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Subject:

Voluntary Investigation and Remediation Plan, Semiannual Progress Report #8
Hercules Savannah Facility, HSI Site No. 10696
3000 Louisville Road
Savannah, Chatham Co., Georgia

ENVIRONMENT

Date:

March 15, 2017

Contact:

David Wilderman

Dear Ms. Daniels:

ARCADIS U.S., Inc. (ARCADIS), on behalf of Hercules LLC (Hercules), is pleased to submit the enclosed Voluntary Investigation and Remediation Plan (VIRP), Semiannual Progress Report #8 (PR#8) for your review. One paper copy and two electronic copies on compact disc are enclosed.

Phone:

770.384.6532

This letter report has been prepared to fulfill the semiannual reporting requirement of the VIRP. Activities completed during this reporting period include the continued implementation of the VIRP primarily through the preparation of responses to the January 5, 2017 EPD comment letter documenting their review of Progress Report #7 (see attached). It should be noted that no groundwater monitoring activities were performed during this reporting period.

Email:

David.Wilderman@arcadis.com

Our ref:

OH01000.GA61

Ms. Carolyn Daniels
March 15, 2017

Thank you in advance for your review of the enclosed document. Please contact Mr. Tim Hassett at (302) 995-3456 or me with any questions or comments that you have regarding this report or project site.

Sincerely,

Arcadis U.S., Inc.



David Wilderman, PG
Principal Hydrogeologist, Project Manager

Copies:

Mr. Tim Hassett, Hercules LLC (electronic only)
Johnnie Quiller, Solenis, LLC (electronic only)

Enclosures:

Attachments

- 1 Response to Comment form



Document Submittal Form

Instructions: This form should be completed and included with any document submitted to the Response and Remediation Program, Response Development Units 1 – 3, that is greater than 25 pages in length or that contains paper sizes larger than 11"x17". This includes Release Notifications and documents related to Hazardous Site Inventory and Voluntary Remediation Program sites. Contact Brownfield Unit staff for Brownfield submittal guidelines. Your cooperation helps to ensure that documents are filed correctly, completely, and efficiently.

Name of Document: VIRP Semiannual Progress Report #8

Date of Document: March 15, 2017

Site Name: Solenis International, L.P., 3000 Louisville Rd., Savannah, GA

Site ID Number: HSI No. 10696

Document Submittal Checklist. Please certify that the submittal includes the following by checking each box as appropriate. Items 1 – 3 should be checked / included / certified for each submittal:

- 1. One paper copy of the document (double-sided is preferred)
- 2. Two compact discs (CDs), each containing an electronic copy of the document as a single, searchable, Portable Document Format (PDF) file. Only one CD is needed for Release Notifications. CDs should be labeled at a minimum with the following: 1) Name of Document, 2) Date of Document, 3) Site Name, and 4) Site Number. Any scanned images should have a resolution of at least 300 dpi and should be in color if applicable.
- 3. The electronic copies are complete, virus free, and identical to the paper copy except as described in Item 4 below.
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I certify that the information I am submitting is, to the best of my knowledge and belief, true, accurate, and complete.

Signature:

Name (printed): David Wilderman

Date: 3/15/2017

Organization: Arcadis U.S., Inc.

Phone: 770.384.6532

Email: David.Wilderman@arcadis.com

Receipt Date
(for EPD use only)

Attachment 1

Response to EPD Comments received January 5, 2017

Voluntary Remediation Program (VRP)

Semi-Annual Progress Report #7 (September 30, 2016)

Hercules Incorporated, Savannah Plant, HSI Site No. 10696, VRP Site 1332420701

3000 Louisville Road, Savannah, Chatham County, Georgia 31415

(Tax Parcel Nos. 2-0734-01-001 and 2-0734-03-001)

The Georgia Environmental Protection Division (EPD) has reviewed the subject submittal for the two properties known as the Hercules Inc. Savannah Plant Site, VRP Site 1332420701 (HSI No. 10696) and has the following comments:

1. Ecological Risk Assessment (Section 4 of Subject Submittal): Comments #1 through #4 of the May 11, 2016 EPD letter regarding Progress Reports #4 through #6 have not been adequately addressed. Therefore, EPD cannot concur with conclusions based on the screening-level ecological risk assessment (SLERA) presented in the March 27, 2015 Progress Report and in the referenced section of the subject submittal.

Hercules Response: *Responses to the above referenced comments have been included at the end of this document.*

2. Proposed Soil Remediation Goals/Cleanup Standards (Section 5.3 of the Subject Submittal): EPD does not agree with the proposed "remedial goals" for 1,1-biphenyl and PCBs presented in Section 5.3. Under the Georgia Voluntary Remediation Program Act (Act), available cleanup standards are the Risk Reduction Standards (RRS) of §391-3-19-.07 of the Rules for Hazardous Site Response (Rules). The remedial goals presented in Section 5.3 are not consistent with the RRS criteria. Notably, the proposed remedial goal for PCBs exceeds a 10-5 cancer risk for direct exposure and leaching to groundwater was not evaluated for either 1,1-biphenyl or PCBs.

Hercules Response: *The EPD has stated their preference to default to industrial RRS as remedial goals (RGs). However, Section 12-8-108 (5) and (6) of the VRP Act allow for the calculation of and/or adoption of alternate RGs which are protective of human health and the environment. Proposed RGs based on direct contact concentrations were selected as opposed to leaching to groundwater based on the restriction of private potable groundwater by a City Ordinance and by the proposed Uniform Environmental Covenant (UEC) that will restrict any use of shallow groundwater for potable use on site. The groundwater pathway is therefore incomplete and should not require evaluation as stated in 12-8-108 (2). Hercules will revisit and substantiate the proposed RGs for these two constituents in the next document submittal.*

3. A. Risk Reduction Standards (Tables 1a through 1c of Subject Submittal):
 - 3.a Delineation standards in soil and groundwater have been proposed for bis (2-chloroethyl) ether and phenol on Table 1a of the subject submittal. However, these substances do not appear on Tables 1b or 1c summarizing residential (Type 1/2) and non-residential (Type 3/4) RRS for

groundwater and soil, respectively. If a delineation standard is required for a specific regulated substance, then appropriate cleanup standards should be proposed unless it can be demonstrated that said substance has not been detected in soil or groundwater at concentrations above its respective delineation standards.

Hercules Response: *These two constituents were inadvertently omitted from Table 1B and 1C in PR#7 and both will be added to subsequent submittals.*

Please note:

- i. Analytical results for samples representing in-situ soil were not summarized in the subject submittal. Please include a table summarizing the referenced soil analytical results in future progress reports as documentation that the referenced substances have been analyzed in soil and to support conclusions regarding: 1) the need for cleanup standards for these substances in soil and/or 2) the extent of contamination greater than delineation standards and/or cleanup standards in soil.

Hercules Response: *Tables in subsequent reports where soil data are reported will be updated to include results and RRS for bis(2-chloroethyl) ether and phenol as requested.*

- ii. Table 1b and the analytical data report provided in Appendix C of the subject submittal indicate the two referenced substances were not included in the analytical suite for the groundwater samples collected in May 2016. Please provide an explanation as to why said substances were not included in the most recent groundwater analytical suite. These substances should be included as analytical parameters for groundwater samples collected in the future until it has been demonstrated that they are not considered to be contaminants of concern for the subject Properties and EPD provides written documentation concurring with said conclusion.

Hercules Response: *Both compounds will be analyzed for and reported as part of tables in subsequent reports.*

- 3b. Table 1a of the subject submittal states the "detection limit" is the delineation standard for bis (2-chloroethyl) ether in groundwater. Please propose a specific value for the Type 1 RRS that is equivalent to the standard practical quantitation limit (PQL) for the analytical method used for said substance in future versions of the table (see the footnote associated with Comment #5 in EPD's May 11, 2016 letter).

Hercules Response: *A Type 1 RRS will be added to Table 1A as requested.*

- 3c. Table 1a of the subject submittal includes delineation (the higher values between Type 1 and Type 2 RRS) standards for the referenced substances in soil; however, the applicant has not previously proposed said standards in the past and did not include the necessary documentation (calculations and input values with source references) in past submittals. Please provide said documentation in the next progress report for EPD review.

Hercules Response: *The delineation standards for soil noted above were presented in Appendix C of the April 9, 2012 VIRP and RRS were summarized in Tables 7 and 8 of that document. In response to that submittal, the EPD provided a list of RRS that could be adopted for use with no further discussion in their January 14, 2014 email. Tables 1a, 1b,*

and 1c reflect the RRS that were provided by EPD and there should be no need to provide support for those RRS.

- 3d. Compliance with Type 4 RRS, as referenced in Section 5.4 of the subject submittal, is based on a direct comparison of soil and groundwater analytical results with the approved Type 4 RRS as determined pursuant to §391-3-19-.07(9) of the Rules. Any areas where Hercules will depend upon institutional and/or engineering controls to prevent unacceptable exposure or impact to potential receptors (including the leaching to groundwater pathway) will need to demonstrate compliance with Type 5 RRS described in §391-3-19-.07(10) of the Rules.

Hercules Response: *Hercules intends to utilize land use controls for the purpose of certifying compliance with site-specific cleanup standards at select areas of this facility as allowed in the VRP Act, O.C.G.A. § 12-8-107 (h). A UEC will be executed restricting groundwater use site-wide. Delineation standards of Type 4 RRS or below will be met for areas beyond any area where controls are used to reach Type 5 RRS.*

4. Groundwater Sampling Procedures:

- a. In addition to the information provided on groundwater field sampling records provided in Appendix B of the subject submittal, future field records should include a calculation of volume of water in the well (not just the sampling equipment) prior to purging and should indicate the method of sample collection (e.g., "straw method", "vacuum jug method", *etc.* for samples to be analyzed for SVOCs).

Hercules Response: *Calculation of the volume in the well should not be needed at wells where purging and sampling is performed in accordance with USEPA Science and Ecosystem Support Division (SESD) SESDPROC-301-R3, Section 3.2.2. Calculations of well volume will be provided for wells where traditional multiple volume purge methods (Section 3.2.1) are used to collect a groundwater sample.*

- b. Comment #8 of EPD's May 11, 2016 letter has not been adequately addressed as neither the groundwater field sampling records for the May 2016 sampling event nor the narrative in Section 3.2.1 reference the use of a vacuum jug for SVOC sample collection. Please refer to the referenced May 2016 EPD comment for future groundwater sampling activities.

Hercules Response: *Additional text will be provided to adequately describe the sampling method used to collect SVOC samples in future reports.*

5. Planned Delineation and Remedial Actions (Sections 5.1 and 5.4 of the Subject Submittal):

- a. Please review your soil analytical results and collect and analyze groundwater samples in each source area where soil contamination has not been delineated vertically above the water table. As has been stated in the past, if soil contamination is not vertically delineated by analytical results before encountering the water table in any source area, a groundwater sample should be collected and analyzed for those substances not delineated in soil at a minimum. Based solely on Figures 6 through 8c in the subject submittal, vertical delineation of contamination in soil has not been achieved before encountering groundwater in several potential source/release areas on the VRP Properties. For example: PCBs and/or 1,1'-

biphenyl have not been vertically delineated before encountering the water table at borings SB-122, SB-126 and SB-128, SB-137 and SB-202, SB-207, SB-204, *etc.* Please indicate the existing or proposed groundwater sampling locations to be used and superimpose these locations on the soil analytical summary figures. You may be able to use existing groundwater sampling locations if located properly, although these cannot be determined using Figures 7a through 7c, and Figures 8a through 8c.

Hercules Response: *Over the course of the groundwater monitoring program, which spans decades, no migration of PCBs into groundwater has been observed. Hercules requests that the EPD consider the strong evidence that the ongoing groundwater monitoring program has provided to balance the need to install additional monitoring wells at this site. It should also be taken into consideration that there is an incomplete exposure pathway for shallow groundwater because of the City of Savannah Code of Ordinances, Division II, Part 5, Article C, Sections 5-1051 and 5-1053. Moreover, Hercules will execute a UEC which will eliminate the potential that the potable groundwater exposure pathway for shallow groundwater would become complete. These two controls effectively render the exposure pathway incomplete as stated in O.C.G.A. § 12-8-108(2) and, in accordance with this Section, the groundwater pathway should not require evaluation.*

- b. EPD concurs that numerical modeling of the naphthalene groundwater contaminant plume is not necessary at this time as stated in Section 5.1 of the subject submittal. However, EPD requests that Hercules submit a mathematical analysis regarding plume stability *in lieu* of a numerical groundwater contaminant fate and transport model.

Hercules Response: *A mathematical analysis of plume stability will be provided in the next deliverable.*

- c. The current groundwater monitoring network is not sufficient to establish whether or not pH readings in the caustic substance release area have returned to acceptable levels. Please either: 1) collect additional groundwater pH readings in said area and summarize the results in a table *or* 2) provide a table summarizing historical field data acquired in the caustic release area subsequent to release discovery which demonstrates that pH in groundwater had returned to acceptable levels thereafter.

Hercules Response: *Hercules will review existing data regarding pH in this area. A summary of the review will be provided as part of next project deliverable. If adequate data is not available, additional samples will be collected and reported as part of the next deliverable.*

EPD is deferring further evaluation of conclusions regarding adequacy of contaminant delineation and groundwater or soil compliance with cleanup standards until comments within this letter have been adequately addressed.

Hercules Response: *Hercules acknowledges the need to provide additional supporting information as requested.*

6. Groundwater Monitoring Schedule and Reporting (Sections 5.2, 6, and 7 of Subject Submittal): Pursuant to §12-8-107(b) of the Act, *"The registered professional (for the VRP Property) shall submit at least semi-annual status reports to the director*

describing the implementation of the plan (VIRP) during the preceding period."

Therefore, EPD cannot concur with the proposed annual reporting schedule proposed in Section 7 of the subject submittal. However, semi-annual groundwater monitoring is not specifically required by the Act, nor is EPD requesting it. EPD does request that *at least* one comprehensive groundwater monitoring event be conducted shortly prior to submittal of the final compliance status report (CSR), due on or before March 15, 2018, in order to establish baseline Property-wide conditions prior to: 1) execution of any environmental covenant and/or 2) removal of the Property(ies) from the Georgia Hazardous Site Inventory (HSI).

Hercules Response: *Hercules understands and will continue to submit semiannual reports until a CSR is submitted in compliance with requirements of the Act. The frequency of groundwater sample collection may be altered as may the content of the reports to reflect the data collection efforts performed over the semiannual monitoring period.*

Please respond to the above comments in a response-to-comment format with the next semi-annual progress report due on or before March 15, 2017. If you have any questions, please contact Ms. Carolyn L. Daniels, P.G. at (404) 657-5646.

Attachments for Further Reference

Text from the May 11, 2016 EPD review of PR#4 through PR#6:

RISK ASSESSMENT (Section 5.0 of the Fourth VRP Progress Report)

1. Section 5.6 (Results): EPD does not concur with the statement, “no further evaluation of sediment is warranted.” Based on Comment # 3.a. of this letter regarding 2,3,7,8-TCDD, EPD recommends that potential risk from 2,3,7,8-TCDD in sediments be further evaluated in Step 3a of the Ecological Risk Assessment (ERA) process.

Hercules Response: *As seen in Table G-14, an ecological screening value (ESV) is not available for the 2,3,7,8-TCDD toxic equivalence (TEQ), therefore the conservative ESV for dioxins/furans was used. However, a more appropriate alternative screening value (ASV) is the USEPA Region 4 ESV for 2,3,7,8-TCDD of 0.0003 milligrams per kilogram (mg/kg). This value was derived by USEPA using the Region 4 Sediment Model based on the equilibrium partitioning approach and the highest ranked surface water quality ESV from Table 1a (Region 4 Surface Water Screening Values for Hazardous Waste Sites) of the 2015 guidance (Region 4 Ecological Risk Assessment Supplemental Guidance, USEPA 2015). It should be noted that this 2015 Region 4 Ecological Risk Assessment Supplemental Guidance (USEPA 2015) was not available when the Voluntary Investigation and Remediation Plan – Semiannual Progress Report #4 was submitted to EPD. The maximum TEQ in sediment (0.00007 mg/kg) is less than the ASV of 0.0003 mg/kg. Additionally, the ASV of 0.0003 mg/kg is based on a default organic carbon (OC) content of 1 percent, however the OC for SED-2, which reported the maximum TEQ, is 2 percent (20,000 mg/kg). Use of this higher OC content would result in a higher ASV. Based on these considerations, there is adequate information to conclude that sediment exposure conditions for aquatic wildlife are acceptable and any ecological risks are negligible. Therefore, additional ecological assessment of the Savannah Plant in regards to 2,3,7,8-TCDD in sediment is not warranted.*

2. Figure 7 (*Regulated Substances Detected in Surface Water/Sediment Samples*): There appears to be a discrepancy in the reporting of sediment analytical results for TEQ of dioxins and furans in Figure 7 and Table G-3. For instance, the maximum detections for dioxin/furans TEQs for SED-1, SED-2, and SED-3 were reported in Figure 7 as 8E-5, 5E-4, and 2E-04 mg/kg, respectively. However, Table G-3 lists 9E-06, 7E-5 and 3E-05 mg/kg, respectively. Please explain this discrepancy.

Hercules Response: *Figure 7 will be revised accordingly so that the TEQs match those presented in Table G-3.*

3. Table G-14 (*Selection of Constituents of Potential Ecological Concern (COPEC) for Sediment*):
 - a. When selecting an alternate screening value (ASV) for 2,3,7,8-TCDD, it is pertinent that the selection on which the toxicity value is based is representative of what is typically observed in the sediments at the site. Therefore, the ASV selected from Canadian Council of Ministers of the Environment (CCME) should not take precedence over other United States Environmental Protection Agency (USEPA) and non-USEPA sources that better represent the study area. Based on this recommendation, the ASV selected for 2,3,7,8-

TCDD should be the higher of the USEPA Regions 3, 4, or 5 sediment screening benchmarks. Furthermore, this revision will have an impact on the results and conclusions of the preliminary risk evaluation for sediments. Please revise accordingly.

Hercules Response: *As discussed in the response to Comment 1, a more appropriate ASV for the site is the current USEPA Region 4 ESV for 2,3,7,8-TCDD which is derived using the Region 4 Sediment Model based on the equilibrium partitioning approach and the highest ranked surface water quality ESV from Region 4 (USEPA 2015). The maximum calculated TEQ in sediment of 0.00007 mg/kg is less than the ASV of 0.0003 mg/kg, and therefore no additional assessment is warranted for 2,3,7,8-TCDD in sediment. As requested, the preliminary risk evaluation will be revised accordingly.*

- b. EPD could not replicate the ASV for acetone (i.e., Region 5). Please provide the equation parameters and a sample calculation to support the value presented in the table.

Hercules Response: *As requested, the parameters used in deriving the ASV for acetone are provided below. Because the Region 5 ecological screening levels (ESLs) have since been archived by USEPA, the current water quality benchmark (WQB) from USEPA Region 4 (i.e., chronic freshwater screening value, USEPA 2015) was used. However, this value is equivalent to the Region 5 ESL of 1.7 mg/L. In addition, the organic carbon-water partitioning coefficient (K_{oc}) was updated to match the value presented in the USEPA Regional Screening Level Chemical-specific Parameters Supporting Table (2.4 L/kg). The preliminary risk evaluation will be revised accordingly.*

$$MSQB = WQB \times \left[(f_{oc} \times K_{oc}) + \left(\frac{1 - f_{solids}}{f_{solids}} \right) \right]$$

Where:

- MSQB = modified sediment quality benchmark (mg/kg)
- K_{oc} = Organic carbon-water partitioning coefficient = 2.4 L/kg (USEPA 2016)
- F_{oc} = Fraction organic carbon = 0.01 (default)
- F_{solids} = Fraction solids = 0.5 (default)
- WQB = Water quality benchmark from USEPA Region 4 = 1.7 mg/L (USEPA 2015).

$$MSQB = 1.7 \text{ mg/L} \times [(0.01 \times 2.4 \text{ L/kg}) + ((1-0.5)/0.5)] = 1.7 \text{ mg/kg}$$

4. Table G-15 (Selection of Constituents of Potential Ecological Concern (COPEC) for Surface Water): The USEPA Region 3 surface water screening value shown for fluoride is incorrect due to a typographical error. The correct value should be 2.119 mg/L. Please note that this change does not result in the selection of fluoride as a surface water COPEC.

Hercules Response: *Table G-15 will be revised so that the correct fluoride ESV of 2.119 mg/L is presented.*

References:

United States Environmental Protection Agency (USEPA). 2015. Region 4 Ecological Risk Assessment Supplemental Guidance Interim Draft. Scientific Support Section, Superfund Division.

<https://www.epa.gov/risk/region-4-ecological-risk-assessment-supplemental-guidance>

USEPA. 2016. Regional Screening Level (RSL) Chemical-specific Parameters Supporting Table, May 2016. <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2016>