory/monitoring data, and other information pertinent to the remediation or remediation systems.~~

~~**B. Annual Progress Reports**~~

~~The Permittee shall provide the Department and the EPA Region 3 with signed Annual Progress Reports. However, Annual Progress Report shall not be required for any year in which the Permittee is required to submit a Corrective Measures Five-Year Assessment Report. The Annual Progress Report shall contain:~~

~~1. A narrative summary of principal activities conducted during the reporting period.~~

~~2. Graphical or tabular presentations of monitoring data, including but not limited to average monthly system pumping rates and throughput, efficiency, groundwater levels and flow direction, and groundwater quality.~~

~~3. A schedule of sampling and field activities to be performed in the following year.~~

~~4. An O&M Evaluation.~~

~~O&M Evaluation shall assess performance of the corrective measure over time and provide one basis for the Department's five-year Evaluation of the corrective measure. Annual O&M Evaluation shall include:~~

a. ~~Summarized data representing corrective measure performance during respective two-year intervals.~~

b. ~~Any proposed changes to the corrective measure and summary of changes that have been previously made.~~

c. ~~Isoconcentration maps for each contaminant of concern listed in the Permit.~~

d. ~~Statistical assessment of the progress of the corrective measure towards achievement of media clean-up standards.~~

e. ~~When appropriate notification that corrective action media clean-up standards have been achieved.~~

~~**B. CMI Work Plan**~~

~~The Permittee shall submit a CMI Work Plan as outlined in Task I. The QAPP, included with the CMI Work Plan, will be revised, as appropriate, throughout the CMI.~~

~~**C. The 30% CMI Design Report**~~

~~The 30% CMI Design Report shall include:~~

1. ~~Draft Design Plans and Specifications reflecting 30% of design work to be completed.~~

2. ~~A draft O&M Plan.~~

3. ~~A preliminary cost estimate.~~

4. ~~A revised project schedule, also to be included in a revised CMI Management Plan.~~

~~**D. The 90% CMI Design Report**~~

~~The 90% CMI Design Report shall include:~~

1. ~~A summary of activities performed and data generated during Corrective Measure Design, including results and interpretation of treatability studies.~~

2. ~~Draft detailed Corrective Measure Design Plans and Specifications reflecting 90% of design work to be completed.~~

3. ~~Final performance criteria for the corrective measures, consistent with comments to have been provided by VADEQ on the Conceptual Design proposed in the Management Plan.~~

4. ~~Proposal of means to evaluate system performance against media cleanup standards listed in the FDRTC and any amendments thereto.~~

5. ~~A Final O&M Plan.~~

6. ~~A revised Cost Estimate.~~

7. ~~Revision to the Sampling and Analysis Plan, including the QAPP, to address sampling activities to be performed during the Corrective Measures Construction Phase, including the sampling activities, sample size, sample locations, frequency of testing, acceptance and rejection criteria, and plans for correcting problems as addressed in the project specification.~~

8. ~~Sampling and construction activities to be performed during the Corrective Measure Construction Phase.~~

9. ~~Proposed changes to the Project Schedule, if appropriate, with emphasis on short-term Construction schedule. These proposed changes in the schedule also will be included in the revised Management Plan.~~

~~E. Final (100%) CMI Design Report~~

~~The Permittee shall submit a Final (100%) CMI Design Report as outlined in Task II to this SOW to the Department and the EPA Region 3.~~

~~F. CMI Report~~

~~The Permittee shall submit the CMI Reports as outlined in Task III of this SOW to the Department and the EPA Region 3. The CMI Report shall describe activities performed during construction, provide actual specifications of implemented remedy, and provide a preliminary assessment of CMI performance. The CMI Report shall include, but not be limited to, the following elements:~~

1. ~~Synopsis of the corrective measure and certification of the design and construction.~~

2. ~~Explanation of any modifications to the Department's approved construction and/or design plans and why these were necessary for the project.~~

3. ~~Listing of the criteria, established in the Department's approved CMI Work Plan, for judging whether the corrective measure is functioning properly, and also explaining any modification to these criteria.~~

4. ~~Certification by registered professional engineer, registered in the Commonwealth of Virginia, that the construction is complete, consistent with contract documents, and the Department's approved corrective measure, and that the equipment performs to meet the intent of the specifications.~~

5. ~~Results of Facility monitoring, assessing the likelihood that the Corrective Measure will meet or exceed the media clean-up standards set forth in the FDRTC and any amendment thereto.~~

~~The CMI Report should include all of the daily inspection summary reports, inspection summary reports, inspection data sheets, problem identification and corrective measure reports, block evaluation reports, photographic reporting data sheets, design engineers' acceptance reports, deviations from design and material specifications (with justifying documentation), and as-built drawings.~~

~~ATTACHMENT U~~

~~COMMUNITY RELATIONS PLAN~~

~~ATTACHMENT U~~

~~COMMUNITY RELATIONS PLAN~~

~~1. The community relations requirements described in this section apply to all remedial activities undertaken pursuant to this permit and to 40 CFR 300.430(c), where applicable.~~

~~2. The Permittee shall provide for the conduct of the following community relations activities, to the extent practicable, prior to commencing field work for the remedial investigation:~~

~~(i) Conducting interviews with local officials, community residents, public interest groups, or other interested or affected parties, as appropriate, to solicit their concerns and information needs, and to learn how and when citizens would like to be involved in the RFI and Corrective Action process.~~

~~(ii) Preparing a formal community relations plan (CRP), based on the community interviews and other relevant information, specifying the community relations activities that the Facility expects to undertake during the remedial response. The purpose of the CRP is to:~~

~~(A) Ensure the public appropriate opportunities for involvement in a wide variety of site-related decisions, including site analysis and characterization, alternatives analysis, and selection of remedy;~~

~~(B) Determine, based on community interviews, appropriate activities to ensure such public involvement, and~~

~~(C) Provide appropriate opportunities for the community to learn about the site.~~

~~(ii) Establishing at least one local information repository at or near the location of the response action. Each information repository should contain a copy of items made available to the public, including information that describes the technical assistance grants application process. The Permittee shall inform interested parties of the establishment of the information repository.~~

3. ~~The CRP shall be inserted into Permit Attachment U and become part of the permit.~~