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APPENDIX A: Site Map

APPENDIX B: Final Decision and Response to Comments (FDRTC) issued on
November 2, 2016.

APPENDIX C: Environmental Covenant Template pursuant to the Virginia Uniform
Environmental Covenants Act, § 10.1-1238 et seq. of the Code of Virginia
("UECA")

ADMINISTRATIVE ORDER ON CONSENT

The parties to this Administrative Order on Consent (AOC), the United States Environmental Protection Agency (EPA) and Hercules LLC (Respondent) having agreed to entry of this AOC, it is therefore ordered and agreed that:

I. JURISDICTION

A. This AOC is issued pursuant to the authority vested in the Administrator of EPA (Administrator) by Section 7003 of the Resource Conservation and Recovery Act of 1976, as amended by the Hazardous and Solid Waste Amendments of 1984 (collectively referred to hereinafter as "RCRA"), 42 U.S.C. § 6973. The authority vested in the Administrator has been delegated to the EPA Regional Administrators by EPA Delegation No. 8-22-C dated March 20, 1985, and further delegated to the Director of the Waste and Chemicals Management Division, now known as the Land and Chemicals Division, on November 4, 2004.

B. On December 18, 1984, EPA granted the Commonwealth of Virginia (the Commonwealth) authorization to operate a state hazardous waste program in lieu of the federal program, pursuant to Section 3006(b) of RCRA, 42 U.S.C. §6926(b). EPA has also subsequently authorized additional revisions to the Commonwealth's authorized program. The Commonwealth, however, does not have authority to enforce Section 7003 of RCRA. The Commonwealth has been given notice of this AOC pursuant to Section 7003(a) of RCRA, 42 U.S.C. § 6973(a).

C. This AOC is issued to Hercules LLC for the facility located at 27123 Shady Brook Trail, Courtland, Virginia (Facility) as more fully described in Section IV., below.

D. Respondent consents to issuance of this AOC, agrees to comply with its terms and will not contest EPA's authority to issue this AOC and to enforce its terms. Further, Respondent will not contest EPA's jurisdiction to compel compliance with this AOC in any subsequent enforcement proceeding, either administrative or judicial; require Respondent's compliance with the terms of this AOC, or impose sanctions for violations of this AOC.

II. PARTIES BOUND

A. This AOC shall apply to and be binding upon EPA, and upon Respondent and Respondent's agents, successors and assigns. Any change in the ownership or corporate status of Respondent including, but not limited to, any transfer of assets or real or personal property, shall not alter Respondent's responsibilities under this AOC.

B. Respondent shall provide a copy of this AOC to the current owner of the Facility, Solenis LLC. Respondent shall be responsible for and liable for completing all of the activities required pursuant to this AOC, regardless of whether there has been a transfer of ownership or

control of the Facility or whether said activities are to be performed by employees, agents, contractors, subcontractors, laboratories, or consultants of Respondent. Respondent shall provide a copy of this AOC within seven (7) days of the Effective Date of this AOC, or the date that such services are retained, to all contractors, subcontractors, laboratories, and consultants that are retained to conduct or monitor any portion of the Work performed pursuant to this AOC. Respondent shall condition all contracts or agreements with contractors, subcontractors, laboratories and/or consultants in connection with this AOC, on compliance with the terms of this AOC. Respondent shall ensure that its contractors, subcontractors, laboratories, and consultants comply with this AOC.

C. In the event that Respondent becomes aware of any change in ownership or operation of the Facility and/or in the event of any change in majority ownership or control of Respondent, Respondent shall notify EPA in writing of the nature of any such change no later than fifteen (15) calendar days after the effective date of such change. In addition, Respondent shall provide a copy of this Order to any successor to Respondent and/or to the Facility at least fifteen (15) calendar days prior to the effective date of such change.

III. DEFINITIONS

Unless otherwise expressly provided herein, terms used in this AOC that are defined in the RCRA statute shall have the meaning assigned to them in that statute. Whenever the terms listed below are used in this AOC the following definitions apply:

“AOC” shall mean this Administrative Order on Consent, any amendments thereto, and any documents incorporated by reference into this AOC.

“CERCLA” shall mean the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601-9675.

“Day or day” shall mean a calendar day. In computing any period of time under this Order, where the last day would fall on a Saturday, Sunday, or federal or State holiday, the period shall run until the close of business of the next working day.

“EPA” shall mean the United States Environmental Protection Agency and its successor departments, agencies, or instrumentalities.

“Facility” shall mean all contiguous property under the control of the owner and/or operator.

“Hazardous Constituents” shall mean those constituents listed in Appendix VIII to 40 C.F.R. Part 261 or any constituent identified in Appendix IX to 40 C.F.R. Part 264.

“Hazardous Waste(s)” shall mean any hazardous waste as defined in Sections 1004(5) and 3001 of RCRA. This term includes Hazardous Constituents as defined above.

“Institutional Controls” or “ICs” shall mean Proprietary Controls and state or local laws, regulations, ordinances, zoning restrictions, or other governmental controls or notices of contamination, notices of administrative action, or other notices that: limit land, water, or other resource use to minimize the potential for human exposure to contaminants at or in connection with the Facility; limit land, water, or other resource use to implement, ensure non-interference with, or ensure the protectiveness of the Work; or provide information intended to modify or guide human behavior at or in connection with the Facility.

“Paragraph” shall mean a portion of this Order identified by an Arabic numeral or an upper or lower case letter.

“Parties” shall mean EPA and Respondent.

“RCRA” shall mean the Solid Waste Disposal Act, 42 U.S.C. §§ 6901-6992, as amended by the Hazardous and Solid Waste Amendments of 1984 (also known as the Resource Conservation and Recovery Act).

“Respondent” shall mean Hercules LLC.

“Section” shall mean a portion of this Order identified by a Roman numeral.

“Solid Waste Management Unit(s)” or “SWMU(s)” shall mean any discernable unit(s) at which solid wastes have been placed at any time irrespective of whether the unit was intended for the management of solid waste or Hazardous Waste. Such units include any area at a Facility where solid wastes have been routinely or systematically released.

“Commonwealth” shall mean the Commonwealth of Virginia.

“Transfer” shall mean to sell, assign, convey, lease, mortgage, or grant a security interest in, or where used as a noun, a sale, assignment, conveyance, or other disposition of any interest by operation of law or otherwise.

“United States” shall mean the United States of America and each department, agency, and instrumentality of the United States, including EPA.

“Work” shall mean all the activities and requirements specified in this AOC including, but not limited to Section VIII (Work To Be Performed) of this AOC.

IV. FINDINGS OF FACT

A. EPA has made the following findings of fact.

1. Hercules LLC is a person within the meaning of Section 1004(15) of RCRA, 42 U.S.C. § 6903(15).
2. Hercules' corporate predecessor, Hercules Incorporated, was the former owner and a generator of hazardous waste at the Facility.
3. The Facility consists of 120 acres, which includes 30 acres of developed land called the Main Plant Area where manufacturing takes place, and 90 acres of undeveloped land divided into 2 areas, called the East and West Areas respectively (see Attachment A). The East and West Areas were formerly used for disposing of wastes in landfills and waste pits and for wastewater and wastewater sludge disposal. In addition, there are two land disposal areas at the Facility: SWMU 45 East Area (a RCRA regulated landfill closed under Virginia Department of Environmental Quality oversight) and SWMU 44 West Area (a small disposal area), at the Facility.
4. The Main Plant Area currently consists of three manufacturing units: Pamolyn, Aquapel and Vul-Cup. The Pamolyn Unit produces fatty acids which are sold to other manufacturers to make coatings, cosmetics, metalworking and building/construction materials among other products. The Aquapel Unit produces a sizing agent used to make paper suitable for writing and printing, and the Vul-Cup Unit produces an organic peroxide vulcanizing agent used in elastomers and plastics. Two manufacturing units, the Rosin Size and Tall Oil Refining Units were discontinued in 1993 and 2008, respectively. The former Tall Oil Refining Unit distilled a material extracted from tree pulp (tall oil) into rosin and fatty acids. The former Rosin Size Unit further processed tall oil rosin.
5. In January 1992, VDEQ approved and Hercules subsequently implemented a Corrective Action Plan for Vul-Cup product recovery. In 1993, Hercules installed a pump and treatment groundwater system in the Vul-Cup Unit. In 1995, VDEQ approved a revised Corrective Action Plan that replaced the ground water pump and treatment system with biosparging treatment technology for groundwater in the Vul-Cup Unit.
6. As a result of manufacturing operations at the Facility, 1, 2 - dichloropropane (PDC), 1,1-dichloroethane, benzene, methyl tert-butyl ether (MBTE), tert-butyl alcohol, cumene, biphenyl, biphenyl ether, iron, vanadium and organic peroxides have come to be located in the groundwater at the Facility.

7. In October 1999, EPA entered into a RCRA Facility Lead Agreement (FLA) with Hercules to perform Corrective Action at the Facility. Under the FLA, Hercules performed the following Corrective Action activities: (1) Site-wide groundwater, soil and sediment sampling; (2) Residential well sampling; (3) Site-wide outfall sampling; (4) West Area Remedial Alternatives evaluation and interim measures; (5) Vul-Cup Contaminant Source Investigations; (6) groundwater remediation system evaluation/optimization; and (7) Route 671 Road Widening Interim Measures. Prior to the FLA, Hercules conducted interim measures in the East Area by removing waste from unlined pits and soils remediation in the Heat Generation Area and waste (incinerator brick) removal from the Vul-Cup Area.

8. In October 2010, EPA and Hercules entered into an Administrative Order on Consent (2010 Order) under Section 3013 of RCRA which required Hercules to complete a RCRA Facility Investigation (RFI) for the West Assembly Area, the Discharge Conduit, the Heat Generation Area and the Vul-Cup Ground Water Area. The 2010 Order also required Hercules to complete a Corrective Measures Study (CMS) during which remedial alternatives would be evaluated for the entire Facility. EPA approved a revised RFI Report on June 6, 2013 and thereafter approved a CMS Report on August 25, 2016.

9. EPA issued a FDRTC in which it selected a Final Remedy for the Facility on November 2, 2016. The FDRTC is incorporated by reference herein and is attached hereto and made a part hereof as Attachment B to this AOC.

10. Ashland Inc., as owner of Hercules Incorporated, sold the Facility to CD&R Seahawk Bidco, LLC (Seahawk), in connection with the sale of its entire water technologies business via a Stock and Asset Purchase Agreement dated February 18, 2014 (Solenis Agreement). Seahawk changed its name to Solenis LLC. Solenis LLC is the current owner and operator of the Facility.

V. CONCLUSIONS OF LAW AND DETERMINATIONS

A. Based on the Findings of Fact set forth above, EPA has determined that:

1. Respondent is a "person" within the meaning of Section 1004(15) of RCRA, 42 U.S.C. § 6903(15).

2. Respondent is the former owner and operator of a facility located at 27123 Shady Brook Trail in Courtland, Virginia.

3. 1, 2 -dichloropropane (PDC), 1,1-dichloroethane, benzene, methyl tert-butyl ether (MTBE), tert-butyl alcohol, cumene, biphenyl, biphenyl ether, iron, vanadium and organic peroxides are "solid wastes" as defined in Section 1004(27) of RCRA, U.S.C. §

6903(27), and/or hazardous wastes as defined in Section 1004(5) of RCRA, 42 U.S.C. § 6903(5), within the meaning of Section 7003 of RCRA, 42 U.S.C. § 6973.

4. The jurisdictional elements of Section 7003(a) of RCRA, 42 U.S.C. § 6973, have been met at the Facility.

5. The actions required by this AOC are necessary to protect public health or the environment.

VI. WORK TO BE PERFORMED

EPA acknowledges that Respondent has completed certain tasks required by this AOC. Respondent also has made available information and data required by this AOC. This previous Work may be used to meet the requirements of this AOC upon submission to and formal approval by EPA unless the Work is listed as approved in Schedule VI hereto, in which case it is already deemed submitted and approved.

Pursuant to Section 7003 of RCRA, 42 U.S.C. § 6973, Respondent agrees to and is hereby ordered to perform the following Work and reporting with respect to the Facility in the manner and by the dates specified herein (Work). All Work undertaken pursuant to this AOC shall be developed and performed, as appropriate and approved by EPA, in accordance with the Scope of Work for Corrective Measures Implementation (CMI); the Scope of Work for Interim Measures; the Scope of Work for a Health and Safety Plan, and RCRA, its implementing regulations and relevant EPA guidance documents. EPA's Scopes of Work and relevant guidance are available at: <https://www.epa.gov/hwcorrectiveactionsites/corrective-action-resources-specific-epas-region-3>.

Days as used herein shall mean calendar days unless otherwise specified.

A. INTERIM MEASURES (IM)

1. Commencing on the Effective Date of this AOC and continuing thereafter, in the event Respondent identifies an immediate threat to public health and/or the environment at the Facility, or discover new releases of hazardous waste and/or hazardous constituents or solid wastes at or from the Facility not previously identified, Respondent shall notify the EPA Project Coordinator orally within forty eight (48) hours of discovery and notify EPA in writing within three (3) calendar days of such discovery summarizing the immediacy and magnitude of the potential threat(s) to public health or the environment. Upon written request of EPA, Respondent shall submit to EPA for approval an IM Workplan in accordance with the IM Scope of Work. Upon receipt of EPA approval of an IM Workplan, Respondent shall implement the EPA-approved Workplan in accordance with the terms and conditions set forth therein. If EPA

determines that immediate action is required, the EPA Project Coordinator may orally authorize Respondent to act prior to EPA's receipt of the IM Workplan.

2. Commencing on the Effective Date of this AOC and continuing thereafter, if EPA identifies an immediate or potential threat to public health and/or the environment at the Facility, or discovers new releases of hazardous wastes, hazardous constituents, and/or solid wastes in the environment at the Facility not previously identified, EPA will notify Respondent in writing. Within ten (10) days of receiving EPA's written notification, Respondent shall submit to EPA for approval an IM Workplan in accordance with the IM Scope of Work that identifies interim measures which will mitigate the threat. Upon receipt of EPA approval of an IM Workplan, Respondent shall implement the EPA-approved Workplan in accordance with the terms and conditions set forth therein. If EPA determines that immediate action is required, the EPA Project Coordinator may orally require Respondent to act prior to Respondent's receipt of EPA's written notification.

3. All IM Workplans shall ensure that the interim measures are designed to mitigate immediate or potential threat(s) to public health and/or the environment and should be consistent with the objectives of, and contribute to the performance of the corrective measures selected by EPA in the FDRTC or any amendment thereto.

4. Each IM Workplan shall include the following sections as appropriate and approved by EPA: Interim Measures Objectives, Public Involvement Plan, Data Collection, Quality Assurance, Data Management, Design Plans and Specifications, Operation and Maintenance, Project Schedule, Interim Measures Construction Quality Assurance, and Reporting Requirements.

5. Concurrent with the submission of an IM Workplan, Respondent shall submit to EPA a IM Health and Safety Plan.

B. CORRECTIVE MEASURES IMPLEMENTATION

I. Corrective Measures Implementation Plan

- a. Within one hundred and twenty (120) days of the effective date of this AOC, Respondent shall submit to EPA for approval a Corrective Measures Implementation Plan (CMIP) for implementation of the corrective measures selected in the FDRTC. The CMIP shall be developed in accordance with the Scope of Work for CMIP. At a minimum the CMIP shall include:
 - i. A Groundwater Monitoring Plan;
 - ii. An Operating & Maintenance Plan for the active groundwater treatment in the Vul-Cup Area using bio-spargers and
 - iii. an Institutional Controls Implementation and Assurance Plan (IC Plan).

- a. The IC Plan shall establish a schedule by which Respondent shall secure from the owner(s) of Facility property the execution and recordation of an environmental covenant pursuant to the Virginia Uniform Environmental Covenants Act, § 10.1-1238 et seq. of the Code of Virginia (UECA) which includes the use restrictions selected by EPA in the FDRTC and which is in substantially the form attached as Appendix C (Covenant).
- b. Upon receipt of EPA-approval of the CMIP Workplan, Respondent shall use best efforts to implement the EPA-approved CMIP Workplan in accordance with the requirements and schedules contained therein.
- c. At a minimum the Covenant shall include the following restrictions and requirements:
 - i. Prohibit the use of the Facility property for any purposes other than industrial unless it is demonstrated to EPA that such use will not pose a threat to human health or the environment and EPA provides prior written approval for such use;
 - ii. Prohibit the use of the shallow groundwater at the Facility for any purpose other than operation, maintenance, and monitoring activities required by EPA, unless it is demonstrated to EPA that such use will not pose a threat to human health or the environment or adversely affect or interfere with the selected remedy, and EPA provides prior written approval for such use;
 - iii. Prohibit the installation of new wells on Facility property unless it is demonstrated to EPA that such wells are necessary to implement the selected remedy and EPA provides prior written approval to install such wells;
 - iv. Require that groundwater monitoring is performed in accordance with the EPA-approved Groundwater Monitoring Plan; and
 - v. Require that the Vul-Cup area remedy be operated and maintained in accordance with the EPA-approved Vul-Cup Area Operating & Maintenance Plan.
- d. For purposes of this Section VI, B., "best efforts" includes the payment of reasonable sums of money in consideration of access, access easements, land/water use restrictions, restrictive covenants, and/or an agreement to release or subordinate a prior lien or encumbrance. If Respondent is unable to accomplish what is required through "best efforts" in a timely manner, Respondent shall promptly notify EPA in writing, and

shall include in that notification a summary of the steps that Respondent has taken to attempt to comply with Paragraph X.B.1.c of this AOC. EPA may, as it deems appropriate, assist Respondent in obtaining land and/or groundwater use restrictions. EPA reserves any right it may have to require that Respondent reimburse EPA for all costs incurred by EPA in obtaining land and groundwater use restrictions, including, but not limited to, attorney's fees, the amount of any just compensation paid and costs incurred by EPA. Provided that EPA has determined that Respondent has used good faith efforts to obtain the Covenants required by Paragraphs X.B.1.c. and (b) of this AOC, Respondent shall not be deemed in violation of Paragraph X.B.1(a) and (b) of this AOC.

2. Corrective Measures Assessment Report

a. Within ninety (90) days after EPA approval of the CMIP pursuant to paragraph VI.B.2.c or d, above, Respondent shall submit a CMI Assessment Report for EPA approval. The CMI Assessment Report shall provide an evaluation of the effectiveness of the Final Remedy in achieving the requirements set forth in the FDRTC and the performance criteria established in the FDRTC and the CMIP.

b. If, based on the CMI Assessment Report or any other information, EPA determines that the corrective measures are not achieving the requirements set forth in the FDRTC and the performance criteria established in the FDRTC and the CMIP, EPA shall notify Respondent in writing of those activities that must be undertaken to meet the requirements of the FDRTC and the performance criteria established in the CMIP and shall set forth a schedule for the completion of those activities. Respondent shall complete the activities in accordance with the schedule set forth in the EPA notification.

3. CMI Five-Year Assessment Report

a. No later than five (5) years after the Effective Date of this AOC and every five (5) years thereafter until Respondent's receipt of written notice from EPA that Respondent has demonstrated, to the satisfaction of EPA, that the terms of this AOC, including any additional tasks determined by EPA to be required pursuant to this AOC, have been satisfactorily completed, Respondent shall submit a CMI Five-Year Assessment Report. Such Report shall contain an evaluation of the past and projected future effectiveness of the corrective measures in achieving the requirements set forth in the FDRTC and the performance criteria established in the CMI Design Report.

b. Respondent may, as part of a CMI Five-Year Assessment Report, request that EPA select an alternative and/or supplemental corrective measures.

c. In the event EPA selects an alternative and/or supplemental corrective measures either in response to a request by Respondent pursuant to Section VI.B.4.b, above, or on its own

initiative, EPA may provide Respondent with a period of thirty (30) calendar days from the date Respondent receives written notice from EPA of the selection of an alternative and/or supplemental corrective measure(s) within which to reach an agreement with EPA regarding performance of the alternative and/or supplemental corrective measure(s) in lieu of, or in addition to, the corrective measures. Any such agreement between EPA and Respondent shall be incorporated into and become enforceable under this AOC in accordance with Section XXIII. SUBSEQUENT MODIFICATION and Respondent shall implement the activities required under any such agreement in accordance with any schedule and provisions contained therein.

d. Nothing in paragraphs VI.A. or VI.B., above, shall limit EPA's authority to implement or require performance of alternative and/or supplemental corrective measure(s) or to take any other appropriate action under RCRA, the Comprehensive Environmental Response, Compensation and Liability Act, as amended, 42 U.S.C. §§ 9601 et seq. (CERCLA), or any other legal authority, including the issuance of an administrative order or the filing of a civil action.

C. SUBMISSIONS/EPA APPROVAL

1. EPA will review the Workplans and reports and all other documents submitted by Respondent pursuant to this AOC, with the exception of progress reports (Submissions), and will notify Respondent in writing of EPA's approval or disapproval of each such Submission. In the event of EPA's disapproval, EPA shall specify in writing any deficiencies in the Submission. Such disapproval shall not be subject to the Dispute Resolution procedures of Section XVI, below.

2. Within thirty (30) calendar days of receipt of EPA's comments on the Submission, or ten (10) calendar days in the case of an IM Workplan, Respondent shall submit to EPA for approval a revised Submission, which responds to any comments received and/or corrects any deficiencies identified by EPA. In the event that EPA disapproves the revised Submission, Respondent may invoke the Dispute Resolution procedures of Section XVI, below. In the event EPA disapproves the revised Submission, EPA reserves the right to revise such Submission and seek to recover from Respondent the costs thereof, in accordance with CERCLA and any other applicable law if (i) EPA determines that disapproving the Submission and awaiting a resubmission would cause disruption to the Work; or (ii) previous Submission(s) have been disapproved due to material defects and the deficiencies in the initial Submission under consideration indicate a bad faith lack of effort to submit an acceptable deliverable. Any Submission approved or revised by EPA under this AOC shall be deemed incorporated into and made an enforceable part of this AOC.

3. Respondent shall provide EPA with annual progress reports commencing on January 31st of the year following the Effective Date and throughout the period that this AOC is effective.

4. One (1) copy of all Submissions required by this AOC shall electronically delivered to the Project Coordinator, and one hard copy shall be hand delivered or sent by Overnight Mail,

Return Receipt Requested, to the Project Coordinator designated pursuant to Section XIII. PROJECT COORDINATORS, below.

5. All Work performed pursuant to this AOC shall be under the direction and supervision of a professional engineer or geologist with expertise in hazardous waste site investigation. Respondent has named and EPA has approved the following contractor to carry out the terms of this AOC on Respondent's behalf:

Joseph A. Keller, P.E.
Vice President - Client Programs
Groundwater & Environmental Services, Inc.
1350 Blair Drive, Suite A,
Odenton, MD 21113
Cell (410) 320-6456
Licensed P.E. in NJ
www.gesonline.com

Respondent shall submit to EPA, in writing, the name, title, and qualifications of any changes or additions regarding the engineer or geologist and of any changes or additions to the contractors or subcontractors to be used in carrying out the terms of this AOC within thirty (30) days of their retention. Notwithstanding the Respondent's selection of an engineer, geologist, contractor or subcontractor, nothing herein shall relieve Respondent of its obligation to comply with the terms and conditions of this AOC. EPA shall have the right to disapprove at any time the use of any professional engineer, geologist, contractor or subcontractor selected by Respondent. EPA's disapproval shall not be subject to review under Section XVI. DISPUTE RESOLUTION of this AOC, or otherwise. Within fifteen (15) calendar days of receipt from EPA of written notice disapproving the use of any professional engineer, geologist, contractor or subcontractor, Respondent shall notify EPA, in writing, of the name, title and qualifications of the personnel who will replace the personnel disapproved by EPA. Respondent shall notify EPA ten (10) days prior to changing its engineer or geologist, and/or contractors or subcontractors to be used in carrying out the terms of this AOC, and shall submit to EPA in writing, the name, title, and qualifications of such person(s).

D. ADDITIONAL WORK

6. EPA may determine or Respondent may propose that certain tasks and deliverables including, but not limited to, investigatory work or engineering evaluation require additional Work. These tasks and deliverables may or may not have been in the EPA-approved Workplans. If EPA determines that such additional Work is necessary, EPA shall request, in writing, that Respondent perform the additional Work and shall specify the reasons for EPA's determination that additional Work is necessary. Within fifteen (15) calendar days after the receipt of such request, or as otherwise agreed by the parties, the Respondent shall have the opportunity to meet or confer with EPA to discuss the additional Work EPA has requested. In the event that

Respondent agrees to perform the additional Work, this AOC shall be modified in accordance with Section XXIII. SUBSEQUENT MODIFICATION, below, and such Work shall be performed in accordance with this AOC. In the event Respondent declines or fails to perform the additional Work, EPA reserves the right, at minimum, to order Respondent to perform such additional Work; to perform such additional Work itself and to seek to recover from Respondent all costs of performing such additional Work in accordance with CERCLA and any other applicable laws; and to disapprove the CMI Workplans, the CMI Reports and/or any other Submission. Respondent reserves its rights and defenses to challenge any such action by EPA, subject to this Section VI.D.

VII. QUALITY ASSURANCE

A. Commencing on the Effective Date of this AOC and continuing thereafter, throughout all sample collection and analysis activities, Respondent shall use EPA-approved quality assurance, quality control, and chain-of-custody procedures, as specified in the EPA-approved Workplans. In addition, Respondent shall:

1. Ensure that laboratories used by Respondent for analyses perform such analyses according to the EPA methods included in Test Methods for Evaluating Solid Waste (SW-846, November 1986) or other methods deemed satisfactory to EPA. If methods other than EPA methods are to be used, Respondent shall submit all analytical protocols to be used for analyses to EPA for approval at least thirty (30) calendar days prior to the commencement of analyses and shall obtain EPA approval prior to the use of such analytical protocols.

2. Ensure that laboratories used by Respondent for analyses participate in a quality assurance/quality control program equivalent to that which is followed by EPA. As part of such a program, and upon request by EPA, such laboratories shall perform analyses of samples provided by EPA to demonstrate the quality of the analytical data.

3. Inform the EPA Project Coordinator at least fourteen (14) calendar days in advance of any laboratory analysis regarding which laboratory will be used by Respondent and ensure that EPA personnel and EPA authorized representatives have reasonable access to the laboratories and personnel used for analysis.

VIII. PUBLIC REVIEW OF ADMINISTRATIVE RECORD

The Administrative Record supporting the issuance of this AOC and any decisions or determinations made by EPA pursuant to the AOC will be available for public review on Mondays through Fridays, from 9:00 a.m. to 5:00 p.m., by contacting the EPA Project Coordinator, Barbara Smith, at:

U.S. Environmental Protection Agency
Region III (3LC20)
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029
Telephone: 215-814-5786

IX. PUBLIC COMMENT AND RELATED SUBSEQUENT MODIFICATIONS

A. Within thirty (30) calendar days of the date that EPA signs this AOC, EPA shall announce the availability of this AOC to the public for review and comment. EPA shall accept comments from the public for a period of thirty (30) calendar days after such announcement. If sufficient interest warrants, as determined by EPA, a public meeting will be held. At the end of the comment period, EPA shall review all comments received during the above-defined thirty (30) day period and/or at such public meeting, and shall either:

1. determine that the AOC should be made effective in its present form in which case EPA shall so notify Respondent in writing and send Respondent a copy of this AOC executed by EPA. The AOC shall become effective on the date of the receipt of such notice and copy of the AOC; or

2. determine that modification of the AOC is necessary, in which case EPA shall notify Respondent in writing as to the nature of all required changes. If Respondent agree to the modifications, the AOC shall be so modified and shall become effective upon the receipt by Respondent of an executed copy of the modified AOC.

B. In the event that the parties are unable to agree on modifications required by EPA as a result of public comment, this AOC shall be withdrawn by EPA. In such an event, EPA reserves the right to take such action as may be necessary to protect public health and the environment, including but not limited to, issuance of a subsequent order or initiate a civil action to Respondent or any other person in connection with the Facility under Section 7003 of RCRA, 42 U.S.C. § 6973.

X. ON SITE AND OFF-SITE ACCESS

1. To the extent that Work required by this AOC, or by any EPA-approved Workplan prepared pursuant hereto, must be done on property not owned or controlled by Respondent, Respondent shall use its best efforts to obtain site access agreement(s) from the present owner(s) and/or lessee(s) of such property, as appropriate, within thirty (30) calendar days of receipt of EPA approval of any Workplan pursuant to this AOC which requires Work on such property. For purposes of this paragraph, best efforts shall include, at a minimum but shall not be limited to :a) a certified letter from Respondent to the present owner(s) or lessee(s) of such property requesting agreements to permit Respondent, EPA, and its authorized representatives access to such property; and b) the payment of reasonable sums of money in consideration of access. "Reasonable sums of money" means the fair market value of the right of access necessary to implement the requirements of this AOC. In the event that such agreements for access are not obtained within thirty (30) calendar days after receipt of EPA approval of any Workplan pursuant to this AOC which requires Work on property which is not owned or controlled by Respondent, Respondent shall notify EPA, in writing within seven (7) calendar days after the conclusion of such thirty-day (30) period, regarding both the efforts undertaken to obtain access and the inability to obtain such agreements. In the event that Respondent fails to obtain off-site access, despite the exercise of best efforts, EPA, in its discretion, may assist Respondent in obtaining off-site access for Respondent. Respondent shall reimburse EPA for all costs incurred by EPA in obtaining access, including, but not limited to, attorney's fees and the amount of any just compensation and costs incurred by EPA.

C. Nothing in this AOC limits or otherwise affects EPA's rights of access and entry pursuant to applicable law, including, but not limited to, RCRA and CERCLA.

XI. SAMPLING AND DATA/DOCUMENT AVAILABILITY

A. Respondent shall submit to EPA the results of all sampling and/or tests or other data generated by, or on behalf of, Respondent in accordance with the requirements of this AOC.

B. Respondent shall notify EPA, in writing, at least fourteen (14) calendar days in advance of any material field activities, including but not limited to, well drilling, installation of equipment, or sampling. Non-material field activities are minor repairs, routine maintenance, routine inspections and similar activities. At the request of EPA, Respondent shall provide or allow EPA or its authorized representatives to take split or duplicate samples of all samples collected by Respondent pursuant to this AOC. Nothing in this AOC shall limit or otherwise affect EPA's authority to collect samples pursuant to applicable law, including, but not limited to, RCRA and CERCLA.

C. Respondent may assert a business confidentiality claim covering all or part of any information submitted to EPA pursuant to this AOC in the manner described in 40 C.F.R. Section 2.203(b). Any assertion of confidentiality shall be adequately substantiated by Respondent when the assertion is made in accordance with 40 C.F.R. Section 2.204(e)(4). Information subject to a confidentiality claim shall be disclosed only to the extent allowed by, and in accordance with, the procedures set forth in 40 C.F.R. Part 2, Subpart B. If no such confidentiality claim accompanies the information when it is submitted to EPA, it may be made available to the public by EPA without further notice to Respondent. Respondent shall not assert any confidentiality claim with regard to any physical, sampling, monitoring, or analytical data.

D. If Respondent wishes to assert a privilege with regard to any document which EPA seeks to inspect or copy pursuant to this AOC, Respondent shall identify the document, the privilege claimed, and the basis therefore in writing. For the purposes of this AOC, privileged documents are those documents exempt from discovery from the United States in litigation under the Federal Rules of Civil Procedure. Respondent shall not assert a privilege with regard to analytical, sampling and monitoring data.

XII. RECORD PRESERVATION

Respondent agrees that it shall preserve, during the pendency of this AOC and for a minimum of at least six (6) years after its termination, all non-duplicative and final data, and all non-duplicative records and documents in their possession or in the possession of their divisions, officers, directors, employees, agents, contractors, successors, and assigns which relate in any way to this AOC or the Work performed hereunder. After six (6) years, Respondent shall make such records available to EPA for inspection or shall provide copies of such records to EPA. Respondent shall notify EPA at least thirty (30) calendar days prior to the proposed destruction of any such records, and shall provide EPA with a reasonable opportunity to inspect, copy and/or take possession of any such records. Respondent shall not destroy any record to which EPA has requested access for inspection and/or copying until EPA has obtained such access or withdrawn its request for such access. Nothing in this Section XII shall in any way limit the authority of EPA under Section 3007 of RCRA, 42 U.S.C. § 6927, or any other access or information-gathering authority.

XIII. PROJECT COORDINATORS

A. EPA hereby designates Barbara Smith as the EPA Project Coordinator. Hereules hereby designates Edward D. Meeks as its Project Coordinator. The Respondent's legal counsel shall not serve as Respondent's Project Coordinator. Each Project Coordinator shall be responsible for overseeing the implementation of the AOC. The EPA Project Coordinator will be EPA's primary designated representative at the Facility. To the maximum extent possible, all communications between Respondent and EPA, and all documents, reports, approvals, and other

correspondence concerning the activities performed pursuant to the terms and conditions of this AOC, shall be directed through the Project Coordinators.

B. Each party agrees to provide at least seven (7) calendar days written notice to the other party prior to changing Project Coordinators.

C. If EPA determines that conditions or activities at the Facility, whether or not in compliance with this AOC, have caused or may cause a release or threatened release of hazardous wastes, hazardous constituents, hazardous substances, solid wastes, pollutants or contaminants which threaten or may pose a threat to the public health or welfare or to the environment, EPA may direct that Respondent stop further implementation of this AOC for such period of time as may be needed to abate any such release or threatened release and/or to undertake any action which EPA determines is necessary to abate such release or threatened release.

D. The absence of the EPA Project Coordinator from the Facility shall not be cause for the delay or stoppage of Work.

XIV. NOTIFICATION

A. Unless otherwise specified, reports, correspondence, approvals, disapprovals, notices, or other submissions relating to or required under this AOC shall be in writing and shall be sent as follows:

1. One electronic and one hard copy of all documents shall be submitted to:
Barbara M. Smith
U.S. Environmental Protection Agency
Region III, Mail Code 3LC20
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029
Telephone: 215-814-5786
E-mail: smith.barbara@epa.gov

2. One copy of all documents to be submitted to EPA shall also be sent to:
Mr. Brett Fisher, P.G
Team Leader, RCRA CA and Groundwater
Virginia Department of Environmental Quality
1111 East Main St., Suite 1400
Richmond, VA 23219
Telephone: 804-698-4219
E-mail: Brett.Fisher@deq.virginia.gov

3. Documents to be submitted to Respondent shall be sent to:

Edward Meeks
Ashland LLC
Remediation Project Manager
500 Hercules Road, Building 8145
Wilmington, DE 19808
E-mail: edmeeks@ashland.com

B. Any notice, report, certification, data presentation, or other document submitted by Respondent pursuant to this AOC which discusses, describes, demonstrates, or supports any finding or makes any representation concerning Respondent's compliance or noncompliance with any requirement of this AOC shall be certified by a responsible corporate officer or a duly authorized representative of a responsible corporate officer. A responsible corporate officer means: (a) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or (b) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding \$25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures. A person is a duly authorized representative only if: (1) the authorization is made in writing by a person described above; (2) the authorization specifies either an individual or position having responsibility for overall operation of the regulated facility or activity (a duly authorized representative may thus be either a named individual or any individual occupying a named position); and (3) the written authorization is submitted to the Project Coordinator designated by EPA in Section XIII. PROJECT COORDINATORS of this AOC.

C. The certification required by paragraph B, above, shall be in the following form:

I certify that the information contained in or accompanying this [type of submission] is true, accurate, and complete. As to [the/those identified portion(s)] of this [type of submission] for which I cannot personally verify [its/their] accuracy, I certify under penalty of law that this [type of submission] and all attachments were prepared in accordance with procedures designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, or the immediate supervisor of such person(s), the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Signature:

Name:

Title:

XV. DELAY IN PERFORMANCE/STIPULATED PENALTIES

A. Unless there has been a written modification of a compliance date by EPA, or excusable delay as defined below in Section XVI. FORCE MAJEURE AND EXCUSABLE DELAY, in the event that Respondent fails to comply with any requirement set forth in this AOC, Respondent shall pay stipulated penalties, as set forth below, upon receipt of written demand by EPA. Compliance by Respondent shall include commencement or completion, as appropriate, of any activity, plan, study or report required by this AOC in an acceptable manner and within the specified time schedules in and approved under this AOC. Stipulated penalties shall accrue as follows:

1. For failure to commence, perform or complete Work as prescribed in this AOC: \$2,500 per day for one to seven days or part thereof of noncompliance, and \$5,000 per day for each day of noncompliance, or part thereof, thereafter;
2. For failure to comply with the provisions of this AOC after receipt of notice of noncompliance by EPA: \$1,000 per day for one to seven days or part thereof of noncompliance, and \$3,000 per day for each day of noncompliance, or part thereof, thereafter; in addition to any stipulated penalties imposed for the underlying noncompliance;
3. For failure to submit deliverables as required by this AOC, or for failure to comply with this AOC not described in subparagraphs 1 and 2 immediately above: \$500 per day for one to seven days or part thereof of noncompliance, and \$1,000 per day for each day of noncompliance, or part thereof, thereafter.

B. Whether or not Respondent has received notice of a violation, stipulated penalties shall begin to accrue on the date that complete performance is due or a violation occurs, and shall continue to accrue through the final day of or correction of the violation, provided, however, that stipulated penalties shall not accrue with respect to any deficient Submission under Paragraph VI.C until the 31st day after the date that EPA notifies Respondent of any deficiency. Nothing herein shall prevent the simultaneous accrual of separate stipulated penalties for separate violations of this AOC.

C. All penalties owed to EPA under this Section XV. shall be due within thirty (30) calendar days of receipt of a demand for payment unless Respondent invoke the Dispute Resolution procedures under Section XVI., below. Such notification shall describe the noncompliance and shall indicate the amount of penalties due. Interest shall begin to accrue on the unpaid balance at the end of the thirty (30) calendar day period and shall accrue at the United States Tax and Loan Rate.

D. All penalty payments shall be made by certified or cashier's check payable to the Treasurer of the United States of America and shall be remitted to:

U.S. Environmental Protection Agency
Fines and Penalties
Cincinnati Finance Office
P.O. Box 979077
St. Louis, MO 63197-9000

All payments shall reference the name of the Facility, Respondent's name and address, and the EPA Docket Number of this AOC. Copies of the transmittal of payment shall be sent simultaneously to the EPA Project Coordinator, the Regional Hearing Clerk (3RC00), U.S. Environmental Protection Agency, Region III, 1650 Arch Street, Philadelphia, Pennsylvania 19103-2029 and the Cincinnati Finance Office.

E. Respondent may dispute EPA's demand for payment of stipulated penalties for any alleged violation of this AOC by invoking the dispute resolution procedures below under Section XVI. DISPUTE RESOLUTION. Stipulated penalties shall continue to accrue, but need not be paid, for any alleged noncompliance which is the subject of dispute resolution during the period of such dispute resolution. To the extent that Respondent does not prevail upon resolution of the dispute, Respondent shall remit to EPA within seven (7) calendar days of receipt of such resolution any outstanding penalty payment, including any accrued interest, in the manner described above in Paragraph D of this Section XV. To the extent Respondent prevails upon resolution of the dispute, no penalties shall be payable.

F. Neither the filing of a petition to resolve a dispute nor the payment of penalties shall alter in any way Respondent's obligation to comply with the requirements of this AOC.

G. The stipulated penalties set forth in this Section XV. shall not preclude EPA from pursuing any other remedies or sanctions which may be available to EPA by reason of Respondent's failure to comply with any of the requirements of this AOC provided, however, that the EPA shall not seek civil penalties pursuant to RCRA for any violation for which a stipulated penalty is provided in this AOC, except in the case of a willful violation of this AOC.

XVI. DISPUTE RESOLUTION

1. Unless otherwise expressly provided for in this AOC, the dispute resolution procedures of this Section shall be the exclusive mechanism to resolve disputes regarding this AOC.

2. A dispute shall be considered to have arisen when one party sends the other party a written Notice of Dispute. Any dispute regarding this AOC shall in the first instance be the subject of informal negotiations. The period for informal negotiations shall not exceed 20 days from the time the dispute arises, unless it is modified by written agreement of the parties.

3. In the event that the parties cannot resolve a dispute by informal negotiations under the preceding Paragraph, then the position advanced by EPA shall be considered binding unless, within fourteen (14) days after the conclusion of the informal negotiation period, Respondent notifies the Region III Director of Land and Chemicals Division (LCD) in writing of its objections, and the basis therefor. Such notice shall set forth the specific points of the dispute, the position which Respondent asserts should be adopted as consistent with the requirements of this AOC, the basis for Respondent's position, and any matters which it considers necessary for LCD's determination. LCD and Respondent shall have an additional fourteen (14) calendar days from the receipt by LCD of the notification of objection, during which time representatives of LCD and Respondent may confer in person or by telephone to resolve any disagreement. If an agreement is reached, the resolution shall be written and signed by an authorized representative of each party. In the event that resolution is not reached within this fourteen (14) calendar day period, the Director of LCD will furnish to Respondent, in writing, his or her decision on the pending dispute.

B. The invocation of formal dispute resolution procedures under this Section XVI. shall not extend, postpone or affect in any way any obligation of Respondent under this AOC unless EPA determines otherwise. Stipulated penalties with respect to the disputed matter shall continue to accrue but payment shall be stayed pending resolution of the dispute.

C. Notwithstanding the stay of payment, stipulated penalties shall accrue from the first day of noncompliance with any applicable provision of this Order. In the event that Respondent does not prevail on the disputed issue, stipulated penalties shall be assessed and paid as provided in Section XV. DELAY IN PERFORMANCE/STIPULATED PENALTIES.

G. Notwithstanding any other provisions of this AOC, no action or decision by EPA pursuant to this AOC, shall constitute final agency action giving rise to any right to judicial review prior to EPA's initiation of judicial action to compel Respondent's compliance with this AOC.

XVII. FORCE MAJEURE AND EXCUSABLE DELAY

A. Respondent shall perform the requirements of this AOC in the manner and within the time limits set forth herein, unless the performance is prevented or delayed by events which constitute a force majeure. Respondent shall have the burden of proving such a force majeure. A force majeure is defined as any event arising from causes not reasonably foreseeable and beyond the control of Respondent, which cannot be overcome by due diligence and which delays or prevents performance in the manner or by a date required by this AOC. Such events do not include increased costs of performance, changed economic circumstances, weather conditions which were reasonably foreseeable and could have been overcome by due diligence, or failure to

obtain federal, state, or local permits unless applications for such permits were submitted in a timely and complete fashion and such permits were not issued, through no fault of Respondent.

B. Respondent shall notify EPA, within seven (7) calendar days after it becomes or should have become aware of any event which Respondent claims constitutes a force majeure. Such notice shall estimate the anticipated length of delay, including necessary demobilization and remobilization, its cause, measures taken or to be taken to prevent or minimize the delay, and an estimated timetable for implementation of these measures. Failure to comply with the notice provision of this Section XVII shall constitute a waiver of Respondent's right to assert a force majeure claim with respect to such event, provided, however, that EPA may, in its sole unreviewable discretion, and not subject to dispute resolution, excuse in writing Respondent's failure to submit a timely notice under this Paragraph. In addition to the above notification requirements, Respondent shall undertake all reasonable actions to prevent or to minimize any delay in achieving compliance with any requirement of this AOC after it become or should have become aware of any event which may delay such compliance.

C. If EPA determines that there is excusable delay because the failure to comply or delay has been or will be caused by a force majeure, the time for performance of that requirement of this AOC may be extended, upon EPA approval, for a period equal to the delay resulting from such force majeure and any such delay shall be deemed not to be a violation of this AOC. This shall be accomplished through an amendment to this AOC pursuant to Section XXIII. SUBSEQUENT MODIFICATION. Such an extension shall not alter the schedule for performance or completion of any other tasks required by this AOC, unless these tasks are also specifically altered by amendment of the AOC. In the event that EPA and Respondent cannot agree that any delay or failure has been or will be caused by a force majeure, or if there is no agreement on the length of the extension, Respondent may invoke the dispute resolution procedures set forth in Section XVI. DISPUTE RESOLUTION, above.

XVIII. RESERVATION OF RIGHTS

A. Notwithstanding any other provisions of this AOC, the United States retains all of its authority to take, direct, or order any and all actions necessary to protect public health or the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances, pollutants, or contaminants, or hazardous or solid waste or constituents of such wastes, on, at, or from the Site, including but not limited to the right to bring enforcement actions under RCRA, CERCLA, and any other applicable statutes or regulations.

B. Subject to XV.G., EPA hereby reserves all of its statutory and regulatory powers, authorities, rights and remedies, both legal and equitable, including any which may pertain to Respondent's failure to comply with any of the requirements of this AOC, including, without limitation, the assessment of penalties under Section 7003 of RCRA, 42 U.S.C. § 6973.

C. This AOC shall not be construed as a covenant not to sue, or as a release, waiver or limitation of any rights, remedies, powers or authorities, civil or criminal, which EPA has under RCRA, CERCLA, or any other statutory, regulatory or common law authority.

D. This AOC is not intended to be nor shall it be construed to be a permit. Respondent acknowledges and agrees that EPA's approval of the Work and/or Work Plan does not constitute a warranty or representation that the Work and/or Work Plans will achieve the required cleanup or performance standards. Compliance by Respondent with the terms of this AOC shall not relieve Respondent of its obligations to comply with RCRA or any other applicable local, state, or federal laws and regulations.

E. EPA reserves the right to perform any portion of the Work consented to herein or any additional site characterization, feasibility study, and response/corrective actions it deems necessary to protect public health or welfare and the environment. EPA may exercise its authority under RCRA, CERCLA or any other authority to undertake or require the performance of response actions at any time. EPA reserves the right to seek reimbursement from Respondent for costs incurred by the United States in connection with any such response actions to which EPA may be entitled to as a matter of law and Respondent reserves any defenses it may have to the EPA's cost recovery claims. . Notwithstanding compliance with the terms of this AOC, Respondent is not released from liability, if any, for the costs of any response actions taken by EPA.

F. Notwithstanding any other provision of this AOC, no action or decision by EPA pursuant to this AOC, including without limitation, decisions of the Regional Administrator, the Director of the Land and Chemicals Division, or any authorized representative of EPA, shall constitute final agency action giving rise to any right of judicial review prior to EPA's initiation of a judicial action to enforce this AOC, including an action for penalties or an action to compel Respondent's compliance with the terms and conditions of this AOC.

XIX. OTHER CLAIMS

Nothing in this AOC shall constitute or be construed as a release from any claim, cause of action or demand in law or equity against any person, firm, partnership, or corporation, or other entity for any liability it may have arising out of or relating in any way to the generation, storage, treatment, handling, transportation, release, or disposal of any hazardous constituents, hazardous substances, hazardous wastes, solid wastes, pollutants, or contaminants found at, taken to, or taken from the Facility.

XX. OTHER APPLICABLE LAWS

All actions required to be taken pursuant to this AOC shall be undertaken in accordance with the requirements of all applicable local, state, and federal laws and regulations. Respondent shall obtain or require its authorized representatives to obtain all permits and approvals necessary under such laws and regulations.

XXI. INDEMNIFICATION OF THE UNITED STATES GOVERNMENT

Respondent agrees to indemnify and save and hold harmless the United States Government, its agencies, departments, agents, and employees, from any and all claims or causes of action arising from or on account of negligent or other wrongful acts or omissions of Respondent or its agents, independent contractors, receivers, trustees, and assigns in carrying out activities required by this AOC. This indemnification shall not be construed in any way as affecting or limiting the rights or obligations of Respondent or the United States under their various contracts. The United States shall not be deemed to be a party to any contract entered into by Respondent for the purpose of carrying out any activities required by this AOC.

XXII. NOTICE OF NON-LIABILITY OF EPA

EPA shall not be deemed a party to any contract involving Respondent and relating to activities at the Facility and shall not be liable for any claim or cause of action arising from or on account of any act, or the omission of Respondent, its respective officers, employees, contractors, receiver, trustees, agents or assigns, in carrying out the activities required by this AOC.

XXIII. SUBSEQUENT MODIFICATION

A. Except as provided in Paragraph C., below, of this Section XXIII, this AOC may be amended only by mutual agreement of EPA and Respondent. Any such amendment shall be in writing, shall be signed by an authorized representative of each party, shall have as its effective date the date on which it is signed by EPA, and shall be incorporated into this AOC.

B. Any reports, plans, specifications, schedules, other submissions and attachments required by this AOC are, upon written approval by EPA, incorporated into this AOC. Any noncompliance with such EPA-approved reports, plans, specifications, schedules, other submissions, and attachments shall be considered a violation of this AOC and shall subject Respondent to the stipulated penalty provisions included in Section XV. DELAY IN PERFORMANCE/STIPULATED PENALTIES.

C. Minor modifications in the studies, techniques, procedures, designs or schedules utilized in carrying out this AOC and necessary for the completion of the project may be made by written agreement of the Project Coordinators. Such modifications shall have as an effective date the date on which the agreement is signed by the EPA Project Coordinator.

D. No informal advice, guidance, suggestions, or comments by EPA regarding reports, plans, specifications, schedules, and any other writing submitted by Respondent shall be construed as relieving Respondent of its obligations to obtain written approval, if and when required by this AOC.

XXIV. TERMINATION AND SATISFACTION

The provisions of this AOC shall be deemed satisfied upon Respondent's receipt of written notice from EPA that Respondent has demonstrated, to the satisfaction of EPA, that the terms of this AOC, including any additional tasks determined by EPA to be required pursuant to this AOC, have been satisfactorily completed. This notice shall not, however, terminate Respondent's obligation to comply with any continuing obligations hereunder including, but not limited to, Sections XII. RECORD PRESERVATION; XVIII. RESERVATION OF RIGHTS; XIX. OTHER CLAIMS; XX. OTHER APPLICABLE LAWS, and XXI. INDEMNIFICATION OF THE UNITED STATES GOVERNMENT.

XXV. ATTORNEY'S FEES

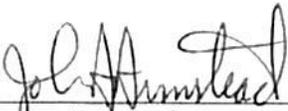
The Respondent shall bear its own costs and attorney's fees.

XXVI. EFFECTIVE DATE

The Effective Date of this AOC shall be the date on which Respondent receives a true and correct copy of the fully executed AOC or a true and correct copy of the fully executed modified AOC as provided in Section IX. PUBLIC COMMENT AND RELATED SUBSEQUENT MODIFICATIONS.

**IT IS SO AGREED AND ORDERED:
U.S. ENVIRONMENTAL PROTECTION AGENCY – REGION III:**

4.12.18
Dated

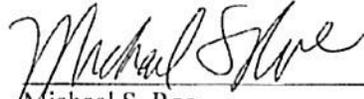


John A. Armstead
Director
Land and Chemicals Division
U.S. EPA, Region III

**FOR THE RESPONDENT:
HERCULES LLC:**

3/19/18

Dated

 *MSR*

Michael S. Roe
President
Hercules LLC



**Hercules Franklin Facility
Facility Lead Corrective Action (FLCA) History
Document Summary**

1. General Corrective Action

- a. *RCRA Facility Assessment (RFA)* - EPA, August 1991
- b. *Construction Completion Report, Limited Remedial Activities* – ERM, March 1999
 - Documented the following remedial activities:
 1. Soil removal in Heat Generation Area
 2. Brick removal in Vulcup / outfall upgrade
 3. Remediation of West Wastewater Treatment Plant
 4. East Area source removal and Landfill O&M
- c. EPA offer letter to participate in FLCA – September 23, 1999
 - Hercules acceptance of FLCA letter – October 28, 1999
- d. *Phase II Due Diligence Report* – Arcadis, April 2001
- e. John Zink Thermal Oxidizer (unit that pulled facility into RCRA)
 - John Zink Thermal Oxidizer Closure Report – GES, July 16, 2001 (submitted to VaDEQ)
 - VaDEQ inspection July 11, 2002
 - Revision 1 of closure report – GES, August 19, 2002
 - Clean Closure letter from DEQ dated September 5, 2002
- f. *Quality Assurance Project Plan (QAPP)* – GES, March 2003
 - EPA approval letter dated May 12, 2003
- g. *Groundwater Sampling and Analysis Plan (GWSAP)* – GES, July 2003
 - EPA comments received November 19, 2003
 - *GWSAP Revision 1* submitted January 2004
 - EPA approval letter dated January 27, 2004
- h. Residential Well Sampling
 - *Residential Well Sampling Workplan* – GES, July 2003
 - EPA approval letter dated August 5, 2003
 - *Residential Well Sampling Summary Letter Report* – GES, May 5, 2004
 1. Concluded that Facility has not caused any contamination to surrounding residential wells
 - EPA approval letter dated October 5, 2004
- i. Route 671 Widening
 - *Route 671 Widening Interim Measures Workplan* – GES, July 2003
 - Workplan EPA approval letter
 - *Route 671 Widening Interim Measures Summary Letter Report* – GES, May 5, 2004
 - EPA approval letter dated October 5, 2004



- j. *Human Health Environmental Indicator Determination* – GES, September 14, 2004
 - EPA approval dated September 28, 2004
- k. Outfall Sampling
 - *Outfall Sampling and Analysis Plan* – GES, December 29, 2004
 - Modified and approved by subsequent EPA comment letters and emails dated February 1, August 5 and September 20, 2005
 - *Outfall Sampling Investigation Report* – GES, June 19, 2006
- l. Groundwater Monitoring Reports
 - Submitted annually from 2004 through 2009
- m. Facility Lead Corrective Action (FLCA) Annual Reports
 - Submitted annually from 2000 through 2009

2. Release Assessment

- a. *Release Assessment Workplan* – ERM, January 1998
- b. EPA Workplan approval letter
- c. *Release Assessment Report* – ERM, March 1999
 - *EPA Comment Set No. 1* dated December 6, 1999 (RA Vol. I)
 - 1. Responses provided in FLCA Annual Report 2000
 - *EPA Comment Set No. 2* dated August 28, 2000 (RA Vol. II & III)
 - 1. Provided comments on the SAP, QAPP and HASP
 - 2. *Hercules' Responses to Comments* submitted to EPA on March 2, 2001
 - *EPA Comment Set No. 4* dated March 29, 2001
 - 1. Provided comments on the following:
 - a. *Hercules' Response to Comments* (dated March 2, 2001) regarding Facility Lead Corrective Action Agreement Work Plan
 - b. *Release Assessment, Vols II & III*
 - c. *2001 FLCA Annual Report*
 - d. A new QAPP was requested by EPA
 - 2. A review and discussion of these comments was conducted in a conference call between EPA, Hercules and GES on April 30, 2001. Responses to these comments, including a revised QAPP, were provided to EPA on July 18, 2001



3. Release Assessment Addendum

- a. *Release Assessment Addendum Work Plan ("Facility Led Corrective Action Agreement Workplan) – ERM, February 2000*
 - *EPA Comment Set No. 3* dated December 6, 2000
 - *Hercules' Response to Comments* submitted to EPA on March 2, 2001
 - *EPA Comment Set No. 5* dated November 6, 2001
 1. A review and discussion of these comments (which addressed the revised QAPP and SAP) was conducted at a meeting with EPA and EPA Quality Assurance Team (QAT) on April 26, 2002. Formal written responses were provided in draft form to EPA in September 2002
- b. *Release Assessment Addendum (RAA) – GES, January 2002*
 - *EPA Comment Set No. 6* dated March 26, 2002
 1. A review and discussion of these comments (which addressed RAA data concerns) was conducted at the same meeting as indicated above. Formal written responses were provided in draft form to EPA in September 2002
 - *EPA Comment Set No. 7* dated April 10, 2002
 1. Hercules received technical comments on the Release Assessment Addendum in a letter from EPA dated April 10, 2002. Formal written responses were provided in draft form to EPA in September 2002
 - *EPA Comment Set No. 8* dated August 28, 2002
 1. Provided comments on the following:
 - a. QAPP, SAP and Release Assessment Report
 - b. QAPP was subsequently revised and submitted as *QAPP – Revision 0* in March 2003
 - c. Conditional approval of *QAPP – Revision 0* received from EPA on May 12, 2003
 - *EPA Comment Set No. 9* dated November 27, 2002
 1. Provided comments on the following:
 - a. *QAPP – Revision 3* dated September 2002
 - b. Responses to Comments on Set Nos. 5, 6 and 7
 2. Conference call took place on December 5, 2002 between EPA, QAT, US Army Corps of Engineers, Hercules, GES and STL.
 - a. *QAPP – Revision 0* submitted in March 2003
 - b. Conditional approval of *QAPP – Revision 0* received from EPA on May 12, 2003

4. East Area

- a. *East Area Improvements Construction Workplan – ERM, June 1999*
 - Workplan EPA approval
- b. *East Area Improvement Report – GES, February 8, 2006*
 - EPA approval letter dated October 23, 2006



5. West Area

- a. *West Area Remedial Alternatives Evaluation Report* – GES, April 2008
 - EPA approval letter dated June 13, 2008
- b. *Interim Measures Implementation (IMI) Workplan* – GES, February 2009
 - EPA Comments dated March 13, 2009
 - Hercules Response to Comments submitted April 7, 2009
 - EPA approval letter dated April 13, 2009
- c. *Workplan for Additional West Area Characterization* – GES, March 3, 2010
 - EPA comments dated March 22, 2010
- d. *Workplan for Additional West Area Characterization, Revision 1* – GES, March 24, 2010
 - EPA approval letter dated March 24, 2010

6. Vul-Cup

- a. Documents submitted to Virginia Department of Environmental Quality (VDEQ):
 - *Site Characterization Report* – Weston, February 16, 1995
 - *Bio-Sparging Feasibility Report* – Weston, August 28, 1995
 - *Results of Vul-Cup Process Area Bio-Sparging System Evaluation* – ERM, July 1998
 - *Amended Corrective Action Plan for Vul-Cup Process Area* – ERM, November 1998
- b. Vul-Cup Corrective Action moved from VDEQ to EPA Region III in 2003
- c. Documents submitted to EPA:
 - *Vul-Cup Site Investigation Report* – GES, March 2007
 1. EPA approval letter dated June 18, 2007
 - *Vul-Cup Process Area Source Investigation Workplan* – GES, March 2008
 1. EPA approval letter dated April 2, 2008
 - *Vul-Cup Area Source Investigation Report* – GES, July 24, 2009
 1. Verbal approval from Barbara Smith (EPA) given during April 29, 2010 meeting



7. Consent Order signed by EPA & Hercules – October 1, 2010

a. Documents submitted to EPA

Facility

- *Description of Current Conditions* – GES, October 29, 2010
 - a. EPA Approval Letter dated March 7, 2013
- *West Area Interim Measures Implementation Report* – GES, February 2, 2011
 - a. EPA Approval Letter dated January 25, 2011
- *4th Quarter 2010 Progress Report* – GES, February 8, 2011
- *Well Sample Analytical Results Table, Vision Church International* – GES, January 19, 2011
- *1st Quarter 2011 Progress Report* – GES, March 31, 2011
- *2nd Quarter 2011 Progress Report* – GES, July 1, 2011
- *RFI Workplan for West Assembly Area, Heat Generation Area, and Discharge Conduit – Revision No. 1* – GES, July 15, 2011
- *3rd Quarter 2011 Progress Report* – GES, September 30, 2011
- *4th Quarter 2011 Progress Report* – GES, December 29, 2011
- *1st Quarter 2012 Progress Report* – GES, April 2, 2012
- *2nd Quarter 2012 Progress Report* – GES, July 2, 2012
- *Draft RFI Summary Report* – GES, September 28, 2012
 - a. EPA Comments letter dated November 1, 2012
 - b. *Response to Comments – Draft RFI Summary Report* – GES, January 2, 2013
- *3rd Quarter 2012 Progress Report* – GES, October 1, 2012
- *4th Quarter 2012 Progress Report* – GES, January 2, 2013
- *Final RFI Summary Report* – GES, April 1, 2013
 - a. EPA Approval Letter dated June 6, 2013
- *2011 Groundwater Monitoring Report* – GES, April 1, 2013
 - a. EPA Comments Letter dated June 6, 2013
 - b. *Response to Comments – 2011 Groundwater Monitoring Report* – GES, August 2, 2013
 - c. EPA Approval Letter dated August 28, 2013
- *1st Quarter 2013 Progress Report* – GES, April 1, 2013
- *2nd Quarter 2013 Progress Report* – GES, July 1, 2013
- *3rd Quarter 2013 Progress Report* – GES, October 1, 2013
- *4th Quarter 2013 Progress Report* – GES, January 6, 2014
- *1st Quarter 2014 Progress Report* – GES, April 1, 2014
- *2nd Quarter 2014 Progress Report* – GES, July 1, 2014
- *3rd Quarter 2014 Progress Report* – GES, October 19, 2014
- *4th Quarter 2014 Progress Report* – GES, January 5, 2015
- *1st Quarter 2015 Progress Report* – GES, April 15, 2015
- *2nd Quarter 2015 Progress Report* – GES, July 1, 2015



- 2013 & 2014 Groundwater Monitoring Report – GES, July 8, 2015
- *Draft Corrective Measures Study Report* – GES, July 2015
- 3rd Quarter 2015 Progress Report – GES, October 29, 2015
- *2014 Groundwater Monitoring Report* – GES, February 4, 2017
- 4th Quarter 2015 Progress Report – GES, February 4, 2016
- 1st Quarter 2016 Progress Report – GES, May 9, 2016
- 2nd Quarter 2016 Progress Report – GES, July 28, 2016
- *Corrective Measures Study Report, Addendum 1* – GES, August 2016
- 3rd Quarter 2016 Progress Report – GES, November 2, 2016
- 4th Quarter 2016 Progress Report – GES, January 30, 2017
- *Vapor Intrusion Investigation Work Plan (VIWP)* – GES, January 24, 2017
- *2016 Groundwater Monitoring Report* – GES, February 27, 2017
- *VIWP Addendum* – GES, March 31, 2017
- 1st Quarter 2017 Progress Report – GES, April 19, 2017
- 2nd Quarter 2017 Progress Report – GES, June 28, 2017
- *Vapor Intrusion Investigation Report (VIIR)* – GES, June 30, 2017
- 3rd Quarter 2017 Progress Report – GES, October 27, 2017
- *2nd Half 2017 VIIR* – GES, November 29, 2017
- *Revised VIIRs* – GES, December 5 and 6, 2017
- 4th Quarter 2017 Progress Report – GES, January 31, 2018

Vul-Cup

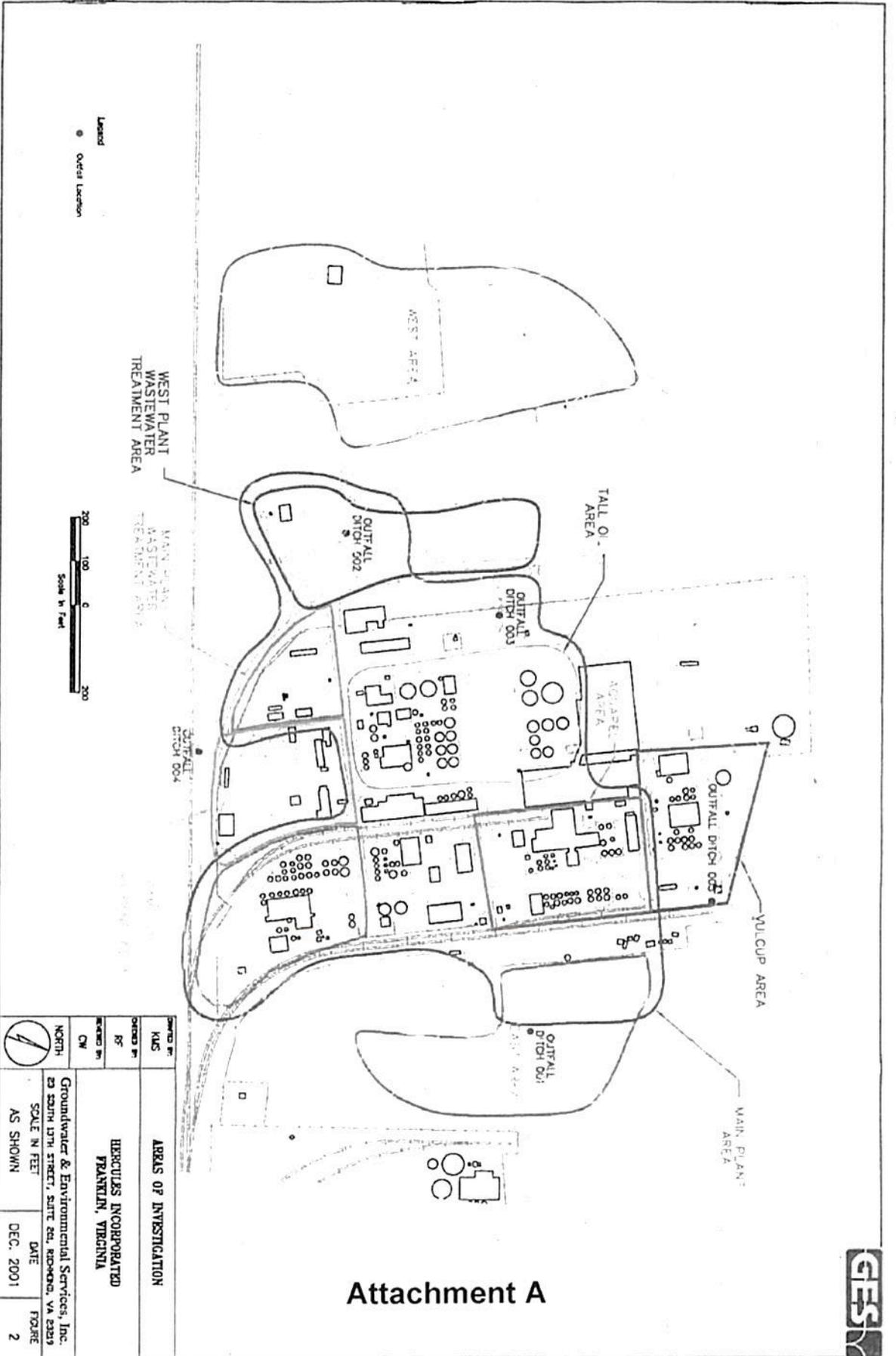
- *Vul-Cup Remediation System Evaluation & Optimization Report* – GES, March 22, 2011
- *Vul-Cup Bio-Sparge Remediation System Operation, Maintenance & Monitoring Plan* – GES, March 23, 2012
 - a. EPA Approval Letter dated October 31, 2012
- *Responses to EPA Comment Letters – Vul-Cup Area Source Investigation Report and Vul-Cup Remediation System Evaluation & Optimization Report* – GES, March 23, 2012
 - a. EPA Approval Letter dated October 31, 2012
- *Vul-Cup Construction Completion and 1st Quarter 2012 Progress Report* – GES, April 2, 2012
 - a. EPA Approval Letter dated October 31, 2012
- *Vul-Cup 2nd Quarter 2012 Progress Report* – GES, July 2, 2012
- *Vul-Cup 3rd Quarter 2012 Progress Report* – GES, October 1, 2012
 - a. EPA Approval Letter dated October 31, 2012
- *Responses to EPA Comments – Vul-Cup Area Documents* – GES, November 30, 2012
 - a. EPA Approval Email dated December 5, 2012
- *Vul-Cup 4th Quarter 2012 Progress Report* – GES, January 4, 2013
- *Vul-Cup 1st Quarter 2013 Progress Report* – GES, April 1, 2013



- *Vul-Cup 2nd Quarter 2013 Progress Report* – GES, July 1, 2013
- *Vul-Cup 3rd Quarter 2013 Progress Report* – GES, October 1, 2013
- *Vul-Cup 4th Quarter 2013 Progress Report* – GES, January 6, 2014
- *Vul-Cup 1st Quarter 2014 Progress Report* – GES, April 1, 2014
- *Vul-Cup 2nd Quarter 2014 Progress Report* – GES, July 1, 2014
- *Vul-Cup 3rd Quarter 2014 Progress Report* – GES, October 19, 2014
- *Vul-Cup Bio-Sparge Remediation System Operation, Maintenance & Monitoring Plan Update* – GES, December 10, 2014
- *Vul-Cup 4th Quarter 2014 Progress Report* – GES, January 5, 2015
- *Vul-Cup 1st Quarter 2015 Progress Report* – GES, April 15, 2015
- *Vul-Cup 2nd Quarter 2015 Progress Report* – GES, July 1, 2015
- *Vul-Cup Semi-Annual Progress Report July - December 2015* – GES, February 4, 2016
- *Vul-Cup Semi-Annual Progress Report January – June 2016* – GES, November 28, 2016
- *Vul-Cup Semi-Annual Progress Report July - December 2016* – GES, February 13, 2017
- *Vul-Cup Semi-Annual Progress Report January – June 2017* – GES, July 17, 2017

b. Documents received from EPA

- *Water Sampling Results from 2003 and 2007* – EPA to Mr. Cory Benson, Vision Church International, January 28, 2011
- *EPA Comment/Conditional Approval of the Draft Corrective Measures Study Report* – EPA, November 2015
- *Statement of Basis* – EPA, September 2016
- *Final Remedy Decision and Response to Comments* – EPA, November 2, 2016
- *VIIWP EPA Comments* – EPA, February 3, 2017
- *EPA Approval of VIIWP-Addendum* – EPA, April 3, 2017
- *EPA Approval of VIIR* – EPA, July 18, 2017
- *EPA Approval of Revised VIIRs* - EPA, December 21, 2017



Attachment A

AREAS OF INVESTIGATION			
PROJECT NO.	HERCULES INCORPORATED		
KMS	FRANKLIN, VIRGINIA		
ORDER NO.			
RF			
ISSUE NO.			
CW			
NORTH	Groundwater & Environmental Services, Inc.		
	23 SOUTH 17TH STREET, SUITE 201, ROANOKE, VA 24019		
	SCALE IN FEET	DATE	FOUR
	AS SHOWN	DEC. 2001	2

**U.S. ENVIRONMENTAL PROTECTION AGENCY
Region III**

**Final Decision and Response to Comments
Former Hercules Facility,
Courtland, VA
RCRA ID# VAD 003 122 165**

I. FINAL REMEDY DECISION

The United States Environmental Protection Agency (EPA) has selected the Final Remedy for the Former Hercules Facility (Facility). The Final Remedy consists of: (1) for soils, implementation and maintenance of land use restrictions to prohibit use of Facility property for residential purposes; (2) for groundwater, continuation of active treatment in the Vul-Culp unit area and monitored natural attenuation/long-term groundwater monitoring in other areas where contaminants remain above EPA's Corrective Action Objectives; and (3) for potential vapor intrusion into structures from subsurface contamination, installation of a Vapor Control System in any building with indoor vapor levels exceeding EPA's acceptable levels. Land and groundwater use restrictions will be maintained by institutional controls. The Final Remedy is based on the findings as detailed in the Statement of Basis, which was issued on September 22, 2016.

II. PUBLIC COMMENT PERIOD

EPA opened the 30-day public comment period in a public notice in the Tidewater Times newspaper on September 23, 2016. The notice provided background on the Facility and requested comment on the proposed Remedy. The public comment period ended on October 24, 2016.

III. RESPONSE TO COMMENTS

EPA received no comments on the proposed Remedy. Consequently, the Final Remedy for the Facility is unchanged from the remedy proposed in the Statement of Basis.

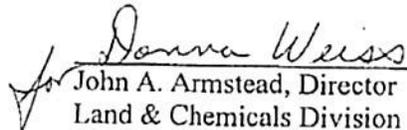
IV. AUTHORITY

EPA is issuing this Final Decision and Response to comments (Final Decision) under the authority of the Solid Waste Disposal Act, as amended by RCRA, and the Hazardous and Solid Waste Amendments (HSWA) of 1984, 42 U.S.C. Sections 6901 to 6992k.

Attachment B

V. DECLARATION

Based on the Administrative Record compiled for the Corrective Action at the Former Hercules Facility, EPA has determined that the Final Remedy selected in this Final Decision is protective of human health and the environment.



John A. Armstead, Director
Land & Chemicals Division
U.S EPA Region III

11/2/16
Date



UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION III

STATEMENT OF BASIS

**Former Hercules Facility
Courtland, VA**

EPA ID: VAD 003 122 165

Prepared by
Office of Remediation
Land and Chemicals Division

September 2016

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Section 1: Introduction

The United States Environmental Protection Agency (EPA) prepared this Statement of Basis (SB) to solicit public comment on its proposed remedy for the Former Hercules Facility (Facility or Site) located in Courtland, Virginia. The Facility was owned by Hercules, Incorporated (Hercules), and became a wholly owned subsidiary of Ashland Water Technologies in November 2008. In August 2014, the Facility was acquired by Solenis, LLC. Hercules retains financial responsibility for historic contamination at the Facility.

This SB highlights key information relied upon by EPA in proposing its remedy for the Facility. Hercules has conducted contaminant source removal activities at several units on the Facility. Where contamination remains on-site, EPA is proposing continued active groundwater treatment at the Vul-Cup Process Area and Monitored Natural Attenuation (MNA) and Long Term groundwater Monitoring (LTM) in other areas where groundwater contaminants remain above EPA's Correction Action Objectives (CAO). Also, a Vapor Control System will be installed in any building with vapor intrusion levels exceeding EPA's acceptable levels. Land and groundwater use restrictions will be maintained by institutional controls.

The Facility is subject to EPA's Corrective Action Program under the Solid Waste Disposal Act, as amended, commonly referred to as the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. Sections 6901 *et seq.* The Corrective Action Program's goal is to ensure that certain facilities subject to RCRA have investigated and cleaned up releases of hazardous waste and/or hazardous constituents that occurred at or from their property. The Commonwealth of Virginia is authorized to implement the Corrective Action Program under Section 3006 of RCRA, and as part of a workshare agreement with EPA, EPA is the lead Agency in overseeing the investigation and selecting a final remedy at the Facility.

EPA is providing thirty (30) days for public comment on this SB. Based on comments received during this period, EPA may modify its proposed remedy. EPA will announce its selection of a final remedy for the Facility in a Final Decision and Response to Comments document after the public comment period has ended.

EPA's Fact Sheet on the Facility is located at: <http://www3.epa.gov/reg3wemd/ca/va/webpages/vad003122165.html>. Information on the Corrective Action program is located at: http://www3.epa.gov/reg3wemd/ca/ca_program.htm.

The Administrative Record (AR) for the Facility contains all documents, including data and quality assurance information that EPA relied on in proposing the final remedy. Attachment B is the AR Index for the Facility. Public Participation information is provided in Section 9, below, of this SB for those interested in reviewing the AR.

Section 2: Facility Background

The Facility is located at 27123 Shady Brook Trail, Courtland, VA, 23873 in Southampton County, at the intersection of State Routes 650 and 671. Courtland is located approximately three miles southwest of the City of Franklin, VA. The Facility location is depicted in Figure 1.

The Facility consists of 120 acres, which includes 30 acres of developed land called the Main Plant Area where manufacturing takes place, and 90 acres of undeveloped land which includes two areas called the East and West Areas, respectively, as shown in Figure 2. There are two closed landfills at the Facility, one in the East Area and one in the West Area. The East and West Areas were used for disposing of wastes in the landfills and in waste pits and for wastewater sludge disposal. The East and West Areas are no longer used and the wastes were removed by Hercules as part of Interim Measures remediation activities, as discussed in Section 3.4., below.

The Nottoway River borders the West Area of the Facility, with a commercial freight railway along the southern border. A Dominion Power plant borders the East Area, and State Route 671 and a cemetery are along the northern border. Prior to Facility construction in 1956, the area was predominantly forests and farmland. Currently, the land around the Facility remains wooded with a few residences and a church located on State Route 650, the roadway dividing the Main Plant from the West Area. The location of the church is shown on Figure 1 as White Oak Springs Church.

The Main Plant currently consists of three manufacturing units: Pamolyn, Aquapel and Vul-Cup. The Pamolyn unit produces fatty acids, which are sold to other manufactures to make coatings, cosmetics, metalworking and building/construction materials among other products. The Aquapel unit produces a sizing agent used to make paper suitable for writing and printing, and the Vul-Cup unit produces an organic peroxide vulcanizing agent used in elastomers and plastics. Two earlier manufacturing units, the Rosin Size and Tall Oil Refining units, were discontinued in 1993 and 2008, respectively. The Tall Oil Refining process distilled a material extracted from tree pulp (tall oil) into rosin and fatty acids. The Rosin Size unit further processed tall oil rosin. Heat generation and wastewater treatment units support the Main Plant operations.

Section 3: Summary of Environmental Investigations

3.1 Corrective Action Regulatory History

In 1997, the Facility was permitted as a large quantity hazardous waste generator and a treatment, storage and disposal (TSD) Facility by Virginia's RCRA program. Hercules required a RCRA

Permit because Vul-Cup process wastewater (WW) contained trace organics with ignitability and corrosivity characteristics (D001/D002). The WW was incinerated in an on-site thermal oxidizer (hazardous waste incinerator), which was removed in 2001, with Clean Closure status given by Virginia in September 2002. In January 1992, the Virginia Department of Environmental Quality (VDEQ) approved, and the Facility subsequently implemented, a Corrective Action Plan (CAP) for product recovery and in 1993, a pump and treatment groundwater (GW) system in the Vul-Cup area. In 1995, VDEQ approved a revised CAP that required the GW system be replaced with biosparging treatment technology for the Vul-Cup GW.

In October 1999, EPA and Hercules entered into a RCRA Facility Lead Agreement (FLA). Under the 1999 FLA, Hercules agreed to conduct Corrective Action (CA) activities to characterize contaminant releases to soil, surface water, sediment and groundwater at the Facility and, if needed, to implement interim measures to protect human health and the environment from any releases. Specifically, Hercules performed the following Corrective Action activities: (1) Site-wide GW, soil and sediment sampling; (2) Residential well sampling; (3) Site-wide outfall sampling; (4) West Area Remedial Alternatives evaluation and interim measures; (5) Vul-Cup Source Investigations and GW remediation system evaluation/optimization; and (6) Route 671 Road Widening Interim Measures.

In October 2010, EPA and Hercules entered into a RCRA 3013 Consent Order. The Order required Hercules to complete a RCRA Facility Investigation (RFI) for four remaining Solid Waste Management Units or Areas of Concern (SWMUs/AOCs): (1) West Assembly Area; (2) Wastewater Treatment Plant Outfalls 201 and 002; (3) Heat Generation Area; and (4) Vul-Cup Area GW (see Section 3.2.1 for RFI discussion). The Order also required Hercules to complete a Corrective Measures Study (CMS) evaluating remedies for the entire Facility. Hercules submitted the *RFI* Report to EPA in 2013 and submitted the draft *CMS* for the Facility to EPA in July 2015. EPA approved the revised *RFI* Report on June 6, 2013 and conditionally approved/commented on the *CMS* in a letter dated November 3, 2015. In August 2016, Hercules submitted a *CMS Addendum* to address EPA's comments, and EPA approved the *CMS Addendum* in a letter to Hercules dated August 25, 2016.

3.2 Facility Corrective Action Investigation Summary:

3.2.1 Corrective Action RCRA Release Assessments and RCRA Facility Investigation

The *RCRA Facility Assessment (RFA)* Report, dated August 1991, identified 63 SWMUs and three AOCs at the Facility, and made recommendations for which SWMUs and AOCs needed further action. Hercules submitted a *Release Assessment Report (RA)* to EPA in March 1999 that identified 15 more SWMUs, for a total of 81 SWMUs. The *RA* included an evaluation of each SWMU and AOC for evidence of releases to the environment. The *RA* served as a Phase I *RFI* Report, under the FLA. Hercules continued further investigations of SWMUs/AOCs and in January 2002, submitted a *Release Assessment Addendum (RAA)* to EPA which served as a Phase II *RFI* Report. The *RAA* focused on the

SWMUs/AOCs identified in the *RA* as needing further investigation. The *RAA* Report recommended that of the 81 SWMUs identified, 64 needed no additional corrective action to protect human health and the environment and 17 SWMUs/AOCs required further investigation. The *RAA* Report recommendations were consistent with the *RFA* recommendations made in 1991.

The *RA* and *RAA* identified and delineated Facility releases, identified contaminants of concern and recommended that: (1) site-wide GW monitoring continue; (2) further investigation of potential sources of contamination in Vul-Cup and Heat Generation Areas be conducted; and (3) EPA proceed to remedy selection in the West Area. EPA approved the *RA* and *RAA* in June 2005.

In September 2012, a final *RFI* Report was submitted to EPA which detailed the investigations in the West Assembly Area, Wastewater Treatment Plant Outfall 201 and 002, Heat Generation Area and Vul-Cup Area GW as recommended in the *RFA*, *RA* and *RAA*. EPA approved the *RFI* Report on June 6, 2013. The findings of the *RA*, *RAA* and *RFI* and *CMS Addendum* Reports are discussed below.

3.3 Findings of Sitewide Investigations

1. Site Geology and Hydrogeology: The Facility is located in the flat lying coastal plain province of Virginia, at approximately 20 feet above mean sea level. The Facility is underlain by a fining upward sequence of unconsolidated sand, silt, clay and some peat, classified as part of the Columbia Group. On-site, the Columbia is overlain by engineered fill, consisting mostly of sand and gravel. Below the Columbia Group, at about 15 to 25 feet below the surface, lies the Yorktown Formation. This formation, also sand and silt, forms the first confining layer beneath the Facility.

Groundwater (GW) is encountered at four to eight feet below ground surface (bgs) and represents the unconfined aquifer or water table. A low permeability clay layer at 12 to 20 feet bgs acts as an aquitard to the downward movement of water and contaminants. Site-specific contaminants are limited to the shallow groundwater zone (Columbia), as confirmed by Site investigations. For potable water, the Facility relies on an on-site well drawing from 334 feet bgs. For process water, the Facility relies on GW wells with pumping zones hundreds of feet bgs, which are not impacted by Facility contamination.

2. Residential Well Sampling Results: In July 2003, the Facility submitted the revised *Residential Well Sampling Workplan* to EPA. EPA approved the *Workplan* in August 2003 and the subsequent *Residential Well Sampling Summary Letter Report* in October 2004. Hercules contacted GW well owners located within 0.5 miles of the Facility to request permission to sample the wells. Five residences, one church and two commercial/industrial properties relying on wells were located within the 0.5 mile radius. During a door to door survey, the Facility found that one well supplied two residences and the White Oak Springs Church. Another well was shared between two other residences and one well supplied the remaining residence.

The Facility sampled the three residential and two commercial/industrial wells. Results indicated that Facility contaminants were not impacting any of the off-site wells. One of the sampled commercial wells had low level semi-volatile organic compounds (sVOCs) detected at levels below lab method detection limits. The sVOCs, which generally are less mobile in GW, were most likely from heavy equipment emissions nearby their commercial operations. The residential well supplying two residences and the church were resampled in 2007 and 2010 at the owners' request. The resampling results showed no detections of Facility related chemicals and the few metals detected in the sample were within naturally occurring background levels for GW in the area. The off-site wells draw water in deeper zones beneath the shallow water table aquifer. Sampling results were shared with the well owners.

3. Soil and Sludge Sampling Results: Soil samples were collected from varying depths at the SWMUs/AOCs, biased towards locations where releases could have occurred or were suspected of occurring in the past. Because of shallow GW, soil samples were collected no deeper than 5 – 10 feet bgs. Soil samples were analyzed for volatile organic compounds (VOCs), sVOCs, metals and process specific analytes that were not on the RCRA Appendix IX lists. Soil results were screened against EPA's Risk Based Concentrations (RBCs). There were many detections of Site-related contaminants with few exceeding the residential RBCs screen. However, no contaminants in soil samples exceeded its RBCs for industrial use. Current and future use of the Facility property is expected to remain industrial. Some soil samples were analyzed for dioxin/furans and poly-chlorinated biphenyls (PCBs). While sampling results detected the presence of some dioxin congeners at two of the four locations sampled, all dioxin levels were below the RBCs for industrial use. PCBs were not detected.

Sludge and soil samples were collected from the West Area wastewater (WW) Lagoon, Sprayfield and Waste Pits for characterization in preparation for removal, as discussed under Section 3.4 (West Area Interim Measures), below. The unlined WW Lagoon contained about 1.5 million gallons of water with about two to three feet of sludge accumulated on the bottom. Composites of sludge and composites of soil beneath the WW Lagoon were sampled and analyzed for VOCs, sVOCs, tentatively identified compounds (TICs), metals and total petroleum hydrocarbons (TPH). Samples collected for VOCs were not composited. One sludge and one soil composite were analyzed for dioxins/furans. The sludge results were screened against RBCs for soil for comparison purposes. Constituents exceeding the industrial RBCs in sludge were 1,2-dichloropropane (PDC), benzene and tetrachloroethylene, and in soil, only benzene. The sVOCs and TICs were detected at high levels, and were estimated due to laboratory dilution requirements. The sludge composite contained a dioxin/furan congener above the industrial RBC.

The Sprayfield paired sludge and soil samples were analyzed for VOCs, sVOCs, metals and TPH and a paired composite (one each for sludge and soil) was analyzed for dioxins/furans. No analytes were found that exceeded industrial RBCs.

4. Sitewide Outfall and Sediment Sampling: Figure 2 shows the locations of the Facility's outfall ditches/locations. Soil and sediment from outfalls 001, 002, 003 and 004 were analyzed for VOCs, sVOCs, metals and TICs. Outfalls 001, 003 and 004 showed no constituents exceeding residential RBCs. Outfall 002 is discussed below.

Outfall 002 receives discharges from the WW Treatment Plant, non-contact cooling water, effluent from Aquapel neutralization and stormwater runoff. Outfall 002 discharges are conveyed in a discharge conduit to the Nottoway River that borders the West Area. A sediment/soil sample collected from Outfall 002 in January 1998 showed only one sVOC exceeding its industrial RBC. Later, in November 1998, a spill from the neighboring Power Plant (adjacent the East Area) drained into the Facility's surface drainage system and discharged into Outfall 002. The Facility reported the spill to the Virginia Department of Environmental Quality (VDEQ) and described it as a soluble polymerized oil that created a hazy appearance in the water. An estimated 10 gallons of oil was released. In 2000, two years after the spill, two sediment/soil samples collected from Outfall 002 were analyzed. Five sVOCs exceeded industrial RBCs and ecological risk screening levels. Eleven years later, in 2011, six sediment samples were collected along the length of the discharge conduit. Results were compared to EPA sediment screening levels for ecological exposures and to probable effect concentrations for benthic organisms. One of the six samples exceeded EPA ecological screening levels for sVOCs, but none of the levels exceeded the probable effects level for benthic organisms. One sample analyzed for dioxin/furans exceeded EPA's RSL for industrial use for one congener, but was below the RSL in the duplicate sample. The congener distribution indicates a probable source from historic incinerator ash. The 2011 sampling showed that most of the effects of the 1998 spill had attenuated except for one sample showing sVOCs (mostly at estimated levels) that may reflect the former spill or runoff from paved surfaces.

Outfall Ditch 005 conveys stormwater to a stream named Wills Gut located adjacent to the Vul-Cup area. In 1988 a release from the Vul-Cup area was discovered, and again in 1993 a seep with Vul-Cup chemicals was found in the stormwater ditch. Four soil and two sediment samples were collected from the Outfall Ditch 005 in May 1998. The soil and sediment samples contained VOCs, sVOCs and metals below the applicable industrial RBCs, except for two soil samples that exceed the industrial RBC for two sVOCs. In October 1998, Outfall 005 was upgraded when soil and bricks were removed. Post upgrade sampling results showed that sVOCs in the soil sample location had been remediated.

5. GW Sampling Results: To characterize Facility-wide GW, 46 GW monitoring wells (MWs) are currently monitored. All but three MWs were installed into the shallow water table aquifer in the Columbia Formation. Three deeper MWs were installed to a depth of approximately 100 feet bgs, into the Yorktown aquifer, below the confining units between the shallow Columbia and the deeper Yorktown aquifers. GW has been monitored since 1998, and stream samples since 1996 for Appendix IX VOCs, sVOCs, tentatively identified compounds (TICs), metals and in the Vul-cup area, total diesel range organics (DRO) are also monitored. Monitoring has document contaminant levels and their decline over time. GW monitoring is performed according to an EPA approved GW Sampling and

Analysis Plan. GW data is screened using National Primary Drinking Water Standard Maximum Contaminant Levels (MCLs) promulgated pursuant to Section 42 U.S.C. §§ 300f et seq. of the Safe Drinking Water Act and codified at 40 CFR Part 141) and EPA RSLs. GW contaminant ranges are shown in Table 1 below, using the most recent data (2014).

Site related GW constituents are vertically confined to the shallow water table aquifer at depths less than 20 feet bgs. Monitoring of some GW wells has been discontinued as sampling results demonstrate downward trends in contaminant concentrations and clean-up goals (below MCLs or RSLs) are attained. Currently, GW is monitored Facility-wide every 15 months, with Vul-Cup wells sampled every 12 months, and selected wells sampled biannually.

GW contaminant levels have remained stable, have declined or exhibit no trend over time, as shown using the Mann-Kendell statistical analysis of the GW data set shown in Attachment A. Contaminant decline and stability can be attributed to: (1) the removal of contaminant sources in the East and West Areas; (2) active GW remediation in the Vul-Cup Area; (3) biochemical breakdown of contaminants through natural processes; and (4) dilution and dispersion. Overall, contaminant levels are declining (See Attachment A for trend analysis). A few contaminants show an increasing trend in a few wells; iron, manganese and vanadium in a few West Area wells, benzene and diphenyl either in a well in the Heat Generation Area, and benzene and PDC in two East Area wells. In the Vul-Cup area, trends show decreasing or stable contaminant levels. GW Reports have been submitted to EPA since 2004.

Contaminant	MCL	RSL	Range
West Area			
1,1-dichloroethane	--	2.7	3.5 - 12
1,2-dichloropropane	5		5.7 - 22
benzene	5		5.6 – 8.7
tert-butyl alcohol	--	140 ¹	34 – 12,000
iron	--	14,000	29,000 – 36,000
manganese	--	430	530 – 1,200
Main Plant			
1,2-dichloropropane	5		110
vanadium	--	86	770
Heat Generation			
biphenyl ether	--	680 ²	1,300
Vul-Cup			
1,2-dichloropropane	5	--	7 – 1,200 D
tert-butyl alcohol	--	140 ¹	250 – 430,000 H
cumene	--	450	540 - 790

Contaminant	MCL	RSL	Range
naphthalene	--	0.17	19 - 23
naphtha	--	0.15	0.17 – 3.9
iron	--	14,000	15,000
East Area			
1,2-dichloropropane	--	0.44	5.4 – 2,300
benzene	5		19
methyl tert butyl ether	--	14	3,000
tert-butyl alcohol	--	140 ¹	190 – 13,000
iron	--	14,000	23,000 – 26,000
manganese	--	430	450 - 590

1 – Delaware screening level – no MCL or RSL established; 2 – EPA-3 calculation – no MCL or RSL established;
H – lab flag: sample prepped beyond holding time; D- lab flag: extract diluted for analysis.

6. Route 671 Road Widening Interim Measure: State Route 671 bounds the northern border of the Facility. In 2002, the Virginia Department of Transportation (VDOT) planned to add two lanes to the existing Route 671 and prepared an *Environmental Site Assessment Plan*, dated August 2002, to assess the right-of-way (ROW) along the Facility boundary for any soil and groundwater contamination. Hercules agreed to characterize the soil and groundwater, while VDOT would perform the necessary excavation, transportation and soil disposal. In November 2003, EPA approved the *Route 671 Widening Interim Measures Workplan*, which had been submitted to EPA by Hercules in July 2003. Seven soil and two GW samples were collected and analyzed. Hercules reported the results to EPA in a *Summary Letter Report* dated May 5, 2004. The results showed that Facility-related soil and GW did not exceed EPA RSLs within the proposed cut limits of the ROW, confirming that contamination had not moved north beyond Rte. 671. EPA approved the *Summary Letter Report* on October 5, 2004.

3.4 Summary of Interim or Remedial Activities

Prior to entering into the FLA, Hercules completed the following remedial activities as detailed in the *Construction Completion Report, Limited Remedial Activities*, dated March 1999: (1) Heat Generation Area contaminated soil removal; (2) Vul-Cup Area brick removal and outfall upgrade; (3) Vul-Cup product recovery and GW remediation using a pump and treatment system beginning in 1991; (4) West Area Wastewater Treatment Plant remediation; and (5) East Area waste removal and operation and maintenance activities at the former East Area Landfill. Also, under VDEQ oversight, the Vul-Cup Thermal Oxidizer was closed and Hercules received a Clean Closure letter under RCRA from VDEQ in September 2002. These interim measures are detailed below.

East Area Waste Removal and Improvements: In November 1999, the Facility completed remediation activities in the East Area. The objective of the activities were to remove the wastes from three Waste Pits (SWMUs 27, 28, 29) then fill, grade and seed the excavations and perform maintenance on the nearby permitted closed sanitary landfill (SWMU 45). The Waste Pits contained fatty acid chloride

wastes from the Aquapel Process neutralization basins. One of the Waste Pits was also used for drum and drum waste disposal. The three Waste Pits were approximately 5 feet deep, underlain by a natural clay layer with a soil covering on top. Approximately 2,500 tons of non-hazardous waste was excavated from the three Waste Pits and shipped off-site to a permitted Waste Management Facility in Waverly, VA. Prior to excavation, the waste was characterized and 1,2-dichloropropane (PDC) was the only site related contaminant exceeding EPA's 1998 industrial RBC. Consequently, the goal was to remove the source of PDC loading to GW in the East Area, which was conducted. In addition to waste removal, the Facility found and removed 441 scrap drum carcasses, and over 89 drums with Aquapel waste and 80 drums with liquids. The Aquapel waste drums contained the same non-hazardous waste found in the Waste Pits, and the drums with unknown liquids were tested and blended where possible. The Facility shipped 80 liquid containing drums off-site, with 53 of the 80 drums sent to an incinerator in Illinois (ONYX) and 27 drums to an ONYX Facility in Ohio where the liquids were disposed of by fuel blending. After completing the waste and drum removals, clean tested borrow soil was trucked in and mixed with uncontaminated site soil and placed in the empty Waste Pits. The soil was graded, hydro-seeded and mulched. Clean borrow soil from off-site was used to build up the soil cap on the former landfill (SWMU-45), which was graded, compacted, hydro-seeded and mulched to create desirable runoff characteristics. The waste and drum removal was completed in November 1999. The Facility submitted the *Report on East Area Improvements* in February 2006. EPA approved the *Report on East Area Improvements* in October 2006.

West Area Interim Measures: In 2010, Hercules conducted source removals in the West Area. The West Area contained: waste sludge material in the wastewater holding Lagoon (SWMU 14); three Waste Pits (SWMUs 20, 21, 22); and Landfill Areas-3 and -4, all unlined. The West Area Waste Pits, Landfill Areas and Lagoon were investigated and characterization of the waste was included in the 2002 *RAA* Report. The waste was typically sludges of varying consistencies from former waste and wastewater treatment activities managed in the West Area. The Facility disposed of waste in the West and East Areas, prior to regulations requiring restrictions and permits. The West Area was and remains without public sewers. Before the wastewater treatment system was modernized, wastewater (WW) generated from the Tall Oil unit went through an oil/water separator, a neutralization tank, an equalization tank and then to the West Area equalization basin (SWMU-14 Lagoon). Hercules used an activated sludge treatment process and land applied the waste activated sludge on the West Area Sprayfield (SWMU-23 in the West Area) under a Virginia Pollutant Discharge Elimination System (VPDES) permit. Years earlier in 2003, use of the West Area Lagoon and Sprayfield was discontinued after the Facility upgraded its WW treatment system. The Lagoon contained an estimated 8,383 tons of sludge and 1.5 million gallons of water. The unlined Waste Pits and Landfill Areas 3 and 4 contained mostly semi-solid wastes/sludges. The Lagoon and Waste Pit and Landfill Areas 3 and 4 waste test results showed that the waste was non-hazardous.

The objective of the West Area Interim Measures was to remove the source material (wastes) and eliminate contaminant loading in West Area GW. The Facility dewatered the Lagoon and mixed a

sludge stabilizer (Calciment®), a fly-ash based product) into the Lagoon sludge. The stabilized sludge was excavated and trucked off-site to a permitted landfill. Wastes from the Waste Pits did not need stabilization for removal and were removed directly along with contaminated non-hazardous soil from Landfill Area-4. A total of 16,808 tons of material was removed and disposed off-site. Lagoon water was treated on-site and discharged under VPDES permit to the Nottoway River. The West Area Sprayfield (SWMU-23) and a solid waste Landfill (SWMU-44) did not require remediation. Confirmation samples showed that remaining soil in the Lagoon was acceptable. The excavations were filled with clean fill and the West Area was regraded and seeded. On February 2011, the Facility submitted to EPA the *West Area Interim Measures Implementation Report*, dated January 2011, which was subsequently approved by EPA in March 2013.

Vul-Cup Groundwater Investigations and GW Remediation System: In June 1988, Facility personnel discovered a release to a storm drainage ditch in the Vul-Cup Process Area. An analysis of water from the drainage ditch determined the release was heptane and Fuel Oil #6. The Facility discovered that a 10,000 gallon aboveground storage tank (AST) containing Fuel Oil #6 had been overfilled, with an unknown quantity released. The heptane was attributed to leaking floor drains beneath the Process plant. In July 1988, the Facility closed the floor drains by filling them with concrete. In 1992, Hercules installed a recovery system to collect free product in GW and in 1993, added a GW pump and treatment system (PTS) with an air stripper. The majority of free product was removed in 1992. In November and December 1993, total petroleum hydrocarbons (TPH) increased in GW and were found seeping into a stormwater outfall ditch (Outfall 005) that discharges to a stream adjacent to Vul-Cup named Wills Gut. The Facility placed booms in the ditch and in Wills Gut Stream to capture the chemicals. Virginia approved the Facility Corrective Action Plan (CAP) for the GW treatment system, but a system evaluation in February 1995 showed that while heptane free product had been recovered, the levels of Vul-Cup and TPH constituents in GW persisted.

In August 1995, the Facility completed a *Biosparging Feasibility Study* which recommended that a biosparging system (BSS) replace the existing PTS. The CAP was modified and the BSS was constructed and began operation in 1996. The BSS consists of air injection wells installed into the water table whereby air is forced into the GW to increase oxygen levels. The oxygen and naturally occurring ammonia nitrogen promotes growth of bacteria which then metabolize the contaminants, reducing them to non-toxic compounds. In 1999, oversight of the Vul-Cup GW treatment was transferred from VDEQ to EPA as part of Corrective Action activities at the Facility. The BSS had been upgraded over the years by adding more injection points, a more powerful and reliable blower and in March 2014, a dedicated air compressor. The BSS operates 24 hours per day.

3.5 Human Health Risk Assessment (HHRA)

A HHRA was included in the *RAA* Report to assess potential future resident exposure to soil in the Main Plant Area. Exposure routes included dermal, ingestion and inhalation risk to children and

adults. Adult exposure for carcinogenic and non-carcinogenic health effects, known as the hazard quotient (HQ), fell within EPA's acceptable risk ranges (10^{-4} to 10^{-6} and $HQ < 1$). For children, the cancer risk fell within EPA's acceptable risk, but with the HQ of 1.18, just exceeding the HQ limit of 1.

The likely future use of the Facility is industrial. The exposure to contaminated soil for adults and children in a residential setting is a theoretical scenario, assuming lifetime exposures. There is potential risk of exposure for utility/construction workers because of subsurface earth moving activities, however employees of the Facility are unlikely to encounter contaminated soil because the soil is covered with asphalt or grass. Surface and subsurface soil samples collected at the Facility very seldom exceeded an industrial RBC. These few exceedances were in areas where contaminated soils were removed. Because the West Area is within the 100 year floodplain of the Nottoway River, the Facility is not planning on developing this Area. There is little risk to potential or actual receptors.

The remaining risk is from consumption of contaminated groundwater by employees. As shown throughout the investigations, Site related GW constituents are vertically confined to the shallow water table aquifer at depths of less than 20 feet bgs. The shallow water table aquifer is not used for water supplies at the Facility or the off-Site neighborhood. The GW water well used to supply water to the Facility draws water from 334 feet bgs, below several confining units. There is little risk to potential or actual receptors.

3.6 Environmental Indicators

Under the Government Performance and Results Act (GPRA), EPA has set national goals to address RCRA corrective action facilities. Under GPRA, EPA evaluates two key environmental clean-up indicators for each facility: (1) Current Human Exposures Under Control; and (2) Migration of Contaminated Groundwater Under Control. The Facility met both of these indicators for the total Facility in September 2004 and March 2011, respectively. The environmental indicator forms are linked to EPA's Fact Sheet for this Facility (see Section 1, above, for the web address).

Section 4: Corrective Measures Study

Hercules submitted a *Draft Corrective Measures Study (CMS)* to EPA dated July 2015, which evaluated Corrective Measure alternatives for GW and presented recommendations for the Main Plant Area, Heat Generation, Vul-Cup, and West and East Areas. After considering and evaluating several GW treatment technologies using EPA's threshold and balancing criteria, the following remedy for GW was proposed:

- (1) Biosparging in the Vul-Cup area of the Main Plant, with long term monitoring (LTM); and

(2) Monitored natural attenuation (MNA) of Facility related GW constituents in the Main Plant Area, East and West Areas.

EPA approved the *CMS* with some comments and the Facility addressed these comments in a *CMS Addendum* submitted in August 2016. The *CMS Addendum* evaluated the potential for volatile vapor from contaminated GW to enter current and future structures. The Facility entered current GW data into EPA's vapor intrusion screening level (VISL) calculator for commercial settings. The VISL indicated a potential for vapor intrusion (VI) in two existing on-site buildings intended for human occupation. EPA approved the *CMS Addendum* in August 2016 and indoor air is listed under the Corrective Action Objectives, below.

Section 5: Corrective Action Objectives (CAOs)

EPA's Corrective Action Objectives (CAOs) for the environmental media at the following:

1. Soil

EPA has determined that the EPA RSLs for Industrial Soils for direct contact with soils are protective of human health and the environment at this Facility provided that the Facility is not used for residential purposes. Therefore, EPA's Corrective Action Objective (CAO) for the Facility Soils is to attain (RSLs) for Industrial Soils and control exposure to the hazardous constituents remaining in soils by requiring the compliance with and maintenance of land use restrictions.

2. Groundwater

EPA expects final remedies to return usable groundwater to its maximum beneficial use within a timeframe that is reasonable given the particular circumstances of the project. For projects where aquifers are either currently used for water supply or have the potential to be used for water supply, EPA will use the National Primary Drinking Water Standard Maximum Contaminant Levels (MCLs) promulgated pursuant to Section 42 U.S.C. §§ 300f et seq. of the Safe Drinking Water Act and codified at 40 CFR Part 141). Therefore, EPA's CAO for Facility GW is to attain MCLs.

3. Vapor Intrusion

The CAO for potential vapor intrusion for occupied buildings is to control human exposure and attain EPA's acceptable cancer risk range of 10^{-4} to 10^{-6} and the non-cancer risk (hazard quotient) of 1 or less.

Section 6: EPA's Proposed Remedy

EPA's proposed remedy for the Facility is a combination of Engineering Controls (ECs) and Institutional Controls (ICs). ECs include a variety of physical devices, barriers, and management practices that contain, reduce the source of, or prevent exposure to contamination. ICs are non-engineered instruments, such as administrative and legal controls, that minimize the potential for human exposure to contamination and/or protect the integrity of the decision by limiting land or resource use. Under this proposed remedy, some contaminants remain in the soil and groundwater at the Facility above levels appropriate for residential uses. Therefore, EPA's proposed remedy requires the compliance with and maintenance of land and groundwater use restrictions which will be implemented through ICs. ICs may be established through an enforceable mechanism such as an order, permit, or an environmental covenant pursuant to the Virginia Uniform Environmental Covenants Act, Title 10.1, Chapter 12.2, Sections 10.1-1238-10.1-1250 of the Code of Virginia (Environmental Covenant). If the enforceable mechanism selected were to be an environmental covenant, it would be recorded with the Facility's property records.

EPA's proposed remedy for the Facility consists of the following components:

1. Soil:

Based on the results of the HHRA and the implementation of the East and West Area Interim Measures, there are currently no unacceptable risk to human health and the environment via soil for the present and reasonable anticipated industrial use of the Facility property. Because contaminants will remain in the Facility soils above levels appropriate for residential uses, the proposed remedy for soils is implementation and maintenance of a land use restriction that prohibit using the Facility property for residential purposes unless it is demonstrated to EPA, that such use will not pose a threat to human health or the environment or adversely affect or interfere with the selected remedy, and EPA provides prior written approval for such use.

2. Groundwater

EPA's proposed GW remedy for the Facility consists of: (a) active GW treatment in the Vul-Cup Area using bio-spargage technology until MCLs are achieved; (b) natural attenuation with continued monitoring until MCLs are achieved in other areas of the Facility and (c) groundwater use restrictions to prevent exposure to contaminants while contaminant levels remain above MCLs. Monitoring will be performed in conformance with an EPA-approved GW monitoring plan.

3. Vapor Intrusion

EPA's proposed remedy for vapor intrusion is the installation and maintenance of a vapor control

system, the design of which shall be submitted to EPA for review and approval, in the two existing on-site buildings referred to in Section 4 above. In addition, a vapor intrusion control system shall be installed in any new structures constructed above the contaminated GW plume or within 100 feet of the perimeter of the contaminated GW plume, unless is demonstrated to EPA that vapor intrusion does not pose unacceptable risk to human health and EPA provides written approval that no vapor control system is needed.

4. Institutional Controls

The ICs shall include the following land and groundwater use restrictions:

- a. The Facility property shall not be used for any purposes other than industrial unless it is demonstrated to EPA that such use will not pose a threat to human health or the environment and EPA provides prior written approval for such use;
- b. Shallow groundwater at the Facility shall not be used for any purpose other than operation, maintenance, and monitoring activities required by EPA, unless it is demonstrated to EPA, that such use will not pose a threat to human health or the environment or adversely affect or interfere with the selected remedy, and EPA provides prior written approval for such use;
- c. No new wells will be installed on Facility property unless it is demonstrated to EPA that such wells are necessary to implement the selected remedy and EPA provides prior written approval to install such wells;
- d. Compliance with the EPA approved groundwater monitoring plan;
- e. Compliance with the EPA approved Vul-Cup Operating & Maintenance Plan; and
- f. Compliance with the EPA approved Vapor Control system Operating & Maintenance Plan.

5. Outfalls and Stream:

Because outfall sediment, soil and surface water, including the Will's Gut stream, does not present unacceptable risk to human health or ecological receptors, EPA is proposing a remedy of Corrective Action Complete without Controls for the outfalls and the Will's Gut stream.

6. Other Requirements

In addition, the Facility shall provide EPA with a coordinate survey of Facility boundaries. Mapping the extent of the land and groundwater use restrictions will allow for presentation in a publically accessible mapping utility such as Google Earth or Google Maps.

EPA, VDEQ and/or their authorized agents and representatives, shall have access to the Facility property to inspect and evaluate the continued effectiveness of the final remedy and if necessary, to conduct additional remediation to ensure the protection of the public health and safety and the environment upon the final remedy selection in the Final Decision and Response to Comments (FDRTC).

Section 7: Evaluation of EPA's Proposed Remedy

This section describes the criteria EPA used to evaluate the proposed remedy consistent with EPA guidance. The evaluation is in two phases. For the first phase, EPA evaluates the proposed remedy using three 'threshold' decision criteria as general goals. In the second phase, for remedies that meet the threshold criteria, EPA then evaluates the remaining proposed remedies using seven balancing criteria (see Table 2 below).

Threshold Criteria	Evaluation
1) Protect human health and the environment	The primary risks posed to human health and the environment by exposure to Facility contaminants are related to potential: (1) ingestion of contaminated GW; and (2) inhalation of volatile vapors in indoor air from contaminated GW beneath structures. The proposed remedy consists of (1) achieving MCLs by active treatment and MNA; (2) restricting Facility property to non-residential use; (2) providing vapor control systems in any new structures constructed over or near GW plumes with volatile contaminants; as necessary and (3) restricting use of the shallow GW aquifer for potable use until GW clean-up goals are attained.
2) Achieve media cleanup objectives	Soil investigations showed that Facility related contaminants were not found at levels exceeding industrial RSLs and future land use is expected to remain industrial. GW contaminants were found in the shallow water table aquifer, vertically confined to that layer. Generally, GW contaminant levels have declined in most instances, with plumes delineated and stable. Contaminant declines in GW can be attributed to removals of sludge/waste from Waste Pits and the West Area Lagoon, thereby removing contaminant loading to GW, and to natural attenuation of GW contaminants from biochemical break down, dilution, and dispersion. The proposed GW remedy includes active GW treatment in the Vul-Cup Area and monitoring attenuation of GW constituents in other Facility areas, and is expected to achieve media clean-up objectives in 10 to 20 years.

	The potential for the occurrence of vapor intrusion will also diminish as volatile GW levels diminish.
3) Remediating the Source of Releases	In all proposed remedies, EPA seeks to eliminate or reduce further releases of any remaining hazardous wastes and hazardous constituents from the Facility posing an unacceptable risk to human health and the environment. The Facility removed contaminated soil from the Heat Generation Area, and waste stored in the Waste Pits in the East and West Areas, and sludge stored in the West Area Lagoon. The removal of these sources removed contaminant loading to GW and eliminated exposure risks to workers and trespassers.
Balancing Criteria	Evaluation
4) Long-term effectiveness	EPA's proposed remedy will maintain protection of human health and the environment over time by reducing Site-related GW contaminants through active treatment (Vul-Cup), attenuation and by controlling exposure to any hazardous constituents that may remain in the groundwater. EPA's proposed remedy requires active treatment and MNA and the compliance with and maintenance of a groundwater use restriction for the shallow water table aquifer.
5) Reduction of toxicity, mobility, or volume of the Hazardous Constituents	The removal of wastes stored in the Waste Pits in the East and West Areas and sludge removed from the Lagoon in the West Area reduced the volume of non-hazardous contaminants and source of GW contaminant loading. Active GW treatment in the Vul-Cup area continues to reduce volume and mobility of GW contaminants in the Main Plant Area.
6) Short-term effectiveness	Waste removal from the East and West Areas has been completed, therefore, short term human exposure to waste has been eliminated.
7) Implementability	Most of the elements in the proposed remedy are already being implemented. EPA proposes to implement GW and land use restrictions through an order, permit or an environmental covenant.
8) Cost	EPA's proposed remedy is estimated to cost the Facility approximately \$60,000 per year for 18 years.
9) Community Acceptance	EPA will evaluate community acceptance of the proposed remedy by reviewing any comments submitted to EPA during the public comment period, which may include a public meeting, if requested. Responses to comments and any subsequent modifications to the proposed remedy will be written and included in the Final Decision and Response to Comments.
10) District/Agency Acceptance	VDEQ reviewed this SB and concurred with the proposed remedy.