Virginia Department of Environmental Quality

Hazardous Waste Management

Post-Closure Care and Site-Wide Corrective Action Permit

Huntington Ingalls, Inc.

Newport News, Virginia

EPA ID No: VAD001307495

April 23, 2019

Modified May 7, 2025

Hazardous Waste Management Post-Closure Care and Site-Wide Corrective Action Permit

Permittee: Huntington Ingalls, Inc.

4101 Washington Avenue

Newport News, Virginia 23607

EPA ID No.: VAD001307495

Pursuant to Chapter 14, Article 4, of Title 10.1 of the Code of Virginia (1950), as amended, and regulations promulgated thereunder by the Virginia Department of Environmental Quality (DEQ),a Hazardous Waste Management Post-Closure and Site-Wide Corrective Action Permit is issued to Huntington Ingalls Incorporated (hereinafter referred to as the Permittee), located in Newport News, Virginia to conduct Post-closure care of one hazardous waste management unit and Corrective Action (CA), 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) or Area of Concern (AOC.) The facility being permitted is located at 4101 Washington Avenue in Newport News, Virginia and has a geographic location of 36° 59'30" North latitude and 76° 26’45" West longitude.

The Permittee shall comply with all terms and conditions set forth in this Permit including Permit Attachments A through F. If the Permit and the Permit Attachments conflict, the wording of the Permit shall prevail. The Permittee shall also comply with all applicable regulations contained 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) and the Resource Conservation and Recovery Act (RCRA) regulations under 40 CFR Parts 124, 260, 261, 264, 262, 268, and 270, as adopted by reference in the VHWMR. (For convenience, wherever the RCRA Regulations are adopted by reference and cited in this Permit and the Permit Attachments, the regulatory citations will be only those from 40 CFR.)

The Commonwealth of Virginia has received authorization for its hazardous waste program under Section 3006(b) of the RCRA, 42 U.S.C. § 6926(b), to administer and enforce the RCRA under the VHWMR in lieu of the federal hazardous waste management program. Applicable regulations are those under the VHWMR (9 VAC 20-60) and the RCRA which are in effect on the date of final administrative action on this Permit as well as any self-implementing statutory provisions and related regulations which are automatically applicable to the Permittee’s hazardous waste activities, notwithstanding the conditions of this Permit.

This Permit is based on the administrative record and the assumption that the information submitted by the Permittee and contained in the administrative record is complete and accurate, The Permittee's failure in the application or during the Permit issuance process to fully disclose all relevant facts, or the Permittee's misrepresentation of any relevant facts at any time, shall be grounds for the modification or termination of this Permit pursuant to 40 CFR § 124.5, § 270.41, §270.42, and § 270.43, and shall also be grounds for initiation of an enforcement action. The Permittee shall inform the Department of any deviations from permit conditions or changes in the information provided in the application. In particular, the Permittee shall inform the Department of any proposed changes that might affect the ability of the Permittee to comply with the applicable regulations and/or permit conditions, or which alter any of the conditions of the Permit in any way.

This Permit is effective as of \_\_\_\_\_\_\_\_\_\_\_, and shall remain in effect until \_\_\_\_\_\_\_\_\_\_\_, unless revoked and reissued in accordance with 40 CFR § 124.5 and § 270.41, or terminated in accordance with 40 CFR § 270.43, or continued in accordance with VHWMR 9 VAC 20-60 - 270.B.15.

Date Signed Leslie A. Romanchik

Hazardous Waste Program Manager

Office of Financial Responsibility and Waste Programs

SIGNATURE PAGE

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The following Attachments are incorporated, in their entirety, by reference into this Permit. These incorporated attachments are enforceable conditions of this Permit. The Department has, as deemed necessary, modified specific language from the permit application. Additional modifications are prescribed in the Permit Conditions (Modules I through VII), and thereby supersede the language of the Permit Attachments to the extent that there is a direct conflict between the Permit Attachments and **Modules I** through **VII** of the Permit.

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DEFINITIONS

All definitions contained in 40 CFR Sections 124.2, 260.10, 270.2, 264.141, 264.1031, 264.1051, 264.1081, and 9 VAC 20-60 are hereby incorporated, in their entirety, by reference into this Permit. Any of the definitions used below, (a) through (m), shall supersede any definition of the same term. Where terms are not defined in the regulations or the Permit, the meaning associated with such terms shall be defined by a standard dictionary reference or the generally accepted scientific or industrial meaning of the term.

1. The term **"Permit"** shall mean the Permit issued by the Virginia Department of Environmental Quality, pursuant to Chapter 14, Article 4, Title 10.1, Code of Virginia (1950), as amended, and 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.)
2. The term **"Director"** shall mean the Director of the Virginia Department of Environmental Quality or his designated representative.
3. The term **"Department"** shall mean the Virginia Department of Environmental Quality (DEQ), (with the address as specified in **Permit Condition I.I.2**.)
4. The terms **"Facility"** or **"Site"** shall mean all contiguous land, and structures, other appurtenances, and improvements on the land, used for treating, storing, or disposing of hazardous waste. For the purpose of implementing corrective action under 40 CFR § 264.101, **“Facility”** means all contiguous property under the control of the owner or operator under a permit under Subtitle C of RCRA.
5. The term **"Hazardous Waste Management Unit”** is a contiguous area of land on or in which hazardous waste is placed, or the largest area in which there is significant likelihood of mixing hazardous waste constituents in the same area. Examples of hazardous waste management units include a surface impoundment, a waste pile, a land treatment area, a landfill cell, an incinerator, a tank and its associated piping and underlying containment system and a container storage area. A container alone does not constitute a unit; the unit includes containers and the land or pad upon which they are placed.
6. The term **"Release"** shall mean any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment of any hazardous waste or hazardous constituents.
7. The term **“Area of Concern”** shall mean an area at the facility or an off-site area, which is not at this time known to be a solid waste management unit, where hazardous waste and/or hazardous constituents are present or are suspected to be present as a result of a release from the facility.
8. The term **“Hazardous Constituent”** shall mean a constituent that is listed in 40 CFR Part 261, Appendix VIII.
9. The term **“Permittee”** shall mean the owner/operator of the facility to which the Permit is issued.
10. The term **“EPA”** shall mean United States Environmental Protection Agency.
11. The term **“Solid Waste Management Unit”** shall mean any discernable unit at the facility from which hazardous constituents might migrate, irrespective of whether the units were intended for the management of solid and/or hazardous wastes. Such units include any area at a facility which solid wastes have been routinely and systematically released.
12. The term **“Unit”** refers to containers, container storage areas, tanks, surface impoundments, waste piles, land treatment units, landfills, incinerators, underground injection wells, and other physical, chemical, and biological units or treatment units.
13. The term **“Days”** shall mean calendar days except as otherwise provided herein.
14. STANDARD CONDITIONS
    1. Effect of Permit
       1. Permit

This Permit, issued by the Director pursuant to 40 CFR § 270.1(c)(4), authorizes only the management of hazardous waste for Post-Closure Care and Site-Wide Corrective Action expressly described in this Permit and in accordance with the conditions of this Permit and with the applicable provisions of the VHWMR under 9 VAC 20-60. Any management of hazardous waste by the Permittee which is not authorized by this Permit or 9 VAC 20-60, and for which a permit is required under Chapter 14, Article 4, Title 10.1, Code of Virginia (1950), as amended, is prohibited (40 CFR § 270.30(g) and 270.4(b) and (c).) Issuance of this Permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, an invasion of other private rights, or any infringement of Commonwealth of Virginia or local laws or regulations. Compliance with this Permit generally constitutes compliance, for the purpose of enforcement, with Chapter 14, Article 4, Title 10.1-1426, code of Virginia (1950), as amended. This Permit does not convey any property rights of any sort, or any exclusive privilege. Possession of a permit does not authorize any injury to persons or property or invasion of other private rights, or infringement of the Commonwealth of Virginia or local laws or regulations. Compliance with the terms of this Permit may not constitute a defense to any action brought under Chapter 14, Article 8, Code of Virginia (1950), as amended, or any other Commonwealth law governing protection of the public health or the environment.

* + 1. CA Obligations

The Permittee is obligated to complete facility-wide CA under the conditions of a RCRA Permit regardless of the operational status of the facility. The Permittee must submit an application for a new Permit at least 180-days before this Permit expires pursuant to 40 CFR § 270.10(h.) Unless the Permit has been modified to terminate the CA schedule of compliance, all Post-closure care obligations have been met, and the Permittee has been released from the requirements for financial assurance for Post-closure care and Corrective Action.

* 1. Permit Actions

This Permit may be modified, revoked and reissued, or terminated for cause as specified in 40 CFR § 124.5, 270.30(f), 270.41, 270.42, and 270.43. The filing of a request by the Permittee for a permit modification, revocation and reissuance, or termination, or the notification of planned changes or anticipated noncompliance on the part of the Permittee does not stay the applicability or enforceability of any permit condition (40 CFR § 270.30(f).)

* + 1. Permit Modifications

Permit modifications at the request of the Permittee shall be done as specified by 40 CFR § 270.42.

* + 1. Renewal

This Permit may be renewed as specified in 9 VAC 20-60-270.B.6 and 40 CFR § 270.10(h), and **Permit Condition I.D.2**. Review of any application for a permit renewal shall consider improvements in the state of control and measurement technology, as well as changes in applicable regulations.

* 1. Severability
     1. Provisions

The provisions of this Permit are severable, and if any provision of this Permit or the application of any provision of this Permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this Permit shall not be affected thereby. Invalidation of any Commonwealth or federal statutory or regulatory provision which forms the basis for any condition of this Permit does not affect the validity of any other Commonwealth or Federal statutory or regulatory basis for said condition. (40 CFR § 124.16(a)(2).)

* + 1. Permit is Stayed

In the event that a condition of this Permit is stayed for any reason, the Permittee shall comply with the conditions of the existing permit; which correspond to the stayed conditions, unless the Director determines compliance with the related applicable and relevant standards would be technologically incompatible with compliance with other conditions of this Permit which have not been stayed (40 CFR § 124.16 (c)(2).)

* 1. Duties and Requirements
     1. Duty to Comply

Pursuant to 40 CFR § 270.30 (a), the Permittee shall comply with all conditions of this Permit, except that the Permittee need not comply with the conditions of this Permit to the extent and for the duration such noncompliance is authorized by an emergency permit under 40 CFR § 270.61. Any other noncompliance with the Permit constitutes a violation of Title 10.1 Code of Virginia (1950), as amended, and regulations promulgated thereunder, and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or denial of a permit renewal application (40 CFR § 270.30 (a).)

* + 1. Duty to Reapply

Pursuant to 40 CFR § 270.30(b), if the Permittee wishes to or is required to continue an activity regulated by this Permit after the expiration date of this Permit, the Permittee shall apply for and obtain a new permit as specified below.

* + - 1. The Permittee shall submit a new and complete permit application for a new permit at least 180 days before the Permit expires, unless a later date has been approved by the Director (40 CFR § 270.30(b).)
      2. Pursuant to 40 CFR § 270.10 (h), the Director shall not grant permission for an application to be submitted later than the expiration date of the existing Permit.
    1. Need to Halt or Reduce Activity Not a Defense

Pursuant to 40 CFR § 270.30(c), it shall not be a defense for the Permittee in an enforcement action to argue that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Permit.

* + 1. Duty to Mitigate

In the event of noncompliance with the Permit, the Permittee shall take all reasonable steps to minimize releases to the environment, and shall carry out such measures as are reasonable to prevent significant adverse impacts on human health or the environment (40 CFR § 270.30(d).)

* + 1. Proper Operation and Maintenance

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

* + 1. Duty to Provide Information

Pursuant to 40 CFR § 270.30(h), the Permittee shall furnish to the Director within a reasonable time, any pertinent information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Permit, or to determine compliance with this Permit. The Permittee shall also furnish to the Director, upon request, copies of records required to be kept by this Permit.

* + 1. Inspection and Entry

Pursuant to 40 CFR § 270.30(i), the Permittee shall allow the Director or an authorized representative, upon the presentation of credentials and other documents as may by required by law to:

* + - 1. Enter at reasonable times upon the Permittee’s premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Permit;
      2. Have access to and copy, at reasonable times, any records that must be kept under conditions of this Permit;
      3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Permit; and
      4. Sample or monitor at reasonable times for the purposes of assuring permit compliance or as otherwise authorized by the VHWMR, any substances or parameters at any location.
    1. Reporting Planned Changes

The Permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility, which will or has the potential to affect the regulated unit or the associated groundwater monitoring system (40 CFR § 270.30(l)(1).) This notice shall include a detailed description of all incidents of noncompliance reasonably expected to result from the proposed changes.

* + 1. Anticipated Noncompliance

The Permittee shall give advance written notice to the Director of any planned changes in the permitted facility or activity that may result in noncompliance with Permit requirements (40 CFR § 270.30(l)(2).)

* + 1. Twenty-four Hour Reporting

Pursuant to 40 CFR § 270.30(l), the Permittee shall report to the Director any noncompliance which may endanger human health or the environment. Information shall be provided orally within twenty-four (24) hours from the time the Permittee becomes aware of the circumstances. The information specified (a, b, and c) shall be reported verbally within 24 hours:

* + - 1. Information concerning the release of any hazardous waste that may cause an endangerment to public drinking water supplies.
      2. Any information of a release or discharge of hazardous waste or of a fire or explosion from the Hazardous Waste Management Permitted facility which could threaten the environment or human health outside of the facility.
      3. The description of the occurrence and its cause shall include at least the following:
         1. Name, address, and telephone number of the owner or operator;
         2. Name, address, and telephone number of the facility;
         3. Date, time, and type of incident;
         4. Name and quantities of material(s) involved;
         5. The extent of injuries, if any;
         6. An assessment of actual or potential hazard to the environment and human health outside the facility, where this is applicable; and
         7. Estimated quantity and disposition of recovered material that resulted from the incident (40 CFR § 270.30(l)(6).)
      4. A written submission shall also be provided to the Director within five (5) days of the Permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the periods of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated duration of noncompliance; the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. The Director may waive the 5-day notice requirement in favor of a written report within fifteen (15) days (40 CFR § 270.30(l)(6)(iii).)
    1. Other Noncompliance

The Permittee shall report all other instances of noncompliance not otherwise required to be reported in this Permit, at the time monitoring reports are submitted. The reports shall contain the information listed in **Permit Condition I.D.10** (40 CFR § 270.30(l)(10).)

* + 1. Other Information

Whenever the Permittee becomes aware that it failed to submit any relevant facts in the permit application, or submitted incorrect information in a permit application or in any report to the Director, the Permittee shall promptly submit such facts or information to the Director (40 CFR § 270.30(l)(11).)

* 1. Monitoring and Records
     1. Monitoring Reports

Monitoring shall be performed and results shall be reported at the intervals specified in the Permit.

* + 1. Samples and Measurements

Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity (40 CFR § 270.30 (j)(1).) The method used to obtain a representative sample of the waste to be analyzed must be the appropriate method specified in 40 CFR § 261, Appendix I, or an equivalent method approved by the EPA. Laboratory methods must be those specified in *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846* (3rd ed.; November, 1986, as updated), *Standard Methods of Wastewater Analysis* (16th ed.; 1985, as updated), or an equivalent method approved by the EPA. Additionally, the laboratory must be accredited for the analytical method, matrix and target analyte (where applicable) by the Virginia Environmental Laboratory Accreditation Program (VELAP.)

* + 1. Records of All Monitoring Information

The Permittee shall retain records of all monitoring information, including all calibration and maintenance records, and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports and records required by this Permit, all certifications required by 40 CFR § 264.73(b)(9), and records of all data used to complete the application for this Permit, for a period of at least three (3) years (or longer if specified elsewhere in this Permit) from the date of the sample collection, measurement, report, certification, or application. These retention periods may be extended by the request of the Director at any time and are automatically extended during the course of any unresolved enforcement actions regarding this facility. The Permittee shall maintain records from all groundwater monitoring wells and associated groundwater surface elevations, for the active life of the facility, and for disposal facilities for the Post-closure care period as well.

* + - 1. Records of monitoring information shall include at a minimum:
         1. The date, exact place, and time of sampling or measurements;
         2. The individual(s) who performed the sampling or measurements;
         3. The date(s) analyses were performed;
         4. The individual(s) who performed the analyses;
         5. The analytical techniques or test methods used; and
         6. The results of such analyses (40 CFR § 270.30(j).)
  1. Compliance Not Constituting Defense

Compliance with the terms of this Permit does not constitute a defense to any action brought under Chapter 14, Article 8 of Title 10.1, Code of Virginia (1950) as amended or any other Commonwealth law governing protection of the public or the environment.

* 1. Transfer of Permits

This Permit is not transferable to any person except after notice to the Director (40 CFR § 270.30(l)(3).) The Director may require modification or revocation and reissuance pursuant to 40 CFR § 124.5, 270.40, 270.41, 270.42, and 270.43 to change the name of the Permittee and incorporate such other requirements as may be necessary. Before transferring ownership or operation of the facility during its operation life, or of a disposal facility during Post-closure care period, the Permittee shall notify the new owner or operator in writing of the requirements of 9 VAC 20-60-264 and 40 CFR § 264 and 270 (40 CFR § 264.12(c).) The Permittee shall send a copy of such notice to the Director (40 CFR § 270.40.)

* 1. Permit Expiration and Continuation

Pursuant to 9 VAC 20-60-270.B.15., this Permit will remain in force until the effective date of a new permit if the Permittee has submitted a timely, complete application pursuant to **Permit Condition I.D.2**, and through no fault of the Permittee, the Director has not issued a new permit with an effective date on or before the expiration date of this Permit. All conditions of the continued Permit shall remain fully effective and enforceable (40 CFR § 270.51.)

* 1. Reports, Notifications, and Submissions to the Department

The Department will review the plans, reports, schedules and other documents (hereinafter collectively referred to as "submission") submitted which require Department approval. The Department will notify the Permittee in writing of Department’s approval or disapproval of each submission.

* + 1. Biennial Report

The Permittee shall submit a biennial report to the Department which covers facility activities during odd numbered calendar years, pursuant to 40 CFR § 264.75.

* + 1. Annual Report

The Permittee shall submit an annual groundwater monitoring and remedial measures report no later than March 1 of each calendar year pursuant to **Permit Condition VI.L.2**.

* + 1. Duty to Submit Certified Documents

All work plans, reports, notifications or other submissions which are required by this Permit to be sent or given to the Director shall be sent electronically, postal mailing or hand-delivered to:

For Corrective Action and Groundwater:

Department of Environmental Quality

Groundwater/Corrective Action Program Team Leader

Office of Remediation Programs

PO Box 1105

Richmond, Virginia 23218

For Permit Modifications:

Department of Environmental Quality

Hazardous Waste Program Manager

Office of Financial Responsibility and Waste Programs

PO Box 1105

Richmond, Virginia 23218

Street Address:

1111 East Main Street, Suite 1400

Richmond, Virginia 23219

And one (1) copy of all such correspondence, reports, and submissions shall also be sent electronically to:

Land Program Manager, Tidewater Regional Office

Department of Environmental Quality

5636 Southern Blvd

Virginia Beach, Virginia 23462

Associate Director, Office of Remediation

Environmental Protection Agency, Region III

1650 Arch Street

Philadelphia, PA 19103-2029

Mail Code: (3LC20)

* + 1. Signatory Requirements

All applications, work plans, reports, and other information submitted shall be signed and certified as specified by 40 CFR § 270.11.

* 1. Documents to be Maintained at the Facility Site
     1. Documents

Current copies of the following documents, as amended, revised, and modified, shall be maintained at the facility. These documents shall be maintained until Post-closure care and Corrective Action are completed and certified by the Permittee and by an independent, Virginia-registered professional engineer, unless a lesser time is specified in the Permit.

The Permit, including all attachments, revisions and modifications;

* + - 1. All Part A and B Permit applications supporting the Permit;
      2. Inspection schedules and logs required by 40 CFR § 264.15(b)(2) and § 264.15(d), as applicable;
      3. Personnel training documents and records required by 40 CFR § 264.16 and this Permit, as applicable;
      4. Closure Plans, as required by 40 CFR § 264.112(a), as applicable;
      5. Post-closure care Plan, as required by 40 CFR § 264.118(a), as applicable;
      6. Groundwater sampling and analysis plans required by 40 CFR § 264.101 and this Permit, including groundwater monitoring results;
      7. Operations and maintenance plan as required by this Permit;
      8. Corrective Action work plans, reports, and other information and submissions regarding Corrective Action, as applicable under this Permit; and
      9. All other documents required by **Permit Conditions I.D.8** through **I.D.12,** **I.E** and **VI.O**.
  1. Approval/Disapproval of Submissions
     1. Review

The Department will review the plans, reports, schedules and other documents (hereinafter collectively referred to as "submission") submitted which require the Department’s approval. The Department will notify the Permittee in writing of the approval, conditional approval, or disapproval of each submission.

* + 1. Approval

Each submission required by this Permit, upon approval by the Director, incorporated into this Permit. Any noncompliance with a Department-approved submission shall be deemed as noncompliance with this Permit. A conditionally approved submission, including any terms of such conditional approval set forth in the Department’s decision, shall constitute the Department-approved submission and shall be incorporated into this Permit.

* + 1. Conditional Approval

In the event of the Department's conditional approval of submission, the Department shall specify in writing any deficiencies in the submission and the terms upon which approval of the submission is conditioned. If the Permittee disputes any term upon which approval of the submission was conditioned, the Permittee may initiate Dispute Resolution pursuant to **Permit Condition I.L**.

* + 1. Disapproval

In the event of the Department’s disapproval of a submission, the Department shall specify the deficiencies in writing. The Permittee shall address the specified deficiencies within a reasonable time period established by the Department taking into account the tasks to be performed, and submit the revised submission, as necessary, to the Department for approval.

* + 1. Revision Disapproval

If the revised submission is disapproved, the Department will notify the Permittee of the deficiencies in writing and specify a schedule for the Permittee to correct the deficiencies and resubmit the submission to the Department. The Permittee shall correct the deficiencies as directed by the Department, and forward the revised submission within the time period specified by the Department. In the event the Permittee disagrees with the Department’s disapproval of the revised submission, the Permittee shall notify the Department in writing and the disagreement shall be resolved in accordance with the Dispute Resolution provision in **Permit Condition I.L**.

* 1. Dispute Resolution
     1. Disagreement with Department’s Determination

Except as otherwise provided in this Permit, in the event the Permittee disagrees, in whole or in part, with the Department disapproval of any submission required by this Permit, the Permittee shall notify the Department in writing of its objections, and the basis thereof, within fourteen (14) days of receipt of the Department's disapproval. Such notice shall set forth the specific matters in dispute, the position(s) the Permittee asserts which should be adopted as consistent with the requirements of the Permit, the basis for the Permittee's position, and supporting documentation considered necessary for the Department's determination.

* + 1. Resolution

The Department and the Permittee shall have an additional fourteen (14) days from the Department's receipt of the notification to meet or confer to resolve any disagreement/dispute. In the event agreement is reached, the Permittee shall submit the revised submission and implement the same in accordance with such agreement.

* + 1. Agreement Not Met

In the event the Permittee and the Department are not able to reach an agreement on the dispute items within the additional 14-day period, the Department will notify the Permittee in writing of its decision on the dispute and the Permittee shall comply with the terms and conditions of the Department's decision in the dispute. The Permittee does not waive its right to assert any and all available defenses in a proceeding to enforce this Permit.

* + 1. Appeal

In the event the Permittee disagrees with Department 's disapproval of a submission or revised submission and the Department 's written decision regarding dispute items, the Permittee may file an appeal with the Director within 30 days of the disapproval (as provided for in Rule 2A:2 of the Supreme Court of Virginia.)

1. GENERAL FACILITY CONDITIONS
   1. General Waste Analysis

A list of hazardous constituents known or suspected to have been placed in the waste management units is provided in **Permit Attachment C**. This list is based upon information provided by the facility.

* 1. Security

The Permittee shall comply with the security provisions of 40 CFR § 264.14. The security provisions shall follow the requirements described in the **Permit Attachment C**.

* 1. General Inspection Requirements

The Permittee shall follow a written inspection schedule observing deterioration, malfunction, or operational errors in the monitoring systems for the waste management units discovered by an inspection (40 CFR § 264.15) as described in **Permit Condition III.E** and **Permit Attachment C**.

* + 1. Inspection Logs

Inspection logs will be maintained for at least three years from the date on which the inspection was completed. Permittee shall implement remedial action when necessary; and maintain a signed and dated inspection log at the facility and available to the Department upon request 40 CFR § 264.15(d.) The inspection logs provide inspection observations, deficiencies noted, and Corrective Action taken. The Permittee shall follow the frequency of inspections as specified in the Permit.

* 1. Personnel Training

The Permittee shall conduct required personnel training (40 CFR § 264.16.) The training program shall follow **Permit Attachment D** and as described in the Permit. The Permittee shall maintain training documents and records (40 CFR § 264.16 (e).)

* + 1. Required Training

All personnel required under this Permit to receive training shall, at minimum, be instructed in the following areas:

* + - 1. Area specific management practices regarding Post-closure care and Corrective Action activities;
      2. Security and safety;
      3. General and area specific inspections and record keeping;
      4. Regulatory updates which affect operations and activities; and
      5. Job function and procedural descriptions of each employee’s respective role in Post-closure care and/or Corrective Action.
  1. Recordkeeping and Reporting

The Permittee shall comply with all applicable reporting requirements as described in **Permit Conditions I.D and I.I**.

* 1. Cost Estimate for Facility Post-Closure
     1. Annual Adjustment

The Permittee must adjust the post-closure care cost estimate for inflation sixty (60) days prior to the anniversary of the date on which the first cost estimate was prepared as required by 40 CFR § 264.144(b.)

* + 1. Adjustment for Changed Conditions

The Permittee must revise the post-closure cost estimates whenever there is a change in the facility's post-closure plans as required by 40 CFR § 264.144(c.)

* + 1. Availability

The Permittee must keep at the facility the latest post-closure cost estimates as required by 40 CFR § 264.144(d.)

* 1. Incapacity of Owner/Operator, Guarantors, or Financial Institutions

The Permittee shall comply with 40 CFR § 264.148 whenever necessary.

1. POST-CLOSURE CARE – SWMU 12A
   1. Highlights

The former surface impoundments (SWMU 12a, or the Regulated Unit) are located in the north central portion of the Facility and are currently under Post-Closure Care (**Permit Attachment C**.) The impoundments were designed to neutralize basic and acidic wastes, precipitate metals hydroxides, and provide retention time for gravity separation of oily wastes. A list of wastes known to or suspected to have been discharged into the units is included with the Post-Closure Care Plan in **Permit Attachment C**.

The Permittee shall provide Post-Closure Care for SWMU 12a and maintain the groundwater monitoring system identified in **Permit Module VI**, as appropriate, for thirty (30) years after the date closure was certified. The units were certified closed on November 8, 1985. The Post-Closure Care shall be extend beyond November 8, 2015 in accordance with **Permit Condition(s) III.C.1 and III.H.1**.

* 1. Units Identified for Post-Closure Care

The Permittee shall provide Post-Closure Care for the following identified hazardous waste management units, subject to the terms and conditions of this Permit.

* + 1. Surface Impoundments

The surface impoundments were closed with some residual waste in place with the building constructed on top of the location functioning as a final cover.

* + - 1. Final Cover - The building foundation which serves as the final cover consists of the following; 2-foot of compacted fill is overlain by a 2.5-foot thick reinforced concrete floor. The perimeter of the building is covered by a 10-inch thick layer of dense graded aggregate covered by a 6-inch layer of asphalt.
      2. List of Wastes - The list of hazardous constituents known or suspected to have been placed in the closed surface impoundments was generated based upon groundwater data and Facility information. The wastes involved have been identified in the List of Wastes, **Permit Attachment C**.
      3. Liner System Description - The surface impoundments do not have a liner system as defined by EPA standards.
      4. Leachate Detection/Collection System - The surface impoundments were not constructed with a leachate collection or detection system.
      5. Groundwater Monitoring System - The groundwater monitoring system is comprised of all wells shown on the well location map (see **Permit Attachment A, Figure A-3**).
  1. Post-Closure Care and Use of Property

The Permittee shall conduct Post-Closure Care for the hazardous waste management units listed in **Permit Condition III.B.**

* + 1. Extension

The Director may extend the Post-Closure period applicable to the hazardous waste management unit or facility if the extended period is necessary to protect human health and the environment (e.g., leachate or groundwater monitoring results indicate a potential for migration of constituents at levels which may be harmful to human health and the environment) (40 CFR § 264.117(a)(2)(ii).)

* + 1. Use of Post-Closure Units

The Permittee shall not allow any use of the units designated in **Permit Condition III.B,** which would disturb the integrity or the function of the monitoring systems and final cover during the Post-Closure Care period in accordance with 40 CFR § 264.117(c.)

* 1. Post-Closure Requirements for Regulated Units
     1. Post-Closure Plan

The Permittee shall implement the Post-Closure Plan in accordance with **Permit Attachment C**. All Post-Closure Care activities must be conducted in accordance with the provisions of the Post-Closure Plan, 40 CFR § 264.117(d), and 40 CFR § 264.118(b.)

* + 1. Groundwater Monitoring Requirements

The Permittee shall maintain and monitor the groundwater monitoring system and comply with all other applicable requirements of 40 CFR § 264.90 during the Post-Closure period in accordance with 40 CFR § 264.117(a.)

* 1. Inspections

The Permittee shall inspect the components, structures, and equipment at the site in accordance with the Inspection Requirements as stated in the Permit and **Permit Attachment C** (40 CFR § 264.117 (a)(1)(ii).)

* 1. Post-Closure Security

The Permittee shall maintain security at the facility during the Post-Closure period, in accordance with the Post-Closure Care Plan, **Permit Attachment C**, and 40 CFR § 264.117 (b.)

* 1. Financial Assurance for Facility Post-Closure

The Permittee shall maintain compliance with 40 CFR § 264.144 by providing financial assurance, as required by 40 CFR § 264.145, in at least the amount of the cost estimates required by **Permit Condition II.F**. The Director must approve changes in financial assurance mechanisms.

* 1. Compliance Period

The Compliance Period is the period of time that the facility is required to remain in compliance with the Groundwater Protection Standards (GPS) in the uppermost aquifer beneath the unit at the point of compliance (40 CFR § 264.92 and 264.96.) The compliance period is the number of years equal to the active life of the unit including the closure period.

* + 1. Conclusion of Compliance Period

If at the end of the specified compliance period, the facility is engaged in a corrective action program, the compliance period shall be extended until the Permittee can demonstrate that the GPS has not been exceeded at the point of compliance for a period of three (3) consecutive years (40 CFR § 264.96 (c).)

* + 1. Certification of Completion of Post-Closure Care

Pursuant to 40 CFR § 264.120, no later than sixty (60) days after completion of the established Post-Closure period for each hazardous waste management unit(s), the Permittee shall submit to the Director, a certification that the Post-Closure Care for the hazardous waste management unit(s) was performed in accordance with the specifications in the approved Post-Closure Plan. The certification must be signed by the Permittee and an independent, licensed, registered, Virginia certified professional engineer. Documentation supporting the professional engineer's certification must be furnished to the Director upon request.

* + 1. Post-Closure Modifications

If the Permittee, or any subsequent owner or operator of the land upon which the closed hazardous waste units are located, wishes to remove hazardous wastes and hazardous waste residues, or contaminated soils, then they shall request modification to this Permit in accordance with the applicable requirements in 40 CFR § 264.119(c) and 9VAC 20-60-270. The Permittee or any subsequent owner or operator of the land shall demonstrate that the removal of hazardous wastes will satisfy the criteria of 40 CFR § 264.117(c.)

1. DETECTION MONITORING – SWMU 12a
   1. Highlights

The Permittee implemented an interim status groundwater monitoring program in July 1981, which was designed to evaluate groundwater quality in the uppermost aquifer beneath the two operating surface impoundments. Six (6) monitoring wells were installed (GM-1 through GM-6.) The wells were abandoned in 1985 prior to the construction of the Blast and Coat Building. No replicate samples were collected and statistical evaluations were not performed on the data collected between 1981 and 1985.

In 1992, the Facility reinstated a groundwater monitoring program in response to the Hazardous and Solid Waste Amendments (HSWA) requiring facilities that closed land-based units without groundwater monitoring to demonstrate that they met the closure performance standards for groundwater. The constituents contained in Appendix 10.6 to 9VAC20‑60-10 (repealed effective 1999 and replaced with Appendix IX to 40 CFR Part 264) were detected in groundwater down-gradient of the Solid Waste Management Unit (SWMU) at concentrations in excess of background levels. In a letter dated October 27, 1993, the Department required the Facility to implement a Groundwater Quality Assessment Program.

Based upon the magnitude and extent of groundwater contamination, the existence of non-aqueous phase liquids in at least one monitoring well at the time of permit issuance, and the 10-year compliance period, the Permittee will not conduct monitoring under a Detection Monitoring Program.

1. GOUNDWATER COMPLIANCE MONITORING
   1. Highlights

The Department has determined that the two (2) (collectively referred to as SWMU 12a) surface impoundments impacted the groundwater quality down-gradient of the units. In accordance with the approved Groundwater Quality Assessment Program, (GQAP, March 1994), three additional monitoring wells were installed on March 9, 1995 to define the extent of contamination. The data collected from the monitoring system, the sample borings, and the temporary sampling points (HydroPunch sites) adequately delineated the horizontal and vertical extent of contamination in the aquifer underlying the unit. At the conclusion of the GQAP the extent of contamination was presented in the Groundwater Quality Assessment Report (O’Brien & Gere, February 2, 1996.) The November 1996 and April 1997 groundwater data indicated that corrective action was required at the point of compliance (POC) to address groundwater contamination that exceeded the GPS related to the former surface impoundments. Groundwater monitoring for SWMU 12a will be conducted under Corrective action groundwater monitoring program as required by 40 CFR § 264.100 which is described in **Permit Module VI, Groundwater Corrective Action**.

1. GROUNDWATER CORRECTIVE ACTION – SWMU 12A
   1. Highlights

In response to exceedances of the Groundwater Protection Standard (GPS) at point of compliance (POC) wells for Solid Waste Management Unit (SWMU) 12a, Huntington Ingalls Incorporated began Corrective Action Groundwater Monitoring in 1997 and implementation of Corrective Action Program in 1998.

The groundwater monitoring program is implemented to demonstrate the effectiveness of the corrective action program (40 CFR § 264.100 (d)) as well as compliance with the Groundwater Protection Standards is detailed in the forthcoming Corrective Measures Implementation (CMI) Work Plan as required by **Permit Condition VI.D.** The Monitored Natural Attenuation (MNA) approach is the currently selected corrective action program to meet Groundwater Protection Standards (GPS.)

* 1. Corrective Action Groundwater Monitoring

The groundwater monitoring program required during the implementation of the regulated unit corrective action program at the point of compliance (POC) is based upon the requirements of the former Compliance Monitoring Program. Annual monitoring and sampling shall be conducted at the POC and monitoring wells in accordance with the Sampling and Analysis Plan (**Permit Attachment E**) and as detailed in the CMI Work Plan for all constituents on the Corrective Action Monitoring Constituent List (**Permit Attachment F, Table F-1**.)

* 1. Groundwater Monitoring Program

The Corrective Action Groundwater Monitoring Program requires monitoring at the background wells, down-gradient point of compliance (POC) wells, and at wells designated as corrective action monitoring wells, at least annually. Static groundwater elevations and total depths will be measured at all wells, specified in this Permitduring each sampling event.

* + - 1. Groundwater beneath the closed surface impoundments (SWMU 12a) shall be monitored with two (2) up-gradient background groundwater monitoring wells, four (4) down-gradient POC wells, and two (2) down-gradient corrective action wells located as specified on the map presented in **Permit Attachment A, Figure A-3**. Monitoring wells MW-1 and MW-2 are located up-gradient of SWMU 12a and will serve as the background wells for the unit. Monitoring wells MW‑3, MW-4, MW-5, and RW-1 are located down-gradient of the unit and will serve as the POC wells. In addition, down-gradient monitoring wells MW-7 and MW-8 will serve as corrective action monitoring wells.
      2. In addition to the wells specified in **Permit Condition VI.C.a**, the following wells will only be used to evaluate the groundwater potentiometric surface during each sampling event; MW-2 and MW-6.
  1. Completion of Corrective Measures

Following completion of corrective measures specified in this Permit and the Director’s approval to terminate corrective action, the Permittee may petition Director to modify or terminate corrective action groundwater monitoring in accordance with **Permit Condition VI.M.3**.

* + 1. Sampling Schedule

POC wells, corrective action wells and up-gradient wells will be sampled in accordance with the CMI Work Plan. Each constituent will be collected using the methods and analyses shall be obtained using the EPA SW-846 and EPA Methods specified in the CMI Work Plan,with the following schedule:

* + - 1. The up-gradient well MW-1, corrective action wells (MW-7 and MW-8) and down-gradient POC wells (RW-1, MW-4, MW-5, and MW-3), will be sampled at least annually for the constituents listed in the Correction Action Monitoring List (**Permit Attachment F, Table F-1**); and
      2. Alternate SW-846 methods may be approved by the Director, provided the request is in writing and submitted 30 days prior to the sampling event. Proposed alternate methods must achieve the same Limit of Quantitation (or lower) as the specified method.
  1. Well Construction, Installation, and Maintenance

The Permittee shall maintain the groundwater monitoring system, which includes the monitoring wells listed in **Permit Condition VI.C** and the locations specified in the **Permit Attachment A, Figure A-3**.

* + 1. Additional or Replacement Well

The Director must approve the addition or removal of any monitoring wells prior to installation or decommissioning, in accordance with 40 CFR § 270.42 and **Permit Condition VII.M**.

* + - 1. All wells deleted from the monitoring program shall be plugged and abandoned in accordance with the CMI Work Plan and the Department’s Well Abandonment Policy (**Permit Attachment E, Appendix E-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.
      2. All monitoring wells added to the existing groundwater monitoring system described in **Permit Condition VI.C,** must be constructed in accordance with the requirements of EPA's *RCRA Groundwater Monitoring Technical Enforcement Guidance Document* (TEGD) and approved by the Department and in accordance with the well and boring logs in **Permit Attachment E, Appendix E-5**.
  1. Maintenance

All groundwater monitoring wells required by this Permit in the Corrective Action Monitoring Program shall be maintained in accordance with **Permit Attachment C** and includes the following:

* + - 1. The groundwater monitoring system must: yield samples in up-gradient well(s) that represent the quality of the background groundwater unaffected by leakage from the Regulated Unit, and in down-gradient wells yield samples that represent the quality of groundwater passing the Point of Compliance; and
      2. The number and location of monitoring wells must be sufficient to identify and define all potential release pathways from the unit to the uppermost aquifer based on site specific hydrogeologic characterization.
  1. Inspections

The Permittee shall inspect all monitoring wells listed in **Permit Condition VI.C** at least semi-annually to ensure that they are not damaged. If any of these wells are damaged beyond reasonable efforts for repair, the Permittee may petition the Director for approval to abandon the affected well(s.) Appropriate permit modification applications shall be submitted.

* 1. Groundwater Protection Standard

The Permittee shall monitor the groundwater to determine whether the regulated units are in compliance with the Groundwater Protection Standard (GPS) under 40 CFR § 264.92. The GPS is established based upon up-gradient concentrations from the Facility's background groundwater monitoring; EPA Safe Drinking Water Act Maximum Contaminant Levels (MCLs), and Alternate Concentration Limits (ACLs) established by the Department. ACLs are health-based standards calculated by the Department. The hazardous constituents from the constituents listed in Appendix IX of 40 CFR Part 264 and concentrations limits listed in **Permit Attachment F, Table F-1** comprise the GPS.

* 1. Sampling and Analysis Procedures

The groundwater monitoring program must include sampling and analytical procedures in accordance with the CMI Work Plan as referenced in the permit conditions that are appropriate for groundwater sampling and that accurately measure hazardous constituents in groundwater samples (40 CFR § 264.97 (d) and (e).) The Permittee shall follow the techniques and procedures when obtaining and analyzing samples from the groundwater monitoring wells described in **Permit Attachment E**.

* 1. Elevation of the Groundwater Surface

The Permittee shall determine the groundwater surface elevation at each monitoring well each time groundwater is sampled in accordance with **Permit Attachment(s) C** and **E**.

* + 1. Elevation Reporting

The Permittee shall report the surveyed elevation of any additional or replacement monitoring well(s) when installed with the 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.

* 1. Statistical Procedures

When evaluating the monitoring results in accordance with **Permit Condition VI.I**, the Permittee may determine whether there is statistically significant evidence of an increased concentration for any hazardous constituent for parameters specified in the Groundwater Protection Standard in **Permit Attachment F, Table F-1,** using the statistical procedures approvedby the Department.

* + 1. Significant Differences

If the appropriate statistical test (specified in **Permit Attachment E, Appendix E-6,** and/or approved by Director) indicates that the difference between the established background (or up-gradient well concentration) and the down-gradient 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.

* + 1. Empirical Comparison

The Permittee may elect to perform a simple empirical comparison of point of compliance data to the GPS (**Permit Attachment F, Table F-1**) instead of the approved statistical procedures.

* 1. Monitoring Program and Data Evaluation

Groundwater samples shall be collected, preserved, and analyzed in accordance with **Permit Condition VI.I** and the **Permit Attachment E**.

* + 1. Concentrations

The Permittee shall determine the concentration of hazardous constituents and/or parameters, as specified in **Permit Attachment F, Table F-1**, and in accordance with **Permit Condition(s) VI.K.2 and VI.L.3**.

* + 1. Sample Analysis

The Permittee shall analyze samples from point of compliance well MW-5 for constituents contained in Appendix IX to 40 CFR Part 264 upon request by the Departmentand agreement by Permitteeto determine whether additional hazardous constituents are present in the uppermost aquifer.

* + - 1. For additional constituents that are not listed in **Permit Attachment F, Table F-1,** without established GPS, the screening concentration shall be based on the Facility’s background limits, EPA MCLs, or the Department’s ACLs.
      2. The Permittee shall notify the Director within seven (7) days of any new exceedances of the GPS. The notification shall include the concentration of constituent exceeding the GPS and shall identify the monitoring well(s) where the GPS was exceeded. Constituents exceeding the GPS shall be added to the groundwater monitoring list, **Permit Attachment F, Table F-1.**
      3. If the second analysis confirms the presence of constituents at levels exceeding an established GPS, the Permittee shall then report the constituents to the Director in writing within seven (7) days and it must be added to the groundwater monitoring list, **Permit Attachment F, Table F-1**.
    1. New Constituents Detected

For each additional newly detected Appendix IX constituent for which a Groundwater Protection Standard has not been established, the Director shall establish a Groundwater Protection Standard and amend **Permit Attachment F, Table F-1**.

* + - 1. Background value determined through data from at least four (4) independent samples collected with one year from the specified up-gradient monitoring well, as specified by **Permit Condition VI.C**.
      2. The background value determined through **Permit Condition VI.L.3.a** will be utilized as the Groundwater Protection Standard under 40 CFR § 264.92 if no applicable Maximum Concentration Level (MCL) is listed in the EPA Safe Drinking Water Act or the background concentration in the up-gradient well exceeds the listed MCL. The Director may establish an Alternate Concentration Limit (ACL) in accordance with 40 CFR § 264.94(b.)
    1. Statistical Significance

For each hazardous constituents identified in **Permit Attachment F, Table F-1**, the Permittee shall determine whether there is statistically significant evidence of increased contamination for any that parameter or hazardous constituent each time the concentration of hazardous constituents is monitored in groundwater at the point of compliance; pursuant to **Permit Condition VI.I**. 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 Condition VI.C** of the Permit, to the background concentration for that constituent, in accordance with the procedures specified in **Permit Attachment E, Appendix E-6**, if appropriate.

* + 1. 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; a summary of the internal laboratory quality assurance/quality control (QA/QC); matrix spike duplicates; percent recovery; duplicate analyses; dilution factors; laboratory specific limit of detection and limit of quantitation; and the results of any screening analyses.

* + 1. Constituent Removal

If a monitoring constituent on the annual monitoring list (**Permit Attachment F, Table F-1**), and in accordance with **Permit Conditions VI.L.4,** has not been detected above the GPS for three (3) consecutive years, the facility may notify the Department and request to remove the constituent from the annual monitoring list. The Department will consider approval of such a request, provided the detection limit for the reported data is below the applicable groundwater protection standard for the constituent. The Director’s approval would be subject to the standard in 40 CFR § 264.93 (b.) The preceding relief does not preclude the continued requirement of **Permit Condition VI.M** to sample for the identified Appendix IX constituents listed in **Permit Attachment F, Table F-1,** at least annually.

* 1. Comparison to Groundwater Protection Standards

At least annually, the Permittee shall compare the groundwater concentration of each constituent contained in **Permit Attachment F, Table F-1,** to the Groundwater Protection Standard (**Permit Attachment F, Table F-1**) for that constituent. The following procedures shall be used.

* + - 1. If a single independent sample was collected at the monitoring well, the Permittee shall conduct a simple empirical comparison of the GPS and the measured value.
      2. If multiple independent samples were collected from each monitoring well, a statistical comparison to the GPS which is approved by the Director shall be conducted.

GPS Exceedance

The Permittee must notify the Department in writing within seven (7) days of determining that the GPS has been exceeded for any constituent listed in **Permit Attachment F, Table F-1**, at any well in which the GPS has not been exceeded previously and the Department has not been previously notified, in accordance with **Permit Condition VI.M.**

* + 1. Request for Termination of Groundwater Monitoring Program

When all constituents on the Groundwater Monitoring List (**Permit Attachment F, Table F-1**) have not been detected above the GPS in any monitoring well three (3) consecutive years, the Permittee may request the Director’s approval to terminate the Corrective Action Groundwater Monitoring Program in accordance with **Permit Condition I.D.8**.

* + 1. Demonstration of GPS Source

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

* + - 1. The Permittee shall include in the notification to the Director (**Permit Condition VI.M.3.b**) that the demonstration will be attempted;
      2. 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 or an alternate schedule as approved by the Director;
      3. The Permittee must submit a report to the Director within ninety (90) days of the notification that demonstrates a source other than SWMU 12a 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 ninety (90) days of the notification in **Permit Condition VI.M.3.b**, an application for a Permit modification to make any appropriate changes in the Corrective Action Monitoring Program; and
      4. The Permittee must continue to monitor in accordance with the Corrective Action Monitoring Program established under 40 CFR § 264.100.
  1. Reporting and Recordkeeping
     1. Groundwater Elevation/Potentiometric
        1. Annually, the Permittee shall submit groundwater elevations and potentiometric contour maps depicting groundwater flow paths and supporting groundwater elevation data to determine if the requirements for locating the monitoring well network continue to be satisfied.
        2. If the evaluation determines that the existing monitoring well network no longer satisfies the requirements of 40 CFR § 264.97 (a), the Permittee shall immediately submit an application for a Permit modification to make any appropriate changes to bring the monitoring system into compliance.
  2. Annual Report

The Annual Groundwater Monitoring and Corrective Action Report, submitted by March 1st of each year, may include the report on the effectiveness of the Corrective Action Program remedial measures and shall meet all the requirements of an Annual Groundwater Report.

The following items shall be included, at a minimum:

* + - 1. Groundwater sampling results collected during the previous calendar year;
      2. Long-term time concentration plots of constituents;
      3. When appropriate, graphic representation of groundwater contamination plumes for constituents exceeding GPS;
      4. Laboratory certificates from the previous calendar year;
      5. Potentiometric surface maps and static groundwater level elevation data collected during each sampling event during the previous calendar year;
      6. Evaluation of groundwater flow directions and gradients;
      7. Calculated or measured rate of migration of hazardous constituents in the groundwater;
      8. Statistically calculated background values, as applicable;
      9. Statistical evaluations, as applicable, of the groundwater data collected during the previous calendar year, including all computations, calculated means, variances, t-statistic values, and t-test results or the calculations and results of statistical tests that the director has determined to be equivalent as appropriate;
      10. Copies of all notifications and reports submitted as required by this permit; and
      11. Recommendations for any changes to the existing groundwater monitoring program.

1. SITE-WIDE CORRECTIVE ACTION
   1. Corrective Action for Continuing Releases; Protection of Human Health and the Environment
      1. Required Corrective Action

Section 3004(u) of RCRA, 42 U.S.C. § 6924 (u), and regulations codified under 40 CFR § 264.101, provide that all permits issued after November 8, 1984, must require corrective action (CA) 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.

* + 1. CA Boundary

Under Section 3004 (v) of RCRA, 42 USC § 6924 (v), and 40 CFR § 264.101 (c), the Department may require that CA 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.

* + 1. Terms And Conditions

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.

* 1. Corrective Measures Implementation
     1. Background

Corrective actions are applicable to the Facility. Facility description, background, and environmental history are provided in **Permit Attachment B**.

* + 1. Final Remedy Selection

Based on the results of numerous investigations that occurred from 2003 to 2018, a Corrective Measures Study (CMS) is not necessary considering site conditions including institutional and engineering controls that are already in place and the forthcoming institutional controls that will be implemented by the Facility’s permit. In lieu of a CMS, EPA’s RCRA Facility Investigation Remedy Selection Track (RCRA FIRST) initiatives were utilized to streamline the remedy selection process. To learn more about the RCRA FIRST process, please visit EPA’s website:

<https://www.epa.gov/hw/toolbox-corrective-action-resource-conservation-and-recovery-act-facilities-investigation-remedy>.

* + 1. Remedy Selection Process

A Remedy Selection Process (RSP) meeting was conducted on October 31, 2018 to gain concurrence on corrective action objectives, facets of the proposed remedy, and establish timelines. As a result of the RSP meeting, the Facility used EPA’s balancing and threshold criteria to evaluate the proposed remedy to demonstrate its protectiveness, effectiveness, and feasibility. Based on this, the Facility’s Permit will be modified to incorporate all facets of the proposed remedy including ongoing Post-Closure Care requirements, groundwater monitoring, and institutional and engineering controls. The final remedy for the Facility was developed and described in the Statement of Basis, dated November 2018. The requirements of this Permit provide for the operation and maintenance of the remedy described in the Statement of Basis.

* + 1. Remedy Controls

The goal of the remedy for corrective action is to ensure protection of human health and the environment. The final remedy for the Site consists of active remediation utilizing Monitored Natural Attenuation (MNA) and implementing Institutional and Engineering Controls, as set forth in the Permit. Institutional Controls (ICs) are generally non-engineered mechanisms such as administrative and/or legal controls that minimize the potential for human exposure to contamination and/or protect the integrity of a remedy. Engineering Controls (ECs) are generally engineered mechanisms such as a landfill cap.

* + 1. Final Remedy Actions

The details of the final remedy are summarized below and are described in more detail in the Administrative Record and Statement of Basis. Modifications in the activities, studies, techniques, procedures, and designs or schedules utilized in carrying out the requirements of this Permit and necessary for the completion of the remedy may be made by written agreement from the Department. Under this final remedy, the Department is requiring the following actions:

* + - 1. Continue post-closure care and the groundwater monitoring program at SWMU 12a to monitor natural attenuation of hazardous constituents (**Permit Attachment(s) E** and **F, Table F-1)**;
      2. Since the metal sorting area serves as an engineering control currently mitigating exposure to contaminants in soil at SWMU 10, complete surface soil removal when the area is no longer used or install an alternative engineering control that achieves the same purpose in the event the sorting area is removed; and
      3. Impose and maintain compliance with land use restrictions including institutional (ICs) and engineering controls (ECs) consisting of property use restrictions for groundwater and soil in accordance with **Permit Condition VII.B.6**.
    1. Final Remedy Implementation

Within ninety (90) days of the effective date of the Permit renewal with incorporating the Final Remedy, the Permittee shall submit to the Department for approval a CMI Plan for operation and maintenance of the post-closure care requirements. The CMI Plan will include the MNA groundwater monitoring programs and monitoring well networks, remedial effectiveness monitoring, sampling and analysis, reporting, and implementation and maintenance of institutional and engineering controls. All components of the remedy shall be implemented in accordance with the Department approved CMI Plan.

* + - 1. Institutional and engineering controls include:
         1. The property shall not be used for residential purposes or for children’s (under the age of 16) daycare facilities, schools, or playground purposes and senior care facilities;
         2. Groundwater beneath the property shall not be used for any purposes except for environmental monitoring and testing, or for non-contact industrial use as approved by the Department. Any new groundwater wells installed at the facility must be approved by the Department;
         3. Maintain and prohibit disturbance of the engineered cover over SWMU 12a;
         4. Excavation and disturbance within areas known to have contaminants left in place on the property shall be conducted in accordance with the Facility’s excavation permitting process as detailed in the CMI Plan required by the Permit;
         5. Maintain the existing security fencing along the perimeter of the property;
         6. Future modifications at the property that could be reasonably understood to adversely affect or interfere with the integrity or protectiveness of the final remedy will be evaluated by the Facility in coordination with the Department to identify and address those potential impacts or interferences.
      2. The Permittee shall, at a minimum, provide coordinate surveys for applicable property use restrictions that meet the following requirements:
         1. Define the boundary of each use restriction as a polygon; and
         2. Establish the longitude and latitude of each polygon vertex as follows:

Decimal degrees format;

At least seven decimal places;

Negative sign for west longitude; and

WGS 1984 datum.

* 1. Evaluation of the Selected Remedy

The Permittee shall submit an annual progress report by March 1 of each year on the remedy status and performance and continue to submit annual reports until remedial cleanup requirements have been met. If the Department determines that the selected remedy will not comply with the media clean-up requirements, the Department may require the Permittee to perform additional studies and/or perform modifications to the existing Corrective action remedy. If necessary, the Department or the Permittee may seek modification of this Permit pursuant to 40 CFR § 270.41 or § 270.42 and § 124.5 to implement modifications to the existing Corrective Measures Remedy.

* 1. Emergency Response and Release Reporting
     1. Emergencies

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

* + - 1. Notify the Department as soon as practicable of the source, nature, extent, location, and the amount of such release, the endangerment posed by such release and the actions taken and/or to be taken, to the extent known, to address such release. Such notification shall also be confirmed in writing within three (3) days of discovery of such release; and
      2. Unless otherwise directed by the Department, immediately take such actions as are necessary and appropriate to address such release to protect human health and the environment.
    1. Releases

The Permittee shall notify the Department in writing of the nature, source, extent, and 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:

* + - 1. Is not being addressed by corrective measures at the time of such discovery;
      2. Is not being addressed pursuant to **Permit ConditionVII.D.1, Emergencies**; and
      3. Is not subject to the Contingency Plan and Emergency Procedures, as applicable, if set forth in the portion of the RCRA Permit issued by the Department.
    1. Requirements of SWMU and AOC

Based on the information submitted in **Permit Condition VII.D.2, Releases**, the Department may require the SWMU and/or AOC to be included in a RCRA Facility Investigation or may require Interim Measures.

* 1. Department’s Authority

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.

* 1. Guidance Documents

Any corrective action performed at the facility shall be in general accordance with relevant and applicable EPA RCRA corrective action guidance available at:

<https://www.epa.gov/hwcorrectiveactionsites/corrective-action-resources-specific-epas-region-3> .

* 1. Solid Waste Management Unit (SWMU) Assessment
     1. Newly Identified SWMU

The Permittee shall notify the Department and the EPA Region III, 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:

* + - 1. A description of the SWMUs type, function, dates of operation, location (including a map), design criteria, dimensions, materials of construction, capacity, ancillary systems (e.g., piping), release controls, alterations made to the unit, engineering drawings, and all closure and Post-Closure information available, particularly whether wastes were left in place;
      2. A description of the composition and quantities of solid wastes processed by the units with emphasis on hazardous wastes and hazardous constituents;
      3. 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 of the release, nature and 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; and
      4. A discussion of the need for and feasibility of implementing interim measures immediately.
    1. New SWMU Determination

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

* + 1. Actions for New SWMU

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

* + 1. Reports

Within the time specified in accordance with the schedule included in the CMI Plan, the Permittee shall submit groundwater monitoring and corrective measures implementation reports. The reports will provide all data necessary for the Department to determine whether a Corrective Measures Study or additional Interim Measures Work Plan is required.

* + 1. RCRA Facility Investigation and Corrective Measures

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

* 1. Financial Assurance
     1. Initial Cost Estimate

Assurances of financial responsibility for Corrective action including Post-Closure Care of SWMU 12a must be provided in accordance with conditions herein.

* + 1. Cost Estimates Updated

The cost estimate for completing Post-Closure Care and the approved remedy(s) shall be updated pursuant to the development of more detailed information (e.g., Corrective Measure Implementation Plan) and any modifications to the approved remedy(s.)

Within ninety (90) calendar days of receipt of the Department’s written approval of modifications to the final remedy, the Permittee shall submit an updated cost estimate to the Department.

* + 1. Financial Assurance Demonstration

Within thirty (30) calendar days of approval of any revised cost estimate, the Permittee shall demonstrate to the Department financial assurance for the updated cost estimates.

* 1. Community Relations

The Permittee shall implement actions as necessary to meet the information needs of the community during implementation of corrective measures at the site.

* + 1. Actions

Documents comprising the Administrative Record shall be made available in either electronic or hard copy format upon request.

* + - 1. Upon request from the Department, the Permittee shall distribute fact sheets and other information to persons on the Facility Mailing List maintained by the Department
      2. Upon request from the Department due to the identification of any new significant information, the Permittee shall conduct a public meeting as necessary to comply with regulatory requirements.
  1. Recordkeeping

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

* + 1. 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)) for: (1) the Permittee and any contractor of the Permittee for the purpose of taking corrective action required by this Permit, and (2) the Department and its authorized representatives for the purposes described in this paragraph.

* 1. Completion of Remedy

If any of the institutional or engineering controls are no longer necessary to protect human health and the environment, the Permittee shall submit a written notification and certification to the Department stating that the remedy has been completed and remedial goals have been attained in accordance with requirements of this Permit, within ten (10) days of receipt of notification by the Department that the remedy is complete. The certification must be signed by the Permittee and by an independent, Virginia registered professional engineer.

* + 1. No Permit Conditions Remain

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

* 1. Well Abandonment

Upon completion of the remedy or as needed in the interim, the Permittee shall request approval for abandonment of all monitoring wells, observation wells, and remediation wells from the Department prior to implementing well abandonment activities. All wells that are to be abandoned shall be plugged and abandoned in general accordance with 12 VAC 5-630-420 and 12 VAC 5-630-450. Chlorination of each well is not required. An effort to remove the well casing and associated materials shall be made at each well prior to abandonment. A report including methods and certification shall be submitted to the Department within thirty (30) days following the completion of abandonment. The Permittee may propose alternate methods for well abandonment and must obtain approval from the Department prior to implementation.

ATTACHMENT A

FACILITY MAPS AND FIGURES

ATTACHMENT B

FACILITY BACKGROUND, CORRECTIVE ACTION, AND ENVIRONMENTAL HISTORY

ATTACHMENT B

Facility Background, Corrective Action, and Environmental History

FACITLITY BACKGROUND

The Huntington Ingalls Incorporated Facility constructs and repairs military and commercial ships, located on the southwest edge of the city of Newport News, Virginia. The facility has been operating the shipbuilding production since 1888. The shipyard covers approximately two (2) square miles and is bounded on the north and west by the James River; on the east by Washington, Huntington, and West Avenues; and on the south by 31st Street. The Facility is built on dredged material with elevations ranging from 10 to 35 feet above mean sea level (amsl.) The higher elevation is on the eastern side where fill material meets the natural riverbank. There are approximately seven churches and schools are located within one mile of the Facility boundaries. Drinking water is supplied by a municipal water system. There are no drinking water wells within a 0.25-mile radius.

The shipbuilding production process generated hazardous waste that includes characteristic hazardous waste for corrosivity (D002), Cadmium (D006), Chromium (D007), and Lead (D008.) These waste were disposed of in the former surface impoundments (SWMU 12a, or the Regulated Unit) that are located in the north central portion of the Facility and are currently under Post-Closure Care. The impoundments were designed to neutralize basic and acidic wastes, precipitate metals hydroxides, and provide retention time for gravity separation of oily wastes. The disposal of hazardous wastes into these impoundments was discontinued in December 1982. The regulated units were used for the disposal of oily wastes until 1985. The oily wastes, which originated primarily from bilges, machine shops, lubricating systems, and hydraulic systems, were classified by the Permittee as non-hazardous.

The impoundments were closed in 1985 by excavating and removing residual waste material and soil in accordance with a Department-approved closure plan. At closure, “approximately all sludges” (Schnabel Engineering Associates, November 7, 1985) had been removed from the two impoundments. Visible traces of oily material were removed but no analytical results were generated to confirm the removal. The surface impoundments were backfilled and covered by the 117,658 square foot Blast and Coat Building (Building 4730.) The units were certified closed on November 8, 1985.

In July 1981, the Permittee implemented an interim status groundwater monitoring program, which was designed to evaluate groundwater quality in the uppermost aquifer beneath the two operating surface impoundments. Six monitoring wells were installed (GM-1 through 6.) The wells were abandoned in 1985 prior to construction of the Blast and Coat Building. Replicate samples were not collected and statistical evaluations were not performed on the data collected between 1981 and 1985.

In 1992, the Facility reinstated a groundwater monitoring program in response to the HSWA Amendments requiring facilities that closed land-based units without groundwater monitoring to demonstrate that they met the closure performance standards for groundwater. Constituents contained in Appendix 10.6 to 9VAC20 60-10 (repealed effective 1999 and replaced with Appendix IX to 40 CFR Part 264) were detected in groundwater down-gradient of the Regulated Unit at concentrations in excess of background levels; therefore, the demonstration failed. By letter dated October 27, 1993, the Department required the Facility to implement a Groundwater Quality Assessment Program.

The Department has determined that the two (2) (collectively referred to as SWMU 12a) surface impoundments had impacted the groundwater quality down-gradient of the units. In accordance with the approved Groundwater Quality Assessment Program, (GQAP, March 1994), three additional monitoring wells were installed on March 9, 1995 to define the extent of contamination. The data collected from the monitoring system, the sample borings, and the temporary sampling points (HydroPunch sites) adequately delineated the horizontal and vertical extent of contamination in the aquifer underlying the unit. At the conclusion of the GQAP, the extent of contamination was present in the Groundwater Quality Assessment Report (O’Brien & Gere, February 2, 1996.) The November 1996 and April 1997 groundwater data indicated that corrective action was required at the point of compliance (POC) to address groundwater contamination that exceeded the GPS related to the former surface impoundments. Groundwater monitoring for SWMU 12a will be conducted under Groundwater Corrective Action groundwater monitoring program as required by 40 CFR § 264.100 which is described in the Groundwater Corrective Action Module (**Permit Module VI.)**

On September 24, 1998, the Department issued a Hazardous Waste Management Permit for Post-Closure Care and Corrective Action for the two (2) former hazardous waste surface impoundments. Subsequent to the issuance to this Post-Closure Permit, DEQ received delegated authority from EPA for Site-Wide Corrective Action for the permitted facility on September 29, 2000. On July 13, 2001, DEQ issued the permit for Corrective Action.

On September 6, 2011, DEQ approved the Class 2 Permit Modification request to consolidate the Corrective Action Permit and the Post-Closure Care Permit into one Permit to have a common expiration date and titled, Hazardous Waste Management Permit for Post-Closure Care and Site-Wide Corrective Action.

Post-Closure Care including groundwater monitoring and related corrective action for two (2) closed surface impoundments (SWMU 12a), are in accordance with **Permit Module III, VI** and **Permit Attachment C** (Post-Closure Care Plan.) Site-Wide Corrective Action for investigation, monitoring, interim measures, and/or corrective actions related to other SWMUs as specified in this Permit in accordance with **Permit Module VII**.

SUMMARY OF ENVIRONMENTAL INVESTIGATIONS AND CLEANUP ACTIVITES

Based on a review of files maintained by the Department and EPA Region 3, a number of solid waste management units (SWMUs) were identified at the Facility. A site layout map is included as **Permit Attachment A, Figure A-2** showing the location of each SWMU. The following table lists each SWMU.

Table B-1: List of Identified SWMUs

| Identification | SWMU Description |
| --- | --- |
| SWMU #1 | Chemical Waste Treatment Plant, Building 4619 |
| SWMU #2 | Oily Waste Treatment Plant, Building 4680 |
| SWMU #3 | Consumat Incinerator, Stop 550 |
| SWMU #4 | Neutralization Tank, Building 1812 |
| SWMU #5 | Boiler House Neutralization Tank - AST 103, Building 78 |
| SWMU #6 | Transfer Stations (one former and one active) |
| SWMU #7a | Barge 25 Oil Barge, Various Along the James River |
| SWMU #7b | Nancy Bean Oil Barge, Various Along James River |
| SWMU #8 | Plastic Shredder, Stop 550 |
| SWMU #9 | Freon Recovery Still, Building 518 |
| SWMU #10 | Scrap Yard, Warwick Blvd. |
| SWMU #11 | Wood Pile, Various Locations in the North Yard |
| SWMU #12a | Surface Impoundment 1975 – 85, Building 4730 |
| SWMU #12b | Surface Impoundment 1966 – 75, Building 4730 |
| SWMU #13 | Open-top Wood Incinerator, Scrap Yard |
| SWMU #14 | Trash Incinerator, Outfitting Berth 1 |
| SWMU #15 | Trash Steam Incinerator, Building 218 |
| SWMU #16 | Solvent Still, Building 505 Storage |
| SWMU #17 | Waste Accumulation Tank - UST 508, Dry Dock 4 |
| SWMU #18 | Waste Accumulation Tank - UST 509, Dry Dock 3 |
| SWMU #19 | Tank 510 - Motor Shop, Building 8 |
| SWMU #20 | Waste Accumulation Tank - UST 511, Dry Dock 10 |
| SWMU #21 | Waste Accumulation Tank - UST 512, Dry Dock 3 |
| SWMU #22 | Waste Accumulation Tank - UST 513, Outfitting Berth 1 |
| SWMU #23 | Waste Accumulation Tank - UST 514, Outfitting Berth 2 |
| SWMU #23 | Waste Accumulation Tank - UST 514, Outfitting Berth 2 |
| SWMU #24 | Tank 515, Paint Spray Booth, Building 147 |
| SWMU #25 | Waste Accumulation Tank - UST 517, Building 102 |
| SWMU #26 | Waste Accumulation Tank - UST 705, Building 501 |
| SWMU #27 | Waste Accumulation Tank - UST 707, Building 59 |
| SWMU #28 | Waste Accumulation Tank - Water Curtain, Building 23 |
| SWMU #29 | Waste Accumulation Tank - Water Curtain, Building 275 |
| SWMU #30 | Waste Accumulation Tank - Water Curtain, Building 274 |
| SWMU #31 | Waste Accumulation Tank - Pb Laundry, Building 28 |
| SWMU #32 | Waste Accumulation Tank - AST (KOH), Building 518 |
| SWMU #33 | Waste Accumulation Tank - UST 713 – Photographic Laboratory, Building 6 |
| SWMU #34 | Waste Accumulation Tank - UST 603, Building 1744 |
| SWMU #35 | Waste Boiler Condensate Reaction Tank, Building 4602 |
| SWMU #36 | Electroplating Plant Trenches, Building 4620 |
| SWMU #37 | Waste Accumulation Tank - Water Curtain – Bonderizing, Building 4681 Shop |
| SWMU #38 | Pipe Shop Trenches, Building 29 |
| SWMU #39 | Pipe Shop Trenches, Building 161 |
| SWMU #40 | Chem. Lab. Waste Collection Area and AST, Building 11 |
| SWMU #41 | Machine Shop TCE Degreasing Tanks, Building 65 |
| SWMU #42 | Shielding/Panel Shop (Baghouses), Building 4582 |
| SWMU #43 | Shielding/Panel Shop (Baghouses), Building 550 |
| SWMU #44 | Waste Consolidation Yard, Stop 550 |
| SWMU #45 | Grinder, Stop 550 |
| SWMU #46 | Oxygen Plant, Cylinder Cleaning with TCE, Building 518 |
| SWMU #47 | Building 276, Bays 3 and 5, Building 276 |
| SWMU #48 | Proposed Substation 3 - BTEX PAH |
| SWMU #49 | Grit Separator Excavation, Building 4720 |
| SWMU #50 | North 20, Area North of Dry Dock 12 |
| ORF1 | Oil Reclamation Facility 1, S. Building 276 |
| ORF2 | Oil Reclamation Facility 2, S. Building 1761 |
| Waste Collection Boxes | Waste Collection Boxes – Oily Waste/Dinosaur/Waste Collection, Various Locations – Managed by Stop 550 |
| SMOF | Submarine Modular Outfitting Facility (SMOF), S. Dry dock 10 |

No Further Action Required SWMUs

EPA and DEQ determined that no further investigation or action was necessary at 39 of the 55 SWMUs in order to meet Corrective action program goals based on operating history, records, and inspections (SWMU 1-9, 11, 12b, 13,15, 17-18, 20-24, 26-39, 43, 45-46, 50, Waste Collection Boxes, and SMOF.) RCRA closure activities have been completed for SWMU 12a. The groundwater monitoring and corrective measures for SWMU 12a continues to be addressed as part of Post-Closure Care via the Hazardous Waste Management Permit. The remaining SWMUs identified by EPA and DEQ were evaluation during the RFI.

No Further Action Required with Intuitional Controls SWMUs

Based on results of the RFI investigations, limited interim measures and risk assessments, EPA and DEQ determined that no further action was necessary to meet program goals if institutional controls were implemented and maintained for SWMUs 14, 16, 19, 40-42, 44, 47-49, ORF1, ORF2, SWMU 25, and SWMU 38.

Further Action Required with Intuitional Controls SWMUs

EPA and DEQ determined that in addition to institutional controls, further actions including engineering controls, surface soil removal, and Monitored Natural Attenuation (MNA) groundwater monitoring were necessary at the following SWMUs 10, 25, and ORF2. SWMU 12a will be managed under Post-Closure Care as described in this Permit and **Permit Attachment C, Post-Closure Care for SWMU 12a**. Below is a summary of the Facility’s environmental history at regulated unit SWMU 12a, including SWMU 10.

RCRA CLOSURE ACTIVITIES

The Permittee implemented an interim status groundwater monitoring program in July 1981 which was designed to evaluate groundwater quality in the uppermost aquifer beneath the two operating surface impoundments. Six monitoring wells were installed (GM-1 through 6.) The wells were abandoned in 1985 prior to construction of the Blast and Coat Building. Replicate samples were not collected and statistical evaluations were not performed on the data collected between 1981 and 1985.

SWMU 12a

The former surface impoundments (SWMU 12a) are located in the north central portion of the Facility. They were designed to neutralize basic and acidic wastes, precipitate metal hydroxides, and provide retention time for gravity separation of oily wastes. Listed wastes handled by the impoundments included D002, D006, D007, and D008 hazardous wastes. Management of hazardous wastes in the impoundments was discontinued in 1982. However, the units were still used to manage oily wastes until 1985. Oily wastes originated from bilges, machine shops, hydraulic systems, etc.

In 1985, the Facility completed regulated unit closure of the surface impoundments in accordance with a DEQ approve closure plan, which included excavation of wastes, sludge, and impacted soil. Following excavation activities, the impoundments were backfilled with clean fill material. Subsequently, the 117,658 square foot Blast and Coat building (building 4730) was constructed over them. The impoundments were certified closed on November 8, 1985, but the Facility was unable to demonstrate “clean” closure for soil. Based on this, the Blast and Coat building serves as protective cover over the area and the Facility began implementing a 30 year Post-Closure Care program in accordance with a Hazardous Waste Management Permit for Post-Closure Care (Permit) issued by DEQ.

In 1981, the Facility implemented an interim status groundwater monitoring program, which consisted of six monitoring wells installed in the uppermost water table aquifer. The wells were abandoned in 1985 during the closure project prior to constructing the Blast and Coat building. Subsequently, in 1991 a groundwater detection monitoring program was implemented. Results indicated contaminants from the former units including volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and free product (lighter non-aqueous phase liquid or LNAPL) from oily wastes had impacted groundwater. Based on this, the Facility was required to complete a groundwater quality assessment in support of developing a compliance groundwater monitoring program specific to the former units. The assessment was completed from 1994-1997. Results indicated the presence of LNAPL and that contaminants in groundwater beneath and down gradient of the former units beyond the point of compliance exceeded Groundwater Protection Standards (GPS.)

In 1997, the Facility implemented a groundwater corrective action monitoring program and in 1998 corrective measures were developed and implemented. Corrective measures began with passive recovery of observed LNAPL and implementation of a pilot test study utilizing air sparging and vapor extraction. Results of the five year pilot test (2000-2005) indicated a lack of effectiveness only recovering approximately 40 lbs of VOCs. Subsequently, an alternative corrective measures evaluation was conducted. Based on the results, the Facility designed and implemented a sparging system utilizing ozone, hydrogen peroxide, and air including vapor recovery. The Facility began operation of the system in 2008. Results indicated that passive LNAPL recovery and the newly modified sparging system were effective at reducing LNAPL in the subsurface and dissolved phase VOCs and SVOCs in groundwater. Based on the initial results, the system was modified to use air sparge only and to discontinue use of ozone and hydrogen peroxide since these components were no longer beneficial to the process. Based on continued success, the system was discontinued completely in 2015 since measureable LNAPL was no longer observed and to allow contaminants to continue attenuating naturally.

Currently, results indicate that natural attenuation is still occurring. Most recent groundwater results from 2017 indicate that only naphthalene, trichloroethylene (TCE), and vinyl chloride exceed their respective GPS at three (3) monitoring well locations.

The Post-Closure Care shall be extend beyond November 8, 2015 in accordance with **Permit Condition(s) III.C.1 and III.H.1**. The Facility continues to implement MNA groundwater monitoring and continues to implement Post-Closure Care, which will continue until groundwater meets GPS at the point of compliance for three (3) consecutive years.

RCRA FACILITY INVESTIGATION ACTIVITIES

Pursuant to the RCRA Corrective action program, HHI performed multiple RCRA Corrective action activities at the Facility. Investigations occurred from 2003-2018 in accordance with an EPA approved RFI Work Plan (O’Brien & Gere, 2003) and additional work plans specific to each SWMU as needed.

SWMU 10

SWMU 10 is a 175ft by 20ft sorting area located within the Scrap Yard. It’s surrounded by concrete and metal barriers and segregated into subareas for sorting and staging various types of metal. Ground cover in the area is a mix of gravel and soil. On September 19, 2007, the Facility conducted a soil sampling event. Results indicated that PCBs, SVOCs, and metals were detected, some of which exceeded industrial Regional Screening Levels (RSLs) for direct contact. Based on this, 2 follow on sampling events occurred in March 2008 and July 2009. Results of the assessments indicated contaminants of concern (COCs) were limited to PCB-Aroclor 1260 in surface soil at 1 sampling location and lead in surface soil at 6 sampling locations. No COCs were detected above industrial RSLs or background concentrations in subsurface soil, indicating that unacceptable impacts to groundwater are not likely.

Based on the results of the soil assessment, the Facility proposes to excavate surface soil to mitigate unacceptable risks to human health and the environment under current and future property use as industrial. SWMU 10 is currently used as part of the Facility’s daily operation, which makes excavation of the surface soil not possible. Due to the nature of how the area is used for metal sorting and staging, no unacceptable risk to onsite workers has been identified. Therefore, the Facility proposes to complete the excavation of surface soil when the metal sorting area is no longer used or when it’s not used temporarily for a period of time long enough to support the removal.

Corrective Measures Study

Based on the results of numerous investigations that occurred from 2003 to 2018, a Corrective Measures Study (CMS) is not necessary considering site conditions including institutional and engineering controls that are already in place and the forthcoming institutional controls that will be implemented by the Facility’s permit.

REMEDY SELECTION PROCESS

In lieu of a CMS, EPA’s RCRA Facility Investigation Remedy Selection Track (RCRA FIRST) initiatives were utilized to streamline the remedy selection process. More about the RCRA FIRST process can be found on EPA’s website through the following link; <https://www.epa.gov/hw/toolbox-corrective-action-resource-conservation-and-recovery-act-facilities-investigation-remedy>.

A Remedy Selection Process (RSP) meeting was conducted in October 31, 2018 to gain concurrence on corrective action objectives, facets of the proposed remedy, and establish timelines. As a result of the RSP meeting, the Facility used EPA’s balancing and threshold criteria to evaluate the proposed remedy to demonstrate its protectiveness, effectiveness, and feasibility. Based on this, the Facility’s Permit will be modified to incorporate all facets of the proposed remedy including ongoing Post-Closure Care requirements, groundwater monitoring, and institutional and engineering controls.

CURRENT CONDITIONS

The Facility continues to implement Post-Closure Care activities at SWMU 12a. The metal sorting area located in SWMU 10, the scrap yard, is still used as part of the Facility’s daily operations. The Facility is secured with perimeter fencing with controlled access and has an onsite excavation permitting process to regulate and control construction projects to ensure proper health and safety for workers and to manage soil and groundwater appropriately. In addition, groundwater beneath the Facility is not used for any purpose. Contaminants in groundwater are generally decreasing and it’s anticipated that they will continue to decrease. Based on this, exposure to contaminants left in soil and groundwater is mitigated due to existing onsite policies and procedures, implementation of institutional controls and maintenance of engineering controls.

CORRECTIVE ACTION

Soils

DEQ has determined that industrial risk based levels are protective of human health and the environment for individual contaminants at this Facility provided that the Facility is not used for residential purposes. Corrective Action for the facility’s soils will involve the control exposure to the hazardous constituents remaining in soils by requiring compliance with and maintenance of land use restrictions at the Facility. The requirement for land use restrictions and site specific controls will be imposed by the Facility’s Hazardous Waste Management Permit for Post-Closure Care and Site-Wide Corrective Action.

Groundwater

DEQ has determined that drinking water standards, namely MCLs or tap water RSLs for constituents that do not have an MCL, are protective of human health and the environment for individual contaminants at this Facility. In addition, DEQ has determined that groundwater protection standards listed in the Facility’s Permit for Post-Closure Care specific to SWMU 12a, some of which are based on site specific background, are also protective of human health and the environment. DEQ’s Corrective Action Objectives for Facility groundwater are the following:

1. To control exposure to the hazardous constituents in the groundwater by requiring the compliance with and maintenance of a groundwater use restriction at the Facility as long as drinking water standards and/or groundwater protection standards are exceeded. This restriction will be imposed by the Facility’s Permit; and
2. To monitor groundwater at the designated monitoring well(s) to demonstrate attenuation of concentrations of the hazardous constituents in groundwater until Remedial Targets are met (see **Permit Attachment F**.)

ATTACHMENT C

POST-CLOSURE CARE PLAN: CLOSED SURFACE IMPOUNDMENTS – SWMU 12a

**ATTACHMENT C**

Post-Closure Care Plan: Closed Surface Impoundments – SWMU 12a

Introduction

Post-Closure Care

The Post-Closure period shall continue for 30 years from the date of closure certification (November 8, 1985.) The Post-Closure period shall extend beyond November 8, 2015 in accordance with **Permit Condition III.C.1** and **III.H.1**, and the facility is required to operate under a Post-Closure Care Permit. Post-Closure Care shall consist of monitoring and reporting in accordance with the requirements of 40 CFR § 264 Subpart F and this Permit as applicable.

Property Use

Use of the property subject to this Post-Closure Care Plan shall never, during the Post­Closure Care Period, be allowed to disturb the integrity of the final cover or any other component of the containment system or the function of the facility's monitoring system unless the Owner/Operator demonstrates to the Director that the disturbance:

1. Is necessary to the proposed use of the property and will not increase the potential hazard to human health or the environment; or
2. Is necessary to reduce the threat to human health or the environment. Such use will require the written permission of the Director prior to implementation.

List of Known Waste Constituents– SWMU 12a

The following list is comprised of, but not limited to, all known hazardous waste constituents (as defined by Appendix 3.5 and 3.6 of the Hazardous Waste Regulations which have since been repealed and replaced with constituents listed in Appendix VIII to 40 CFR Part 261) which have been or are suspected to have been managed in the two closed surface impoundments. All detected constituents which are also listed in Appendix IX to 40 CFR Part 264 are included.

Table C-1: List of Hazardous Constituents

| List of Detected Constituents from 40 CFR 264 Appendix IX for 12a | |
| --- | --- |
| Acenaphthene | 2,4-Dimethylphenol |
| Anthracene | Ethylbenzene |
| Antimony | Fluoranthene |
| Arsenic | Fluorene |
| Barium | Lead |
| Benzene | Mercury |
| Beryllium | 2-Methylnaphthalene |
| Bis (2-ethylhexyl) Phthalate | 2-Methylphenol |
| Cadmium | 4-Methylphenol |
| Chloroethane | Naphthalene |
| Dibenzofuran | Nickel |
| Di-n-butyl phthalate | Nitrobenzene |
| 1,1-Dichloroethane | Phenanthrene |
| 1,2-Dichlorobenzene | Phenol |
| 1,2-Dichloroethylene | Pyrene |
| 1,4-Dichlorobenzene | Silver |

Inspection and Maintenance Plan

It is anticipated that the plant will remain in operation during the Post-Closure and Site-Wide Corrective Action Periods. Contract personnel will be used for maintenance and inspections in the event that the plant ceases to operate in the future.

Security

Adequate security shall be maintained by the use of facility fencing and to prohibit unauthorized access security staff are present at all times.

1. All visitors must sign in prior to entering active portions of the facility.
2. Consequently, unauthorized persons will not be allowed in the vicinity of the permitted hazardous waste management unit.

Maintenance Requirements

****Benchmarks****

Benchmarks were installed to act as points of reference for locating the boundaries of the unit and to detect any changes such as subsidence that may impact the facility. Benchmarks were installed by a certified land surveyor. Their location and elevation are tied into the property boundary and are recorded in the deed to the property. The location and elevation of the benchmarks shall be determined if damage or deterioration to the wells, benchmarks, or cover were noted during inspection.

****Groundwater Monitoring Wells****

Monitoring well locking caps shall be locked at all times except when the monitoring wells are being sampled or maintained. Monitoring wells shall be replaced or repaired as necessary (for diagram see **Permit Attachment E, Appendix E-5**.)

Inspection Requirements and Schedule

Pursuant to 9 VAC 20-60-264.15, the Permittee shall follow a written inspection schedule observing malfunction, deterioration, operational errors, and discharges from the former surface impoundments; implement remedial action when necessary; and maintain a signed and dated inspection log at the facility and available to the Department upon request.

Semi-Annual Inspections

Benchmarks

The Permittee shall inspect the benchmarks semi-annually for defective or disturbance and maintained as necessary to sustain their intended use.

Groundwater Monitoring Wells

The Permittee shall at least inspect semi-annually for damage to groundwater monitoring wells and piezometers to sustain their original intended purpose. Protective concrete aprons shall be inspected for subsidence and breakage.

Sampling Events

The Permittee shall inspect during sampling for unsatisfactory performance or operational deficiencies of the wells and piezometers (obstructions, bends, excess sediment accumulation, grout erosion, inadequate yield, etc.)

Annual Inspections

Final Cover

The Permittee shall inspect the final cover (concrete floor of the Blast and Coat Building) for any evidence of damage or deterioration.

Inspection Records

The inspection log must provide inspection observations, deficiencies noted, and corrective action taken. Examples of inspection logs containing the minimum necessary information are provided in **Permit Attachment C, Appendices C-1 and C-2**.

Facility Contact:

The facility copy of the Post-Closure Plan is maintained in the facility files at the Huntington Ingalls Shipbuilding site in Newport News, Virginia. Mr. Hiltke is responsible for storage and updating of the Post-Closure Plan during the Post-Closure period.

Contact Information

Mr. Mark F. Hiltke

Environmental Engineer 4

Huntington Ingalls Inc. Shipbuilding

4101 Washington Avenue

Newport News, Virginia 23607

APPENDIX C - 1

Example Inspection Log

Monitoring Wells:

\*Note: A Separate inspection sheet is required for each monitoring well.

1. Inspected by (full name):
2. Date/Time of Inspection:
3. Inspection Observations:

C.1. Locking protective casing:

C.2. Concrete well Pad:

C.3. Lock:

C.4. Erosion:

C.5. Exterior well identification number:

1. Inspection Comments:
2. Repair/remediation Comments:
3. Repair/remediation Date:

APPENDIX C - 2

Example Inspection Log of Benchmark and Final Cover

Benchmark Verification and Final Cover Inspection:

1. Inspected by (full name):
2. Date/Time:
3. Benchmark Inspection Observations:
4. Determine location of all benchmarks and note changes:
5. Attach results of benchmark survey.
6. Repair/remediation Comments:
7. Repair/remediation Date:
8. Final Cover (Blast and Coat Building Floor) Inspection Observations:

ATTACHMENT D

PERSONNEL TRAINING

ATTACHMENT D

Personnel Training

Training

Training Requirements

Appropriate training shall be completed by all persons at Huntington Ingalls Shipbuilding Inc. as well as all contractors or consultants who are or who may be involved in the task associated with hazardous waste Post-closure care and/or Site-Wide Corrective Action activities. The Permittee shall insure that those individuals responsible for Post-Closure groundwater sampling, groundwater monitoring, inspections, and maintenance and repair and RCRA investigation activities are appropriately trained.

Training for New Employees

New employees who have as part of their job responsibility tasks which are associated or may be associated with the Post-closure care and Corrective Action activities shall not work unsupervised until the training requirements in accordance with this Permit are completed. Such new employees shall complete required training within six months of their employment date.

Training Documentation

All training of each employee, contractor, or consultant shall be documented at the time of each completed session and such documentation shall be maintained in the facility files in the operating log for at least three (3) years from the date on which the training was completed. Documentation shall include the name of each trainee and trainer, date of instruction, and a summary or outline of the training session.

Training Frequency

All training pursuant to this Permit shall be reviewed at least annually and updated as necessary. All personnel who are subject to the training requirements of this Permit shall be required to review their training at least annually.

Training for Assigned Duties

In general, all personnel who are actively associated or may be associated with the proper inspection and maintenance of the monitoring wells and the proper operation of the monitoring wells are required to read the Permittee’s Post-Closure Plan and/or Sampling and Analysis Plan (**Permit Attachments C** and **E**, respectively) as appropriate.

Training for Duties

The personnel shall be trained to properly perform their assigned duties including, but not limited to, conducting inspections as required pursuant to **Permit Attachment C**, obtaining samples from groundwater monitoring wells and maintaining documentation in accordance with the requirement of this Permit.

Instruction

The personnel noted above shall be required under this Permit to fully understand the techniques of proper maintenance and operation and maintain appropriate documentation required under this Permit.

Role of Supervisory Personnel and Training

Supervisory staff shall be trained to review and to provide appropriate guidance. The Permittee shall provide sufficient opportunity for personnel to acquire a full understanding of maintenance and operation techniques by providing sufficient instruction and/or sponsoring sufficient instruction by professionals who are qualified to provide such instruction.

Training for Personnel Exposed to Hazards

All personnel who are or may be exposed to the hazards associated with the Post-closure care and/or Site-Wide Corrective Action activities shall receive the appropriate training and shall utilize the appropriate personnel training as specified by the Occupational Safety and Health Act (OSHA) requirements in 29 CFR 1910.120.

Training for Personnel Involved in Post-Closure Care

Personnel involved in the actual Post-closure care activity, specifically the groundwater monitoring wells, within the scope of this Permit will be trained in the proper management procedures for spent monitoring well sample effluent (i.e. purge water, decontamination fluids) and the Sampling and Analysis Plan and Groundwater Monitoring Program required by the Permit and **Permit Attachment E**. These procedures will ensure continued safe operation and maintenance and compliance with applicable environmental regulations.

Responsibility for Training

The Permittee will be responsible for the overall training program, scheduling, and documentation of such training and shall serve as the Post-closure care Training Director. The Permittee shall ensure that all sub-contractors are trained in accordance with OSHA (29 CFR § 1910.120.)

Required Training for All Personnel

All personnel required under this Permit to receive training shall at minimum be instructed in the following areas:

1. Area specific management practices regarding Post-closure care activities;
2. Security and safety;
3. General and area specific inspections and recordkeeping;
4. Regulatory updates which affect operations and activities; and
5. Job function and procedural descriptions of each employee’s respective role in Post-closure care.

Job Description Summary

Facility Contact

The facility contact oversees the monitoring wells, security, safety, and inspection and maintenance programs. Additionally, has record keeping responsibilities, retains Hazardous Waste Management Facility Permit and inspection checklists and/or logs and assures that all inspection and maintenance schedules are in accordance with **Permit Attachment C**.

ATTACHMENT E

GROUNDWATER MONITORING PROGRAM, SAMPLING AND ANALYSIS PLAN

ATTACHMENT E

Groundwater Monitoring Program, Sampling and Analysis Plan

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1. SAMPLING
   1. 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, 40 CFR § 264.97(d) and 264.97(e) outline minimum procedures and techniques for groundwater monitoring programs implemented pursuant to 40 CFR §264 Subpart F. These regulations require that groundwater monitoring programs include measurement, sampling, and analytical methods that accurately assess groundwater quality, and that provide early detection of hazardous constituents released to groundwater.

The groundwater beneath the closed surface impoundments (SWMU12a) will be monitored with two (2) up gradient background monitoring well(s) (MW-1 and MW-2), three (3) down-gradient point of compliance (POC) monitoring wells (MW‑3/RW-1, MW-4, and MW-5) and two (2) corrective action monitoring wells (MW-7 and MW-8.) The wells are located as specified on the map presented in **Permit Attachment A**.

* 1. Sampling Frequency

The point of compliance (POC) wells, corrective action wells and up-gradient wells will be sampled in accordance with the Sampling and Analysis Plan the following schedule:

* + - 1. The up-gradient well MW-1, corrective action wells (MW-7 and MW-8) and down-gradient POC wells [(RW-1, MW-4, MW-5, and MW-3 (when not being used as an LNAPL recovery well)] will be sampled at least annually for the constituents listed in the Correction Action Monitoring List (**Permit Attachment F**);
      2. The down-gradient POC well MW-5 will be sampled for constituents of 40 CFR Part 264 Appendix IX, upon request by the Department and agreement by Permittee to determine whether additional hazardous constituents are present in the uppermost aquifer; and
      3. In addition**,** the wells MW-2 and MW-6 will only be used to evaluate the groundwater potentiometric surface during each sampling event.
  1. Field Methods

The static water level elevation in each well and the depth of each well will be measured prior to each sampling event. If applicable, the presence and levels of combustible gases will be measured with a Lower Explosivity Limit (LEL) meter, and appropriate action taken.

* + 1. Measurement of Static Water Level Elevations

Up-gradient wells and wells where constituents of concern have not been historically detected will be measured first, followed by wells where constituents have been noted. Water levels will be measured a precision of ±0.01 foot. Well measurements will be made from the surveyed datum on the top of the inner well casing. In general, the wetted-tape method is the only method for water level measurement that is consistently accurate to 0.01 foot. An electronic water level probe may also be used.

All measurements and methods of measurement for each well will be recorded in the Groundwater Logbook, an example Groundwater Logbook is provided in **Permit Attachment E, Appendix E-1**. Measurements that do not correlate with the previous trends will be verified in the field with different measurement technology, if necessary.

* + 1. 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. Well depth will be measured using a weighted tape measure or marked cable constructed of materials that are chemically inert and not prone to sorption or desorption. The weight will be heavy enough to keep the tape measure straight and blunt enough so that it will not penetrate soft materials on the bottom of the well.

* + 1. Immiscible Layers

Each well shall be tested for the presence of immiscible fluids prior to well evacuation and sample collection.

Procedures for Testing for Immiscible Fluid Layers:

* + - 1. Air in the wellhead will be screened for organic vapors using a photo ionization detector or other appropriate device;
      2. An electronic interface probe or other appropriate device capable of detecting light and dense immiscible fluids will lowered into the well to determine the existence of any immiscible layers; and
      3. If immiscible layers are detected, immiscible phases will be collected prior to any purging activities.
    1. Well Purging

The volume of stagnant water in well each will be determined prior to well evacuation based on the static water level, well depth, well diameter, filter pack length, and borehole diameter.

* + - 1. The volume of stagnant water to be purged shall be calculated according to the formulae presented in **Permit Attachment E, Appendix E-2** or the volume purged shall be sufficient when pH, temperature, and conductivity have stabilized. Purge volume calculations will be recorded in the Groundwater Logbook shown in **Permit Attachment E, Appendix E-1**. Three times the volume of the stagnant water will be purged from the well prior to sampling
      2. The rate at which groundwater is removed from the well during purging ideally will be less than approximately 0.2 to 0.3 L/min, or 0.05 to 0.08 gpm. Wells will be purged at rates below those used to develop the well to prevent further development of the well, to prevent damage to the well, and to avoid disturbing accumulated corrosion or reaction products in the well.
      3. Wells also will be purged at or below their recovery rate so that migration of water in the formation above the well screen does not occur. A low purge rate will reduce the possibility of stripping VOCs from the water, and will reduce the likelihood of mobilizing colloids in the subsurface that are immobile under natural flow conditions. The Permittee will ensure that purging does not cause the formation of water to cascade down the sides of the well screen and that water will be purged from the well at a rate that does not cause recharge water to be excessively agitated.
      4. To eliminate the need to dispose of large volumes of purge water, and to reduce the amount of time required for purging, wells may be purged with the pump intake just above or just within the screened interval. Pumping rates below the recharge capability of the aquifer must be maintained if purging is performed with the pump placed at the top of the well screen, below the stagnant water column above the top of the well screen. A packer will be placed above the screened interval to ensure that "stagnant" casing water is not drawn into the pump. The packer will be kept inflated in the well until after groundwater samples are collected.
      5. All purging fluids will be containerized and disposed of in an on-site wastewater treatment system if available or a permitted treatment facility with approval.
    1. LNAPL Detected

In cases where an LNAPL has been detected in the monitoring well, a stilling tube will be inserted into the well prior to well purging in accordance with the following:

* + - 1. The stilling tube will be composed of a material that meets the performance guidelines for sampling devices;
      2. The stilling tube will be inserted into the well to a depth that allows groundwater from the screened interval to be purged and sampled, but that is below the upper portion of the screened interval where the LNAPL is entering the well screen;
      3. The stilling tube will be inserted into the well in a manner that prevents the LNAPL from entering the stilling tube. One method of doing this is to cover the end of the stilling tube with a membrane or material that will be ruptured by the weight of the pump, for example a piece of aluminum foil or a more chemically inert material based on the site-specific situation;
      4. The stilling tube will slowly be lowered into the well to the appropriate depth and then attached firmly to the top of the well casing. When the pump is inserted, the weight of the pump breaks the covering at the end of the tube, and the well can be purged and sampled from below the LNAPL layer; and
      5. The membrane or material that is used to cover the end of the stilling tube will be fastened firmly so that it remains attached to the stilling tube when ruptured. Pieces of the membrane or material must not fall off of the stilling tube into the well.
    1. Stabilization Parameters

Stabilization parameters pH, temperature, conductivity, and turbidity will be measured at the start, end and several times during purging as a check on the stability of the water samples over time. For most wells, purging will continue until measurements of pH, temperature, conductivity, and turbidity, and optionally redox potential and dissolved oxygen, in in-line or downhole analyses of groundwater have stabilized within approximately 10% over at least two measurements – for example, over two successive measurements made three minutes apart. If a well is purged to dryness or is purged such that full recovery exceeds two hours, the well will be sampled as soon as a sufficient volume of groundwater has entered the well to enable the collection of the necessary groundwater samples.

* 1. Groundwater Sampling Equipment

The Department prefers that all sampling equipment be dedicated to a particular well.

* + 1. Selection of Sampling Equipment
       1. 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.
       2. 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.
       3. Sampling equipment should be designed such that Viton®, Tygon®, silicone, or neoprene components do not come into contact with the groundwater sample. These materials have been demonstrated to cause sorptive losses of contaminants. The use of PVC sampling equipment when sampling for organic contaminants is discouraged.
       4. 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.
  1. Decontamination

Equipment that is used for measuring water level or well depth, for purging or for sampling groundwater will be disassembled and cleaned before each use at each well if it is not dedicated to a particular well or it is dedicated but stored outside of the well.

* + 1. Cleaning Procedure for Organic Constituents
       1. Wash the equipment with a non-phosphate detergent.
       2. Rinse the equipment with tap water.
       3. Rinse the equipment with pesticide-grade hexane or methanol (methyl alcohol.)
       4. Rinse the equipment with reagent grade acetone.
       5. Rinse the equipment with organic-free reagent water (de-ionized, distilled.)
       6. If acetone, hexane, or methanol are analytes of interest, a different solvent (which is not a target analyte) will be chosen (e.g., isopropanol.)
    2. Cleaning Procedures for Inorganic Constituents
       1. Wash the equipment with a non-phosphate detergent.
       2. Rinse the equipment with tap water.
       3. Rinse the equipment with dilute (0.1N) hydrochloric or nitric acid.
       4. Rinse the equipment with reagent water (de-ionized, distilled.)
       5. Dilute hydrochloric acid is preferred over nitric acid when cleaning stainless steel because nitric acid may oxidize the steel.
    3. Equipment Storage

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.

* + 1. Decontamination Pad

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 55 gal drums approved by the U.S. Department of Transportation. All decontamination fluids will be managed and disposed in accordance with the Department Investigation-Derived Waste Policy. Disposable items will be disposed of a solid waste in an approved, permitted landfill.

* 1. 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, based on results from the most recent sampling event, 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 are listed below.

* + - 1. Volatile organics (VOAs or VOCs) and total organic halogens (TOX)
      2. Dissolved gases and total organic carbon (TOC)
      3. Semi-volatile organics (SMVs or SVOCs)
      4. Pesticides/herbicides
      5. PCBs and dioxins
      6. Metals and cyanide
      7. Total phenols
      8. Major water quality cations and anions (sulfate, chloride, etc.)
      9. Nitrate
      10. Radionuclides
    1. Sample Preparation and Handling

A sample collecting bottle kit should be prepared from the sample parameter list in accordance with approved sample analysis methods (see **Permit Attachment E, Appendix E-4**.) The sample kit should be stored in clean coolers for transport to the site. To preserve sample integrity, all samples should be collected in pre-cleaned containers, preserved when required, and stored at the appropriate temperature. Samples shall be transferred directly from the sampling device to the sample containers.

* + 1. Use and Operation of Groundwater Sampling Equipment

The recommendations that apply to the use and operation of groundwater sampling equipment are listed below.

* + - 1. Check valves should be designed and inspected to ensure that fouling problems do not reduce delivery capabilities or result in aeration of samples.
      2. Sampling equipment should never be dropped into the well, as this will cause degassing of the water upon impact.
      3. Contents of the sampling device should be transferred to sample containers in a controlled manner that will minimize sample agitation and aeration.
      4. Decontaminated sampling equipment should not be allowed to come into contact with the ground or other contaminated surfaces prior to insertion into the well.
      5. Groundwater 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 two (2) hours has had the opportunity to exchange gases with the atmosphere and to interact with the well casing material.
      6. The rate at which a well is sampled should not exceed the rate at which the well was purged. Ideally, the rate of sample collection should be approximately the same as the actual groundwater flow rate. Because this is typically not possible. Low sampling rates, approximately 0.1 L/min, or about 0.03 gpm, are suggested.
      7. 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.
      8. 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.
      9. 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.
      10. Groundwater samples collected for analysis for organic constituents or parameters should not be filtered in the field.
      11. Sample collection must be accomplished prior to a flow-through cell, and subsequent to stabilization of indicator field parameters.
  1. 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 groundwater 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):

* + - 1. One field duplicate;
      2. One equipment rinsate (required only when non-disposable equipment is being used);
      3. One matrix spike (when appropriate for the method;
      4. One duplicate sample (either a matrix duplicate or a matrix spike duplicate); and
      5. A trip blank should be prepared and analyzed when samples are being analyzed for volatile organic analytes. A trip blank should be submitted with samples each day that samples are collected.
    1. QC Samples

All field QC samples should be prepared exactly as regular investigation samples with regard to sample volume, containers, and preservation. The concentrations of any contaminants found in blank samples should not be used to correct the groundwater data. The contaminant concentrations in blanks should be documented, and if the concentrations are more than an order of magnitude greater than the field sample results, the Permittee should resample the groundwater.

* + 1. Laboratory QA/QC Program

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

* + 1. Instruments

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 will be pH 4 or pH 5, and pH 9 or pH 10, respectively. Calibration records will be maintained in the field log book and will include a discussion of initial calibration, multi-level calibration for determination of usable range, periodic calibration checks, conditions that warrant re-calibration of instruments, and acceptable control limits.

* 1. 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 seal provide prevention of easy detection of sample tampering. The custody 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 over-pack 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 over-pack 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 copy. An example of a chain-of-custody form that includes the necessary information is included in **Permit Attachment E, Appendix E-3**;
      5. Samples will be packaged and labeled for shipment in compliance with current U.S. Department of Transportation regulations. All samples will be shipped priority/overnight via commercial carrier or hand delivered to the lab;
      6. Samples will arrive at the laboratory via the overnight delivery service or hand delivery. Upon delivery to the laboratory, shipping container will be checked for intact custody seals and the samples will be unpacked and the information on the accompanying chain of custody records will be examined. If the samples shipped match those described on the chain-of-custody form, the laboratory sample coordinator will sign the form and assume responsibility for the samples. If problems are found with the sample shipment, the laboratory sample custodian will sign the form and record the problems in the “Remarks” section;
      7. Any missing samples, missing sample tags, broken sample bottles, or unpreserved samples will be noted on the chain-of-custody record. If there are problems with individual samples, the sample custodian will inform the laboratory coordinator of such problems. The laboratory custodian will then contact the Permittee to determine a viable solution to the problem; and
      8. All information relevant to the sample will be secured at the end of each business day. All samples will be stored in a designated sample storage refrigerator, access to which will be limited to laboratory employees.
    1. Field Logbook

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

1. LABORATORY ANALYSIS
   1. 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 at the facility and are listed in **Permit** **Attachment F**, as well as the analytical methods that must be used to in the analysis of groundwater samples.

* 1. Laboratory QA/QC

Laboratory quality assurance/quality control (QA/QC) procedures will be consistent with the procedures recommended by the applicable SW-846 method. The laboratory shall assure the accuracy and precision of all analytical determinations.

* + 1. 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.

* + 1. 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.

1. DATA EVALUATION
   1. 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:

* + - 1. Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses, April 1993; and
      2. Region III Modifications to National Functional Guidelines for Organic Data Review Multi-Media, Multi-Concentration, September 1994.
  1. Statistical Evaluation

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

* 1. Data Quality Objective

High-quality data collection implies data of sufficient completeness, representativeness and comparability for field activities (sampling, measurements, and screening) and laboratory analyses to meet the program objectives.

* + - 1. It is the Permittee’s responsibility to report sufficient valid analytical results for each sampling event
      2. Reported data will, at a minimum, be of such quality to immediately detect a release from the regulated unit.
      3. Laboratory methods will be selected to yield reporting limits (limit of quantitation, or LOQ) values that are equal to or below the background values, or Maximum Contaminant Levels (MCLs) for the human health-based standards for the target analytes.
      4. The human health-based standards are established as Maximum Contaminant Levels (MCLs) under the Safe Drinking Water Act, or as Regional Screening Levels (RSLs), or Alternate Concentration Limits (ACLs) whenever MCLs and RSLs are not available.
      5. ACLs were originally calculated by the Risk Exposure and Analysis Modeling System (REAMS) using a residential groundwater ingestion-modeling scenario.
      6. The GPS for each constituent will be updated with current data and are listed in **Permit Attachment F**.

1. RECORDKEEPING AND REPORTING of groundwater data
   1. Introduction

Copies of all groundwater analytical results, groundwater annual reports, groundwater level elevations, Groundwater Sampling and Analysis Plan, Post-Closure Care Permit, etc. shall be maintained at the site 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 **Permit Attachment E**, **Sections IV.B** and I**V.C**.

* 1. Groundwater Monitoring Results

The Permittee shall report concentrations or values of the parameters and constituents listed in **Permit Attachment F** for each required groundwater monitoring well and will be included in the Annual Report.

* 1. Annual Report

The Permittee shall submit an Annual Groundwater Monitoring Report to the Virginia Department of Environmental Quality by March 1 of the following year for the year beginning January 1 and ending December 31 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 F** to the Groundwater Protection Standard listed in **Permit Attachment F;**
      5. The calculated or measured rate of migration of hazardous waste or hazardous waste constituents in the groundwater; and
      6. Results of the evaluations of groundwater surface evaluations to determine whether the requirements for locating the monitoring wells continue to meet the criteria set forth in 40 CFR § 264.97.

APPENDIX E-1

Groundwater Log Example

Sampling event

Location

Well no.

Date:

Weather Temperature:

Measurement team:

Time well casing unlocked:

Depth to water from top of outer casing: ft.

Depth of well from top outer casing: ft.

Static water level: ft.

Measurement technique: [ ] Water level indicator [ ] Other/explain:

Formulas for determining purge volume TWD =

Water level above sand pack: [ ]

3 x [(*π* rb2 hs - *π* rc2hs) x 0.3 + (*π* rc2hw)]

Water Level below sand pack: [ ]

3 x [*π* rb2 hw - *π* rc2 hw) x 0.3 + (*π* rc2hw)]

Where:

rb = radius of boring =

rc = radius of casing =

hs = height of sand =

hw = height of water =

Immiscible layers: [ ] yes [ ] no

Detection method: [ ] visual [ ] other

Collection method: [ ] beaker [ ] other

Sample identification

Purge team

Purge procedure/equipment:[ ] Teflon bailer [ ] Well pump:

Purge time

Purge volume

Purge appearance

Comments:

Sampling event:

Location:

Well: Date:

Sampling procedure/equipment:[ ] Teflon bailer

[ ] Well pump

Sampling time:

pH Meter calibrated with buffers:[ ] 4[ ] 7[ ] 10

pH Meter calibrated by:

Conductivity meter calibrated with standard solution of

Conductivity meter calibrated by:

pH (S.U.)

Temp (°C)

Cond (µS)

| Sample Collection Time: Container\*/Preservative | |
| --- | --- |
| (1) VOC(G/none)  (2) TOX(A/HNO3)  (3) TOC(A/H2SO4)  (4) COD(A/H2SO4)  (5) O&G/TPH(A/HCL)  (6) PHEN(A/H2SO4)  (7) N( / )  (8) PHOS(A/H2SO2) | (9) SO( / )  (10) TMET(P/HNO3)  (11) DMET(P/NONE)  (12) pH, COND(P/NONE)  (13) Chloride(P/NONE)  (14) SMLL TST(P/NONE)  (15) CN (P/NONE)  (16) (P/NONE) |

Final pH (S.U.)

Final temperature (°C)

Final conductivity (µS)

Locked well at

Comments

Notes:

1. G = glass, A=amber glass bottle, P=plastic (polyethylene)
2. Shipping containers (cooling chest with ice or ice pack) should be certified as to the 4°C temperature at time of sample placement into these containers. Preservation of samples requires that the temperature of collected samples be adjusted to the 4°C immediately after collection. Shipping coolers must be at 4°C and maintained at 4°C upon placement of sample and during shipment. Chain-of-custody forms will have Shipping/Receiving (max/min) temperature boxes for recording data and verification.
3. IDW: Collect all used decontamination solutions and rinses; store in a labeled 55 gallon drum for no more than 90 days in accordance with the Department’s IDW Policy.
4. Siltation: If the level of siltation is higher than l foot above the base of the screen, the well will need to be redeveloped. Note whether the level of siltation is greater than l foot in the comments section.
5. Dedicated Teflon Tubing: replace if older than one year; note in comments the date the tubing was installed.

APPENDIX E- 2

Calculations of Purge Volume

Determine purge volume as follows:

Water level above sand pack:

3 x [(*π* rb 2 hs - *π* rc2 hs) x 0.3 + (*π* rc 2hw)]

Water level below sand pack:

3 x [(*π* rb 2hw - *π* rc2 hw) x 0.3 + (*π* rc 2hw)]

Where:

rb = radius of boring

rc = radius of casing

hs = height of sand

hw = height of water

This calculation must be based upon 30% filter pack volume. Once the volume to be purged is known, purging can begin. The purge water will be collected, containerized disposed of in accordance with local, state, and federal regulations and laws.

Appendix E-3:

Example Chain of Custody Form

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Company Name:  Address:  Phone Number: | | | | | | | | Company Contact: | | | | | | | | | | | | | | | |
| Required Analyses | | | | | | | | | | | | | | | |
| Project # | | | Project Name: | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Remarks |
| Samplers: | | | | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Sample Number | Date | Time | | Type G/C | Preservative Used | Bottle Type | # |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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|  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Relinquished By: {Sign/Print) Date/Time | | | | | | | | | | | | | | | | | | Mode Of Transport: | | | | | |
| Relinquished/Received By: (Sign/Print) Date/Time | | | | | | | | | | | | | | | | | | Comments: | | | | | |
| Received By: (Sign/Print) Date/Time | | | | | | | | | | | | | | | | | |  | | | | | |

Appendix E-4:

Sample Containers and Preservatives

Table E-1: Analytes Sample Containers and Preservatives

| Analyte | SW-846 Analysis Numbers | Container | Preservative | Holding Time(days) |
| --- | --- | --- | --- | --- |
| Metals except mercury | 6010B, 6020A | HDPE | HNO3 to pH<2 | 6 months |
| Mercury | 7470A | HDPE | HNO3 to pH<2 | 28 |
| Appendix IX VOCs | 8260B | 40 ml VOA | 4°C | 14 |
| Appendix IX Semi-volatiles | 8270C | Amber glass | 4°C | 7/40 |
| Appendix IX Organochlorines | 8081A | Amber glass | 4°C | 7/40 |
| Appendix IX Herbicides | 8151A | Amber glass | 4°C | 7/40 |
| Appendix IX Organophosphates | 8141 | Amber glass | 4°C | 7/40 |
| Hexachlorophene | 8151A | Amber glass | 4°C | 7/40 |
| pH | 9040 | HDPE | None | Analyze immediately |
| Specific Conductance | 9050 | HDPE or glass | 4°C | Analyze immediately |

Notes:

1. References: Test Methods for Evaluating Solid Waste - Physical/Chemical Methods, SW-846 (3rd edition, 1996 as updated.) Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020. Standard Methods for the Examination of Water and Wastewater, 16th edition (1985.)
2. Container Types: HDPE = Plastic (polyethylene), T = Fluorocarbon resins (PTFE, Teflon, FEP, PFA, etc.)

Appendix E-5:

Monitoring Well Construction Diagram

(Source: EPA Technical Enforcement Guidance Document, 1986)

Montioring Well Construction Diagram
Source: EPA Technical Enforcement Guidance Document, 1986

Appendix E-6:

Statistical Procedures

1. Highlights

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

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

An outlier refers to a data point which is an inconsistently large or small value. An outlier can be observed due to sampling, laboratory, transportation, or transcription errors. To remove the possibility of including data with this type of error, the historical data should be screened for each well and constituent for the existence of outliers (USEPA 1992 Section 6.2) using the method described by Dixon (1953) or another method approved by the Department. Background observations, which are considered to be outliers, should not be included in the statistical analysis. If an extreme value occurs in a point-of-compliance well or during a compliance sampling event, the facility should collect a re­sample during the compliance period of the initial sample. Any elimination of an outlier must be approved by the Department.

* + 1. Testing Normality of Data Distribution

The Permittee shall verify that the distribution of monitoring data for the Hazardous Constituents is consistent with the assumptions of the selected statistical test method. A multiple group version of the Shapiro-Wilk test shall be applied to determine if the distribution of the data is normal or lognormal. To test for log normality, the natural logarithms of original data are taken and if the distribution of the transformed concentrations is normal then the data are considered to be log-normally distributed. The Permittee may use any other appropriate method for testing the distributional assumptions (see Gibbons 1994a for a review, also see USEPA 1992.) However, the Permittee shall demonstrate that the alternative method can detect deviations from normality with similar power as the Shapiro-Wilk and Shapiro-Francia methods. No testing of normality is required when the percentage of non-detects or non-quantified values are greater than 50%. Once the distribution of the data is determined, the Permittee should apply statistical tests as follows:

* + - 1. When the detection frequency is less than 50% and/or transformation fails to bring about normality, a non-parametric method should be used;
      2. When the detection frequency is between 50% and 75%, a parametric test can be performed with an adjustment for non-detects. Aitcheson's or Cohen's adjustments are recommended. Determination of the appropriate adjustment to be applied should be based on the properties of the data set (USEPA, 1992, Section 2.2); and
      3. When the detection frequency is 75% or greater, an appropriate parametric test may be applied without adjusting for non-detects. Non-detects should be analyzed using one half the laboratory limit of detection or quantitation.
    1. Missing Data

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

* + 1. Data below Detection Limits

For data where the non-detects or non-quantified values are less than 25 percent, the Permittee shall replace the non-detects or non-quantified values with one half the laboratory limit of detection or quantitation. However, when the percentage of non­detects or non-quantified values is greater than 25 percent and less than 50 percent the mean and standard deviation should be adjusted using Atchison's method (USEPA 1992 Section 2.2.2 and Aitchison, 1955.) An acceptable alternative to Aitchison's method is Cohen's maximum likelihood estimator (Cohen, 1961.) Extensive tables and computational details are also provided in Gibbons, 1994a. The approach for selection between the two methods is described in USEPA (1992) Section 2.2.1.

* 1. Selection of Statistical Method

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

* + 1. Interval Method

If the Permittee uses an interva1method and the percentage of detects is greater than 50%, the Permittee shall test the data from the background wells for normality. If the background well data are normally or log-normally distributed the Permittee shall use a parametric interval method. **Permit Attachment E, Appendix E-6, Table E-2**, provides the suggested minimum number of samples for calculation of parametric interval methods that are acceptable to the Department. In the event the background data are not normally or log-normally distributed the Permittee shall use a non-parametric interval method. Suggested test methods and recommended minimum sample size requirements are provided in **Permit Attachment E, Appendix E-6, Table E-2**. However, a statistical analysis can be conducted with a smaller data set than the suggested size at any time. Please note that these methods can lead to higher false positive or false negative rates with smaller samples sizes. For each sampling event, the Permittee shall calculate the appropriate interval for the background data set based on the method selected, and compare each data point from the point of compliance well to the upper limit. If the point of compliance well data exceeds the upper limit, the Permittee shall report that there has been a statistical increase of contaminants in the groundwater.

* + 1. Other Methods

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

* 1. Verification Sampling (Optional)

Verification resampling can be an integral part of the statistical methodo1ogy (USEPA, 1992 section 5); however, it should be considered as a part of the statistical test and based on the site-specific condition. Since the probability of an initial exceedance is very high for the site as a whole (considering only test wise false positive rates), the verification sample.is considered as a part of the evaluation to conclude a statistically significant exceedance. A pre-planned verification sample can be incorporated into the calculation of the statistical limits to calculate an upper limit using a smaller false positive rate.

Without verification resampling, an attempt to minimize the false positive rates will lead to very large prediction limits. This will increase the false negative rates and decrease the power of the test to detect a release from the facility. All verification samples must be collected at the earliest time possible (prior to next scheduled sampling event) or as approved by the Department or as specified in this Permit. Note that the Department must be informed of any planned verification resampling in advance.

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

* 1. Comparing Point of Compliance Well Data to a Standard during Compliance or Corrective Action Monitoring

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

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

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

Comparisons of point of compliance well data to a groundwater protection standard based on a MCL or ACL should be performed by a parametric or non-parametric· confidence interval. If data are normally or log-normally distributed a 95% lower confidence limit on the last four samples (collected during the last 12 months) can be calculated for comparison to the MCL or ACL. If data are not normally or log-normally distributed the minimum concentration from the last four samples (collected during the last 12 months) should be compared to the groundwater protection standard (based on a MCL or ACL.)

Alternative statistical methods for comparing lower limits of compliance well data to a groundwater protection standard based on a MCL or ACL should be approved by the Department prior to implementation. If the lower confidence limit or minimum concentration exceeds the groundwater protection standard based on a MCL or ACL then the Permittee has shown a statistical exceedance above the ground water protection standard.

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

1. References

Aitchison, J. *On The Distribution Of A Positive Random Variable Having Discrete Probability Mass At The Origin*, Journal of American Statistical Association, 50(272), 901-908 (1955.)

Cohen, A.C. *Tables For Maximum Likelihood Estimates: Singly Truncated And Singly Censored Samples*, Technometrics, 3, 535-541 (1961.)

Gibbons, R.D. *Statistical Methods for Groundwater Monitoring*, John Wiley and Sons, Inc., 1994.

Gibbons, R.D. *Some Conceptual And Statistical Issues In Analysis Of Groundwater Monitoring Data*, Environmetrics, 7, 185-199 (1996.)

USEPA, *Statistical Analysis Of Groundwater Monitoring Data At RCRA Facilities*. Addendum to Interim Final Guidance. Office of Solid Waste, July 1992.

USEPA, *Statistical Analysis Of Groundwater Monitoring Data At RCRA Facilities* - Interim Final guidance (April 1989.)

Table E-2: Suggested Minimum Samples

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

Notes:

1. The above tests can be used with fewer samples; however it will increase the false positive rate.
2. # Includes one verification re-sample, use 19 samples for a 95% Prediction Interval with no verification re-samples.
3. + For Intra-well testing only
4. NA = Not Applicable

Appendix E-7:

Monitoring Well Abandonment Procedures

Note: Approval from the Director must be granted before any monitoring well may be abandoned.

Well Abandoned

Monitoring wells and/or piezometers will be abandoned by pressure grouting methods. Surface installations (protective covers or manholes) will be removed and an attempt to pull the casing string with the rig will be made.

Once this has either been accomplished or has failed, grouting operations will commence as described below.

1. Monitoring well abandonment will be accomplished by lowering a tremie pipe to the bottom of the borehole.
2. Portland cement/bentonite grout will then be pumped down the tremie pipe until an even flow of consistent grout returns at the surface.
3. The tremie pipe will be removed from the borehole on completion of grouting operations and a minimum four inch thick and six foot diameter concrete cap will be constructed over the grouted borehole.

Casings Removal

Removed casings will be steam cleaned, cut up into manageable sections, and disposed of as refuse.

Tremie Rods

All tremie rods and other downhole equipment will be steam cleaned prior to introduction into the hole or well.

Decontamination Fluid

All decontamination fluid will be containerized and handled pursuant to decontamination fluid handling procedures contained in **Permit Attachment E, Section I.E**.

ATTACHMENT F

GROUNDWATER MONITORING CONSTITUENTS AND CORRECTIVE ACTION REMEDIAL TARGETS

**ATTACHMENT F**

Groundwater Monitoring Constituents and Corrective Action Remedial Targets

Table F-1: Groundwater Monitoring List for SWMU 12a

| Constituent | SW-846 Analytical Method | Origin | GPS (ug/L) |
| --- | --- | --- | --- |
| Vinyl-Chloride | 8260B | MCL | 2.0 |
| Naphthalene | 8270C | Background | 8.8 |

Notes:

All methods are as described in EPA's SW-846, Test Methods for Evaluating Solid Waste, Third Edition.

Groundwater protection standard concentration limits based on:

1. ug/L = micrograms per Liter
2. Maximum Contaminant Levels (MCLs) derived from EPA’s Drinking Water Regulations and Health Advisories
3. Background values are derived from the Sampling and Analysis Plan
4. Regional Screening Levels (RSLs) derived from EPA Region III Tapwater, TR 1E-06, May 2018
5. Alternate Concentration Limits (ACLs) derived from Virginia Department of Environmental Quality ACL table updated November 2017, effective January 2, 2018, are applied if MCL or the EPA Region III Tap Water RSL are not available

Table F-2: Site-Wide Corrective Action Groundwater Monitoring List

| Constituent | SW-846 Analytical Method | Origin | GPS (ug/L) |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Notes:

All methods are as described in EPA's SW-846, Test Methods for Evaluating Solid Waste, Third Edition.

Groundwater protection standard concentration limits based on:

1. ug/L = micrograms per Liter
2. Maximum Contaminant Levels (MCLs) derived from EPA’s Drinking Water Regulations and Health Advisories
3. Background values are derived from the Sampling and Analysis Plan
4. Regional Screening Levels (RSLs) derived from EPA Region III Tapwater, TR 1E-06, May 2018
5. Alternate Concentration Limits (ACLs) derived from Virginia Department of Environmental Quality ACL table updated November 2017, effective January 2, 2018, are applied if MCL or the EPA Region III Tap Water RSL are not available