

**UNITED STATES DISTRICT COURT FOR THE
NORTHERN DISTRICT OF WEST VIRGINIA**

<p>UNITED STATES OF AMERICA and STATE OF WEST VIRGINIA,</p> <p>Plaintiffs,</p> <p>v.</p> <p>HONEYWELL INTERNATIONAL INC. & OLIN CORPORATION,</p> <p>Defendants.</p>	<p>Civil Action No. <u>5:23-CV-59</u></p>
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CONSENT DECREE

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WHEREAS, the United States of America (“United States”), on behalf of the Administrator of the United States Environmental Protection Agency (“EPA”), filed a complaint in this matter under sections 106 and 107 of the Comprehensive Environmental Response, Compensation, and Liability Act (“CERCLA”).

WHEREAS, the United States in its complaint seeks, *inter alia*: (1) reimbursement of costs incurred by EPA and the Department of Justice (“DOJ”) for response actions at the Hanlin-Allied-Olin Superfund Site in Moundsville, West Virginia (“Site”), together with accrued interest; and (2) performance by the defendants of a response action at the Site consistent with the National Contingency Plan, 40 C.F.R. part 300 (“NCP”).

WHEREAS, in accordance with the NCP and section 121(f)(1)(F) of CERCLA, EPA notified the State of West Virginia (“State”) on July 21, 2021, of negotiations with potentially responsible parties (“PRPs”) regarding the implementation of the remedial design and remedial action (“RD/RA”) for the Site, and EPA has provided the State with an opportunity to participate in such negotiations and to be a party to this Consent Decree (“Decree”).

WHEREAS, the State has also filed a complaint against the defendants in this Court alleging that the defendants are liable to the State under section 107 of CERCLA; the West Virginia Hazardous Waste Management Act, W. Va. Code § 22-18-1 *et seq.*; the West Virginia Hazardous Waste Emergency Response Fund Act, W. Va. Code § 22-19-1 *et seq.*; and all relevant rules promulgated according to these Acts.

WHEREAS, in accordance with section 122(j)(1) of CERCLA, EPA notified the United States Department of the Interior and the Natural Resources Section of the National Oceanic and Atmospheric Administration on July 21, 2021, of negotiations with PRPs regarding the release of hazardous substances that may have resulted in injury to the natural resources under federal trusteeship and encouraged the trustee(s) to participate in the negotiation of this Decree.

WHEREAS, the defendants that have entered into this Decree (“Settling Defendants”) do not admit any liability to Plaintiffs arising out of the transactions or occurrences alleged in the complaints, nor do they acknowledge that the release or threatened release of hazardous substance(s) at or from the Site constitutes an imminent and substantial endangerment to the public health or welfare or the environment.

WHEREAS, in accordance with section 105 of CERCLA, EPA listed the Site on the National Priorities List (“NPL”), set forth at 40 C.F.R. part 300, Appendix B, by publication in the Federal Register on July 22, 1999, 55 Fed. Reg. 39878.

WHEREAS, in response to a release or a substantial threat of a release of hazardous substances at or from the Site, Settling Defendants completed a Remedial Investigation for the Site on July 6, 2018, and a Feasibility Study for the Site on March 5, 2020, in accordance with 40 C.F.R. § 300.430.

WHEREAS, in accordance with section 117 of CERCLA and 40 C.F.R § 300.430(f), EPA published notice of the completion of the Feasibility Study and of the proposed plan for remedial action on July 10, 2020, in a major local newspaper of general circulation. EPA

provided an opportunity for written and oral comments from the public on the proposed plan for remedial action. A copy of the transcript of the public meeting and comments received are available to the public as part of the administrative record upon which the Division Director for the Superfund and Emergency Management Division, EPA Region 3, based the selection of the response action.

WHEREAS, EPA selected a remedial action to be implemented at the Site, which is embodied in a final Record of Decision (“Record of Decision”), executed on June 23, 2021, on which the State has given its concurrence. The Record of Decision includes a summary of responses to the public comments. Notice of the final plan was published in accordance with section 117(b) of CERCLA.

WHEREAS, based on the information currently available, EPA and the State have determined that the Work will be properly and promptly conducted by Settling Defendants if conducted in accordance with this Decree.

WHEREAS, the Parties recognize, and the Court by entering this Decree finds, that this Decree has been negotiated by the Parties in good faith, that implementation of this Decree will expedite the cleanup of the Site and will avoid prolonged and complicated litigation between the Parties, and that this Decree is fair, reasonable, in the public interest, and consistent with CERCLA.

NOW, THEREFORE, it is hereby **ORDERED** and **DECREED** as follows:

I. JURISDICTION AND VENUE

1. This Court has jurisdiction over the subject matter of this action under 28 U.S.C. §§ 1331, 1367, and 1345, and sections 106, 107 and 113(b) of CERCLA, and personal jurisdiction over the Parties. Venue lies in this District under section 113(b) of CERCLA and 28 U.S.C. §§ 1391(b), and 1395(a), because the Site is located in this judicial district. This Court retains jurisdiction over the subject matter of this action and over the Parties for the purpose of resolving disputes arising under this Decree, entering orders modifying this Decree, or effectuating or enforcing compliance with this Decree. Settling Defendants may not challenge the terms of this Decree or this Court’s jurisdiction to enter and enforce this Decree.

II. PARTIES BOUND

2. This Decree is binding upon the United States and the State and upon Settling Defendants and their successors. Unless the United States and the State otherwise consent, (a) any change in ownership or corporate or other legal status of any Settling Defendant, including any transfer of assets, or (b) any Transfer of the Site or any portion thereof, does not alter any of Settling Defendants’ obligations under this Decree. Settling Defendants’ responsibilities under this Decree cannot be assigned except under a modification executed in accordance with ¶ 74.

3. In any action to enforce this Decree, Settling Defendants may not raise as a defense the failure of any of their officers, directors, employees, agents, contractors,

subcontractors, or any person representing Settling Defendants to take any action necessary to comply with this Decree. Settling Defendants shall provide notice of this Decree to each person representing Settling Defendants with respect to the Site or the Work. Settling Defendants shall provide notice of this Decree to each contractor performing any Work and shall ensure that notice of the Decree is provided to each subcontractor performing any Work.

III. DEFINITIONS

4. Subject to the next sentence, terms used in this Decree that are defined in CERCLA or the regulations promulgated under CERCLA have the meanings assigned to them in CERCLA and the regulations promulgated under CERCLA. Whenever the terms set forth below are used in this Decree, the following definitions apply:

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

“Consent Decree” or “Decree” means this consent decree, all appendixes attached hereto (listed in Section XIX), and all deliverables incorporated into the Decree under ¶ 7.6 of the SOW. If there is a conflict between a provision in Sections I through XXIV and a provision in any appendix or deliverable, the provision in Sections I through XXIV controls.

“Day” or “day” means a calendar day. In computing any period under this Decree, the day of the event that triggers the period is not counted and, where the last day is not a working day, the period runs until the close of business of the next working day. “Working day” means any day other than a Saturday, Sunday, or federal or State holiday.

“DOJ” means the United States Department of Justice.

“Effective Date” means the date upon which the Court’s approval of this Decree is recorded on its docket.

“EPA” means the United States Environmental Protection Agency.

“Fund” means the Hazardous Substance Superfund established under section 9507 of the Internal Revenue Code, 26 I.R.C. § 9507.

“Future Response Costs” means all costs (including direct, indirect, payroll, contractor, travel, and laboratory costs) that the United States: (a) pays between August 31, 2021 and the Effective Date; and (b) pays after the Effective Date in implementing, overseeing, or enforcing this Decree, including: (i) in developing, reviewing and approving deliverables generated under this Decree; (ii) in overseeing Settling Defendants’ performance of the Work; (iii) in assisting or taking action to obtain access or use restrictions under ¶ 12.a; (iv) in securing, implementing, monitoring, maintaining, or enforcing Institutional Controls, including any compensation paid; (v) in taking action under ¶ 22 (Access to Financial Assurance); (vi) in taking response action described in ¶ 58 because of Settling Defendants’ failure to take emergency action under ¶ 5.5 of the SOW; (vii) in implementing a Work Takeover under ¶ 9; (viii) in implementing community involvement activities including the cost of any technical assistance grant provided under section 117(e) of CERCLA; (ix) in enforcing this Decree, including all costs paid under

Section XII (Dispute Resolution) and all litigation costs; and (x) in conducting periodic reviews in accordance with section 121(c) of CERCLA. Future Response Costs also includes all Interest accrued after February 1, 2022, on EPA's unreimbursed costs (including Past Response Costs) under section 107(a) of CERCLA.

"Including" or "including" means "including but not limited to."

"Institutional Controls" means Proprietary Controls (*i.e.*, easements or covenants running with the land that (i) limit land, water, or other resource use, provide access rights, or both and (ii) are created under common law or statutory law by an instrument that is recorded, or for which notice is recorded, in the appropriate land records office) and state or local laws, regulations, ordinances, zoning restrictions, or other governmental controls or notices that: (a) limit land, water, or other resource use to minimize the potential for human exposure to Waste Material at or in connection with the Site; (b) limit land, water, or other resource use to implement, ensure noninterference with, or ensure the protectiveness of the Remedial Action; (c) provide information intended to modify or guide human behavior at or in connection with the Site; or (d) any combination thereof.

"Interest" means interest at the rate specified for interest on investments of the Fund, as provided under section 107(a) of CERCLA, compounded annually on October 1 of each year. The applicable rate of interest will be the rate in effect at the time the interest accrues. The rate of interest is subject to change on October 1 of each year. As of the date of lodging of this Decree, rates are available online at <https://www.epa.gov/superfund/superfund-interest-rates>.

"National Contingency Plan" or "NCP" means the National Oil and Hazardous Substances Pollution Contingency Plan promulgated under section 105 of CERCLA, codified at 40 C.F.R. part 300, and any amendments thereto.

"Operable Unit 1" shall mean the Interim Remedial Action for the south plant alluvial groundwater, and the final remedy for the shallow soils, former mercury cell building area, and Hanlin area sewers.

"Owner Settling Defendants" means the following Settling Defendants who own or control all or a portion of the Site: Honeywell International Inc. and Olin Corporation.

"Paragraph" or "¶" means a portion of this Decree identified by an Arabic numeral or an upper- or lower-case letter.

"Parties" means the United States, the State, and Settling Defendants.

"Past Response Costs" means all costs (including direct, indirect, payroll, contractor, travel, and laboratory costs) that the United States paid in connection with the Site through August 31, 2021, plus all interest on such costs accrued under section 107(a) of CERCLA through such date.

"Performance Standards" means the cleanup levels and other measures of achievement of the remedial action objectives, as set forth in the Record of Decision.

“Plaintiffs” means the United States and the State.

“RCRA” means the Solid Waste Disposal Act, 42 U.S.C. §§ 6901-6992k (also known as the Resource Conservation and Recovery Act).

“Record of Decision” means the EPA decision document that memorializes the selection of the remedial action relating to Operable Unit 1 at the Site signed on June 24, 2021, by the Regional Administrator, EPA Region 3, and all attachments thereto. The Record of Decision is attached as Appendix A.

“Remedial Action” means the remedial action selected in the Record of Decision.

“Remedial Design” means those activities to be undertaken by Settling Defendants to develop plans and specifications for implementing the Remedial Action as set forth in the SOW.

“Scope of the Remedy” means the scope of the remedy set forth in ¶ 1.3 of the SOW.

“Section” means a portion of this Decree identified by a Roman numeral.

“Settling Defendants” means the settling defendants identified in Appendix D. As used in this Decree, this definition means all settling defendants, collectively, and each settling defendant, individually.

“Site” means the Hanlin-Allied-Olin Superfund Site, comprising approximately 221 acres, located at State Route 2 in Moundsville, Marshall County, West Virginia, and depicted generally on the map attached as Appendix C.

“Special Account” means the special account, within the Fund, established for the Site by EPA under section 122(b)(3) of CERCLA.

“State” means the State of West Virginia.

“State Future Response Costs” means “response costs” as used in section 107(a) of CERCLA that are incurred by the State pursuant to this Consent Decree associated with the Site as it relates to Operable Unit 1 after the Effective Date.

“Statement of Work” or “SOW” means the document attached as Appendix B, which describes the activities Settling Defendants must perform to implement and maintain the effectiveness of the Remedial Action.

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

“Waste Material” means (a) any “hazardous substance” under section 101(14) of CERCLA; (b) any pollutant or contaminant under section 101(33) of CERCLA; (c) any “solid waste” under section 1004(27) of RCRA; and (d) any “hazardous waste” under section 22-18-3(6) of the West Virginia Hazardous Waste Management Act, W. Va. Code § 22-18-1 *et seq.*

“Work” means all obligations of Settling Defendants under Sections V (Performance of the Work) through VIII (Indemnification and Insurance).

“Work Takeover” means EPA’s assumption of the performance of any of the Work in accordance with ¶ 11.

IV. OBJECTIVES

5. The objectives of the Parties in entering into this Decree are to protect public health, welfare, and the environment through the design, implementation, and maintenance of a response action at the Site by Settling Defendants, to pay response costs of Plaintiffs, and to resolve and settle the claims of Plaintiffs against Settling Defendants as provided in this Decree.

V. PERFORMANCE OF THE WORK

6. Settling Defendants shall finance, develop, implement, operate, maintain, and monitor the effectiveness of the Remedial Action all in accordance with the SOW, any modified SOW and all EPA-approved, conditionally approved, or modified deliverables as required by the SOW or modified SOW.

7. Nothing in this Decree and no EPA approval of any deliverable required under this Decree constitutes a warranty or representation by EPA or the State that completion of the Work will achieve the Performance Standards.

8. Settling Defendants’ obligations to finance and perform the Work and to pay amounts due under this Decree are joint and several. In the event of the insolvency of any Settling Defendant or the failure by any Settling Defendant to participate in the implementation of the Decree, the remaining Settling Defendants shall complete the Work and make the payments.

9. Modifications to the Remedial Action and Further Response Actions

a. Nothing in this Decree limits EPA’s authority to modify the Remedial Action or to select further response actions for the Site in accordance with the requirements of CERCLA and the NCP. Nothing in this Decree limits Settling Defendants’ rights, under sections 113(k)(2) or 117 of CERCLA, to comment on any modified or further response actions proposed by EPA.

b. If EPA modifies the Remedial Action in order to achieve or maintain the Performance Standards, or both, or to carry out and maintain the effectiveness of the Remedial Action, and such modification is consistent with the Scope of the Remedy, then Settling Defendants shall implement the modification as provided in ¶ 9.c.

c. Upon receipt of notice from EPA that it has modified the Remedial Action as provided in ¶ 9.b and requesting that Settling Defendants implement the modified Remedial Action, Settling Defendants shall implement the modification, subject to their right to initiate dispute resolution under Section XII within 30 days after receipt of EPA's notice. Settling Defendants shall modify the SOW, or related work plans, or both in accordance with the Remedial Action modification or, if Settling Defendants invoke dispute resolution, in accordance with the final resolution of the dispute. The Remedial Action modification, the approved modified SOW, and any related work plans will be deemed to be incorporated into and enforceable under this Decree.

10. **Compliance with Applicable Law.** Nothing in this Decree affects Settling Defendants' obligations to comply with all applicable federal and state laws and regulations. Settling Defendants must also comply with all applicable or relevant and appropriate requirements of all federal and state environmental laws as set forth in the Record of Decision and the SOW. The activities conducted in accordance with this Decree, if approved by EPA, will be deemed to be consistent with the NCP as provided under section 300.700(c)(3)(ii).

11. **Work Takeover**

a. If EPA determines that Settling Defendants (i) have ceased to perform any of the Work required under this Section; (ii) are seriously or repeatedly deficient or late in performing the Work required under this Section; or (iii) are performing the Work required under this Section in a manner that may cause an endangerment to human health or the environment, EPA may issue a notice of Work Takeover to Settling Defendants, including a description of the grounds for the notice and a period of time ("Remedy Period") within which Settling Defendants must remedy the circumstances giving rise to the notice. The Remedy Period will be 20 days, unless EPA determines in its unreviewable discretion that there may be an endangerment, in which case the Remedy Period will be 10 days.

b. If, by the end of the Remedy Period, Settling Defendants do not remedy to EPA's satisfaction the circumstances giving rise to the notice of Work Takeover, EPA may notify Settling Defendants and, as it deems necessary, commence a Work Takeover.

c. EPA may conduct the Work Takeover during the pendency of any dispute under Section XII but shall terminate the Work Takeover if and when: (i) Settling Defendants remedy, to EPA's satisfaction, the circumstances giving rise to the notice of Work Takeover; or (ii) upon the issuance of a final determination under Section XII (Dispute Resolution) that EPA is required to terminate the Work Takeover.

VI. **PROPERTY REQUIREMENTS**

12. **Agreements Regarding Access and Noninterference**

a. As used in this Section, "Affected Property" means any real property, including the Site, where EPA determines, at any time, that access; land, water, or other resource use restrictions; Institutional Controls; or any combination thereof, are needed to implement the Remedial Action.

b. Settling Defendants shall use best efforts to secure from the owner(s), other than an Owner Settling Defendant, of all Affected Property, an agreement, enforceable by Settling Defendants and by Plaintiffs, requiring such owner to provide Plaintiffs and Settling Defendants, and their respective representatives, contractors, and subcontractors with access at all reasonable times to such owner's property to conduct any activity regarding the Decree, including the following:

- (1) implementing the Work and overseeing compliance with the Decree;
- (2) conducting investigations of contamination at or near the Site;
- (3) assessing the need for, planning, or implementing additional response actions at or near the Site;
- (4) determining whether the Site is being used in a manner that is prohibited or restricted, or that may need to be prohibited or restricted under the Decree; and
- (5) implementing, monitoring, maintaining, reporting on, and enforcing any land, water, or other resource use restrictions and Institutional Controls.

c. Further, each agreement required under ¶ 12.b must commit the owner to refrain from using its property in any manner that EPA, after consultation with the State, determines will pose an unacceptable risk to human health or to the environment as a result of exposure to Waste Material, or will interfere with or adversely affect the implementation, integrity, or protectiveness of the Remedial Action including the following:

- (1) Prohibit the residential use of the Site;
- (2) Ensure that any new structure constructed at the Site include engineering controls (e.g. vapor barriers) in the design, or demonstrate that the vapor intrusion pathway is not complete;
- (3) Prohibit any actions inconsistent with an established soil management plan approved by EPA, in consultation with WVDEP;
- (4) Prohibit disturbance of any remedial component, such as the GWTP building, monitoring and extractions wells, and the concrete cap at the former mercury cell building; and
- (5) Prohibit potable use of Site-wide alluvial groundwater.

d. As used in this Section, "best efforts" means the efforts that a reasonable person in the position of Settling Defendants would use to achieve the goal in a timely manner, including the cost of employing professional assistance and the payment of reasonable sums of money to secure access and/or use restriction agreements.

e. Settling Defendants shall provide to EPA and the State a copy of each agreement required under ¶ 12.b. If Settling Defendants cannot accomplish what is required through best efforts in a timely manner, they shall notify EPA, and include a description of the steps taken to achieve the requirements. If the United States deems it appropriate, it may assist Settling Defendants, or take independent action, to obtain such access or use restrictions.

13. **Access and Noninterference by Owner Settling Defendant.** The Owner Settling Defendant shall: (a) provide Plaintiffs and the Settling Defendants, and their representatives, contractors, and subcontractors with access at all reasonable times to the Site to conduct any activity regarding the Decree, including those listed in ¶ 12.b; and (b) refrain from using the Site in any manner that EPA, after consultation with the State, determines will pose an unacceptable risk to human health or to the environment because of exposure to Waste Material, or will interfere with or adversely affect the implementation, integrity, or protectiveness of the Remedial Action, including the restrictions listed in ¶ 12.c.

14. If EPA determines in a decision document prepared in accordance with the NCP that Institutional Controls in the form of state or local laws, regulations, ordinances, zoning restrictions, or other governmental controls or notices are appropriate, Settling Defendants shall cooperate with EPA's and the State's efforts to secure and ensure compliance with such Institutional Controls.

15. **Notice to Successors-in-Title**

a. Owner Settling Defendant shall, within 60 days after the Effective Date, submit for EPA approval a notice to be recorded regarding its property at the Site in the appropriate land records. The notice must: (1) include a proper legal description of the property; (2) provide notice to all successors-in-title: (i) that the property is part of, or affected by, the Site; (ii) that EPA has selected a remedy for the Site; and (iii) that potentially responsible parties have entered into a Decree requiring implementation of such remedy; and (3) identify the U.S. District Court in which the Decree was filed, the name and civil action number of this case, and the Effective Date of the Decree. Owner Settling Defendant shall record the notice within 10 days after EPA's approval of the notice and submit to EPA, within 10 days thereafter, a certified copy of the recorded notice.

b. Owner Settling Defendant shall, prior to entering into a contract to Transfer any of its property that is part of the Site, or 60 days prior to a Transfer of such property, whichever is earlier:

- (1) notify the proposed transferee that EPA has selected a remedy regarding the Site, that potentially responsible parties have entered into a Consent Decree requiring implementation of such remedy, and that the United States District Court has entered the Decree (identifying the name and civil action number of this case and the date the Court entered the Decree); and

- (2) notify EPA and the State of the name and address of the proposed transferee and provide EPA and the State with a copy of the notice that it provided to the proposed transferee.

16. Notwithstanding any provision of the Decree, EPA and the State retain all of their access authorities and rights, as well as all of their rights to require land, water, or other resource use restrictions and Institutional Controls, including related enforcement authorities, under CERCLA, RCRA, and any other applicable statute or regulations.

VII. FINANCIAL ASSURANCE

17. To ensure completion of the Work required under Section V, Settling Defendants shall secure financial assurance, initially in the amount of \$7,536,000 (“Estimated Cost of the Work”), for the benefit of EPA. The financial assurance must: (i) be one or more of the mechanisms listed below, in a form substantially identical to the relevant sample documents available from EPA; and (ii) be satisfactory to EPA. As of the date of lodging of this Decree, the sample documents can be found under the “Financial Assurance - Settlements” category on the Cleanup Enforcement Model Language and Sample Documents Database at <https://cfpub.epa.gov/compliance/models/>. Settling Defendants may use multiple mechanisms if they are limited to surety bonds guaranteeing payment, letters of credit, trust funds, insurance policies, or some combination thereof. The following are acceptable mechanisms:

- a. a surety bond guaranteeing payment, performance of the Work, or both, that is issued by a surety company among those listed as acceptable sureties on federal bonds as set forth in Circular 570 of the U.S. Department of the Treasury;
- b. an irrevocable letter of credit, payable to EPA or at the direction of EPA, that is issued by an entity that has the authority to issue letters of credit and whose letter-of-credit operations are regulated and examined by a federal or state agency;
- c. a trust fund established for the benefit of EPA that is administered by a trustee that has the authority to act as a trustee and whose trust operations are regulated and examined by a federal or state agency;
- d. a demonstration by one or more Settling Defendants that they meet the relevant test criteria of ¶ 18, accompanied by a standby funding commitment that requires the affected Settling Defendants to pay funds to or at the direction of EPA, up to the amount financially assured through the use of this demonstration in the event of a Work Takeover; or
- e. a guarantee to fund or perform the Work executed in favor of EPA by a company: (1) that is a direct or indirect parent company of a Settling Defendant or has a “substantial business relationship” (as defined in 40 C.F.R. § 264.141(h)) with a Settling Defendant; and (2) demonstrates to EPA’s satisfaction that it meets the financial test criteria of ¶ 18.

18. Settling Defendants seeking to provide financial assurance by means of a demonstration or guarantee under ¶ 17.d or 17.e must, within 30 days after the Effective Date:

a. demonstrate that:

(1) the affected Settling Defendant or guarantor has:

- i. two of the following three ratios: a ratio of total liabilities to net worth less than 2.0; a ratio of the sum of net income plus depreciation, depletion, and amortization to total liabilities greater than 0.1; and a ratio of current assets to current liabilities greater than 1.5; and
- ii. net working capital and tangible net worth each at least six times the sum of the Estimated Cost of the Work and the amounts, if any, of other federal, state, or tribal environmental obligations financially assured through the use of a financial test or guarantee; and
- iii. tangible net worth of at least \$10 million; and
- iv. assets located in the United States amounting to at least 90 percent of total assets or at least six times the sum of the Estimated Cost of the Work and the amounts, if any, of other federal, state, or tribal environmental obligations financially assured through the use of a financial test or guarantee; or

(2) the affected Settling Defendant or guarantor has:

- i. a current rating for its senior unsecured debt of AAA, AA, A, or BBB as issued by Standard and Poor's or Aaa, Aa, A or Baa as issued by Moody's; and
- ii. tangible net worth at least six times the sum of the Estimated Cost of the Work and the amounts, if any, of other federal, state, or tribal environmental obligations financially assured through the use of a financial test or guarantee; and
- iii. tangible net worth of at least \$10 million; and
- iv. assets located in the United States amounting to at least 90 percent of total assets or at least six times the sum of the Estimated Cost of the Work and the amounts, if any, of other federal, state, or tribal environmental obligations financially assured through the use of a financial test or guarantee; and

b. submit to EPA for the affected Settling Defendant or guarantor: (1) a copy of an independent certified public accountant's report of the entity's financial statements for the latest completed fiscal year, which must not express an adverse opinion or disclaimer of opinion; and (2) a letter from its chief financial officer and a report from an independent certified public accountant substantially identical to the sample letter and reports available from EPA. As of the

date of lodging of this Decree, a sample letter and report is available under the “Financial Assurance - Settlements” subject list category on the Cleanup Enforcement Model Language and Sample Documents Database at <https://cfpub.epa.gov/compliance/models/>.

19. Settling Defendants providing financial assurance by means of a demonstration or guarantee under ¶ 17.d or 17.e must also:

a. annually resubmit the documents described in ¶ 18.b within 90 days after the close of the affected Settling Defendant’s or guarantor’s fiscal year;

b. notify EPA within 30 days after the affected Settling Defendant or guarantor determines that it no longer satisfies the relevant financial test criteria and requirements set forth in this Section; and

c. provide to EPA, within 30 days of EPA’s request, reports of the financial condition of the affected Settling Defendant or guarantor in addition to those specified in ¶ 18.b; EPA may make such a request at any time based on a belief that the affected Settling Defendant or guarantor may no longer meet the financial test requirements of this Section.

20. Settling Defendants shall, within 30 days after the Effective Date, seek EPA’s approval of the form of Settling Defendants’ financial assurance. Within 30 days after such approval, Settling Defendants shall secure all executed or otherwise finalized mechanisms or other documents consistent with the EPA-approved form of financial assurance and shall submit such mechanisms and documents to the Regional Financial Management Officer, to DOJ, and to EPA and the State in accordance with ¶ 72.

21. Settling Defendants shall diligently monitor the adequacy of the financial assurance. If any Settling Defendant becomes aware of any information indicating that the financial assurance provided under this Section is inadequate or otherwise no longer satisfies the requirements of this Section, such Settling Defendant shall notify EPA of such information within seven days. If EPA determines that the financial assurance provided under this Section is inadequate or otherwise no longer satisfies the requirements of this Section, EPA will notify the affected Settling Defendant of such determination. Settling Defendants shall, within 30 days after notifying EPA or receiving notice from EPA under this Paragraph, secure and submit to EPA for approval a proposal for a revised or alternative financial assurance mechanism that satisfies the requirements of this Section. EPA may extend this deadline for such time as is reasonably necessary for the affected Settling Defendant, in the exercise of due diligence, to secure and submit to EPA a proposal for a revised or alternative financial assurance mechanism, not to exceed 60 days. Settling Defendants shall follow the procedures of ¶ 23 in seeking approval of, and submitting documentation for, the revised or alternative financial assurance mechanism. Settling Defendants’ inability to secure financial assurance in accordance with this Section does not excuse performance of any other requirement of this Decree.

22. Access to Financial Assurance

a. If EPA issues a notice of a Work Takeover under ¶ 11.b, then, in accordance with any applicable financial assurance mechanism including the related standby

funding commitment, EPA may require that any funds guaranteed be paid in accordance with ¶ 22.d.

b. If EPA is notified that the issuer of a financial assurance mechanism intends to cancel the mechanism, and the affected Settling Defendant fails to provide an alternative financial assurance mechanism in accordance with this Section at least 30 days prior to the cancellation date, the funds guaranteed under such mechanism must be paid prior to cancellation in accordance with ¶ 22.d.

c. If, upon issuance of a notice of a Work Takeover under ¶ 11.b, either: (1) EPA is unable for any reason to promptly secure the resources guaranteed under any applicable financial assurance mechanism including the related standby funding commitment, whether in cash or in kind, to continue and complete the Work; or (2) the financial assurance is a demonstration or guarantee under ¶ 17.d or 17.e, then EPA is entitled to demand an amount, as determined by EPA, sufficient to cover the cost of the remaining Work to be performed. Settling Defendants shall, within 30 days after such demand, pay the amount demanded as directed by EPA.

d. Any amounts required to be paid under this ¶ 22 must be, as directed by EPA: (i) paid to EPA in order to facilitate the completion of the Work by EPA or by another person; or (ii) deposited into an interest-bearing account, established at a duly chartered bank or trust company that is insured by the FDIC, in order to facilitate the completion of the Work by another person. If payment is made to EPA, EPA may deposit the payment into the Fund or into the Special Account to be retained and used to conduct or finance response actions at or in connection with the Site, or to be transferred by EPA to the Fund.

23. Modification of Amount, Form, or Terms of Financial Assurance. Beginning after the first anniversary of the Effective Date, and no more than once per calendar year, Settling Defendants may submit a request to change the form, terms, or amount of the financial assurance mechanism. Any such request must be submitted to EPA in accordance with ¶ 20, and must include an estimate of the cost of the remaining Work, an explanation of the bases for the cost calculation, and a description of the proposed changes, if any, to the form or terms of the financial assurance. EPA will notify Settling Defendants of its decision regarding the request. Settling Defendants may initiate dispute resolution under Section XII regarding EPA's decision within 30 days after receipt of the decision. Settling Defendants may modify the form, terms, or amount of the financial assurance mechanism only: (a) in accordance with EPA's approval; or (b) in accordance with any resolution of a dispute under Section XII. Settling Defendants shall submit to EPA, within 30 days after receipt of EPA's approval or consistent with the terms of the resolution of the dispute, documentation of the change to the form, terms, or amount of the financial assurance instrument.

24. Release, Cancellation, or Discontinuation of Financial Assurance. Settling Defendants may release, cancel, or discontinue any financial assurance provided under this Section only: (a) if EPA issues a Certification of Work Completion under ¶ 5.10 of the SOW; (b) in accordance with EPA's approval of such release, cancellation, or discontinuation; or (c) if there is a dispute regarding the release, cancellation or discontinuance of any financial assurance,

in accordance with the agreement, final administrative decision, or final judicial decision resolving such dispute under Section XII.

VIII. INDEMNIFICATION AND INSURANCE

25. Indemnification

a. Plaintiffs do not assume any liability by entering into this Decree or by virtue of any designation of Settling Defendants as EPA's and the State's authorized representatives under section 104(e)(1) of CERCLA. Settling Defendants shall indemnify and save and hold harmless Plaintiffs and their officials, agents, employees, contractors, subcontractors, and representatives for or from any claims or causes of action arising from, or on account of, negligent or other wrongful acts or omissions of Settling Defendants, their officers, directors, employees, agents, contractors, subcontractors, and any persons acting on Settling Defendants' behalf or under their control, in carrying out activities under this Decree, including any claims arising from any designation of Settling Defendants as EPA's and the State's authorized representatives under section 104(e)(1) of CERCLA. Further, Settling Defendants agree to pay Plaintiffs all costs they incur including attorneys' fees and other expenses of litigation and settlement arising from, or on account of, claims made against Plaintiffs based on negligent or other wrongful acts or omissions of Settling Defendants, their officers, directors, employees, agents, contractors, subcontractors, and any persons acting on their behalf or under their control in carrying out activities under with this Decree. Plaintiffs may not be held out as parties to any contract entered into by or on behalf of Settling Defendants in carrying out activities under this Decree. The Settling Defendants and any such contractor may not be considered an agent of Plaintiffs.

b. Either Plaintiff shall give Settling Defendants notice of any claim for which such Plaintiff plans to seek indemnification in accordance with this ¶ 25, and shall consult with Settling Defendants prior to settling such claim.

26. Settling Defendants covenant not to sue and shall not assert any claim or cause of action against Plaintiffs for damages or reimbursement or for set-off of any payments made or to be made to Plaintiffs, arising from or on account of any contract, agreement, or arrangement between any one or more of Settling Defendants and any person for performance of Work or other activities on or relating to the Site, including claims on account of construction delays. In addition, Settling Defendants shall indemnify and save and hold Plaintiffs harmless with respect to any claims for damages or reimbursement arising from or on account of any contract, agreement, or arrangement between any one or more of Settling Defendants and any person for performance of work at or relating to the Site, including claims on account of construction delays.

27. **Insurance.** Settling Defendants shall secure, by no later than 15 days before commencing any on-site Work, the following insurance: (a) commercial general liability insurance with limits of liability of \$6 million per occurrence and automobile liability insurance with limits of liability of \$6 million per accident. The insurance policy must name Plaintiffs as additional insureds with respect to all liability arising out of the activities performed by or on behalf of Settling Defendants under this Decree. Settling Defendants shall maintain this

insurance until the first anniversary after issuance of EPA's Certification of Remedial Action Completion under ¶ 5.8 of the SOW. In addition, for the duration of this Decree, Settling Defendants shall satisfy, or shall ensure that their contractors or subcontractors satisfy, all applicable laws and regulations regarding the provision of worker's compensation insurance for all persons performing the Work on behalf of Settling Defendants in furtherance of this Decree. Prior to commencement of the Work, Settling Defendants shall provide to EPA certificates of such insurance. Settling Defendants shall resubmit such certificates each year on the anniversary of the Effective Date. Each submittal of a certificate shall be accompanied by an attestation signed by the Vice President, Risk Management (or agent with authority to attest on behalf of the Settling Defendants) containing the following statement:

To the best of my knowledge, after reasonable investigation and review of SD's insurance policies and coverage, I certify that SD has insurance coverage that provides (a) commercial general liability insurance with limits of liability of at least \$6 million per occurrence and (b) automobile liability insurance with limits of liability of at least \$6 million per accident and that such coverage limits shall not be reduced and/or withheld pursuant to any deductible, endorsement, or other provision set forth in the corresponding insurance policy and is not provided on a claims-made basis. Additionally, I certify that the United States is an additional insured under such insurance policies with respect to all liability arising out of the activities performed by or on behalf of Settling Defendants under this Decree. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If Settling Defendants demonstrate by evidence satisfactory to EPA that any contractor or subcontractor maintains insurance equivalent to that described above, or insurance covering the same risks but in a lesser amount, then, with respect to that contractor or subcontractor, Settling Defendants need provide only that portion of the insurance described above that is not maintained by the contractor or subcontractor. If Settling Defendants use a contractor or subcontractor to satisfy the insurance requirements described above, Settling Defendants shall provide to EPA certificates of such insurance and a copy of each insurance policy. Settling Defendants shall resubmit such certificates and copies of policies each year on the anniversary of the Effective Date.

If a claim against the United States arises out of the activities performed by or on behalf of Settling Defendants under this Decree that potentially triggers the insurance coverage addressed in this paragraph, the United States, as an additional insured, shall be provided with copies of the insurance policies. Settling Defendants shall ensure that all submittals to EPA under this Paragraph identify the Hanlin-Allied-Olin Superfund Site in Moundsville, West Virginia, and the civil action number of this case.

IX. PAYMENTS FOR RESPONSE COSTS

28. **Payment for Past Response Costs.** Within 30 days after the Effective Date, Settling Defendants shall pay EPA, in reimbursement of Past Response Costs in connection with the Site, \$534,165.00. The Financial Litigation Unit ("FLU") of the United States Attorney's Office for the Northern District of West Virginia shall provide to Settling Defendants, in accordance with ¶ 72, instructions for making this payment, including a Consolidated Debt

Collection System (“CDCS”) reference number. Settling Defendants shall make such payment at <https://www.pay.gov> in accordance with the FLU’s instructions, including references to the CDCS Number. Settling Defendants shall send notices of this payment to DOJ and EPA in accordance with ¶ 72. If the payment required under this Paragraph is late, Settling Defendants shall pay, in addition to any stipulated penalties owed under Section XIII, an additional amount for Interest accrued from the Effective Date until the date of payment.

29. Payments by Settling Defendants for Future Response Costs

a. **Periodic Bills.** On a periodic basis, EPA will send Settling Defendants a bill for Future Response Costs, including a “SCORPIOS Report” or other standard cost summary listing direct and indirect costs paid by EPA, its contractors, subcontractors, and DOJ. Settling Defendants may initiate a dispute under Section XII regarding a Future Response Cost billing, but only if the dispute relates to one or more of the following issues: (i) whether EPA has made an arithmetical error; (ii) whether EPA has included a cost item that is not within the definition of Future Response Costs; or (iii) whether EPA has paid excess costs as a direct result of an EPA action that was inconsistent with a specific provision or provisions of the NCP. Settling Defendants must specify in the Notice of Dispute the contested costs and the basis for the objection.

b. **Payment of Bill.** Settling Defendants shall pay the bill, or if they initiate dispute resolution, the uncontested portion of the bill, if any, within 60 days after receipt of the bill. Settling Defendants shall pay the contested portion of the bill determined to be owed, if any, within 60 days after the determination regarding the dispute. Each payment for: (i) the uncontested bill or portion of bill, if late, and; (ii) the contested portion of the bill determined to be owed, if any, must include an additional amount for Interest accrued from the date of receipt of the bill through the date of payment. Settling Defendants shall make payment at <https://www.pay.gov> using the “EPA Miscellaneous Payments Cincinnati Finance Center” link, and including references to the Site/Spill ID and DJ numbers listed in ¶ 72 and the purpose of the payment. Settling Defendants shall send notices of this payment to DOJ and EPA in accordance with ¶ 72.

c. **Periodic Payments to State.** The State will send Settling Defendants a bill requiring payment of State Future Response Costs that includes a cost invoice on a periodic basis. Settling Defendants shall make all payments within sixty (60) days after Settling Defendant’s receipt of each bill requiring payment, unless such cost invoice is disputed by Settling Defendants, in which case such dispute is subject to the same dispute resolution procedure as set forth in ¶ 29(a). Settling Defendants shall make all payments to the State required by this Paragraph by wire transfer, Automated Clearing House, or official bank check(s) made payable to the West Virginia Department of Environmental Protection. If Settling Defendants choose to utilize either wire transfer or Automated Clearing House methods of payment, Settling Defendant shall contact the State to obtain the necessary transfer information. Settling Defendants shall send the bank check(s) to the following address:

West Virginia Department of Environmental Protection
Office of Environmental Remediation
Attn: Greg Null

601 57th St. SE
Charleston, West Virginia 25304

30. **Deposit of Payments.** EPA may, in its unreviewable discretion, deposit the amounts paid under ¶¶ 28 and 29.b, in the Fund, in the Special Account, or both. EPA may, in its unreviewable discretion, retain and use any amounts deposited in the Special Account to conduct or finance response actions at or in connection with the Site, or transfer those amounts to the Fund.

X. DISBURSEMENT OF SPECIAL ACCOUNT FUNDS

31. **Creation of the Disbursement Special Account and Agreement to Disburse Funds to Settling Defendants.** Within 30 days after the Effective Date, EPA will establish the Hanlin-Allied-Olin Disbursement Special Account (“Disbursement Special Account”) and shall transfer \$1,700,000 from the Special Account to the Disbursement Special Account. Subject to the terms and conditions set forth in this Section, EPA agrees to make the funds in the Disbursement Special Account, including Interest Earned on the funds in the Disbursement Special Account, available for disbursement to Settling Defendants as partial reimbursement for performance of the Work. EPA shall disburse funds from the Disbursement Special Account to Settling Defendants in accordance with the procedures and milestones for phased disbursement set forth in this Section. For purposes of this Paragraph, “Interest Earned” means interest earned on amounts in the Hanlin-Allied-Olin Disbursement Special Account, which will be computed monthly at a rate based on the annual return on investments of the EPA Hazardous Substance Superfund. The applicable rate of interest will be the rate in effect at the time the interest accrues.

32. **Timing and Amount of Disbursements.** Within 120 days after EPA’s receipt of a Cost Summary and Certification, as defined by ¶ 34.b, or if EPA has requested additional information under ¶ 34.b or a revised Cost Summary and Certification under ¶ 34.d, within 120 days after receipt of the additional information or revised Cost Summary and Certification, and subject to the conditions set forth in this Section, EPA shall disburse the funds from the Disbursement Special Account at the completion of the following milestones, and in the amounts set forth below:

Milestone	Funds to be Disbursed
1. EPA approval of RD work plan	Up to 30% of funds from the Disbursement Special Account as supported by Cost Summary
2. EPA approval of the RA work plan	Up to 30% of funds from the Disbursement Special Account as supported by Cost Summary
3. EPA certification of construction completion	40% of funds from the Disbursement Special Account as supported by Cost Summary

33. EPA shall disburse the funds from the Disbursement Special Account to Settling Defendants pursuant to instructions for electronic funds transfer, which the Settling Defendants shall provide to EPA no later than the day the Settling Defendants submit their Cost Summary and Certification to EPA.

34. Requests for Disbursement of Special Account Funds

a. Within 120 days after issuance of EPA's written confirmation that a milestone of the Work, as defined in ¶ 32, has been satisfactorily completed, Settling Defendants shall submit to EPA a Cost Summary and Certification, as defined in ¶ 34.b, covering the Work performed up to the date of completion of that milestone. Settling Defendants shall not include in any submission costs included in a previous Cost Summary and Certification following completion of an earlier milestone of the Work if those costs have been previously sought or reimbursed in accordance with ¶ 32.

b. Each Cost Summary and Certification must include a complete and accurate written cost summary and certification of the necessary costs incurred and paid by Settling Defendants for the Work covered by the particular submission, excluding costs not eligible for disbursement under ¶ 35. Each Cost Summary and Certification must contain the following statement signed by the Vice President, Global Remediation and Site Redevelopment of a Settling Defendant, an Independent Certified Public Accountant, or other specified independent person acceptable to EPA:

To the best of my knowledge, after thorough investigation and review of Settling Defendants' documentation of costs incurred and paid for Work performed in accordance with this Decree [insert, as appropriate: "up to the date of completion of milestone 1," "between the date of completion of milestone 1 and the date of completion of milestone 2," or "between the date of completion of milestone 2 and the date of completion of the milestone 3,"] I certify that the information contained in or accompanying this submission is true, accurate, and complete. I am aware that there are significant penalties for knowingly submitting false information, including the possibility of fine and imprisonment.

c. The Vice President, Global Remediation and Site Redevelopment of a Settling Defendant, Independent Certified Public Accountant, or other specified independent person acceptable to EPA shall also provide EPA a list of the documents that he or she reviewed in support of the Cost Summary and Certification. Upon request by EPA, Settling Defendants shall submit to EPA any additional information that EPA deems necessary for its review and approval of a Cost Summary and Certification.

d. If EPA finds that a Cost Summary and Certification includes an arithmetical error, costs excluded under ¶ 35, costs that are inadequately documented, or costs submitted in a prior Cost Summary and Certification, EPA will notify Settling Defendants and provide them an opportunity to cure the deficiency by submitting a revised Cost Summary and Certification. If Settling Defendants fail to cure the deficiency within 30 days after being notified of, and given the opportunity to cure, the deficiency, EPA will recalculate Settling Defendants' costs eligible for disbursement for that submission and disburse the corrected amount to Settling Defendants in accordance with the procedures in ¶ 32. Settling Defendants may dispute EPA's recalculation under this Paragraph in accordance with Section XII. In no event may Settling Defendants be disbursed funds from the Disbursement Special Account in excess of amounts properly documented in a Cost Summary and Certification accepted or modified by EPA.

35. **Costs Excluded from Disbursement.** The following costs are excluded from, and may not be sought by Settling Defendants for, disbursement from the Disbursement Special Account: (a) response costs paid in accordance with Section IX; (b) any other payments made by Settling Defendants to the United States in accordance with this Decree, including any Interest or stipulated penalties paid in accordance with Sections IX or XIII; (c) attorneys' fees and costs, except for reasonable attorneys' fees and costs necessarily related to obtaining access or institutional controls as required by Section VI; (d) costs of any response activities Settling Defendants perform that are not required under, or approved by EPA under, this Decree; (e) costs related to Settling Defendants' litigation, settlement, development of potential contribution claims, or identification of defendants; (f) internal costs of Settling Defendants, including salaries, travel, or in-kind services, except for those costs that represent the work of employees of Settling Defendants directly performing the Work; (g) any costs incurred by Settling Defendants before the Effective Date or (h) any costs incurred by Settling Defendants under Section XII.

36. **Termination of Disbursements.** EPA's obligation to disburse funds from the Disbursement Special Account under this Decree terminates upon EPA's determination that Settling Defendants: (a) have knowingly submitted a materially false or misleading Cost Summary and Certification; (b) have submitted a materially inaccurate or incomplete Cost Summary and Certification, and have failed to correct the materially inaccurate or incomplete Cost Summary and Certification within 30 days after being notified of, and given the opportunity to cure, the deficiency; or (c) failed to submit a Cost Summary and Certification as required by ¶ 34 within 120 days (or such longer period as EPA agrees) after being notified that EPA intends to terminate its obligation to make disbursements under this Section because of Settling Defendants' failure to submit the Cost Summary and Certification as required by ¶ 34. EPA's obligation to disburse funds from the Disbursement Special Account also terminates upon EPA's assumption of performance of any portion of the Work in accordance with ¶ 9, when such assumption of performance of the Work is not challenged by Settling Defendants or, if challenged, is upheld under Section XII. Settling Defendants may dispute EPA's termination of special account disbursements under Section XII.

37. **Recapture of Disbursements.** Upon termination of disbursements from the Disbursement Special Account under ¶ 36, if EPA has previously disbursed funds from the Disbursement Special Account for activities specifically related to the reason for termination, e.g., discovery of a materially false or misleading submission after disbursement of funds based on that submission, EPA shall submit a bill to Settling Defendants for those amounts already disbursed from the Disbursement Special Account specifically related to the reason for termination, plus Interest on that amount covering the period from the date of disbursement of the funds by EPA to the date of repayment of the funds by Settling Defendants. Within 60 days after receipt of EPA's bill, Settling Defendants shall reimburse the Fund for the total amount billed. Payment must be made in accordance with ¶ 29.b. Upon receipt of payment, EPA may, in its sole discretion, deposit all or any portion thereof in the Special Account, the Disbursement Special Account, or the Fund.

38. **Balance of Special Account Funds.** After EPA issues its written Certification of Remedial Action Completion in accordance with this Decree and after EPA completes all disbursement to Settling Defendants in accordance with this Section, if any funds remain in the

Disbursement Special Account, EPA may, in its sole discretion, transfer such funds to the Special Account or to the Fund.

XI. FORCE MAJEURE

39. “Force majeure,” for purposes of this Decree, means any event arising from causes beyond the control of Settling Defendants, of any entity controlled by Settling Defendants, or of Settling Defendants’ contractors that delays or prevents the performance of any obligation under this Decree despite Settling Defendants’ best efforts to fulfill the obligation. Given the need to protect public health and welfare and the environment, the requirement that Settling Defendants exercise “best efforts to fulfill the obligation” includes using best efforts to anticipate any potential force majeure and best efforts to address the effects of any potential force majeure (a) as it is occurring and (b) following the potential force majeure such that the delay and any adverse effects of the delay are minimized to the greatest extent possible. “Force majeure” does not include financial inability to complete the Work or a failure to achieve the Performance Standards.

40. If any event occurs for which Settling Defendants will or may claim a force majeure, Settling Defendants shall notify EPA’s Project Coordinator by email. The deadline for the initial notice is 5 days after the date Settling Defendants first knew or should have known that the event would likely delay performance. Settling Defendants shall be deemed to know of any circumstance of which any contractor of, subcontractor of, or entity controlled by Settling Defendants knew or should have known. Within 14 days thereafter, Settling Defendants shall send a further notice to EPA and the State that includes: (i) a description of the event and its effect on Settling Defendants’ completion of the requirements of the Decree; (ii) a description of all actions taken or to be taken to prevent or minimize the adverse effects or delay; (iii) the proposed extension of time for Settling Defendants to complete the requirements of the Decree; (iv) a statement as to whether, in the opinion of Settling Defendants, such event may cause or contribute to an endangerment to public health or welfare, or the environment; and (v) all available proof supporting their claim of force majeure. Failure to comply with the notice requirements herein regarding an event precludes Settling Defendants from asserting any claim of force majeure regarding that event, provided, however, that if EPA, despite late or incomplete notice, is able to assess to its satisfaction whether the event is a force majeure under ¶ 39 and whether Settling Defendants have exercised their best efforts under ¶ 39, EPA may, in its unreviewable discretion, excuse in writing Settling Defendants’ failure to submit timely or complete notices under this Paragraph.

41. EPA, after a reasonable opportunity for review and comment by the State, will notify Settling Defendants of its determination whether Settling Defendants are entitled to relief under ¶ 39, and, if so, the duration of the extension of time for performance of the obligations affected by the force majeure. An extension of the time for performance of the obligations affected by the force majeure shall not, of itself, extend the time for performance of any other obligation. Settling Defendants may initiate dispute resolution under Section XII regarding EPA’s determination within 15 days after receipt of the determination. In any such proceeding, Settling Defendants have the burden of proving that they are entitled to relief under ¶ 39 and that their proposed extension was or will be warranted under the circumstances.

42. The failure by EPA to timely complete any activity under the Decree or the SOW is not a violation of the Decree, provided, however, that if such failure prevents Settling Defendants from timely completing a requirement of the Decree, Settling Defendants may seek relief under this Section.

XII. DISPUTE RESOLUTION

43. Unless otherwise provided in this Decree, Settling Defendants must use the dispute resolution procedures of this Section to resolve any dispute arising under this Decree. Settling Defendants shall not initiate a dispute challenging the Record of Decision. The United States may enforce any requirement of the Decree that is not the subject of a pending dispute under this Section.

44. A dispute will be considered to have arisen when one or more parties sends a written notice of dispute (“Notice of Dispute”) in accordance with ¶ 72. Disputes arising under this Decree must in the first instance be the subject of informal negotiations between the parties to the dispute. The period for informal negotiations may not exceed 20 days after the dispute arises, unless the parties to the dispute otherwise agree. If the parties cannot resolve the dispute by informal negotiations, the position advanced by EPA, and the State if such dispute involves a State claim, is binding unless Settling Defendants initiate formal dispute resolution under ¶ 45. By agreement of the parties, mediation may be used during this informal negotiation period to assist the parties in reaching a voluntary resolution or narrowing of the matters in dispute.

45. Formal Dispute Resolution

a. **Statements of Position.** Settling Defendants may initiate formal dispute resolution by serving on the Plaintiffs, within 20 days after the conclusion of informal dispute resolution under ¶ 44, an initial Statement of Position regarding the matter in dispute. The Plaintiffs’ responsive Statements of Position are due within 20 days after receipt of the initial Statement of Position. All Statements of Position must include supporting factual data, analysis, opinion, and other documentation. A reply, if any, is due within 14 days after receipt of the response. If appropriate, EPA may extend the deadlines for filing statements of position for up to 45 days and may allow the submission of supplemental statements of position.

b. **Formal Decision.** The Director of the Superfund & Emergency Management Division, EPA Region 3, will issue a formal decision resolving the dispute (“Formal Decision”) based on the statements of position and any replies and supplemental statements of position. The Formal Decision is binding on Settling Defendants unless they timely seek judicial review under ¶ 46.

c. **Compilation of Administrative Record.** EPA shall compile an administrative record regarding the dispute, which must include all statements of position, replies, supplemental statements of position, and the Formal Decision.

46. Judicial Review

a. Settling Defendants may obtain judicial review of the Formal Decision by filing, within 20 days after receiving it, a motion with the Court and serving the motion on all

Parties. The motion must describe the matter in dispute and the relief requested. The parties to the dispute shall brief the matter in accordance with local court rules.

b. **Review on the Administrative Record.** Judicial review of disputes regarding the following issues must be on the administrative record: (i) the adequacy or appropriateness of deliverables required under the Decree; (ii) the adequacy of the performance of the Remedial Action; (iii) whether a Work Takeover is warranted under ¶ 11; (iv) determinations about financial assurance under Section VII; (v) EPA's selection of modified or further response actions; (vi) any other items requiring EPA approval under the Decree; and (vii) any other disputes that the Court determines should be reviewed on the administrative record. For all of these disputes, Settling Defendants bear the burden of demonstrating that the Formal Decision was arbitrary and capricious or otherwise not in accordance with law.

c. Judicial review of any dispute not governed by ¶ 46.b shall be governed by applicable principles of law.

47. **Escrow Account.** For disputes regarding a Future Response Cost billing, Settling Defendants shall: (a) establish, in a duly chartered bank or trust company, an interest-bearing escrow account that is insured by the Federal Deposit Insurance Corporation ("FDIC"); (b) remit to that escrow account funds equal to the amount of the contested Future Response Costs; and (c) send to EPA, in accordance with ¶ 72, copies of the correspondence and of the payment documentation (*e.g.*, the check) that established and funded the escrow account, including the name of the bank, the bank account number, and a bank statement showing the initial balance in the account. EPA may, in its unreviewable discretion, waive the requirement to establish the escrow account. Settling Defendants shall cause the escrow agent to pay the amounts due to EPA and the State under ¶ 29, if any, by the deadline for such payment in ¶ 29. Settling Defendants are responsible for any balance due under ¶ 29 after the payment by the escrow agent.

48. The initiation of dispute resolution procedures under this Section does not extend, postpone, or affect in any way any requirement of this Decree, except as EPA agrees, or as determined by the Court. Stipulated penalties with respect to the disputed matter will continue to accrue, but payment is stayed pending resolution of the dispute, as provided in ¶ 51.

XIII. STIPULATED PENALTIES

49. Unless the noncompliance is excused under Section XI (Force Majeure), Settling Defendants are liable to the United States for the following stipulated penalties:

a. for any failure: (i) to pay any amount due under Section IX; (ii) to establish and maintain financial assurance in accordance with Section VII; (iii) to submit timely or adequate deliverables under Section 8 of the SOW.

Period of Noncompliance	Penalty Per Noncompliance Per Day
1st through 14th day	\$3,000
15th through 30th day	\$5,000
31st day and beyond	\$10,000

b. for any failure to submit timely or adequate deliverables required by this Decree other than those specified in ¶ 49.a:

Period of Noncompliance	Penalty Per Noncompliance Per Day
1st through 14th day	\$2,000
15th through 30th day	\$4,000
31st day and beyond	\$7,000

50. **Work Takeover Penalty.** If EPA commences a Work Takeover, Settling Defendants are liable for a stipulated penalty in the amount of \$250,000. This stipulated penalty is in addition to the remedy available to EPA under ¶ 22 (Access to Financial Assurance) to fund the performance of the Work by EPA.

51. **Accrual of Penalties.** Stipulated penalties accrue from the date performance is due, or the day a noncompliance occurs, whichever is applicable, until the date the requirement is completed or the final day of the correction of the noncompliance. Nothing in this Decree prevents the simultaneous accrual of separate penalties for separate noncompliances with this Decree. Stipulated penalties accrue regardless of whether Settling Defendants have been notified of their noncompliance, and regardless of whether Settling Defendants have initiated dispute resolution under Section XII, provided, however, that no penalties will accrue as follows:

a. with respect to a submission that EPA subsequently determines is deficient under ¶ 7.6 of the SOW, during the period, if any, beginning on the 31st day after EPA's receipt of such submission until the date that EPA notifies Settling Defendants of any deficiency;

b. with respect to a matter that is the subject of dispute resolution under Section XII, during the period, if any, beginning on the 21st day after the later of the date that EPA's Statement of Position is received or the date that Settling Defendants' reply thereto (if any) is received until the date of the Formal Decision under ¶ 45.b; or

c. with respect to a matter that is the subject of judicial review by the Court under ¶ 46, during the period, if any, beginning on the 31st day after the Court's receipt of the final submission regarding the dispute until the date that the Court issues a final decision regarding such dispute.

52. **Demand and Payment of Stipulated Penalties.** EPA may send Settling Defendants a demand for stipulated penalties. The demand will include a description of the noncompliance and will specify the amount of the stipulated penalties owed. Settling Defendants may initiate dispute resolution under Section XII within 30 days after receipt of the demand. Settling Defendants shall pay the amount demanded or, if they initiate dispute resolution, the uncontested portion of the amount demanded, within 30 days after receipt of the demand. Settling Defendants shall pay the contested portion of the penalties determined to be owed, if any, within 30 days after the resolution of the dispute. Each payment for: (a) the uncontested penalty demand or uncontested portion, if late; and (b) the contested portion of the penalty demand determined to be owed, if any, must include an additional amount for Interest accrued from the date of receipt of the demand through the date of payment. Settling Defendants shall make payment at <https://www.pay.gov> using the link for "EPA Miscellaneous Payments

Cincinnati Finance Center,” including references to the Site/Spill ID and DJ numbers listed in ¶ 72, and the purpose of the payment. Settling Defendants shall send a notice of this payment to DOJ and EPA, in accordance with ¶ 72 and to the EPA Regional Hearing Clerk at R3_Hearing_Clerk@epa.gov. The payment of stipulated penalties and Interest, if any, does not alter any obligation by Settling Defendants under the Decree.

53. Nothing in this Decree limits the authority of the United States or the State: (a) to seek any remedy otherwise provided by law for Settling Defendants’ failure to pay stipulated penalties or interest; or (b) to seek any other remedies or sanctions available by virtue of Settling Defendants’ non-compliances with this Decree or of the statutes and regulations upon which it is based, including penalties under section 122(l) of CERCLA, provided, however, that the United States may not seek civil penalties under section 122(l) of CERCLA for any noncompliance for which a stipulated penalty is provided for in this Decree, except in the case of a willful noncompliance with this Decree.

54. Notwithstanding any other provision of this Section, the United States may, in its unreviewable discretion, waive any portion of stipulated penalties that have accrued under this Decree.

XIV. COVENANTS BY PLAINTIFFS

55. **Covenants for Settling Defendants.** Subject to ¶ 57, the United States covenants not to sue or to take administrative action against Settling Defendants under sections 106 and 107(a) of CERCLA regarding the Work, Past Response Costs, and Future Response Costs.

56. The covenants under ¶ 55: (a) take effect upon the Effective Date; (b) are conditioned on the satisfactory performance by Settling Defendants of the requirements of this Decree; (c) extend to the successors of each Settling Defendant but only to the extent that the alleged liability of the successor of the Settling Defendant is based solely on its status as a successor of the Settling Defendant; and (d) do not extend to any other person.

57. **General Reservations.** Notwithstanding any other provision of this Decree, the Plaintiffs reserve, and this Decree is without prejudice to, all rights against Settling Defendants regarding the following:

- a. liability for failure by Settling Defendants to meet a requirement of this Decree;
- b. liability arising from the past, present, or future disposal, release, or threat of release of Waste Material outside of the Site;
- c. liability based on Settling Defendants’ ownership of the Site when such ownership commences after Settling Defendants’ signature of this Decree;
- d. liability based on Settling Defendants’ operation of the Site when such operation commences after Settling Defendants’ signature of this Decree and does not arise solely from Settling Defendants’ performance of the Work;

e. liability based on Settling Defendants' transportation, treatment, storage, or disposal, or arrangement for transportation, treatment, storage, or disposal of Waste Material at or in connection with the Site, after signature of this Decree by Settling Defendants, other than as provided in the Record of Decision, under this Decree, or ordered by EPA;

f. liability for additional operable units at the Site or the final response action, other than those portions of the final response action constituting Work;

g. liability, prior to achievement of Performance Standards, for additional response actions that EPA determines are necessary to achieve and maintain Performance Standards or to carry out and maintain the effectiveness of the Remedial Action, but that are not covered by ¶ 9.b; and

h. criminal liability.

58. Subject to ¶ 55, nothing in this Decree limits any authority of Plaintiffs to take, direct, or order all appropriate action to protect human health and the environment or to prevent, abate, respond to, or minimize an actual or threatened release of Waste Material on, at, or from the Site, or to request a Court to order such action.

XV. COVENANTS BY SETTLING DEFENDANTS

59. Covenants by Settling Defendants

a. Subject to ¶ 60, Settling Defendants covenant not to sue and shall not assert any claim or cause of action against the United States or the State under CERCLA, section 7002(a) of RCRA, the United States Constitution, the Tucker Act, 28 U.S.C. § 1491, the Equal Access to Justice Act, 28 U.S.C. § 2412, the West Virginia Constitution, the West Virginia Hazardous Waste Management Act, W. Va. Code § 22-18-1 *et seq.*, the West Virginia Hazardous Waste Emergency Response Fund Act, W. Va. Code § 22-19-1 *et seq.*, or at common law regarding the Work, past response actions relating to the Site, Past Response Costs, and Future Response Costs, and State Future Response Costs.

b. Subject to ¶ 60, Settling Defendants covenant not to seek reimbursement from the Fund through CERCLA or any other law for costs of the Work and past response actions regarding the Site, Past Response Costs, Future Response Costs, State Past Response Costs, and State Future Response Costs.

60. **Settling Defendants' Reservation.** The covenants in ¶ 59 do not apply to any claim or cause of action brought, or order issued, after the Effective Date by the United States or the State to the extent such claim, cause of action, or order is within the scope of a reservation under ¶ 57.a through 57.g.

XVI. EFFECT OF SETTLEMENT; CONTRIBUTION

61. The Parties agree and the Court finds that: (a) the complaint filed by the United States in this action is a civil action within the meaning of section 113(f)(1) of CERCLA; (b) this Decree constitutes a judicially approved settlement under which each Settling Defendant has, as

of the Effective Date, resolved its liability to the United States within the meaning of sections 113(f)(2) and 113(f)(3)(B) of CERCLA and to the State within the meaning of section 107 of CERCLA, W. Va. Code § 22-18-1 *et seq.*, and W. Va. Code § 22-19-1 *et seq.*, and all relevant rules promulgated according to these Acts as it relates to Operable Unit 1; and (c) each Settling Defendant is entitled, as of the Effective Date, to protection from contribution actions or claims as provided by section 113(f)(2) of CERCLA, or as may be otherwise provided by law, for the “matters addressed” in this Decree. The “matters addressed” in this Decree are the Work, Past Response Costs, Future Response Costs, and State Future Response Costs, provided, however, that if either Plaintiff exercises its rights under the reservations in ¶ 57.a through 57.h, the “matters addressed” in this Decree will no longer include those response costs or response actions that are within the scope of the exercised reservation.

62. Each Settling Defendant shall, with respect to any suit or claim brought by it for matters related to this Decree, notify DOJ and EPA and the State no later than 60 days prior to the initiation of such suit or claim. Each Settling Defendant shall, with respect to any suit or claim brought against it for matters related to this Decree, notify DOJ and EPA and the State within 10 days after service of the complaint on such Settling Defendant. In addition, each Settling Defendant shall notify DOJ and EPA and the State within 10 days after service or receipt of any Motion for Summary Judgment and within 10 days after receipt of any order from a court setting a case for trial.

63. **Res Judicata and Other Defenses.** In any subsequent administrative or judicial proceeding initiated against any Settling Defendant by either Plaintiff for injunctive relief, recovery of response costs, or other appropriate relief relating to the Site, Settling Defendants shall not assert, and may not maintain, any defense or claim based upon the principles of waiver, claim preclusion (*res judicata*), issue preclusion (*collateral estoppel*), claim-splitting, or other defenses based upon any contention that the claims raised by the United States or the State in the subsequent proceeding were or should have been brought in the instant case.

64. Nothing in this Decree diminishes the right of the United States under section 113(f)(2) and (3) of CERCLA to pursue any person not a party to this Decree to obtain additional response costs or response action and to enter into settlements that give rise to contribution protection pursuant to section 113(f)(2).

XVII. RECORDS

65. **Settling Defendant Certification.** Each Settling Defendant certifies individually that: (a) to the best of its knowledge and belief, after thorough inquiry it has not altered, mutilated, discarded, destroyed or otherwise disposed of any records, documents or other information relating to its potential liability under CERCLA regarding the Site, since the earlier of notification of potential liability by the United States or the State or the filing of suit against it regarding the Site; and (b) it has fully complied with any and all EPA and State requests for information under sections 104(e) and 122(e) of CERCLA, and section 3007 of RCRA, and the W Va. Hazardous Waste Management Act, W. Va. Code § 22-18-1 *et seq.*

66. Retention of Records and Information

a. Settling Defendants shall retain, and instruct their contractors and agents to retain, the following documents and electronically stored data (“Records”) until 10 years after the Certification Completion of the Work under SOW ¶ 5.8 (the “Record Retention Period”):

- (1) All records regarding Settling Defendants’ liability under CERCLA regarding the Site;
- (2) All reports, plans, permits, and documents submitted to EPA in accordance with this Decree, including all underlying research and data; and
- (3) All data developed by, or on behalf of, Settling Defendants in the course of performing the Remedial Action.

b. Honeywell International Inc. and Olin Corporation shall retain all Records regarding the liability of any person under CERCLA regarding the Site during the Record Retention Period.

c. At the end of the Record Retention Period, Settling Defendants shall notify EPA that it has 90 days to request the Settling Defendants’ Records subject to this Section. Settling Defendants shall retain and preserve their Records subject to this Section until 90 days after EPA’s receipt of the notice. These record retention requirements apply regardless of any corporate record retention policy.

67. Settling Defendants shall provide to EPA and the State, upon request, copies of all Records and information required to be retained under this Section. Settling Defendants shall also make available to EPA and the State, for purposes of investigation, information gathering, or testimony, their employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work.

68. Privileged and Protected Claims

a. Settling Defendants may assert that all or part of a record requested by Plaintiffs is privileged or protected as provided under federal law, in lieu of providing the record, provided that Settling Defendants comply with ¶ 68.b, and except as provided in ¶ 68.c.

b. If Settling Defendants assert a claim of privilege or protection, they shall provide Plaintiffs with the following information regarding such record: its title; its date; the name, title, affiliation (e.g., company or firm), and address of the author, of each addressee, and of each recipient; a description of the record’s contents; and the privilege or protection asserted. If a claim of privilege or protection applies only to a portion of a record, Settling Defendants shall provide the record to Plaintiffs in redacted form to mask the privileged or protected portion only. Settling Defendants shall retain all records that they claim to be privileged or protected until Plaintiffs have had a reasonable opportunity to dispute the privilege or protection claim and any such dispute has been resolved in Settling Defendants’ favor.

c. Settling Defendants shall not make any claim of privilege or protection regarding: (1) any data regarding the Site, including all sampling, analytical, monitoring, hydrogeologic, scientific, chemical, radiological or engineering data, or the portion of any other record that evidences conditions at or around the Site; or (2) the portion of any record that Settling Defendants are required to create or generate in accordance with this Decree.

69. **Confidential Business Information (CBI) Claims.** Settling Defendants may claim that all or part of a record provided to Plaintiffs under this Section is CBI to the extent permitted by and in accordance with section 104(e)(7) of CERCLA and 40 C.F.R. § 2.203(b). Settling Defendants shall segregate and shall clearly identify all records or parts thereof submitted under this Decree for which they claim is CBI by labeling each page or each electronic file “claimed as confidential business information” or “claimed as CBI.” Records that Settling Defendants claim to be CBI will be afforded the protection specified in 40 C.F.R. part 2, subpart B. If no CBI claim accompanies records when they are submitted to EPA and the State, or if EPA notifies Settling Defendants that the records are not entitled to confidential treatment under the standards of section 104(e)(7) of CERCLA or 40 C.F.R. part 2, subpart B, the public may be given access to such records without further notice to Settling Defendants.

70. In any proceeding under this Decree, validated sampling or monitoring data generated in accordance with the SOW and reviewed and approved by EPA, if relevant to the proceeding, is admissible as evidence, without objection.

71. Notwithstanding any provision of this Decree, Plaintiffs retain all of their information gathering and inspection authorities and rights, including enforcement actions related thereto, under CERCLA, RCRA, and any other applicable statutes or regulations.

XVIII. NOTICES AND SUBMISSIONS

72. All agreements, approvals, consents, deliverables, modifications, notices, notifications, objections, proposals, reports, waivers, and requests specified in this Decree must be in writing unless otherwise specified. Whenever a notice is required to be given or a report or other document is required to be sent by one Party to another under this Decree, it must be sent as specified below. All notices under this Section are effective upon receipt, unless otherwise specified. In the case of emailed notices, there is a rebuttable presumption that such notices are received on the same day that they are sent. Any Party may change the method, person, or address applicable to it by providing notice of such change to all Parties.

As to DOJ: *via email to:*
eescdcopy.enrd@usdoj.gov
Re: DJ # 90-11-3-12417

As to EPA: *via email to:*
Paul Leonard, Director
Superfund & Emergency Mgmt. Div. at
leonard.paul@epa.gov

AND

Lisa Denmark, EPA Project Coordinator at
denmark.lisa@epa.gov
Re: Site/Spill ID # 03FD

AND

R3_ORC_mailbox@epa.gov

As to the Regional *via email to:*
Financial Management cinwd_acctsreceivable@epa.gov
Officer: Re: Site/Spill ID # 03FD

As to the State: William F. Huggins, Jr. WVDEP Project Coordinator
at william.huggins@wv.gov
Re: WVD024185373

AND

Jason McDougal, WVDEP Program Manager
jason.s.mcdougal@wv.gov
Re: -WVD024185373

AND

Casey Korbini, WVDEP Deputy Director for
Remediation Programs
Ccsey.e.korbini@wv.gov
Re: -WVD024185373

As to Settling *via email to:*
Defendants: Prashant.Gupta@Honeywell.com

XIX. APPENDIXES

73. The following appendixes are attached to and incorporated into this Decree:

“Appendix A” is the Record of Decision.

“Appendix B” is the SOW.

“Appendix C” is the description and map of the Site.

“Appendix D” is the complete list of Settling Defendants.

XX. MODIFICATIONS TO DECREE

74. Except as provided in ¶ 9 of the Decree and ¶ 7.6 of the SOW (Approval of Deliverables), nonmaterial modifications to Sections I through XXIV and the Appendixes must be in writing and are effective when signed (including electronically signed) by the Parties. Material modifications to Sections I through XXIV and the Appendixes must be in writing, signed (which may include electronically signed) by the Parties, and are effective upon approval by the Court. As to changes to the remedy, a modification to the Decree, including the SOW, to implement an amendment to the Record of Decision that “fundamentally alters the basic features” of the Remedial Action within the meaning of 40 C.F.R. § 300.435(c)(2)(ii) will be considered a material modification.

XXI. SIGNATORIES

75. The undersigned representative of the United States, the undersigned representative of the State, and each undersigned representative of a Settling Defendant certifies that he or she is fully authorized to enter into the terms and conditions of this Decree and to execute and legally bind such Party to this document.

XXII. PRE-ENTRY PROVISIONS

76. If for any reason the Court should decline to approve this Decree in the form presented, this agreement, except for ¶ 77 and ¶ 78, is voidable at the sole discretion of any Party and its terms may not be used as evidence in any litigation between the Parties.

77. This Decree will be lodged with the Court for at least 30 days for public notice and comment in accordance with section 122(d)(2) of CERCLA and 28 C.F.R. § 50.7. The United States may withdraw or withhold its consent if the comments regarding the Decree disclose facts or considerations that indicate that the Decree is inappropriate, improper, or inadequate.

78. Settling Defendants agree not to oppose or appeal the entry of this Decree.

XXIII. INTEGRATION

79. This Decree constitutes the entire agreement among the Parties regarding the subject matter of the Decree and supersedes all prior representations, agreements, and understandings, whether oral or written, regarding the subject matter of the Decree.

XXIV. FINAL JUDGMENT

80. Upon entry of this Decree by the Court, this Decree constitutes a final judgment under Fed. R. Civ. P. 54 and 58 among the Parties.

SO **ORDERED** this ____ day of _____, 20__.

United States District Judge

Signature Page for Consent Decree in *U.S. v. Honeywell International Inc. and Olin Corporation*
(N.D.W.V.)

FOR THE UNITED STATES:

2-22-2023

Dated

NATHANIEL
DOUGLAS

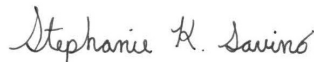
 Digitally signed by NATHANIEL
DOUGLAS
Date: 2023.02.17 15:32:28 -05'00'

Nathaniel Douglas
Deputy Section Chief
U.S. Department of Justice
Environment and Natural Resources Division
Environmental Enforcement Section



Jason A. Dunn
Senior Attorney
U.S. Department of Justice
Environment and Natural Resources Division
Environmental Enforcement Section
P.O. Box 7611
Washington, DC 20044-7611

William Ihlenfeld
United States Attorney



Stephanie K. Savino
Assistant United States Attorney
United States Attorney's Office
P.O. Box 591
Wheeling, WV 26003

Signature Page for Consent Decree in *U.S. v. Honeywell International Inc. and Olin Corporation*
(N.D.W.V.)

**FOR THE U.S. ENVIRONMENTAL
PROTECTION AGENCY:**

Diana Esher Digitally signed by Diana
Esher
Date: 2023.02.08
14:46:49 -05'00'

Diana Esher
Deputy Regional Administrator
U.S. Environmental Protection Agency
Region 3

**CECIL
RODRIGUES** Digitally signed by CECIL
RODRIGUES
Date: 2023.02.02
13:25:58 -05'00'

Cecil Rodrigues
Regional Counsel
U.S. Environmental Protection Agency
Region 3

**JEFFERIE
GARCIA** Digitally signed by
JEFFERIE GARCIA
Date: 2023.01.24
08:54:39 -05'00'

Jefferie E. Garcia
Senior Assistant Regional Counsel
U.S. Environmental Protection Agency
Region 3

Signature Page for Consent Decree in *U.S. v. Honeywell International Inc. and Olin Corporation*
(N.D.W.V.)

FOR THE STATE OF WEST VIRGINIA:

1-12-23

Dated



Robert Rice, Deputy Secretary and Director
W. Va. Dept. of Environmental Protection,
Division of Land Restoration

1/12/23

Dated

Jonathan C.
Frame

Digitally signed by Jonathan C.
Frame
Date: 2023.01.12 10:34:14
-05'00'

Jon C. Frame, Counsel
W. Va. Dept. of Environmental Protection,
Division of Land Restoration

Signature Page for Consent Decree in *U.S. v. Honeywell International Inc. and Olin Corporation*
(N.D.W.V.)

FOR: HONEYWELL INTERNATIONAL INC.

06-Jan-2023

Dated

DocuSigned by:

3742A97B2C4040D...

Name: Bennt Dehghi
Title: VP, Corporate Global Remediation and Site Redevelopment
Address: 855 S Mint St. Charlotte, NC 28202

If the Decree is not approved by the Court within 60 days after the date of lodging, and the United States requests, this Settling Defendant agrees to accept service of the complaint by mail, and to execute a waiver of service of a summons under Rule 4 of the Federal Rules of Civil Procedure and any applicable local rules of this Court. **This Settling Defendant hereby designates the agent below to accept service of the complaint by mail and to execute the Rule 4 waiver of service.** This Settling Defendant understands that it does not need to file an answer to the complaint until it has executed the waiver of service or otherwise has been served with the complaint.

Name: Chuck Anthony
Title: General Counsel-HSEPS
Company: Honeywell International Inc.
Address: 855 S. Mint Street Charlotte, NC 28202

Phone: 980-279-3070
email: Charles.Anthony@honeywell.com

Signature Page for Consent Decree in *U.S. v. Honeywell International, Inc. and Olin Corporation* (N.D.W.V.)

FOR: OLIN CORPORATION, INC.

12/16/22
Dated

Name: Dave M. Share
Title: VP, Environmental Remediation
Address: 490 Stuart Road, NE Cleveland, TN 37312

If the Decree is not approved by the Court within 60 days after the date of lodging, and the United States requests, this Settling Defendant agrees to accept service of the complaint by mail, and to execute a waiver of service of a summons under Rule 4 of the Federal Rules of Civil Procedure and any applicable local rules of this Court. **This Settling Defendant hereby designates the agent below to accept service of the complaint by mail and to execute the Rule 4 waiver of service.** This Settling Defendant understands that it does not need to file an answer to the complaint until it has executed the waiver of service or otherwise has been served with the complaint.

Name: Lisa A. Funderburg
Title: VP and Chief EHS Counsel
Company: Olin Corporation
Address: 190 Carondelet Plaza, Suite 1530
Clayton, MO 63105
Phone: (217) 993-1609
email: lafunderburg@olin.com

EXHIBIT A

RECORD OF DECISION

HANLIN-ALLIED-OLIN SUPERFUND SITE OPERABLE UNIT 1

MOUNDSVILLE,
MARSHALL COUNTY, WEST VIRGINIA



U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 3, PHILADELPHIA, PENNSYLVANIA

June, 2021

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LIST OF ACRONYMS

AOC	Administrative Order on Consent
AR	Administrative Record
ARARs	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
C.F.R.	Code of Federal Regulations
CMP	chloromethane products
COC	chemicals of concern
COPC	Contaminants of Potential Concern
COPEC	Contaminants of Potential Ecological Concern
CR	Cancer Risk
CTE	Central Tendency Exposure
DNAPL	Dense Non-aqueous Phase Liquid
DWWM	Division of Water and Waste Management
EU	Exposure Unit
EPA	U.S. Environmental Protection Agency
ERA	Ecological Risk Assessment
FYR	Five-Year Review
FS	Feasibility Study
Gpm	gallons per minute
GWTP	Groundwater Treatment Plant
HHRA	human health risk assessment
HI	Hazard Index
HQ	Hazard Quotient
IC	Institutional Control
ISCO	In Situ Chemical Oxidation
LOAEL	Lowest Observed Adverse Effect Level
MCC	Moundsville Country Club
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram
MSL	mean sea level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	operation and maintenance
ORP	oxidation-reduction potential
OSDF	On-site Disposal Facility
OU	operable unit
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PCS	Pollution Control Standards
PRAP	Proposed Remedial Action Plan
RACR	Remedial Action Completion Report
RAO	Remedial Action Objective
RSL	Regional Screening Levels
RI	Remedial Investigation

RG	remedial goal
ROD	Record of Decision
RSL	Regional Screening Level
RVI	Remote Visual Inspection
SLERA	screening level ecological risk assessment
SF	square feet
SMA	Soil Management Area
SVE	soil vapor extraction
SVOC	Semi-Volatile Organic Contaminants
SWMU	Solid Waste Management Units
TAL	Target Analyte List
TBC	advisories, criteria, or guidance “to be considered”
µg/L	micrograms per liter
µg/m ³	micrograms per cubic meter
U.S.C.	United States Code
VOC	volatile organic compound
WVDEP	West Virginia Department of Environmental Protection

I. DECLARATION

HANLIN-ALLIED-OLIN SUPERFUND SITE OPERABLE UNIT 1 RECORD OF DECISION

MOUNDSVILLE,
MARSHALL COUNTY, WEST VIRGINIA

**RECORD OF DECISION
HANLIN-ALLIED-OLIN SUPERFUND SITE
OPERABLE UNIT 1 (OU1)
MOUNDSVILLE, MARSHALL COUNTY, WEST VIRGINIA**

DECLARATION

1.0 SITE NAME AND LOCATION

Hanlin-Allied-Olin Superfund Site
Operable Unit 1 (OU1)
Route 2
Moundsville, Marshall County, West Virginia
EPA ID Number WV024185373

2.0 STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) identifies the remedy selected (Selected Remedy) by the U.S. Environmental Protection Agency (EPA) for the Hanlin-Allied-Olin Superfund Site (the Site). The Interim and Final Remedial Actions selected in this ROD were chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. §§ 9601-9675, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R Part 300 et seq., as amended.

This decision document is based on the Administrative Record (AR) for the Site, which was developed in accordance with Section 113(k) of CERCLA, 42 U.S.C. § 9613(k). This AR file is available for review online at <https://semspub.epa.gov/src/collection/03/AR66453>, at the EPA Region III Records Center in Philadelphia, Pennsylvania, and at the Moundsville-Marshall County Public Library, 700 Fifth Street, Moundsville, WV 26041 (304-845-6911). The AR Index identifies each document contained in the AR upon which the Selected Remedy is based. The signed ROD will become part of the AR for the Site.

The State of West Virginia has concurred with the Selected Remedy.

3.0 ASSESSMENT OF THE SITE

The Site is located in Moundsville, Marshall County, West Virginia along the Ohio River and is depicted on Figure 1. The Site includes the following three areas, as shown by the yellow lines on Figure 1:

- Hanlin Area, located in the southern portion of the Site, is approximately 201 acres;
- Allied Park Area, located in the northwestern portion of the Site, is approximately 44 acres; and

- Olin Area, located on the northeastern portion of the Site, is approximately 137 acres.

On August 22, 2011, Olin Corporation sold its property to Caiman Energy, which redeveloped the property for use as a natural gas processing facility; the facility was sold to Williams Partners on April 30, 2012. Despite this development, for the purposes of the Remedial Investigation/Feasibility Study (RI/FS) and this ROD, the northeastern parcel is still referred to as the Olin Area. Environmental assessments for OU1 have occurred under multiple owners, contractors, and regulatory frameworks. The Human Health Risk Assessment considered the Site based on exposure units as seen on Figure 2.

4.0 DESCRIPTION OF INTERIM AND FINAL REMEDIAL ACTIONS

The actions presented in this ROD constitute an interim remedial approach for South Plant alluvial groundwater and a final remedy for Shallow Soils, the former Mercury Cell Building area, and Hanlin Area sewers for OU1 at the Site. Additional information is needed to screen and evaluate alternatives for bedrock groundwater, Site-wide alluvial groundwater and the Ohio River, which are all part of OU2. The final remedy for Site-wide groundwater (including South Plant alluvial groundwater covered under this interim remedial action and bedrock groundwater) and the Ohio River will be selected in a future decision document.

The final remedial actions include the following: Stabilization of Operations Area Soils, Excavation of Floodplain Wet Soils, and Cover of General Floodplain Soils for Shallow Soils. It uses treatment to the maximum extent practicable, it is readily implementable, and the alternative is cost-effective by excavating only the floodplain wet soils while covering other soils located in the floodplain. The Former Mercury Cell Building remedy is Capping which will utilize a concrete cover along with Institutional Controls. The remedy for the Sewers is Grouting with Partial Excavation as Necessary. This remedy includes grout injections into existing sewer lines and disposal of sewer lines that cannot hold grout to specified standards. The Interim Remedial Action for the South Plant Groundwater is Upgraded Groundwater Extraction and Treatment (+SVE) to the existing treatment plant. A process is included which allows for more than one technology to be evaluated and installed at the existing plant.

These Interim and Final Remedial Actions are capable of permanently reducing the toxicity, mobility, and volume of contaminants in groundwater and soil on the Site. The estimated cost to implement the Interim and Final Remedial Actions is approximately \$19 million and \$2.9 million, respectively, over a 30-year period including operations and maintenance.

5.0 STATUTORY DETERMINATIONS

The Final Remedial Actions selected by this ROD (Shallow Soils, the former Mercury Cell Building area, and Hanlin Area sewers) meet the mandates of CERCLA § 121 and the regulatory requirements of the NCP. This Final Remedial Action is protective of human health and the environment, is cost effective, complies with Federal and State requirements that are applicable or relevant and appropriate to the Final Remedial Action (ARARs), and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. This remedy

also satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduction of the toxicity, mobility, or volume of hazardous substances). In accordance with CERCLA § 121(c), a remedy review will be conducted within 5 years after initiation of the Final Remedial Action to ensure it continues to provide adequate protection of human health and the environment. Five-Year Reviews (FYRs) will be conducted at least every 5 years after the date of the initiation of the Final Remedial Action and will continue until hazardous substances are no longer present above levels that allow for unlimited use and unrestricted exposure.

The Interim Remedial Action (South Plant alluvial groundwater) selected by this ROD is protective of human health and the environment in the short term and is intended to provide adequate protection until a final ROD for OU2 is signed; complies with those Federal and State ARARs for this limited-scope action; and is cost-effective. Although the Interim Remedial Action is not intended to address fully the statutory mandate for permanence and treatment to the maximum extent practicable, it does utilize treatment and thus supports that statutory mandate. Because this Interim Remedial Action does not constitute the final remedy for groundwater, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element, although partially addressed in this remedy, will be addressed by the final response action for OU2. Because this Interim Remedial Action will result in hazardous substances remaining on-site above health-based levels, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within five years after commencement of the remedial action. Because this ROD selects an Interim Remedial Action, review of this Site and remedy will be ongoing as EPA continues to develop remedial alternatives for OU2.

6.0 ROD CERTIFICATION CHECKLIST

The information in the chart immediately below is included in the Decision Summary (Part II) of this ROD. Additional information can be found in the AR file for the Site.

ROD CERTIFICATION CHECKLIST	
Information	Location
Chemicals of concern (COCs) and respective concentrations	Section 7.0
Baseline risk represented by the COCs	Section 7.1
Performance Standards established for COCs and the basis for these levels	Section 12.1
How source materials constituting principal threat are addressed	Section 11.0
Current and reasonably anticipated future land use assumptions and potential future beneficial uses of groundwater	Section 6.0
Potential future land and groundwater uses that will be available at the Site as a result of the Final Remedial Action	Section 6.0

Estimated capital, annual operation and maintenance, and total present worth costs, discount rate, and the number of years over which the remedial action cost estimates are projected	Section 10.7
Key factors that led to selecting the Final Remedial Action	Section 10

7.0 AUTHORIZING SIGNATURE

This ROD documents the Interim and Final Remedial Actions for OU1 of the Hanlin-Allied-Olin Superfund Site. EPA selected these Interim and Final Remedial Actions with the concurrence of the West Virginia Department of Environmental Protection (WVDEP).

Approved by:

Date:

June 23, 2021

Linda Dietz, Acting Director
Superfund & Emergency Management Division
EPA Region III

II. DECISION SUMMARY

HANLIN-ALLIED-OLIN SUPERFUND SITE OPERABLE UNIT 1 RECORD OF DECISION

MOUNDSVILLE,
MARSHALL COUNTY, WEST VIRGINIA

1.0 SITE NAME, LOCATION AND DESCRIPTION

The Site is located about two miles southwest of the town of Moundsville, Marshall County, West Virginia along the Ohio River and is depicted on Figure 1. The Site includes the following three areas, as shown by the yellow lines on Figure 1:

- Hanlin Area, located in the southern portion of the Site, is approximately 201 acres;
- Allied Park Area, located in the northwestern portion of the Site, is approximately 44 acres; and
- Olin Area, located on the northeastern portion of the Site, is approximately 137 acres.

EPA is the lead agency for the Site and the WVDEP is the support agency.

2.0 SITE HISTORY, PREVIOUS CLEANUP ACTIVITIES AND ENFORCEMENT ACTIVITIES

2.1 SITE HISTORY

Allied Chemical Corporation and its successors, including Allied Signal, Inc. and AlliedSignal, Inc., (collectively “Allied”), all of which are predecessors of Honeywell International, Inc. (Honeywell), owned and operated the entire Site from 1953 to May 1980. In 1980, Allied sold the southern portion of the Site (South Plant) to LCP Chemicals–West Virginia (LCP-WV). In 1981, Allied sold the northeastern portion of its facility to Olin and retained the northwest portion of the Site, referred to as “Allied Park”. The latter two areas, namely the Allied Park and Olin Areas, comprise the North Plant Area. In 1990, LCP-WV underwent a name change to Hanlin Chemicals–West Virginia (Hanlin Chemicals). Honeywell, acquired by Allied in 1999 (thereafter known as Honeywell), reacquired the Hanlin Area of the Site in 2001.

During the facility production years, the North and South Plants had distinctly different processes. The North Plant primarily produced aniline, nitrobenzene, methylene dianiline (MDA), dinitrotoluene (DNT), diaminotoluene (TDA), and toluene diisocyanate (TDI); other products included fumaric, maleic, and malic acids. At one time, acetylene was also produced in the North Plant. The South Plant produced chloromethanes and, using the chlor-alkali (mercury cell) process, other products including chlorine, sodium hydroxide, and hydrogen. Olin operated the MDA/DNT/TDA/TDI production area of the North Plant from 1981 until production was shut down in 1984. Olin conducted a phased decommissioning of the facilities, and by 1989, the equipment had been removed and all buildings demolished. The Olin Area has been redeveloped and was sold to Williams Partners in 2012 and is still referred to as the Olin Area.

Manufacturing operations in the Hanlin Area (see Figure 3) ceased in 1991. The Hanlin and Allied Park areas underwent various decommissioning and demolition activities as a non-time critical removal action pursuant to an administrative order on consent (AOC) issued by EPA to

AlliedSignal, Inc. in 1995 (Allied 1995 AOC). The majority of the Hanlin Area former process structures have been demolished, although Site maintenance and office buildings remain. Figures 3 and 4 show the Hanlin and Olin process-related areas, respectively, while Figure 5 shows the current Site features and excavation areas.

2.2 REGULATORY HISTORY AND PREVIOUS INVESTIGATIONS

2.2.1 State Enforcement Actions

The State of West Virginia has a long history of involvement with the Site. During operations at the Site in the 1970s, 1980s, and early 1990s, the West Virginia Department of Natural Resources (“WVDNR,” prior to the formation and existence of the WVDEP) issued numerous National Pollutant Discharge Elimination System (“NPDES”) and Water Resources Department /Water Commission permits to Allied, Hanlin, and Olin for discharge of wastewater to retention ponds and the Ohio River. Both the North and South Plants were also subject to West Virginia Water Resource and Industrial Waste Permits. On October 22, 1981, the West Virginia Division of Water Resources entered into a consent decree with Allied requiring it, among other things, to perform certain studies and submit a proposal for closing inactive facilities.

On December 28, 1988, WVDNR completed a Preliminary Assessment and Site Investigation on the Olin and Hanlin Areas. On December 30, 1988, WVDNR issued Order Number HW-147-88 (“1988 WV Order”) to LCP-WVA, for violations of the West Virginia Hazardous Waste Management Regulations, including, among other things, failure to conduct a groundwater monitoring program and violations of hazardous waste storage regulations. The 1988 WV Order required LCP-WVA to come into compliance and to pay a penalty amount of \$9,500. On August 14, 2000, WVDEP issued Consent Order 4330 (“2000 WV Order”) to Honeywell. Effective September 8, 2000, the 2000 WV Order focused on containment of impacted groundwater and surface water. Honeywell submitted a Compliance Schedule and Conceptual Design pursuant to the 2000 WV Order in October 2000. Honeywell installed the necessary extraction wells for both broad-plume containment and targeted source-area remediation, implemented stormwater sampling and constructed appropriate treatment facilities. Note that operation and maintenance (“O&M”) data, including routine well sampling data for extraction and monitoring wells, have been incorporated into the Site RI dataset.

The groundwater treatment plant (GWTP) required by the 2000 WV Order includes a soil vapor extraction (SVE) system, which was required by Administrative Order by Consent for Removal Response Action, Docket No. CERCLA-03-2003-0188DC (“2002 Honeywell AOC”). The groundwater treatment system primarily consists of three main treatment components: (i) a clarifier system, to settle out mercury-bearing solids from extraction wells with higher mercury concentrations; (ii) an air stripper, to remove VOCs from all water streams; and (iii) a catalytic oxidizer, to treat VOCs in the vapor phase from both the groundwater and soil vapor extraction. The GWTP became operational in October 2002 and has undergone upgrades, most notably in 2017, when the current clarifier system was installed. Influent water from sources with relatively high solids and mercury are processed through the clarifier prior to entry into the air stripper. The clarifier system includes three parallel pairs of sludge settling/storage tanks, which concentrate the clarifier sludge without the need for manual decanting prior to off-Site disposal.

Groundwater is pumped from a total of 12 mercury removal wells, source area wells, and hydraulic control wells installed in 2001 and distributed through the South Plant; the extracted water is treated in the GWTP. Typical treatment plant flows are 442 gallons per minute¹ (gpm). The SVE system includes eight wells installed in 2009 and 2013. The SVE wells are located in the former chloromethane products (CMP) area. The SVE system draws approximately 200 to 300 standard cubic feet per minute of soil gas. Water from these wells is treated through bag filters for sediment removal, and then combined with the condensate from a vapor-liquid separator. The combined liquid stream is then discharged to the equalization tank for VOC treatment through the GWTP. Vapor from the SVE wells is combined with the vapor stream from the GWTP air stripper for treatment via the catalytic oxidizer and a combined quench chamber and caustic scrubber system.

Waste streams for the combined GWTP and SVE system include the following:

- Treated wastewater flows to the stilling pond then is ultimately discharged to the Ohio River via Outfall 001 per the 2000 WV Order, which is not specific to State statutory limits.
- Air emissions from the catalytic oxidizer, which will be evaluated to be in compliance with ARARs during the Interim Remedial Action.
- Non-hazardous sludges from the clarifier system.
- Bag filters used to filter SVE condensate, which contain characteristically hazardous sediment due to solvent presence.
- Non-hazardous Stilling Pond sediments removed and disposed off-Site approximately every five years to maintain pond capacity.

All wastes disposed of off-Site are transported to appropriately licensed facilities for disposal. The treated water is ultimately discharged to the Ohio River in accordance with the requirements of the 2000 WV Order.

2.2.2 Private Party Actions

2.2.2.1 Olin Corporation

In the mid-1980s, Olin conducted a phased decommissioning of the processing facilities and equipment on the Olin Area. By 1989, the equipment had been removed and all buildings demolished. On September 29, 1994, EPA and Olin entered into an Administrative Order By Consent for Removal Response Action, Docket No. III-94-29-DC (“1994 Olin AOC”), to investigate the contamination in the Olin Area and propose a removal action. Pursuant to the 1994 Olin AOC, Olin conducted an Engineering Evaluation and Cost Analysis (EE/CA) of the Olin Area. Olin submitted to EPA a draft EE/CA Report in July 2002 and a revised report in

¹ The 442 gpm average flow represents a 12-month average and was calculated based on 2020 Discharge Monitoring Reports submitted to EPA and WVDEP using the Monthly Average Flow value.

February 2005. Olin submitted an addendum to the revised EE/CA Report in November 2006, including both the North and South Plant areas which by this time were owned by only Honeywell and Olin. EPA approved the revised EE/CA Report and Addendum by letter dated April 25, 2007. Based on the findings of the investigation, EPA recommended that contaminated soils be excavated and placed in the north cell of an on-site landfill.

On June 18, 1997, EPA and Olin entered into an Administrative Order By Consent for Removal Response Action, Docket No. III-97-95-DC (“1997 Olin AOC”). The 1997 Olin AOC required Olin to conduct the removal action selected by EPA based on the EE/CA submitted pursuant to the 1994 Olin AOC. The 1994 Olin AOC was completed on April 25, 2007. Pursuant to this action, Olin excavated approximately 100,000 cubic yards of contaminated soils which were placed in the north cell of the on-site landfill during the winter and spring of 2008.

On September 24, 2001, EPA entered into an Administrative Order on Consent for Remedial Investigation/Feasibility Study, Docket No. CERCLA-03-2001-0323 (“2001 RI/FS AOC”), with both Honeywell and Olin. The 2001 RI/FS AOC required “the preparation of, performance of, and reimbursement for all costs incurred by EPA in connection with a Remedial Investigation/Feasibility Study” (RI/FS) at the Site. The RI/FS addressed groundwater and any soils that were not examined under the EE/CAs conducted at the Site and included both the North and South Plant areas which in 2001 were owned by only Honeywell and Olin. Groundwater and soil data were compiled into an RI/FS work plan. The RI was approved in July 2018, and the FS accepted on March 5, 2020.

Olin, Honeywell, and Caiman executed an Environmental Covenant (“Covenant”) on August 15, 2011 to “impose certain activity and use limitations on” and to grant rights of access to the Olin Area. Pursuant to the Covenant, the parties agreed that portions of the Olin Area “shall be used solely for commercial and/or industrial purposes” and forbade any residential, recreational, and agricultural use as well as the construction of any hotel, school, or child care facility on any part of the Olin Area. On August 22, 2011, Olin Corporation sold its property to Caiman Energy, which redeveloped the property for use as a natural gas processing facility; the facility was sold to Williams Partners on April 30, 2012. Despite this development, for the purposes of the RI/FS, the northeastern parcel is still referred to as the Olin Area.

2.2.2.2 Honeywell (formerly Allied)

In 1977 and 1978, Allied commissioned groundwater studies of the South and North Plants, respectively, which identified groundwater “severely contaminated with organic and inorganic compounds.” Allied already had several pumping wells (“Ranney Wells”) used to draw water for use in plant operations. During the investigation, Allied installed and sampled numerous monitoring wells. Using well sampling data and available literature, the studies identified waste ponds, piles, landfills, pits, and lagoons used by Allied to dispose of its waste from its manufacturing processes as the source of groundwater contamination. The commissioned studies suggested that continued pumping of Ranney Wells A and B would contain the contamination. Allied closed the ponds and piles in accordance with the State’s requirements. In 1980, Allied provided EPA with Notification of Hazardous Waste Site for the South Plant as required by CERCLA Section 103(c).

On March 8, 1995, EPA and Allied entered into an Administrative Order on Consent for Removal Response Action, Docket No. III-93-55-DC (“1995 Allied AOC”), requiring Allied to take action to “identify, segregate, remove, and properly dispose of all hazardous substances on the Hanlin and Allied Park Areas of the Site contained in tanks, vessels, process lines, drums, cylinders, or other containers which may be stored on the Site.” The 1995 Allied AOC also required Allied to address mercury contamination at and from the mercury cell building, maintain operation of the Ranney wells, and conduct an EE/CA at the “Hanlin-Allied Area.” Allied demolished the mercury cell building and removed 550,000 cubic yards of solid and hazardous waste material from the South Plant, completing four required Response Action Plans and submitting the EE/CA Report in December 2001. Honeywell submitted an Addendum to the EE/CA Report in February 2002. EPA approved the EE/CA by letter dated May 20, 2002.

On September 24, 2001, EPA entered into an Administrative Order on Consent for Remedial Investigation/Feasibility Study, Docket No. CERCLA-03-2001-0323 (“2001 RI/FS AOC”), with both Honeywell and Olin, described earlier. The RI was approved in July 2018, and the FS accepted on March 5, 2020.

On August 16, 2002, EPA and Honeywell entered into a 2002 Honeywell AOC. The 2002 Honeywell AOC required Honeywell to perform several tasks, including designing and constructing a hazardous waste landfill, excavating and consolidating waste material from several former land disposal units into the landfill, and designing and constructing an SVE system to remediate contaminated subsurface soils in the former production area.

Honeywell completed construction of the landfill in August 2009. The landfill (On-Site Disposal Facility or OSDF) consists of two cells with an engineered liner and leachate collection system and a multi-layer cap. All waste placed in the landfill was from on-site sources generated during Allied, Olin, LCP, and Hanlin operations. The landfill did not receive wastes from off-site sources. Honeywell installed an SVE system in the summer of 2009 to treat contaminated subsurface soils in the former chloromethane production area. Operation of the SVE is ongoing, and O&M of the OSDF is still ongoing.

2.2.2.3 LCP Chemicals-West Virginia/Hanlin

On March 19, 1987, EPA and LCP-WVA entered into an Administrative Order on Consent under Section 3008(h) of the Resource Conservation and Recovery Act (RCRA), Docket No. RCRA-III-006-CA (“1987 LCP AOC”), pursuant to which LCP-WVA agreed to conduct a hydrogeologic investigation of the Hanlin Area/South Plant and submit a corrective measure study, design, and implementation program in response to a release of hazardous waste into the environment. By letter dated November 27, 1991, EPA found LCP-WVA, by then known as Hanlin, in violation of the 1987 AOC.

On September 1, 1989, EPA and LCP-WVA entered into an Administrative Order by Consent, Docket No. III-89-34-DC (“1989 LCP AOC”) to conduct a Removal Action to address a spill of sulfuric acid on the Hanlin Area of the site. LCP-WVA developed a Remedial Work Plan which EPA approved on July 3, 1990. On July 10, 1991, LCP-WVA, by then known as Hanlin, filed for

protection from its creditors pursuant to Chapter 11 of the U.S. Bankruptcy Code and ceased its clean-up efforts at the Site under the 1989 LCP AOC. On September 3, 1992, EPA notified Hanlin that it was in violation of the 1989 LCP AOC.

On August 4, 1995, EPA and Hanlin entered into an Administrative Order on Consent for Removal Response, Docket, No. III-93-55-DC (“1995 Hanlin AOC”) to conduct a Removal Action to “identify, segregate, remove, and properly dispose of all hazardous substances on the Hanlin Area of the Site contained in tanks, vessels, process lines, drums, cylinders, or other containers....” The 1995 Hanlin AOC also required Hanlin to address mercury contamination at and from the mercury cell building, maintain operation of the Ranney wells, and conduct an EE/CA at the Hanlin Area.

In 1998, Allied acquired certain portions of Hanlin’s assets from the bankruptcy estate. On April 27, 1998, pursuant to a settlement in the U.S. Bankruptcy Court for the District of New Jersey (“the Bankruptcy Settlement”), the United States agreed to resolve its bankruptcy claim against Hanlin in exchange for Allied assuming Hanlin’s liability. The Bankruptcy Settlement acknowledged that Allied agreed to assume Hanlin’s environmental liabilities for the Site. The Bankruptcy Settlement incorporates an agreement between Hanlin and Allied in which Allied expressly recognized and reaffirmed its continuing obligations at the Site and stated that the Bankruptcy Settlement does not discharge or otherwise reduce its obligations under the incorporated agreement.

2.2.3 EPA Actions

In March 1980, EPA completed a preliminary assessment of both the North and South Plants. EPA made a Determination of a Threat to Public Health or Welfare or the Environment at the Site and oversaw work performed by LCP-WVA pursuant to the 1989 LCP AOC. On September 19, 1990, EPA conducted a preliminary assessment of the Hanlin Area. On March 25, 1994, EPA made a Determination of Imminent and Substantial Endangerment at the Site. Since 1994, EPA has overseen work conducted by Olin and/or Honeywell pursuant to the 1994 Olin AOC, the 1995 Allied AOC, the 1997 Olin AOC, the 2001 RI/FS AOC, and the 2002 Honeywell AOC. On July 22, 1999, EPA listed the Site on the National Priorities List (NPL) (55 Fed Reg. 39878). On September 27, 2007, EPA approved a Request for exemption to the \$2 million statutory limit for a CERCLA Non-Time Critical Removal Action at the Olin Area.

3.0 COMMUNITY PARTICIPATION

The Proposed Plan for this ROD, Interim and Final Remedial Actions for OU1, and the entire AR can be viewed online at <https://semspub.epa.gov/src/collection/03/AR66453>, or in-person at the EPA Region III Records Center in Philadelphia, Pennsylvania, and in-person at the Moundsville Library in Moundsville, West Virginia. The Proposed Remedial Action Plan (PRAP) was released for public comment on July 10, 2020. EPA held a 30-day public comment period from July 10, 2020 through August 8, 2020 and held a live, online public meeting to discuss the proposed actions on July 23, 2020. Two (2) citizens and three (3) potentially responsible party (PRP) employees attended the meeting; however, no elected officials attended the public meeting. Comments were submitted to EPA during the comment period by the PRP.

A summary of the public comments is included in the Responsiveness Summary as a part of this ROD.

4.0 SCOPE AND ROLE OF RESPONSE ACTION

The alternatives presented in this ROD constitute an interim remedial approach for South Plant alluvial groundwater and a final remedy for Shallow Soils, the former Mercury Cell Building area, and Hanlin Area sewers at the Site. Additional information is needed to screen and evaluate alternatives for bedrock groundwater, Site-wide alluvial groundwater and the Ohio River, which are all part of OU2. The final remedy for Site-wide groundwater (including South Plant alluvial groundwater covered under this interim remedial action) and the Ohio River will be selected in a future decision document.

The Interim Remedial Action selected in this ROD is intended to prevent current and potential future exposure to alluvial South Plant groundwater and soil vapors through a combination of containment, treatment, and institutional controls until a final remedy can be selected. Through the use of treatment technologies, this interim remedy will prevent alluvial groundwater in the South Plant Area from discharging directly to the Ohio River at unacceptable levels and reduce the toxicity, mobility, and volume of contaminants in South Plant groundwater. The Interim Remedial Action will be protective of human health and the environment in the short term and is intended to provide adequate protection until a final remedy for the Site-wide groundwater is selected. Although this interim action is not intended to address fully the statutory mandate for permanence and treatment to the maximum extent practicable, the interim action will utilize treatment and thus supports that statutory mandate. Because the interim action does not constitute the final remedy for the alluvial South Plant groundwater, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element, although partially addressed by this selected interim remedy, will be addressed by the final response action.

The Final Remedial Action will prevent current and potential future exposure to contaminated Shallow Soils, mercury releases from the former Mercury Cell Building area, and former Site sewer lines through a combination of excavation, containment, treatment and institutional controls. Through the use of treatment technologies, this final remedy will permanently reduce the toxicity, mobility, and volume of contaminants in Site soils and sewers that are removed to the extent practicable.

5.0 SITE CHARACTERISTICS

5.1 GENERAL PHYSIOGRAPHIC SETTING

Overviews of the area topography and surface features are provided in the Remedial Investigation. The Site is located on a bend in the Ohio River (see Figure 1), named Round Bottom, and consists of four main river terraces (i.e., the present location of the Ohio River, and three ancient locations of progressively higher elevation). The river terraces are relatively level strips of land that tend to parallel the course of the Ohio River and have average land surface

elevations of approximately 640 ft, 660 ft, 690 ft, and 730 ft above mean sea level (MSL). Round Bottom is bounded on the east by a steep valley bedrock wall that rises about 500 ft above Round Bottom and ascends to an elevation of more than 1,200 ft MSL over a distance of about 0.5 miles. The upland areas are rugged terrain and are characterized by steep slopes and strong relief.

During the Hanlin and Allied Park Removal Actions, several Solid Waste Management Units (SWMUs) were excavated but were not backfilled to original ground surface elevations. The small brine pond that was excavated from the central portion of the Site, just north of the main office building and parking lot, was also not restored to original grade. Rather, these areas were backfilled and graded to a more limited extent and in a manner to promote stormwater drainage. During the Olin Area Removal Action, several deep excavations were performed and the excavations were backfilled to roughly original grade and to blend in with the surrounding ground surface elevations. Another change to Site topography resulting from the Removal Actions is the construction of the OSDF in the southwest corner of the Site. Figure 1a: Hanlin-Allied-Olin Site Historical Timeline summarizes major activities at the Site. Additionally, Conceptual Site Models can be found in Figure 1b and 1c.

5.2 GEOLOGY AND HYDROGEOLOGY

Alluvial deposits consist mostly of sand, gravel, and silt mixtures. One of the most important characteristics affecting contaminant transport through these deposits is the hydraulic conductivity, with the percentage of silt and clay (i.e., fines) in the soil matrix decreasing conductivity and slowing transport. As a general observation, the alluvial system at the Site exhibits a consistent zone of high-conductivity, clean sand and gravel in the deep saturated zone in the western half of the Site. The high conductivity deposits are from past epochs of glaciation when the early Ohio River received glacial outwash. Conversely, soils in the eastern half of the Site and in the vadose and shallow saturated zones near the Ohio River are generally more representative of flood plain deposits, having an increased heterogeneity and percentage of finer grains, and lower hydraulic conductivities.

The alluvial deposits overlie Pennsylvanian-aged sedimentary bedrock of the Monongahela and Conemaugh Formations. These are generally made up of sandstone, siltstone, shale, coal, and limestone.

The hydrogeology beneath the Site consists of a highly productive alluvial aquifer connected to an underlying bedrock aquifer that locally produces limited amounts of water. Local silty layers in the alluvium create perched zones and semi-confined conditions in a few places. Former production wells at the Site, the nearby Moundsville Country Club (MCC) irrigation well for watering the golf course, and the two Washington Lands water-supply wells are installed in the higher hydraulic conductivity outwash deposits.

The alluvial overburden throughout the Site can be laterally divided into two hydrogeologic zones. The main zone, located in the western and southern portion of the Site, represents the more permeable and relatively homogeneous deposits that lie along the central axis of the alluvial valley. In contrast, the eastern zone is located closer to the side of the Ohio Valley and is characterized by thinner alluvium and saturated thicknesses, a more steeply sloping bedrock

contact, finer-grained soils, and delayed vertical drainage. The lithologic contrast between the main zone and the eastern zone contributes to a sharp contrast in groundwater flow regimes. For the South Plant, groundwater flow is strongly influenced by operation of the groundwater extraction and treatment system, which was designed to hydraulically control plume migration and to remove chemicals in both source and downgradient locations in the Hanlin Area of the Site. Groundwater flow in the eastern and northern portion of the Site has not been fully evaluated nor has the groundwater communication between the alluvial and bedrock aquifers. This will be addressed in OU2.

5.3 SHALLOW (0-8 FT) SOILS

The Shallow Soils are defined as the soils that are present at 0-8 ft below ground surface (bgs) and include soils in the Hanlin and Allied Park Areas of the Site (Figure 6a and 6b). Shallow Soils are further subdivided into surface soils, 0-1 ft bgs, and intermediate soils (1-8 ft bgs). Contaminants of Potential Concern (COPCs) were found in Shallow Soils at levels that exceed EPA Regional Screening Levels (RSLs), including mercury and other target analyte list (TAL) metals, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and selected process-related constituents, such as North Plant Semi-Volatile Organic Contaminants (SVOCs), in specific areas. The parameters that exceed RSLs with the greatest frequency include mercury, PCBs, and benzo(a)pyrene equivalents. Higher mercury concentrations are associated with several former process-related facilities, including the former Mercury Cell Building, several disposal areas, the caustic storage area, the scrap yard area, and the hydrogen line to the North Plant. PCB concentrations are correlated with former transformer/capacitor locations as well as multiple SWMUs. PAHs are broadly distributed, with little association with specific Site (former) process features. Arsenic and chromium concentrations are observed above their respective RSLs throughout the Site in distributions that are similar to those of background datasets.

Supplementary soil characterization and remedial activities have occurred following the submittal of the Draft RI Report in 2012, including sampling to support potential Site redevelopment activities, sampling and soil removal to address PCBs, and a study to characterize mercury geochemistry. These studies were included in the Final RI which was approved by letter on July 23, 2018 and can be found in the AR.

5.4 DEEP SOILS

Multiple phases of deep soils investigations in the North and South Plants have revealed the presence of elevated concentrations of organic chemicals in the deep subsurface soils, principally entailing CMPs in the South Plant and process-related VOCs (chlorobenzene, benzene) and SVOCs (chlorinated benzenes, nitroaromatics, and aminoaromatics) in the North Plant. In deep soils in the South Plant, VOC concentrations are highest in the vicinity of the former CMP Production Area, the former drainage ditch, and the acid neutralization pond. In the North Plant, SVOC concentrations are highest in the vicinity of the former Aniline/Nitrobenzene Area and the MDA/DNT/TDA/TDI production area as well as several former SWMUs in Allied Park.

5.5 FORMER MERCURY CELL BUILDING

The former Mercury Cell Building area covers approximately 49,000 square feet (SF) (slightly more than 1 acre) in the middle of the Hanlin Area (Figure 7). A section of the eastern and central portion of the former Mercury Cell Building area houses the Hanlin Area GWTP and annex. Field observations indicate that elemental mercury is present in limited (i.e., bead-scale) quantities in and beneath the former Mercury Cell Building.

Elemental mercury is primarily associated with foundation drainage features (e.g., drainage trenches and sumps) and has been found at depths up to 12 ft below the foundation slab. The concrete comprising the foundation drainage features is impacted with elemental mercury. Comparison of the vertical migration of elemental mercury with observed soil lithology indicates that fine soils tend to suspend mercury, whereas coarse soils may permit its transport. The effect of mercury at this location on groundwater is lower compared to other mercury handling areas on Site.

5.6 SEWERS

Historic plant drawings indicate that the Hanlin Area contains approximately 1,900 linear feet of acid sewers; 5,600 linear feet of process sewer; 7,825 linear feet of sanitary sewer; and 1,640 ft of storm drains that have not been decommissioned. Of the lines that underwent video inspection, approximately half were found to be in good condition, with remaining lines sustaining various types of degradation such as concrete weathering, cracks, holes, or joint displacement. Elemental mercury was observed in soil in three general areas (Figure 8): (i) a cluster of locations southwest of the former Mercury Cell Building, (ii) a cluster of locations southeast of the former Mercury Cell Building, and (iii) a sanitary line along the main plant road. There is no correlation between soil mercury concentration data and sewer location, and thus, sewers do not contribute to actionable soil impacts in the Hanlin Area. Similar to mercury observations, CMP impacts to CMP Production Area groundwater do not spatially correlate with sewer locations.

5.7 SOUTH PLANT GROUNDWATER

CMPs and mercury are the principal contaminants observed in South Plant groundwater (Figures 9a, 9b and 9c). The CMPs and CMP by-products or impurities (Total CMPs) are chloromethane, methylene chloride, chloroform, carbon tetrachloride, trichloroethene, and tetrachloroethene. The occurrence of Total CMPs is centered at the location (see Figure 9a) of the former CMP Production Area and extends in a bifurcated plume westward toward the Ohio River. CMPs and mercury are present throughout much of the South Plant but are captured and removed by the GWTP.

A capture zone analysis was conducted to confirm that the capture of contaminated groundwater is occurring. This analysis demonstrated that the GWTP generally prevents continued migration of contaminants off-site apart from a narrow margin along the Ohio River. Capture of alluvial groundwater migrating to the Ohio River is dependent upon the location of an artificial groundwater divide created between the GWTP extraction wells and the Ohio River. This

groundwater divide is continually in flux due to temporal changes in both the Ohio River stage and groundwater level in the alluvial aquifer. The Ohio River stage is lower in elevation than the water level of the alluvial aquifer during average to low river flow conditions. This hydrogeology causes groundwater to flow from the groundwater divide created by the GWTP on the Site towards the river. As the river stage drops the gradient becomes greater, the artificial groundwater divide created by the GWTP will move slightly inland. During high river flow conditions, the groundwater divide effectively moves into the river, and the hydraulic gradients between the river and Site reverse so that groundwater flow is inwards to the Site.

The GWTP provides capture in that there is no continued migration of contaminated alluvial groundwater into this narrow discharge zone. The groundwater that does discharge to the Ohio River contains contaminants that migrated into this margin prior to the installation of the current GWTP or during periods of extended GWTP shutdown needed for past maintenance practices (recent upgrades to the GWTP have eliminated the need for extended shutdowns for routine maintenance). Contaminant discharge to the Ohio River may also be occurring due to the interaction between the contaminated alluvial and bedrock groundwater systems with the Ohio River. This interaction and any potential effect on the Ohio River will be further considered under OU2. CMPs are present in the northern portion of the Moundville Country Club at concentrations that are several orders of magnitude lower than those of the South Plant alluvium. For both the shallow and deep alluvial aquifers, mercury concentrations (see Figure 9b) above the maximum contaminant level (MCL) are generally located in the immediate vicinity of chlor-alkali process and disposal-related areas, with some influence from pumping wells observed. Groundwater concentrations attenuate rapidly with distance from the process and disposal areas, likely as a result of declining pH values at greater distances. SVOCs (see Figure 9c) in shallow and deep alluvial groundwater are primarily found in the CMP Production Area extending westward.

5.8 NORTH PLANT GROUNDWATER

For groundwater in the North Plant, the following constituents are the most widely distributed in groundwater: 1,2-dichlorobenzene, 1,4-dichlorobenzene, 2,4-diaminotoluene, 2,6-diaminotoluene, 2,4-dinitrotoluene, aniline, benzene, chlorobenzene, chloroform, and nitrobenzene. North Plant-related contaminants are found predominantly in the shallow zone of the North Allied Park Area (see Figure 4), whereas the deep alluvial zone groundwater plumes of VOCs and SVOCs are more widespread.

5.9 METALS IN SITE-WIDE GROUNDWATER

The most frequent exceedances of risk-based screening levels for metals in groundwater are associated with arsenic, manganese, iron, and cobalt, none of which have a known anthropogenic source on the Site, with the exception of coal-fired power generation, which occurred both on-Site and regionally.

A review of the distribution of the metals that exceed risk-based screening levels with the greatest frequency indicates that metals concentrations are spatially associated with geochemical master variables (i.e., pH and oxidation-reduction potential [ORP]) through established

relationships of mobilization and immobilization. The presence of metals in Site groundwater is expected based upon geochemical controls established in the scientific literature. Moreover, a review of the distribution of metals along the south property line generally shows a pattern of attenuating metals concentrations from process areas to the Site boundaries, which is expected, based upon Site geochemistry; localized exceptions to this, such as iron on the south property line, may stem from localized geochemical conditions in these areas (e.g., reduced ORP).

5.10 CONTAMINANT PRESENCE, FATE AND TRANSPORT

Mercury is the most notable process-related inorganic constituent in groundwater. It is located close to process and disposal areas and locally mobilized in the presence of alkaline groundwater conditions. A Site-specific partitioning coefficient (K_d) study was performed to support risk assessment calculations; this study showed that mercury is substantially less leachable and volatile than would be assumed using default modeling parameters.

VOCs (chloromethane, methylene chloride, chloroform, carbon tetrachloride, trichloroethene, and tetrachloroethene) in the South Plant area are present in a concentration high enough to exist as a dense non-aqueous phase liquid (DNAPL) and will likely have already percolated through the unsaturated soil and into alluvial and bedrock groundwater. This will be further evaluated in OU2. VOCs in the shallow soil and alluvial groundwater are subject to mass transfer to the atmosphere through air exchange with soil gas. The fate and transport of SVOCs (benzo(a)pyrene, dichlorobenzenes, toluenes, aniline, and nitrobenzene) are affected by the physicochemical characteristics of the various COPCs. PCBs and pesticides are anticipated to behave similarly from a fate and transport standpoint; both parameter groups are hydrophobic, and as a result, infiltration via aqueous transport and lateral groundwater flow are not expected to be significant transport mechanisms for these parameters.

Several attenuation mechanisms play a role in the distribution and fate of COPCs in groundwater. The degree of sorption of organic COPCs is variable among contaminants, and the amount of retardation in groundwater varies from almost no retardation for soluble parameters such as 2,4-diaminotoluene to two orders of magnitude of retardation (i.e., retardation factors of approximately 100) for dichlorobenzenes. Microcosm studies have shown that the majority of South Plant COPCs are amenable to intrinsic degradation depending upon groundwater geochemistry. South Plant COPCs can degrade anaerobically, particularly at lower concentrations. The combination of groundwater extraction in the South Plant, source depletion, intrinsic degradation, and volatilization on a Site-wide basis has led to a consistent pattern of mass decrease in the South Plant. The North Plant groundwater will be evaluated in OU2.

6.0 CURRENT AND POTENTIAL FUTURE LAND USE AND RESOURCE USE

The Site is located 1 to 2 miles southwest of the City of Moundsville in Marshall County, West Virginia, occupying approximately 382 acres along the west side of West Virginia State Route 2. The Hanlin and Allied portions of the Site are currently vacant except for operations of the wastewater treatment plant in the Hanlin area.

Several potential projects have been proposed for the adjacent property to the South Plant. This area has met industrial standards for cleanup and is not part of the NPL listed area. No reuse project has come to fruition as of the date of this ROD.

On August 22, 2011, Olin Corporation sold its property, approximately 137 acres located on the northeastern portion of the Site, to Caiman Energy, which redeveloped the property for use as a natural gas processing facility; the facility was sold to Williams Partners on April 30, 2012.

The Moundsville Country Club (MCC) is located to the south of the Site. The MCC includes workers and recreational land uses. Predominant use of this parcel is recreational (golf) and other related activities such as shopping at the country club store and social gatherings.

Surface waters of the Ohio River adjacent to the Site are used primarily for industrial purposes, although there are some recreational locations along the Ohio River for activities such as hiking, fishing, birding and kayaking. Islands that are part of the Ohio River Islands National Wildlife Refuge are located both upstream and downstream of the Site. There is also a floodplain area adjacent to Captina Island, located downstream of the Site, that is part of the refuge.

Per the RI, the nearest groundwater public supply well is the Washington Lands Water Supply, which provides drinking water for approximately 3,200 residents. The Washington Lands supply consists of two wells located approximately 3,000 feet south of the Site and pump at a combined rate of approximately 250,000-300,000 gallons per day (or approximately 175-210 gpm). The MCC also operates a groundwater supply well that is used for irrigation purposes. The MCC well is pumped up to approximately 250,000 to 280,000 gallons per day as needed during the months of July to October. The MCC well is screened at 50-70 feet with an elevation of 590-610 ft above MSL.

7.0 SUMMARY OF SITE RISK

During the RI/FS, a Human Health Risk Assessment (HHRA) and an Ecological Risk Assessment (ERA) were conducted to determine the current and potential future effects of contaminated media on human health and the environment in the absence of any cleanup actions at the Site.

7.1 SUMMARY OF HUMAN HEALTH RISK ASSESSMENT

7.1.1 Human Health Risk Assessment

The HHRA was conducted to characterize and quantify the current and potential future human health risks that would occur if no remedial action were taken to address contaminated media at the Site. The HHRA identifies the potential exposure pathways in which people may be exposed to Site contaminants, the toxicity of the contaminants present, and the potential for carcinogenic and non-carcinogenic effects to occur from exposure to the contaminants.

The Reasonable Maximum Exposure (RME) was estimated to reflect the highest exposure that could reasonably be anticipated. The RME, which is typically the basis for decision making in the Superfund program, is a more protective exposure level than the Central Tendency Exposure (CTE), which is also estimated as part of the uncertainty assessment) but is a lower exposure than a “worst-case” scenario would be.

Risks for the potential to develop cancer were estimated as probabilities; EPA has set a target risk range of 10^{-4} to 10^{-6} (also expressed as 1E-4 to 1E-6) for a lifetime excess carcinogenic risk. For risks other than cancer, the Hazard Index (HI) was derived; when the HI is 1 or less, adverse effects are not expected. When the HI exceeds 1, adverse effects do not necessarily occur but can no longer be ruled out. Therefore, EPA’s goal is to cleanup sites to result in HIs at or below 1. In addition, only chemicals that affect the same organ systems (“target organs”) are truly considered additive for purposes of calculating an HI. Therefore, when a total HI exceeds 1, the data are further examined to see whether site conditions pose an HI above 1 for any individual target organ.

Chemicals that contribute significantly to cancer risks above 1E-4 or HIs above 1 are called chemicals of concern (COCs); these are the chemicals that warrant remedial action. Carcinogenic risks and non-carcinogenic hazards were found to be at or in exceedance of regulatory thresholds for the following exposure scenarios.

7.1.1.1 Soils HHRA

The HHRA evaluated the potential exposure of human receptors to constituents detected in environmental media at the Site. The future use of the land was reasonably anticipated to be commercial or industrial, which could also include construction and excavation activities. Risks posed to trespassers were also evaluated. Residential use of the land is not anticipated and was not evaluated; institutional controls are expected to ensure that the Site will not be used for residential purpose. For the purposes of the HHRA, the Hanlin-Allied Area soils were subdivided into six (6) exposure units² (EUs): Operations Area, Central Area, Hanlin Floodplain, Allied Park Floodplain, Cell Building, and Southeastern Area.

The HHRA incorporated site-specific soil adsorption coefficients (K_d) determined from field data, which helped identify to what extent the mercury in soil could volatilize. Assumptions about mercury volatilization were critical to assess which areas mercury is a COC for human health.

The HHRA supports the following conclusions in these Site areas:

Operations Area

² The exposure unit is a geographic area within which a receptor comes into contact with a contaminated medium during the exposure duration. The exposure unit is defined based on the receptor, the medium, and the nature of the receptor’s contact with the medium.

The Operations Area is currently used for operations and maintenance; this use will likely continue in the foreseeable future. While there is the potential for industrial development of small portions of the Operations Area, a scenario that was evaluated in the HHRA, such use would be limited due to the presence of the OSDF cells, GWTP, SVE system, and several remaining SWMUs.

The potential RME cancer risks and HIs for the Operations Area are summarized below for each receptor:

Operations Area					
Receptor	Media (ft bgs)	CR	HI	Max Target Organ HI	COC
Industrial/ commercial worker	Surface soil (0-1)	4E-5	2	1	
O&M worker	Surface soil (0-1)	3E-5	1		
Construction/ excavation worker	Shallow soil (0-8)	8E-6	8	7	PCBs
Trespasser	Surface soil (0-1)	1E-5	0.7		

No unacceptable cancer risks (CR) were associated with current or future scenarios. The total HI exceeded 1 for the current and future industrial workers, but the target-organ-specific HI did not exceed 1; therefore, this was not a pathway of concern. The HIs exceeded 1 for future construction workers due to PCBs in shallow soil. The primary target organs were the immune system, skin and eye. Therefore, the only COC associated with soil in the Operations Area was PCBs.

Also, within this exposure unit, potential hot spots were examined to confirm that the area-wide risk calculations did not substantially underestimate risks. Detected concentrations of mercury above the area-wide average were observed in a few locations in the Operations Area.

Additionally, within the remaining cells of the SWMU J area, elevated concentrations of arsenic and thallium were observed. These areas are considered to have low redevelopment potential, due to institutional and logistical constraints such as the high level of routine O&M activities in the Mercury Cell Building and SWMU J vicinity, the presence of an SVE system in the CMP Production Area, encapsulation of the waste in SWMU J, and the covenant with the State of West Virginia forbidding intrusive activities within SWMU G. Institutional controls included in the Final Remedial Action selected in this ROD will appropriately restrict the areas for intrusive redevelopment.

Central Area

Portions of the Central Area are currently used for O&M purposes. There is the potential for industrial redevelopment of this area.

The potential RME cancer risks and HIs for the Central Area are summarized below for each receptor:

Central Area					
Receptor	Media (ft bgs)	CR	HI	Max Target Organ HI	COC
Industrial/commercial worker	Surface soil (0-1)	3E-5	1		
O&M worker	Surface soil (0-1)	2E-5	0.9		
Construction/excavation worker	Shallow soil (0-8)	2E-6	2	1	
Trespasser	Surface soil (0-1)	9E-6	0.3		

No unacceptable cancer risks were associated with current or future scenarios. The total HI exceeded 1 for the future construction worker, but the target-organ-specific HI did not exceed 1; therefore, this was not a pathway of concern. All other HIs were at or below 1. Therefore, there are no soil COCs for the Central Area.

Hanlin Floodplain

The Hanlin Floodplain consists of soils that are inundated or saturated at some point during the year. Due to the nature of the floodplain and the recent flood events in past years, this area is not currently used for industrial/commercial purposes and is not expected to be used for industrial/commercial purposes in the foreseeable future. Limited O&M activities occur in the Hanlin Floodplain Area.

The potential RME cancer risks and HIs for the Hanlin Floodplain are summarized below for each receptor:

Hanlin Floodplain					
Receptor	Media (ft bgs)	CR	HI	Max Target Organ HI	COC
Industrial/commercial worker	Surface soil (0-1)	6E-5	2	1	
O&M worker	Surface soil (0-1)	5E-5	1		
Construction/excavation worker	Shallow soil (0-8)	4E-6	4	2	PCBs, Manganese
Trespasser	Surface soil (0-1)	2E-5	0.9		

No unacceptable cancer risks were associated with current or future exposure scenarios. The total HI exceeded 1 for the future industrial/commercial worker, but the target-organ-specific HI did not exceed 1; therefore, this was not a pathway of concern. The HIs exceeded 1 for future construction workers due to PCBs and manganese. The primary target organs were the immune system, eye, and skin for PCBs, and the central nervous system, which also poses a maximum HI exceeding 1 due to manganese. However, manganese concentrations are either within

background levels, or are associated with two locations close to the riverbank that are unlikely to be disturbed in a construction scenario. Additionally, the PCB-driven hazard stems from one sample with elevated concentrations of PCBs in a location within the Stilling Pond, which is protected from construction encounter by the pond itself, the subaqueous geosynthetic cover installed during the removal action, and steep embankments and fencing surrounding the pond. Therefore, the manganese and PCBs are either unlikely to pose an unacceptable risk because the contamination level is within background levels at most locations for manganese, or the exposure pathway for both manganese and PCBs is unlikely to be completed, given the location of the contaminants in Site soils and likely future land use. The only COCs associated with soil in the Hanlin Floodplain were PCBs and manganese.

Also, within this exposure unit, potential hot spots were examined to confirm that the area-wide risk calculations did not substantially underestimate risks. Elevated arsenic and mercury concentrations relative to area-wide averages were observed in SWMUs E1, E2, and M. These locations were disposal areas that were largely removed during the removal action. Because of the high level of vegetation and the floodplain's lack of development potential, institutional controls included in the Final Remedial Action selected by this ROD will appropriately restrict the area for intrusive redevelopment. Elevated mercury concentrations were noted in subgrade soils in the Hanlin Floodplain's Stilling Pond, which underwent removal and closure with a geosynthetic clay liner cover. Subgrade soils will not be exposed because this feature is still used in plant operations; a chain-link fence surrounds it and the liner covers it. There is also a steep drop of approximately 10 ft from the surrounding floodplain to the pond water level. Long-term protection of these measures will be ensured with institutional controls.

Allied Park Floodplain

The Allied Park Floodplain consists of wet soils to a degree for some period of the year. Due to the nature of the floodplain and the recent flood events in past years, this area is not currently used for industrial/commercial purposes, and this land use will likely continue in the foreseeable future. Limited operations and maintenance activities occur in the Allied Park Floodplain Area.

The potential RME cancer risks and HIs for the Allied Park Floodplain are summarized below for each receptor:

Allied Park Floodplain					
Receptor	Media (ft bgs)	CR	HI	Max Target Organ HI	COC
Industrial/ commercial worker	Surface soil (0-1)	4E-5	1		
O&M worker	Surface soil (0-1)	2E-5	0.7		
Construction/ excavation worker	Shallow soil (0-8)	4E-6	2	1	
Trespasser	Surface soil (0-1)	1E-5	0.5		

No unacceptable cancer risks were associated with current or future exposure scenarios. The total HI exceeded 1 for future construction/excavation workers; however, target organ-specific hazards did not exceed the acceptable threshold of 1. All other HIs were 1 or less. Therefore, there were no soil COCs for the Allied Park Floodplain.

Southeast Area

The Southeast Area is not currently used for industrial/commercial purposes, although this land use may change in the foreseeable future.

The potential RME cancer risks and HIs for the Southeast Area are summarized below for each receptor:

Southeast Area					
Receptor	Media (ft bgs)	CR	HI	Max Target Organ HI	COC
Industrial/commercial worker	Surface soil (0-1)	1E-5	0.2		
O&M worker	Surface soil (0-1)	8E-6	0.1		
Construction/excavation worker	Shallow soil (0-8)	1E-6	0.2		
Trespasser	Surface soil (0-1)	5E-6	0.08		

All risks were within the acceptable range. Therefore, there were no soil COCs for the Southeast Area.

Former Mercury Cell Building

Two-thirds of the Former Cell Building area is covered by the GWTP, Site office building, and treatment plant annex. The western third of the Cell Building is the remaining concrete slab. Risk estimates are primarily derived from soil data underneath the concrete slab. Beads of mercury have been visible in the Mercury Cell Building area.

The potential RME cancer risks and HIs for the Former Mercury Cell Building are summarized below for each receptor:

Former Mercury Cell Building					
Receptor	Media (ft bgs)	CR	HI	Max Target Organ HI	COC
Industrial/commercial worker	Surface soil (0-1)	6E-6	0.3		
O&M worker	Surface soil (0-1)	4E-6	0.1		
Construction/excavation worker	Shallow soil (0-8)	3E-6	6	6	Mercury
Trespasser	Surface soil (0-1)	3E-6	0.09		

No unacceptable cancer risks were associated with current or future scenarios. The HIs exceeded 1 for future construction workers. The primary target organ for non-cancer effects was the central nervous system, with mercury as the only COC. All other HIs were within the acceptable range. Therefore, the only COC associated with soil at the Former Mercury Cell Building was mercury.

7.1.1.2 Groundwater HHRA

The OU1 groundwater HHRA was originally intended to evaluate the potential exposure of human receptors to constituents detected in alluvial groundwater beneath the Site as well as off-Site alluvial groundwater beneath the northwestern portion of the adjacent MCC. Alluvial groundwater was subdivided into three EUs (North Plant, South Plant, and off-Site) primarily on the basis of current and reasonably anticipated future land use and COPC distribution. While a preliminary evaluation was conducted, EPA concluded that the groundwater warranted further study before a final remedy could be selected. For example, the interconnection of the alluvial groundwater with bedrock groundwater and with the river has not yet been fully characterized. Therefore, EPA focused the OU1 RI on soils and sewers, deferring a complete groundwater assessment to a later operable unit.

Alluvial groundwater risks will be further assessed, along with its interconnections with bedrock groundwater, in OU2. The final COCs, RAOs, and action for groundwater, if necessary, will be selected in a future decision document.

However, one aspect of groundwater is being addressed in OU1, as an interim action. In 2002, the GWTP was constructed to prevent the off-site migration of chemical constituents from contaminated groundwater into the Ohio River, towards the MCC Golf Course and to the Washington Lands Community Water Supply Wells. The need for this treatment was based on several studies dating back to 1977 by Allied Chemical Corporation, which were submitted to West Virginia demonstrating groundwater contamination and discharge to the Ohio River. Contaminants included methylene chloride, chloroform, carbon tetrachloride, mercury, nitrobenzene, m-dichlorobenzene, o-dichlorobenzene, chlorobenzene, 2,6- dinitrotoluene, aniline, 2,4-dinitrophenol, and toluene-2,6-diamine.

For purposes of OU1, EPA and WVDEP agreed that continued operation of the GWTP with upgrades to maintain containment of contaminated groundwater and to meet WVDEP discharge standards is necessary and should be incorporated into an EPA decision document.

The preliminary alluvial groundwater HHRA showed that contaminants originally identified by WVDEP continue to exist in the alluvial groundwater at concentrations of concern. The continued operation of the GWTP and the groundwater extraction wells is necessary to prevent any off-site migration of these contaminants while a final remedy for groundwater is being determined.

7.1.2 Sewers

Three types of sewer lines exist at the Site: acid, process, and sanitary lines. All types of lines were identified in the RI to have the potential to contain mercury (see Figure 10). Overall, 78 lines were identified for investigation either through desktop reconnaissance or identification in the field during the RI and of which 49 total lines were confirmed to be present in the field. Of the 49 lines found in the field, 32 were jetted (by high pressure water stream to dislodge contents), and 38 underwent remote visual inspection (RVI). Trenching and ground-penetrating radar were also used to investigate and confirm the presence of sewer lines. The sewer lines that were identified by desktop reconnaissance but could not be confirmed in the field were expected to be located in two general areas: the Chlor-Alkali process area and areas to the southwest (11 of 29 total unconfirmed lines); and the CMP Production Area and adjacent Vinyl Chloride Process Area and Drum Storage Area (18 of 29 total unconfirmed lines). The sewer lines area depicted in Figure 8. Additionally, due to obstructions within several lines, RVI could not be performed for the entire length of the line. This investigation process was able to reduce the amount of lines that need remediation due to the presence of mercury.

Five sewer segments, with a total length of approximately 790 feet, are impacted with visible mercury at invert depths ranging from 3 to 10.5 ft bgs. The lone COC in the sewers is mercury. Beads of elemental mercury have been observed within sections of the process sewer and sanitary sewer as outlined in the RI Report. Direct-contact risks were not estimated for the sewers; rather, they are considered as a potential source for contaminant migration. The sewers contained mercury at one time and though not all have been individually evaluated, the potential exists for all lines to have mercury. The sewer lines are not effective as containment based on the evaluation that has been completed. The lines are interconnected and mercury has been observed which serves as a potential source for contaminant migration justifies the need to have them addressed.

7.2 ECOLOGICAL RISK ASSESSMENT SUMMARY

The ERA identified and evaluated six terrestrial ecological exposure areas, using a multi-step process that allows for the identification of those Constituents of Potential Ecological Concern (COPECs) with the greatest potential to pose unacceptable risk to ecological receptors. The first step utilized protective media-specific screening criteria to identify COPECs for further evaluation. COPECs were then evaluated using receptor-specific exposure assumptions and food chain modeling. These steps comprise the Screening Level Ecological Risk Assessment (SLERA).

Receptors selected for evaluation were chosen as representative of the different types of animals and those which would ingest different types of food. The groups of animals for five of the terrestrial areas were invertivorous birds, invertivorous mammals, and omnivorous mammals. The groups selected for evaluation in the Wet Soils Area were invertivorous shorebirds and amphibians. The Wet Soils Area is located within SWMU M that, unlike the other terrestrial areas of the Site, retains standing water long enough throughout the year to attract different types of wildlife.

In the second step of the ERA the risks to avian and mammalian receptors were evaluated using food chain models, which incorporate conservative exposure assumptions with literature-derived dietary effects estimates. For amphibians, dietary effects estimates could not be calculated; therefore, risks were quantified using ecological screening values. Although COPECs and magnitude of hazard quotients (HQs) varied among exposure areas, the SLERA identified potential risks to birds and mammals from exposure to contaminants in soil in each ecological exposure area. COPECs identified based on maximum lowest observable adverse effect level (LOAEL) HQs include metals, PCBs, pesticides, SVOCs, and VOCs.

The SLERA was refined to identify and focus on COPECs and exposure areas which pose the highest potential ecological impacts that would not otherwise be addressed by actions driven by the need to address human health risk. The four areas identified are within the Hanlin and Allied Park floodplains and include: (i) the footprint of former SWMU S, in Allied Park; (ii) the vicinity of former SWMU M, in north Hanlin floodplain; (iii) the Stilling Pond vicinity, in the south Hanlin floodplain; and (iv) the vicinity of former SWMU E1, in the south Hanlin floodplain. The soil in the floodplain are identified in one of two ways. “Wet Soils” refers to the soils in the vicinity of former SWMU M, discussed in item (ii) above. All other floodplain soils are referred to as “general floodplain soils”.

7.3 RISK ASSESSMENT SUMMARY

In summary, the soils and groundwater HHRA and ERA for the Site demonstrate the presence of unacceptable risks to human health and the environment, and that remedial actions are necessary to reduce the risks to within or below EPA’s acceptable risk range. Therefore, EPA has determined that response actions are necessary to protect the public health, welfare, or the environment from actual or threatened releases of hazardous substances into the environment. This ROD selects a Final Remedial Action for Shallow Soils, the former Mercury Cell Building Area, and the Hanlin Area sewers. However, because more information is needed to select an appropriate remedy for site-wide groundwater, this ROD selects an Interim Remedial Action for South Plant alluvial groundwater. North Plant groundwater is not addressed in this ROD.

7.4 IDENTIFICATION OF SITE MANAGEMENT AREAS

In the FS, areas that were identified in the risk assessment as being of potential concern were further evaluated to assess appropriate remedial approaches to mitigate potential unacceptable risks. In areas for which active soil management approaches are deemed necessary, iterative truncation calculations were applied in the OU1 FS to develop Soil Management Areas (SMAs), rather than deriving chemical-specific quantitative goals. Iterative truncation is a simplistic approach to identify the soils that may be left in place within an EU such that the average concentration within the EU is at or below the acceptable risk level.

In iterative truncation, high-concentration points for a given COC are iteratively removed from the dataset (simulating, e.g., a removal of the highest contaminated soil and replacing with clean fill), with risk estimates recalculated at each step, until the desired risk level is achieved. The points removed in the analysis define the area of soil that must be managed; they are the locations that drive the risk, and therefore they become the focus of remedial action.

Human health-driven and ecologically-driven general floodplain soil SMAs were derived based on attaining area-wide risk objectives through iterative truncation. The ecologically driven Wet Soils SMA consists of five sample locations identified in an ecologically-based cleanup target level screening using remediation areas consisting of 35 ft radius circles around each location. The area defined by the circles was selected to be sufficient to mitigate ecological risk in the vicinity of the samples with identified COPEC concentrations exceeding the target cleanup levels.

Areas with unacceptable soils human health hazard include the Operations Area, with PCBs as the lone COC. There is only one SMA in the Operations Area, and it has PCB impacts (approximately 7,000 SF from 0-8 ft bgs, or approximately 2,000 CY).

PCBs and manganese were identified as COCs in the Hanlin Floodplain; however, because of the limited extent of contamination and the existing obstacles to exposure, a complete pathway to human receptors is unlikely under the expected future land use. Because the OU1 FS did not conclude a need for human-health driven, active remediation areas in the Hanlin Floodplain, the floodplain SMAs did not include the 0-8 ft horizon; the SMAs in the Hanlin Floodplain were limited to 0-1 ft to address unacceptable ecological risk.

The ERA resulted in the identification of SMAs in the four areas of interest in the floodplain, including SWMU S footprint general floodplain soils, SWMU M vicinity wet soils, SWMU E1 vicinity general floodplain soils, and the Stilling Pond area general floodplain soils (totaling approximately 5 acres, each from 0-1 ft bgs, or approximately 7,500 CY).

The Former Mercury Cell Building Area, with mercury as the lone COC, was also found to warrant an SMA. A portion of the Cell Building footprint is used for O&M (i.e., the GWTP and Annex). This area will be used for this purpose for the foreseeable future. Institutional controls (ICs) are selected as a component of the Final Remedial Action, (further described below in this ROD), to maintain the existing structures in place to protect that portion of the Cell Building area. Hence, the Cell Building remedy will primarily address the western portions of the building footprint. The Cell Building management area is the exposed portion of the foundation without structures, including the existing asphalt pavement to the north of the GWTP Annex. The total area of the Cell Building management area is approximately 21,000 SF, which includes approximately 550 linear feet of foundation trenches. The existing asphalt pavement is approximately 4,000 SF of this management area. Elemental mercury is primarily associated with foundation drainage features (e.g., drainage trenches and sumps) and has been found at depths to 12 ft below the foundation slab. The concrete comprising the foundation drainage features is also impacted with elemental mercury.

Additionally, soil is not intended for residential use, and the Site also contains several SWMUs and covered areas that remain from previous removal actions; exposure to their contents is not anticipated if the containment measures remain intact. Due to the current highly developed character of all but the aforementioned areas in the floodplain, only intermittent and limited exposure of ecological receptors is expected. ICs that appropriately restrict the areas for intrusive development will be developed in the Remedial Design.

Table 1 includes the Soil COCs for the North and South Plant Soils, Former Mercury Cell Building Area, Wet Soils Area and the Sewers. Table 2 is a list of discharge limits for the GWTP as provided by WVDEP. Both tables are in the Tables Section at the end of the document.

7.5 BASIS FOR REMEDIAL ACTION

In summary, the soils and groundwater HHRA and ERA for the Site demonstrate the presence of unacceptable risks to human health and the environment, and that remedial actions are necessary to reduce the risks to within or below EPA's acceptable risk range. Therefore, EPA has determined that response actions are necessary to protect the public health, welfare, or the environment from actual or threatened releases of hazardous substances into the environment.

A Final Remedial Action is required for Shallow Soils, the former Mercury Cell Building Area, and the Hanlin Area sewers. The HHRA has identified mercury as the primary COC that poses the greatest potential unacceptable risk to human health in the latter two areas; PCBs and manganese are also COCs in shallow alluvial soils. The current and future anticipated land use is commercial/industrial and potential exposed populations include current and future Site workers and visitors.

The HHRA for the Site also demonstrates the presence of unacceptable risks to human health and environment in alluvial groundwater. However, EPA will reevaluate the groundwater in the future, in anticipation of a final remedy. At present, EPA finds that the existing groundwater treatment should continue. Therefore, it has been determined that the implementation of the Interim Remedial Action is necessary to protect human health and the environment from actual or threatened releases of hazardous substances at the Site. More information is needed to select an appropriate remedy for site-wide groundwater; only an Interim Remedial Action is being selected for South Plant alluvial groundwater by this ROD.

In summary, the HHRA for the Former Mercury Cell Building area demonstrates the presence of unacceptable risks to human health and environment. EPA has identified mercury as the primary COC that poses the greatest potential unacceptable risk to human health in this area. The current and future anticipated land use is commercial/industrial and potential exposed populations include current and future Site workers and visitors.

The Sewers area is a source of mercury contamination, which poses an unacceptable risk to human health and environment. EPA has identified mercury as the primary COC that poses the greatest potential unacceptable risk to human health in this area. The current and future anticipated land use is commercial/industrial and potential exposed populations include current and future Site workers and visitors.

8.0 REMEDIAL ACTION OBJECTIVES

The following Remedial Action Objectives (RAOs) were developed to protect human health and the environment from current and potential future risk at the Site.

8.1 SOUTH PLANT GROUNDWATER INTERIM RAOS

In general, South Plant groundwater is primarily impacted by CMPs and mercury. South Plant groundwater is currently treated by the Hanlin Area GWTP pursuant to WVDEP Order 4330. Additionally, an SVE system was installed and operated as part of the 2002 Honeywell AOC to reduce source contributions to South Plant groundwater. The following interim RAOs have been identified for the South Plant alluvial groundwater exposure pathways:

- Prevent off-Site migration at concentrations that pose an unacceptable risk to human health or the environment.
- Prevent ingestion, dermal contact, or inhalation of volatile contaminants from contaminated groundwater, including but not limited to preventing potable use.
- Reduce mass and associated COC concentrations in the vadose and saturated zones.

Final Site-wide groundwater RAOs including alluvial groundwater at the South Plant will be established as part of OU2.

GWTP Discharge Objectives

The current operational GWTP discharges treated South Plant alluvial groundwater into the Ohio River pursuant to a 2000 WV State Order and a 1985 WV NPDES permit.³ Due to the prioritization of Site soil source removal actions, groundwater media has not been a direct focus of past removal actions. Although continued soil source removal is a major component of the Final Remedial Action, EPA intends to facilitate the transition to groundwater remediation by also selecting an Interim Remedial Action that will contain and treat groundwater contaminant sources in the South Plant alluvial groundwater. The Interim Remedial Action will incorporate the current operational GWTP with two major exceptions: 1) the GWTP will be significantly upgraded, using an array of treatment options, to better treat COCs extracted from the alluvial groundwater, and 2) the discharge from the GWTP into the Ohio River will comply with current NPDES levels, which are orders of magnitude more protective than the discharge levels permitted by the State's 1985 NPDES permit.

Due to the complex nature of the COCs addressed by the GWTP, upgrades to the GWTP will employ a phased approach to arrive at the best mix of treatment options. This phased approach is expected to take no more than 5 years 3 months to implement. To facilitate this methodology and to meet the WVDEP total mercury discharge limit of 0.14 micrograms per liter ($\mu\text{g/L}$), the requisite GWTP's end-of-pipe compliance point will be temporarily measured at an alternative compliance point through samples taken at the Stilling Pond in the South Plant (the GWTP end-of-pipe discharge will release into the Stilling Pond). Finally, any discharge into the Ohio River will meet a total mercury discharge limit of 0.012 $\mu\text{g/L}$ at the boundary of a temporary mixing zone that will be established by WVDEP and EPA.⁴ These temporary adjustments to the requisite

³ The existing GWTP was recently upgraded to reduce system downtime and improve the efficiency of the removal of settled solids.

⁴ Currently, WV's goal is to reduce the use of mixing zones as a tool in measuring compliance with NPDES discharge limits but would exercise its enforcement discretion to allow the use of a temporary mixing zone for purposes of this Interim Remedial Action.

standards of using the Stilling Pond and the end of a mixing zone as alternative compliance points will end prior to but no later than 5 years and 3 months from the issuance of the OU1 ROD.⁵ Once the upgrade to the GWTP is complete, total mercury discharges measured from the requisite GWTP's end-of-pipe compliance point must meet the 0.14 µg/L limit. See Table 2 for a complete list of GWTP Discharge Limits.

In summary, the Interim Remedial Action will meet the following objectives:

- Achieve 0.14 µg/L total mercury at the end-of-pipe discharge, which is the WVDEP water quality standard for protection of human health. This goal will be temporarily evaluated for up to 5 years using the monthly average mercury concentration of the samples collected from the current Stilling Pond compliance point.
- Achieve 0.012 µg/L total mercury at the boundary of a temporary mixing zone.
- Achieve 0.14 µg/L total mercury at the end-of-pipe discharge within 5 year and 3month schedule.

8.2 SHALLOW SOILS [NORTH AND SOUTH PLANT SOILS (0-8 FEET)] RAOS

Shallow soil impacts at the Site are generally located in the South Plant. Allied Park soil impacts were largely addressed in the 1995 Allied AOC and the HHRA and the Ecological Risk Assessment demonstrated that no further action is necessary for these COCs, except for one ecologically-driven area. South Plant soil COCs include PCBs for human health endpoints and metals, SVOCs, PCBs, and pesticides for ecological endpoints. In Allied Park, ecologically driven COCs include metals, PCBs, VOCs, and SVOCs. The following RAO has been identified for the North and South Plant Soils exposure pathways (0-8 ft):

- Prevent direct contact exposures (ingestion, dermal contact, and inhalation) from contaminated Shallow Soils at concentrations that pose an unacceptable risk to human health or ecological receptors.

8.3 FORMER MERCURY CELL BUILDING AREA RAOS

The following RAOs have been identified for the Former Cell Building exposure pathways:

- Prevent direct contact (ingestion, dermal contact, and inhalation) from contaminated surface and subsurface soils at concentrations that pose an unacceptable risk to human health or wildlife.
- Contain mercury in its current location in the Former Cell Building area and subgrade to prevent migration into adjacent media (i.e., groundwater and air).

⁵ Depending upon several factors, including but not limited to, the status of OU2's remedial action, the success of the enhanced treatment measures, and any unforeseen circumstances, Honeywell may request an extension of the use of a mixing zone following the end of the 5 year 3 months compliance period. EPA, in consultation with WVDEP, will make the unilateral decision whether to grant the request and, in its discretion, select the duration of the extension. Moreover, at the end of the compliance period, EPA will evaluate the need for the continued use or termination of the use of mixing zones consistent with the substantive requirements of NPDES permit renewal procedures.

- Remove and dispose off-Site all visible mercury (e.g., silver beads) wherever encountered.

8.4 SEWERS RAOS

The COC in the sewers is mercury. Beads of elemental mercury have been observed within sections of the process sewer and sanitary sewer as outlined in the RI Report. The following RAOs have been identified for the sewer exposure pathways:

- Contain observed mercury within the sewer network to prevent migration into adjacent media (i.e., groundwater and air).
- Prevent direct contact (ingestion, dermal contact, and inhalation) to on-site workers during disturbance of sewer lines for removal and proper off-site disposal.
- Prevent migration of mercury from the sewer network to surrounding media by excavation and dispose of mercury and mercury-contaminated sewer lines that cannot meet the performance standard for grouting.

9.0 DESCRIPTION OF REMEDIAL ALTERNATIVES

CERCLA requires that any remedial action selected under CERCLA § 121 be protective of human health and the environment, cost effective, in compliance with regulatory and statutory provisions that are ARARs, and compliant with the NCP, to the extent practicable. Permanent solutions to contamination, that reduce the volume, toxicity, or mobility of the contaminants should be developed whenever possible. Emphasis is also placed on applying innovative technologies to clean up the contaminants.

With this ROD, EPA is implementing the Interim and Final Remedial Actions for OU1 to address contaminated groundwater, contaminated soils, sewers and the former mercury cell building. The following Remedial Alternatives were evaluated in the FS and are summarized in this ROD:

9.1 SOUTH PLANT GROUNDWATER

Table 3. South Plant Groundwater Interim Remedial Alternatives

Alternative	Description
1	No Action
2	Upgraded Groundwater Extraction and Treatment (+ SVE) (Figure 11)
3	In-Situ Chemical Oxidation + SVE (Figure 12)
Notes:	SVE = Air Sparging/Soil Vapor Extraction

COMMON ELEMENTS

Each of the remedial alternatives, with the exception of *Alternative 1: No Action*, include the following common components: ICs, containment of South Plant alluvial groundwater, and

groundwater and surface water monitoring for mercury and other COCs. Operation of the SVE system will continue as part of the overall system.

ALTERNATIVE 1: No Action

The NCP, 40 C.F.R. Part 300, which governs Superfund response actions, requires that EPA evaluate a “No Action” alternative for every NPL site to establish a baseline for the comparison of alternatives. Under this alternative, the Site would remain in its present condition, groundwater contamination would be subject to natural processes only and the existing mitigation system would not be required to be operated, sampled and maintained.

ALTERNATIVE 2: Upgraded Groundwater Extraction and Treatment (+ SVE)

Alternative 2 includes upgrading the GWTP to achieve the following performance criteria (see Figure 9d):

- Achieve 0.14 µg/L of total mercury at the GWTP end-of-pipe discharge temporarily evaluated at the Stilling Pond alternative compliance point;
- Achieve 0.012 µg/L of total mercury at the boundary of the temporary mixing zone; and
- Achieve 0.14 µg/L total mercury at the GWTP end-of-pipe discharge within 5 years and 3 months of the issuance of the OUI ROD.⁶

This alternative would include upgrades to the GWTP to ensure removal of mercury to attain the West Virginia direct discharge limit with continued operation of the current SVE system to continue removal of soil vapor. The upgrades to the GWTP would include one or more of the following technologies: Pre-Aeration, Multimedia Filtration, and Ion Exchange. It is not required that all of the upgrades are implemented provided the GWTP improvements incorporated into the remedial design would meet the performance criteria described above. Alternative 2 would also meet the discharge limits for the COCs listed in Table 2.⁷

Pre-aeration is a technology that was considered as a means of stripping out excess carbon dioxide and displacing the headspace with air in the raw water tank to minimize the partial pressure of carbon dioxide in contact with the raw water. Currently, it is suspected that excess carbon dioxide in the raw water, present as carbonic acid, bicarbonate ions, and/or carbonate ions, is effervescing out of solution upon contact with the ferric coagulant. The local acidity generated from the coagulation-flocculation reaction⁸ appears to provide the impetus for carbon dioxide to form bubbles near the floc interface that are, in some cases, causing the floc to float rather than settle, as intended for removal. Reducing the carbon dioxide by allowing it to off-gas

⁶ If, due to good-faith negotiations, there is a delay exceeding 3 months between the ROD issuance and the entry of the Consent Decree to implement the ROD, Honeywell may petition EPA to recuperate any time that cuts into the remaining 5-year attainment period.

⁷ Due to the nature of the Interim Remedial Action, EPA will consider alternatives to obtain the requisite COC discharge standards which may include, but is not limited to, the use of mixing zones and other means of attainment.

⁸ In water treatment, coagulation flocculation involves the addition of compounds that promote the clumping of fines into larger “floc” so that they can be more easily separated from the water.

within the raw water tank is anticipated to prevent mercury bound in coagulated solids from breaking through into the clarifier supernatant due to incomplete settling. Basically, this process will bind the material allowing for collection of the solids, which would in turn improve the efficiency and the effectiveness of the clarification process.

Adding multimedia filtration downstream of the clarifier would remove mercury bound in coagulated solids that did not settle during the clarification process. Its usefulness would have to be assessed in coordination with the potential improvements available from pre-aeration. Multimedia filtration was also considered as pretreatment to protect a potential downstream polishing filter from occasional breakthroughs of suspended solids.

Ion exchange as a remedial technology would include adding a polishing filter that consists of mercury-selective sacrificial ion exchange media to further remove mercury from the clarifier effluent. Effectiveness of mercury removal from the polishing filter would depend on the speciation of the mercury remaining in the clarifier effluent. It is anticipated that ionic forms of mercury would be readily removed, while the removal efficiency of other species would be less predictable and would need to be empirically assessed.

The GWTP will require study and upgrades to effectively extract COCs from the South Plant alluvial groundwater and treat the extracted groundwater to ensure that the discharge meets the water quality standard identified in the proposed RAOs. The following sequence of activities related to the current GWTP would be conducted as a pre-design evaluation to determine the best combination of technologies to achieve the treated water performance criteria.

Data Gap Assessment (2-3 months)

A desktop assessment would be performed to identify and resolve data needs to define the treatment solution, such that a suitable list of candidate treatment options can be developed. Data needs could include chemical complexation of mercury in the aquifer and supernatant of the clarifier, as well as representative ranges of water quality (e.g., pH and alkalinity) for the influent and effluent of the current GWTP system. This assessment is expected to take 2-3 months.

Desktop Engineering Evaluation (2-3 months)

A desktop engineering evaluation of *in situ* and *ex situ* treatment options would be performed, utilizing any newly collected data, and screening out those technologies that may not be capable of achieving the end-of-pipe treatment goal. A combination of technologies may be utilized to achieve the objective. This evaluation is expected to take 2-3 months.

Bench-Scale Treatability Study (6-9 months)

The necessity of a bench-scale treatability study would depend on the results of the data gap assessment discussed above and evaluation of treatment options. The objectives of the bench-scale treatability study would include (i) confirming the best combination of treatment technologies to meet discharge criteria of 0.14 µg/L of total mercury at the temporary alternative compliance point, to meet 0.012 µg/L of total mercury at the boundary of the temporary mixing zone, and to meet 0.14 µg/L at the GWTP end-of-pipe discharge within 5 years; and (ii)

providing preliminary estimates of additive dosing and residence time requirements, as applicable. This study is expected to take 6-9 months.

Field-Scale Pilot Study (12-18 months)

The selected treatment option(s) would likely require testing in the field to confirm if the water quality standard can be met consistently for the GWTP discharge. Additionally, field pilot testing would support improved estimates of system scale and associated costs. This study is expected to take 12-18 months.

Design and Construction (24-30 months)

Following completion of bench-scale and field-scale testing, the upgraded GWTP would be designed and constructed to implement the enhanced treatment to meet the performance standards. This work is expected to take 24-30 months. The scope of the interim remedy ultimately would depend on the outcome of the pre-design evaluation activities which will determine the best combination of technologies to achieve the treated water discharge performance criteria.

ALTERNATIVE 3: In-Situ Chemical Oxidation + SVE

This alternative (see Figure 12) involves the implementation of an *in situ* chemical oxidation (ISCO) flow through injection barrier near the downgradient edge of the plume to replace the hydraulic containment provided by the GWTP system. This alternative would include continued operation of the existing SVE system (minus the GWTP air stripper component of the combined vapor stream).

For purposes of analyzing this alternative, the treatment zone length for the ISCO barrier was selected as the combination of the length of the reach along the Ohio River and southern property boundary currently contained by the GWTP, estimated to be 3,000 linear feet north-south and 750 linear feet west-east, respectively. The design basis radius of influence (ROI) for injection wells in the permeable alluvium is 25 ft, yielding a treatment zone width of approximately 50 ft. The retention time of groundwater as it flows through the 50-ft-wide barrier was calculated to be approximately 200 days, which would conservatively require up to two injection events per year. The vertical treatment interval of 30 ft for the ISCO barrier was selected based on cross sections of the total VOC and SVOC soil concentrations. To treat this interval, three injection wells, each with 10-foot screens, would be required at each injection location (to approximate terminal depths of 55, 65, and 75 ft bgs). Based on a conservative well nest spacing of 45 ft (for overlap), this design would require 84 tri-nested well locations, or 252 total permanent injection wells. Base-activated sodium persulfate, with sodium hydroxide as the caustic activator, was selected as the presumptive reagent. Bench and/or field pilot testing would be performed to optimize the oxidant selection and dosage. For each subsequent injection, it was assumed that 33% of this dosage would be required, as the initial native oxidant demand would not be recharged with incoming groundwater.

The injection volume was selected to be 75% of the total effective pore volume within the treatment zone, assuming a 25% effective porosity. This percentage equates to approximately 7.9 million gallons of injection solution per event. It was assumed that injection events would

proceed in one well interval at a time (i.e., in 84 locations simultaneously), then rotate to the next two intervals. At an assumed average rate of 5 gpm per well, this simultaneous injection would result in a cumulative injection rate of 420 gpm. Based on the target injection volume described above, each injection would take approximately 300 hours to complete, or roughly six weeks assuming 10-hour days.

A permanent injection system compound would be installed in a centralized area, with buried field piping to convey the sodium persulfate and sodium hydroxide injection solutions to the injection well nests. The system would include chemical storage, mixing, pumping systems, manifolds, controls and telemetry. The well installation and chemical injections would comply with federal underground injection control regulations, 40 CFR Part 144.

9.2 SHALLOW SOILS

Table 4. Shallow Soils Remedial Alternatives

Alternative	Description
1	No Action
2	Excavation and Off-Site Disposal of Operations Area and Floodplain Soils
3	Stabilization of Operations Area Soils and Excavation of Floodplain Soils
4	Stabilization of Operations Area Soils, Excavation of Floodplain Wet Soils, and Cover of General Floodplain Soils

COMMON ELEMENTS

Each of the remedial alternatives, with the exception of *Alternative 1: No Action*, include the following common components:

Visible, elemental mercury (if any) that is encountered during intrusive work will be removed for proper off-site disposal.

The following ICs would be implemented for OU1 Shallow Soils:

- Prevent residential use of the Site as a supplement to the current industrial zoning;
- Require that any new building that is constructed onsite include engineering controls (e.g., vapor barriers) in the design, or demonstrate that the vapor intrusion pathway is not complete;
- Restrict any actions inconsistent with an established soil management plan approved by EPA in consultation with WVDEP;
- Provide for continued O&M of existing waste management units established by earlier removal actions.

The above land use restrictions will be established through one or more environmental covenants executed pursuant to the West Virginia Uniform Environmental Covenants Act, WV Code § 22-22B.

ALTERNATIVE 1: No Action

The NCP, 40 C.F.R. Part 300, which governs Superfund response actions, requires that EPA evaluate a “No Action” alternative for every NPL site to establish a baseline for the comparison of alternatives. Under this alternative, the Site would remain in its present condition, soil contamination would be subject to natural processes only.

ALTERNATIVE 2: Excavation and Off-Site Disposal of Operations Area and Floodplain Soils

This alternative involves excavating the soil in the soil management areas (SMAs) and transporting off-Site for disposal at one or more licensed facilities approved to handle the subject waste streams. The SMAs consist of the Operations Area and Hanlin Floodplain soils. The Operations Area is an approximate 7,000 SF (0.16 acre) treatment area with a vertical extent of 0 to 8 ft bgs, equivalent to a treatment volume of 2,000 CY. Sloping and/or benching would be required to reach this target depth, which would entail limited excavation of additional material outside the treatment area. Site characterization data indicate the material would primarily be classified as hazardous waste under the Toxic Substances Control Act (TSCA) and regulations at 40 CFR Part 761 for PCBs, with a small portion also classified as hazardous waste for RCRA constituents under WV Code § 33-20-3, which incorporates 40 CFR Part 261 by reference. These waste streams would require characterization and segregation during implementation of the remedy, as two types of landfill would have to be identified to receive the excavated waste.

The floodplain soils total approximately 5 acres. The vertical extent of each area to be remediated is 0 to 1 ft bgs, equivalent to a total treatment volume of 7,500 CY. Site characterization data indicate the material would be classified as non-hazardous waste. Both the Operations Area and the Hanlin Floodplain soils would be replaced with backfill with hydroseeding after excavation. Existing on-Site stockpiles are available. Ongoing inspection and maintenance of the Hanlin-Allied Removal Action soil units would continue as a component of the OU1 Site remedy.

ALTERNATIVE 3: Stabilization of Operations Area Soils and Excavation of Floodplain Soils

This alternative involves *in situ* Solidification/Stabilization (S/S) of the Operations Area and excavation and off-Site disposal of the floodplain soils. The Operations Area delineation is the same as Alternative 2. To effectively blend the reagents to the 8 ft bgs target depth, it is assumed that a deep mixing tool (Lang Tool or suitable equivalent) would be used to homogenize the soil and distribute the reagents throughout the treatment zone.

Optimum application of *in situ* S/S typically would require bench and/or field pilot testing to select the most effective reagent and dosage. It is assumed that a combination of cement and stabilizing additives would effectively mitigate direct contact exposure in the Operations Area. The floodplain SMA delineation is the same as Alternative 2. The floodplain would be replaced

with backfill after excavation. Existing uncontaminated, on-Site stockpiles are available at a sufficient quantity for backfill.

ALTERNATIVE 4: Stabilization of Operations Area Soils, Excavation of Floodplain Wet Soils, and Cover of General Floodplain Soils

This alternative involves *in situ* S/S of the Operations Area soils and a vegetative cover over the floodplain soils, except for the SWMU M vicinity wet soils, which would be excavated as with the previous alternatives. The Operations Area delineation is the same as Alternative 2, as is the proposed approach for *in situ* S/S (i.e., Lang Tool, cement and stabilizers, etc.). See Figure 13.

This alternative includes S/S of waste and contaminated soil and the common elements above. S/S is an immobilization technology that EPA defines as a presumptive remedy for principal threat metals-in-soil waste targeted for treatment. The contaminated soil would be mixed with an additive to render it less soluble, mobile, or toxic. The decision to stabilize and include or haul and dispose of the contaminated soil off-Site would be made during design. The contaminated material would be stabilized by mixing in place using commercially available shallow soil mixing and S/S equipment, such as one or more large vertical augers. Since this technology does not require excavating or stockpiling the waste, there is a substantial reduction in work area requirements as well as a reduction in potential chemical exposure.

After completion of the in-situ S/S procedures, confirmatory testing (e.g., toxicity characteristic leaching procedure (TCLP) for contaminants, unconfined compressive strength, and permeability) would be performed on the stabilized waste material and surrounding soil to verify that treatment requirements have been met.

Addition of binding agents can increase the volume of treated waste by up to 30% to 50%. Soil mixing would increase the waste volume by 30% and the addition of an amendment would further increase the waste volume by an additional 25%. The anticipated volume increase would be refined during design; however excess stabilized material that cannot reside onsite would need to be properly disposed of off-Site. A geotechnical evaluation of the stabilized material would need to be performed during design to ensure that the Site work could be completed safely and effectively.

The type and quantity of S/S amendment would be selected using a treatability test during design. Magnesium compounds may have some effectiveness in stabilizing boron present in water, wastewater, and sludges. Portland-limestone cements (PLCs) may also be a treatment option and appear to have some advantages compared to standard Portland cement, with no negative impacts on cement performance, durability, or constructability. These advantages include reduced permeability and porosity, reduced shrinkage, and strength improvement. PLCs require less energy to grind than standard Portland cement and have an approximately 10% smaller carbon footprint. Additionally, a geotechnical evaluation of the stabilized material would need to be performed during design to ensure that the Site work could be completed safely and effectively. A protective cap would be placed above the stabilized mass to limit water infiltration and residual risks from direct contact with treated waste.

The SWMU M vicinity wet soils would be excavated (approximately 0.4 acres) and replaced with approximately 900 CY of backfill with hydroseeding after excavation. The SWMU M vicinity wet soils will be excavated and transported off-site. The remaining floodplain soils comprise approximately 4.2 acres. The dermal vegetative cover will consist of a foundation layer and seeding. Basic long-term maintenance of the cover would consist of mowing, inspections, and minor repairs.

The floodplain cover is assumed to consist of one foot of clean soil that is suitable for support of vegetative growth. Existing stockpiles have been evaluated and found to be suitable for this purpose and are assumed to be the source of fill for the cover soils for this alternative. The fill would be hydroseeded after placement and grading. The area of floodplain that would receive cover is approximately 4.2 acres. To promote the stability of the cover system, the establishment of vegetation and the physical stability of the cover would be monitored over the first three years after construction and thereafter re-evaluated to determine whether monitoring can be discontinued or is needed for an additional period of time. Additionally, the presence of invasive plant species within this area will be monitored during that timeframe, and appropriate steps to limit the establishment of such species will be taken. Site restoration requirements generally consist of backfill and compaction. No wetland mitigation or restoration is required in the SWMU M vicinity wet soils.

9.3 FORMER MERCURY CELL BUILDING

Table 5. Former Mercury Cell Building Remedial Alternatives

Alternative	Description
1	No Action
2	Institutional and Engineering Controls
3	Capping
4	Excavation and Off-Site Disposal of Foundation Trenches + Capping
5	Excavation and Off-Site Disposal of Foundation Trenches and Management

COMMON ELEMENTS

Each of the remedial alternatives, with the exception of *Alternative 1: No Action*, include the following common components: ICs as described below.

The following ICs will be implemented at the former Mercury Cell Building Area:

- Monitor vapor intrusion in existing enclosed structures;
- Require that any new building that is constructed include engineering controls (e.g., vapor barriers) in the design, or demonstrate that the vapor intrusion pathway is not complete;
- Prohibit disturbance of any remedial component, such as the GWTP building floor and concrete cap;

- Establish and require compliance with health and safety protocols for any future required sub-surface disturbance in which on-site workers could come in contact with elemental mercury or other hazardous conditions.

ALTERNATIVE 1: No Action

Under Alternative 1, no action would be taken at the Site. This “no action” alternative is included because the NCP requires that a “no action” alternative be retained as a baseline alternative to which the other alternatives may be compared. This alternative hypothetically assumes that all existing mitigation systems are shut down. This alternative would not reduce human health or ecological risks to acceptable levels and would not achieve the RAOs. This alternative would not be protective of human health and will not be considered further.

ALTERNATIVE 2: Institutional and Engineering Controls

This alternative involves the implementation of institutional and engineering controls to mitigate direct contact exposures. A combination of land use restrictions (institutional) and fencing (engineering) would be implemented to mitigate the potential for direct contact exposures. The fencing would include approximately 750 linear feet of security fencing around the perimeter of the Cell Building management area. Straightforward maintenance of the controls would be required. The additional ICs would prevent disturbance of the soil.

ALTERNATIVE 3: Capping

This alternative involves capping with concrete the western and southern portions of the Cell Building management area, also known as the exposed portion of the foundation without structures. A new concrete cap would not be installed over the existing asphalt cap to the north of the GWTP Annex, as this area was paved in 2005. The total area of the proposed concrete cap is approximately 17,000 SF. See Figure 14.

An epoxy sealant would be applied over the existing surface area of 17,000 SF prior to concrete work to seal cracks, reduce vapor migration, enhance the containment of mercury in its present location and prevent migration into adjacent media. This will be confirmed by periodic sampling to confirm that mercury vapors inside existing or future structures remain within the acceptable risk range.

The concrete cap design is assumed to consist of at least 6 inches of concrete poured over the full extent of the 17,000 SF area. A variable thickness would be required in some locations (e.g., to fill the trenches). The formwork for the concrete would be constructed to create a slight grade (1% to 2%) to shed water to the sides and prevent ponding. It is expected that the concrete cap would extend beyond the limits of the existing slab as a conservative precaution. Long-term inspection and maintenance of the concrete cap and the existing asphalt pavement would be required, primarily to inspect the competency of the concrete over time and perform corrective maintenance as needed.

ALTERNATIVE 4: Excavation and Off-Site Disposal of Foundation Trenches + Capping

This alternative involves excavating the foundation elements and sub-grade soil of the Cell Building management area with visible elemental mercury. To analyze this alternative, seven soil and concrete excavation areas were delineated around the 550 linear feet of foundation, trenches and the former caustic above-ground storage tank area to the southwest. The total excavation area of this alternative is approximately 8,600 SF. The average depth of excavation within each area was selected based on the observed visible mercury impacts in boring logs as reported in the Mercury Cell Building Conceptual Site Model Revision 1 (available in the Administrative Record). The total excavation volume for this alternative is approximately 1,430 CY.

Based on Site characterization data it is assumed that approximately 50% of the concrete and soil would contain visible mercury impacts and would require pre-treatment on-Site, pursuant to land disposal restrictions under WV Code § 33-20-10 (incorporating 40 CFR Part 268 by reference), prior to transportation and disposal. Pre-treatment could consist of mixing the waste with a dry chemical to immobilize the visible mercury, at which point it could be transported off-Site as D009 characteristically hazardous waste to a RCRA Part B treatment facility. It is assumed that the remainder of the concrete and soil would be characterized as D009 and would not require pretreatment.

The deep excavations in Areas 2, 6, and 7 (adjacent to the existing GWTP structures) would require extensive geotechnical shoring to protect the existing structures (approximately 210 linear feet). It is assumed that a fully cantilevered steel sheet pile system would be installed to three times the depth of proposed excavation (i.e., up to 36 ft bgs in some locations). The excavated areas would be replaced with backfill after excavation. Existing on-Site stockpiles are available at a sufficient quantity for backfill. Following backfill, the entire Cell Building management area would be capped with epoxy sealant and concrete similar to Alternative 3. This concrete cap would be installed over the full 21,000 SF since the existing asphalt pavement to the north of the GWTP Annex would be largely disturbed by excavation of Area 7.

ALTERNATIVE 5: Excavation and Off-Site Disposal of Foundation Trenches and Management

This alternative involves additional excavation beyond the seven areas identified in Alternative 4, with complete removal of the existing concrete foundation to the south and west of the GWTP Annex (approximately 17,000 SF of concrete removal). This alternative also conservatively assumes that during removal of the concrete and the foundation trenches, visible mercury could be identified in the excavation bases and sidewalls, which will expand the design limits of the treatment areas. An additional 25% was added to the estimated soil volume as a safety factor, and it was assumed that this additional soil could require pre-treatment for visible mercury pursuant to WV Code § 33-20-10. The total excavation volume of this alternative is approximately 2,400 CY.

The deep excavations in Areas 2, 6, and 7 would require the same geotechnical shoring that was included in Alternative 4. The excavated areas would be replaced with backfill after excavation.

Existing on-Site stockpiles are available at a sufficient quantity for backfill. Following backfill, the entire Cell Building management area would be covered with an impermeable surface (asphalt).

9.4 SEWERS

Table 6. Sewers Remedial Alternatives

Alternative	Description
1	No Action
2	Excavation and Off-Site Disposal
3	Grouting
4	Blinding/Blocking
5	Grouting with Partial Excavation as Necessary

COMMON ELEMENTS

Alternative 5 is a hybrid of both Alternatives 2 and 3. There are no other overlapping or common elements.

ALTERNATIVE 1: No Action

Under Alternative 1, no action would be taken at the Site. This “no action” alternative is included because the NCP requires that a “no action” alternative be retained as a baseline alternative to which the other alternatives may be compared. This alternative hypothetically assumes that all existing mitigation systems are shut down. This alternative would not reduce human health or ecological risks to acceptable levels and would not achieve the RAOs. This alternative would not be protective of human health and will not be considered further.

ALTERNATIVE 2: Excavation and Off-Site Disposal

This alternative involves excavating the sewers that are impacted with visible mercury. Five segments have been identified in previous investigations: SS-1 to SS-2, SS-1 to SS-1A, PS-8A to PS-8, PS-8 to PS-8B, and PS-5 to PS-5B. The total length of impacted sewer lines is approximately 790 linear feet, with invert depths ranging from 3 to 10.5 ft bgs. Sloping and/or benching would be required in some locations to reach the target depth. The total excavation volume for this alternative is approximately 740 CY. Excavated soil and sewer materials would be transported off-Site for disposal at a licensed waste disposal facility. Excavated soil and sewer materials would be characterized per the site-specific material management plan, which allows material that does not exceed the industrial RSL to be reused as backfill. Site characterization data were utilized to estimate the relative portions of excavated material that would be anticipated to exceed the industrial RSL, be classified as D009 characteristically hazardous waste in accordance with WV Code § 33-20-3, or be suitable for reuse as backfill. A limited amount of pre-treatment on-Site is anticipated to be required to immobilize visible mercury, primarily from the excavated sewer lines.

The excavated areas would be replaced with backfill after excavation. Existing on-Site stockpiles are available at a sufficient quantity for backfill.

ALTERNATIVE 3: Grouting

This alternative involves abandoning in place the sewers that are impacted with visible mercury by full grouting the impacted lines. Grouting would involve a pressure injection via tremie methods to inject flowable fill, or suitable equivalent. The flowable fill would encapsulate the visible mercury and would solidify in place. A specialty contractor would be procured to complete a pressure injection at various access points within the lines.

ALTERNATIVE 4: Blinding/Blocking

This alternative involves blinding/blocking the sewers that are impacted with visible mercury, which entails the closure of a line by the installation of physical barriers (e.g., caps, flanges, etc.) at access points along the impacted lines. Long-term inspection and maintenance of the barriers, as well as routine video inspection of the sewer lines, would be required.

ALTERNATIVE 5: Grouting with Partial Excavation as Necessary

This alternative (see Figure 10 and 15) consists of Alternative 3 (Grouting) as the base remedy, but with additional clearing (via jetting, augering, or other methods) and camera inspection of the segments of impacted sewer lines that were not able to be investigated previously. If the grouting performance standard cannot be achieved while grouting from one end of the sewer, presumably due to a blockage in the line, grouting will be attempted from the other end of the sewer. If the performance standard cannot be achieved, the line would be exposed via excavation, limited to 5 feet on either side of the blockage, and that section of the line will be removed. The ends of the sewer line would be capped, and the grouting would continue.

As a conservative assumption, this alternative assumes that up to 20% of the sewer lines would not meet the grouting performance requirement. These segments would be excavated and transported off-site for proper disposal.

10.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

In this section, the Remedial Alternatives summarized above are compared to each other using the nine criteria set forth in 40 C.F.R. § 300.430(e)(9)(iii). In the remedial decision process, EPA analyzes the relative performance of each alternative against the evaluation criteria, noting how each alternative compare to the other options under consideration. Additional information supporting this analysis of remedy alternatives can be found in the AR file for the Site.

These evaluation criteria relate directly to requirements of Section 121 of CERCLA, 42 U.S.C. § 9621, for determining the overall feasibility and acceptability of a remedial action. The nine criteria fall into three groups described as follows:

Threshold criteria must be satisfied for a remedy to be eligible for selection.

Primary balancing criteria are used to weigh major tradeoffs between remedies.

Modifying criteria are considered after public comment is received on the Proposed Plan.

Evaluation Criteria for Superfund Remedial Alternatives	
<i>Threshold Criteria</i>	1. Overall Protection of Human Health and the Environment determines whether an alternative can adequately protect human health and the environment by eliminating, reducing, or controlling exposures to hazardous substances, pollutants or contaminants to levels that do not pose an unacceptable risk.
	2. Compliance with ARARs evaluates whether an alternative meets Federal and more stringent State environmental laws or facility siting laws, or whether a waiver is justified.
<i>Primary Balancing Criteria</i>	3. Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.
	4. Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
	5. Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
	6. Implementability considers the technical and administrative feasibility of implementing an alternative, including factors such as the relative availability of goods and services.
	7. Cost includes the estimated capital and annual operation and maintenance costs, as well as present worth cost of an alternative. Present-worth cost is the total cost of an alternative over time in today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
<i>Modifying Criteria</i>	8. State/ Support Agency Acceptance considers whether the State agrees with EPA's analyses and recommendations, as described in the Feasibility Study and Proposed Plan.
	9. Community Acceptance considers whether the local community agrees with EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

The following subsections summarize the comparative analysis evaluation of the remedial alternatives developed for the Site against the nine evaluation criteria.

10.1 OVERALL PROTECTION OF HUMAN HEALTH AND ENVIRONMENT

This criterion addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or institutional controls.

10.1.1 South Plant Groundwater

The GWTP is currently operational, has operated at the Site since October 2002 and has treated over 1.49 billion gallons of influent. Groundwater treatment will be significantly improved by Alternative 2 which will upgrade the facility to achieve the updated effluent performance criteria. The exact modifications will be determined during the pre-design evaluation process. Alternative 3 has not been tested at the Site, though it is a mature and well-tested technology. It is anticipated that it will be able to achieve protection of human health and the environment after significant engineering design and pilot study evaluations. However, Alternative 3 would discontinue the GWTP thereby preventing significant source area mass reduction in the saturated zone, but the SVE system would continue to reduce source area mass in the vadose zone. The SVE system has operated since 2009 and has removed >347,000 lbs. of volatile organic contaminants.

Alternatives 2 and 3 both provide for containment of the alluvial groundwater plume in the South Plant Area by different means. Alternative 2 will continue to use the existing GWTP which is extracting alluvial groundwater. Pursuant to an April 2018 piezometer study that evaluated the capture capability of the existing GWTP, the GWTP is creating an inward gradient and is providing capture of the COCs within the South Plant alluvial plume. Alternative 3 will not employ an extraction component. With the use of 232 injection wells, Alternative 3 will create a reactive barrier to effectively prevent COCs (except mercury) from migrating off-Site. Alternative 3 would not treat mercury contamination in groundwater, making it less protective than Alternative 2.

Alternative 2, for purposes of this interim remedial action, will achieve RAOs after a pre-design evaluation process and pilot study period and will be protective of human health and the environment. It is unknown whether Alternative 3 will achieve the mercury RAO.

10.1.2 Shallow Soils

Other than the No Action alternative, the three soils action alternatives would protect human health and the environment and achieve the RAO of preventing direct contact via combinations of complete removal, solidification, or covering with clean soil. Each of the three alternatives also involves a disturbance of the Operations Area soils via either removal or *in situ* mixing, which would require best management practices (BMPs) during implementation to mitigate the potential for releases due to fugitive emissions/dust. However, Alternative 3 would disturb all 5 acres of the floodplain soils, whereas Alternative 4 would only disturb the SWMU M vicinity wet soils (approximately 0.4 acres).

10.1.3 Former Mercury Cell Building

Former Cell Building Alternatives 3, 4, and 5 would protect human health and the environment and achieve the RAOs (preventing direct contact and containing mercury in its present location) via capping, removal, or combinations thereof. The other action remedy, Alternative 2 (Institutional and Engineering Controls), would prevent direct contact, but would not be as effective at containing mercury. Alternative 4 (Excavation and Off-Site Disposal of Foundation Trenches + Capping) would involve much greater disturbance of contaminated media than Alternative 3 (Capping), which could have the unintended effect of causing vertical mobilization of mercury during implementation. This mobilization could occur through the generation of soil macropores from excavation-related soil disturbance, which could admit residual elemental mercury to deeper depths, or through the related disturbance and mobilization of soil pore water with dissolved mercury.

However, given the physical interaction of mercury with soil at the Site, the potential for downward migration of mercury is considered limited, thus Alternatives 3, 4, and 5 are considered to satisfy the requirements of this criterion.

10.1.4 Sewers

Other than the No Action alternative, the four sewer action alternatives would protect human health and the environment and achieve the RAOs (prevent direct contact and contain mercury in its present location) via either complete removal or stabilization, or some combination of the two approaches (Alternative 5, Grouting with Partial Excavation as Necessary). Alternative 2 (Excavation and Off-Site Disposal) would involve the greatest disturbance of contaminated media, which may have the unintended effect of causing vertical mobilization of mercury during implementation and potential short term exposure risks to Site workers during implementation which would need to be addressed in a health and safety plan and materials handling plan. Since Alternative 4 (Blinding/Blocking) does not directly bind all the mercury, it would require routine inspections to ensure the plugs/blinds are intact and functioning. Alternatives 2, 3, and 5 are more protective in the long-term given that the mercury is either removed from the Site (Alternative 2) or encapsulated in grout (Alternatives 3 and 5) versus isolation via plugs (Alternative 4).

10.2 COMPLIANCE WITH ARARS

Section 121(d) of CERCLA, 42 U.S.C. § 9621(d), and the NCP at 40 C.F.R. § 300.430(f)(1)(ii)(B), require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate Federal and State requirements, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law, which are collectively referred to as “ARARs,” unless such ARARs are waived under Section 121(d)(4) of CERCLA, 42 U.S.C. § 9621(d)(4), and the NCP at 40 C.F.R. § 300.430(f)(1)(ii)(C).

“Applicable requirements” are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or

State environmental or facility-siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. Only those State standards that are identified by a State in a timely manner and that are more stringent than Federal requirements may be applicable. 40 C.F.R. § 300.5

“Relevant and appropriate requirements” are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility-siting laws that, while not “applicable” to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site. Only those State standards that are identified by a State in a timely manner and that are more stringent than Federal requirements may be relevant and appropriate. 40 C.F.R. § 300.5

The “To Be Considered” (TBC) category consists of advisories, criteria or guidance that EPA, other federal agencies, or states developed that may be useful in developing CERCLA remedies (NCP at 40 C.F.R. § 300.400(g)(3)). TBCs are identified on an as-appropriate basis.

10.2.1 South Plant Groundwater

Alternative 2 will continue to operate the GWTP which will collect waste streams that must be managed and disposed of pursuant to West Virginia Hazardous Waste Regulations, which incorporate the federal RCRA regulations by reference. See Tables 11-1, 11-2, and 11-3. Alternative 2 will meet the ARARs relating to the management and disposal of any waste streams.

Alternative 2 will treat groundwater to attain compliance with substantive NPDES requirements after a pre-design evaluation process and pilot study period to refine treatment technologies and injection substrates. See Tables 11-1, 11-2, and 11-3. Although Alternative 3 will meet the requirements for the majority of COCs, it does not meet the requisite ARARs for Mercury. Alternative 2’s remedial activities will be undertaken to comply with these requirements.

Alternative 2 and 3 will also continue implementing the SVE system, which may generate hazardous air pollutants regulated by the National Emission Standards for Hazardous Air Pollutants under the Clean Air Act. See Tables 11-1, 11-2, and 11-3. Alternative 2 and 3’s remedial activities will be undertaken to comply with these requirements.

10.2.2 Shallow Soils

Alternatives 2, 3 and 4 contain excavation as a component of the remedial action. Alternatives 3 and 4 include stabilization and solidification controls. All Alternatives will involve the movement and/or disposal of soil and the backfilling of some areas with “clean” soil, likely causing dust and vehicular pollutant air emissions. These activities must meet storm water management, erosion and sediment control, waste management, and air emission standards. See Tables 11-1 to 11-3, specifically West Virginia Stormwater Management Act, West Virginia Waste Management Act, West Virginia Hazardous Waste Management System, and Clean Air

Act regulations. After completion of the *in situ* S/S procedures in either Alternative 3 or 4, confirmatory testing (e.g., toxicity characteristic leaching procedure (TCLP) for contaminants, unconfined compressive strength, and permeability) would be performed on the stabilized waste material and surrounding soil to verify that treatment requirements have been met. Alternatives 2, 3, and 4 will meet the ARARs relating to the management and disposal of soils, waste, and air emissions.

10.2.3 Former Mercury Cell Building

Alternative 2 (Controls) would require the property deed to reflect that the property has been used to manage hazardous wastes and that the land use is restricted pursuant to the West Virginia Environmental Covenant Act, WV C.S.R. Title 33 Series 20-12. Alternative 3 involves capping the area of the former Cell Building. The cap must not negatively affect the topography of the Site and therefore must meet stormwater management and erosion and sediment control standards. The construction of the cap may cause hazardous air pollutant emissions. See Tables 11-1, 11-2, and 11-3, specifically West Virginia Stormwater Management Act, West Virginia Hazardous Waste Management System, Clean Air Act. Alternative 3 will meet the ARARs relating to construction of the cap.

Alternative 4 adds excavation of soil and the disposal of trenches in addition to the cap in Alternative 3. Alternative 5 is similar to Alternative 4 but replaces the cap with management of the area. Because Alternative 4 and 5 require hazardous waste determinations before disposal off-site, Alternative 4 and 5 must meet the ARARs set forth in Alternative 3 but must also satisfy waste management standards. See Table 11, specifically West Virginia Waste Management Act, WV C.S.R. Title 33 Series 1. Nevertheless, with sufficient due diligence, all alternatives would be able to adhere to the ARARs and meet the substantive requirements of applicable permits, and therefore satisfy the requirements of this criterion.

10.2.4 Sewers

Alternatives 2 and 5 contain excavation as a component of the remedial action. Alternatives 2 and 5 involve the movement and/or disposal of soil and the backfilling of some areas with “clean” soil, likely causing dust and vehicular air emissions due to truck usage. These activities must meet storm water management, erosion and sediment control, waste management, and air emission standards. See Table 11, specifically West Virginia Stormwater Management Act, WV C.S.R. 47-02,10 & 58, West Virginia Waste Management Act, WV C.S.R. Title 33-1 & West Virginia Hazardous Waste Management System, WV C.S.R. Title 33 Series 20 and Clean Air Act regulations, 40 C.F.R. Part 63, Subpart G and WV C.S.R. Title 45 Series 1-40. Alternatives 2 and 5 will meet the ARARs relating to the management and disposal of soils, waste, and air emissions.

No ARARs are anticipated to apply to either Alternative 3 or 4. The four action alternatives satisfy the requirements of this criterion.

10.3 LONG-TERM EFFECTIVENESS

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once performance standards have been met. This criterion includes the consideration of magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes that will remain on-site following remediation.

10.3.1 South Plant Groundwater

Alternative 2 is expected to be effective over the long term by reducing soil vapors and capturing South Plant area alluvial groundwater and permanently reducing contaminants through treatment prior to discharge to the Ohio River. Although Alternative 2 would create secondary waste streams, it would result in the permanent removal of COCs from groundwater. The specific treatment process would be determined during the pre-design evaluation and pilot study process prior to implementation. Alternative 3 would replace the groundwater extraction component of the overall remedy with *in situ* oxidation of COCs, which would not create secondary waste streams that are produced with the operation of the groundwater treatment plant. However, the effectiveness of the ISCO remedy is less reliable than the proven technologies of Alternative 2 and would require comprehensive groundwater monitoring downgradient.

10.3.2 Shallow Soils

Removal of PCBs achieves long-term permanence and would not require inspections or maintenance. Similarly, *in situ* S/S of the PCBs, with construction quality assurance of the mixing effectiveness, would permanently encapsulate and immobilize the COCs and mitigate the direct contact exposure, and would not require inspections or maintenance.

Alternative 4 would require long-term inspection and maintenance of the general floodplain cover materials. However, this requirement is straightforward, and would consist of mowing the grass and periodic basic inspections. Experience from the Removal Actions has shown that floodplain soil covers with vegetation remain stable; hence, there would likely be little to no maintenance requirements in a given year. Historically, there is no evidence of scouring due to flood events. In addition, vegetation will help adequately maintain soil cover. The three action alternatives satisfy the requirements of this criterion.

10.3.3 Former Mercury Cell Building

Alternative 2 (ICs) would be effective in the long term at mitigating direct contact but would have no effect on the potential migration of mercury. Removal of mercury-impacted soil and concrete (Alternatives 4 and 5) achieves long-term permanence. Capping (Alternative 3) would also be effective at meeting the requirements of this criterion, for the following reasons: (i) with proper maintenance, the cap is an effective technology, and (ii) there is minimal potential for mercury migration beneath the Cell Building based on the Site soil characteristics and lack of disturbance, which would occur by implementing Alternatives 4 and 5. Thus, Alternatives 3, 4, and 5 satisfy the requirements of this criterion.

10.3.4 Sewers

Excavation achieves long-term permanence and would not require inspections or maintenance. Similarly, grouting of the sewer lines, with construction quality assurance of the complete grouting effectiveness, would permanently encapsulate the COCs and would not require inspections or maintenance. Alternatives 3, 4, and 5 would achieve the RAOs in under one year. Alternatives 2 and 5 satisfy the requirements of this criterion. However, similar to considerations related to excavation alternatives to address the former Cell Building area, it is unknown whether the excavation could break the sewer lines and release mercury to the subgrade, further spreading mercury and frustrating the containment RAO. Thus, Alternative 5 is more likely to achieve long-term effectiveness since it would include less excavation than Alternative 2. Alternative 4 would likely be less effective at meeting the requirements of this criterion due to the need to routinely inspect the integrity of the remedy since mercury would be left untreated within the sewer lines. Alternative 3 (grouting) would prevent infiltration through the media, which in turn prevents dissolution of the mercury and chemical transformation into more toxic and mobile byproducts. However, Alternative 3 would likely be less effective at meeting the requirements of this criterion as compared to Alternative 5 because some areas of the sewer lines may be inaccessible for grouting and Alternative 5 includes enhanced clearing techniques and contingency planning for addressing those areas.

10.4 REDUCTION OF TOXICITY, MOBILIZATION, OR VOLUME THROUGH TREATMENT

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present that may be included as part of a remedy.

10.4.1 South Plant Groundwater

Alternative 2 will remove contaminants from groundwater via pumping and treating and soil vapor extraction. This process would reduce toxicity, mobility, and volume of COCs in groundwater. The GWTP treats extracted groundwater prior to its release into the Ohio River (toxicity), the extraction wells control plume migration (mobility), and the extraction system also removes contaminants from extracted alluvial groundwater and the vadose zone (volume).

The proposed ISCO flow-through barrier in Alternative 3 would reduce the toxicity and volume of COCs as they migrate through the injection zone but would not reduce the overall mobility of the plume, in contrast to the GWTP, which by its nature draws the plume towards pumping wells and also hastens source mass reduction. ISCO is a proven technology for the organic contaminants but will not reduce the mercury in groundwater. Significant downgradient monitoring of the ISCO barrier would be necessary to insure RAOs are achieved.

Additionally, ISCO can alter the geochemical nature of the aquifer (e.g., significantly lowering pH), which could in turn potentially mobilize naturally occurring metals in the soil matrix, creating secondary residuals *in situ* which would also have to be carefully monitored.

Alternative 2 allows flexibility during the pre-design evaluation and pilot study phase to maximize the use of up to three treatment technologies to upgrade the existing system to meet the discharge requirements.

10.4.2 Shallow Soils

A complete excavation in both the Operations Area and the Hanlin Floodplain (Alternative 2) would remove the contaminated soil but would not reduce the toxicity, mobility, and volume of the COCs through treatment. In Alternative 3 (Operations Area stabilization, floodplain area removal), the PCBs and other COCs of the Operations Area would be solidified in place, which would reduce their toxicity and mobility through treatment. In Alternative 4 (Operations Area stabilization, general floodplain covering, and floodplain wet soils removal), the cover material over the majority of the floodplain would reduce the ecological toxicity and mobility of the floodplain COCs by covering the COCs in place but not through treatment. However, stabilization of contaminated soil would reduce the toxicity and mobility of the COCs through treatment. Alternatives 3 and 4 satisfy this criterion more than Alternative 2. While the removal-related elements of Alternatives 2, 3, and 4 additionally reduce COC volume, they have the disadvantage of potentially mobilizing COCs via dust generation, cross contamination within the work area, and waste transport through the community.

10.4.3 Former Mercury Cell Building

None of the alternatives include treatment. Alternative 2 (controls) would not reduce the toxicity, mobility or volume of the COCs.

Alternative 3 (capping) would reduce the exposure potential (and hence toxicity) of mercury by mitigating direct contact. Capping would also reduce mercury mobility by blocking further rainfall infiltration, which would provide a means to prevent chemical transformation into a more leachable form.

Within the limits of the Site boundary, removal of the mercury-impacted soil and concrete (i.e., Alternatives 4 and 5) reduces the toxicity, volume and potentially, mobility, of the COCs. However, the uncertainty in mercury removal completeness and the potential for enhanced mobilization in an excavation scenario limit the reductions in mobility.

Alternative 4 (Excavation and Off-Site Disposal of Foundation Trenches + Capping) would involve much greater disturbance of contaminated media than Alternative 3 (Capping), which could have the unintended effect of causing vertical mobilization of mercury during implementation. This mobilization could occur through the generation of soil macropores from excavation-related soil disturbance, which could admit residual elemental mercury to deeper depths, or through the related disturbance and mobilization of soil pore water with dissolved mercury.

10.4.4 Sewers

Grouting is a solidification treatment; Alternatives 3 and 5 would reduce the toxicity and mobility of mercury made environmentally unavailable by solidifying in grout. The other alternatives for the sewers do not satisfy this criterion. Alternative 2 (Excavation and Off-Site Disposal) would involve the greatest disturbance of contaminated media, which may have the unintended effect of causing vertical mobilization of mercury during implementation and potential short term exposure risks to Site workers during implementation which would need to be addressed in a health and safety plan and materials handling plan.

10.5 SHORT-TERM EFFECTIVENESS

Short-term effectiveness addresses the period of time needed to implement the remedy and achieve protection, as well as any adverse impacts that may be posed to workers, the community, and the environment during construction and operation of the remedy until the performance standards are achieved.

10.5.1 South Plant Groundwater

The GWTP and SVE systems provide immediate effectiveness for hydraulic/pneumatic containment of the COCs. A combination of the implemented upgrade technologies following the pre-design evaluation and pilot study period will provide immediate effectiveness in treating the captured vapors and groundwater. Comprehensive post-implementation downgradient groundwater monitoring would be necessary to demonstrate the ISCO barrier wall would provide complete plume treatment and meet RAOs.

Additionally, the risks to workers, the environment, and the community are much more substantial for Alternative 3, which would involve significant chemical handling above-grade, and expose workers to caustic chemicals if not properly handled. Both alternatives involve routine above-grade waste handling and treatment from the SVE system. Alternative 2 best satisfies the requirements of this criterion.

10.5.2 Shallow Soils

The three action alternatives would be effective immediately upon completion of the removal, S/S, or covering components of the remedy. Alternative 2 would pose moderate risks to worker safety, including exposure to contaminated media. Both Alternative 2 and 3 include off-Site transportation of contaminated soil creating a potential exposure risk to the community. Alternative 2 would mitigate this risk to human health and the environment during implementation of the remedy by site-specific worker health and safety plans and BMPs.

Risk to workers and the community posed by implementing Alternative 3 would be less than for Alternative 2. Excavation and *in situ* S/S would pose risks to worker safety including exposure to contaminated media; however, there would be no potential exposure risk to the community from the *in situ* treatment of the Operations Area soils. Human health and the environment can be

protected during implementation of the remedy by site-specific worker health and safety plans and BMPs.

Alternative 4 risks to workers, the community, and the environment are less than risk posed by the other two alternatives for the vegetative cover component, and consistent with the risk posed by Alternatives 2 and 3 for *in situ* S/S and wet soils excavation. Covering would pose relatively minor risks to workers. *In situ* S/S and wet soils excavation could pose risks to worker safety including exposure to contaminated media. The components of Alternative 4 together mitigate the risk to the community, as limited off-Site transportation of contaminated material would be required. As with previous alternatives, human health and the environment can be protected during implementation of the remedy by site-specific worker health and safety plans and BMPs.

The risks that may be posed to the community, workers, and the environment are less for Alternative 4 than the other alternatives. Limited exposure to contaminated media from waste handling and off-Site transportation of contaminated soil from the wet soils is the main concern. Eliminating the excavation of floodplain soils will eliminate the need for trucks transporting soils from the Site through the community. Additionally, workers and community exposure is minimized. Therefore, Alternative 4, Stabilization of Operations Area Soils, Excavation of SWMU Floodplain Wet Soils, and Cover of General Floodplain Soils, best meets the requirements of this criterion.

10.5.3 Former Mercury Cell Building

Alternatives 3, 4, and 5 would effectively achieve the RAOs upon completion of the cap or excavation and backfilling. Alternative 2 is less effective at achieving the RAOs. The risks to workers, the community, and the environment are none for Alternative 2, and minor for the cap but relatively substantial for the excavation options, which would require geotechnical protection of existing structures, remediation assets, deep excavations, hazardous waste handling and off-Site transportation, and disturbance of subgrade soils that could mobilize mercury and lead to an increase in groundwater impacts. Excavation may also produce the potential for increased mercury volatilization in the short term, which could be mitigated by monitoring and engineering controls. Capping (Alternative 3) best meets the requirements of this criterion.

10.5.4 Sewers

The four action alternatives would be effective immediately upon completion of the excavation, grouting, or blocking/blinding components of the remedy, all of which could be completed within one year. The risks that may be posed to the community, workers, and the environment are the most severe for Alternative 2, which involves deep excavation, exposure to contaminated media from waste handling, off-Site transportation of contaminated soil and sewers, and disturbance of subgrade soils, which could mobilize mercury. The short-term risks to workers and the community are lowest for Alternative 3, which only requires the jet grouting of the lines from access points above-grade; however, this alternative may not completely contain the mercury since some parts of the sewers may not be accessible. Risks to workers and the community are moderate for Alternative 4, which requires blinding or blocking in place which

could require confined space work, and Alternative 5, which poses some risk for excavation which may be necessary.

10.6 IMPLEMENTABILITY

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

10.6.1 South Plant Groundwater

Implementation of the GWTP and SVE systems are currently operational and has overall proven to be effective in capturing South Plant area alluvial groundwater prior to discharge to the Ohio River. It is anticipated that additional optimization and/or capital upgrades to the GWTP following the pre-design evaluation and pilot study period will achieve 0.14 µg/L total mercury at the GWTP end-of-pipe discharge, meet 0.012 µg/L at the boundary of the temporary mixing zone, and meet 0.14 µg/L at the GWTP end-of-pipe discharge within 5 years and 3 months. The extent of the modifications will not be reliably known until the data gap assessment, engineering evaluation, and pilot study(ies) are complete. The materials and services required to upgrade the GWTP are readily available and the pre-design evaluation and pilot study period will improve the effectiveness of implementation.

Implementation of the ISCO injection events would be significantly challenging due to the number of well locations (252 total injection points), the injection volume (almost 8 million gallons of solution twice per year), potential for the injection to daylight to the surface or Ohio River and well fouling. ISCO is also untested at the Site.

10.6.2 Shallow Soils

The alternatives for the Operations Area (excavation versus *in situ* S/S) are equally implementable, as they both would require utility protection, BMPs for worker and environmental protection, etc. Among the remedial options in the floodplain, the approach that involves soil cover (Alternative 4) as opposed to excavation best meets the requirements of this criterion, based on the relatively simpler implementation of the floodplain cover (placement of an additional foot of clean cover) versus the excavation of the top foot of soil. Though shallow excavation would not pose significant challenges, it would still require utility location and protection, and intrusive work in a wide variety of Site conditions (near surface water, culverts, etc.).

While the removal-related elements of Alternatives 2, 3, and 4 additionally reduce COC volume, they have the disadvantage of potentially mobilizing COCs via dust generation, cross contamination within the work area, and waste transport through the community. Alternative 4 disturbs a smaller area of contamination and therefore reduces the potential of mobilizing COCs during construction activities. Alternative 4 would not involve deep excavation work limiting exposure to contaminated media. It is also less intrusive and less complicated to implement. Hence, Alternative 4 best meets the requirements of this criterion.

10.6.3 Former Mercury Cell Building

The installation of engineering controls (Alternative 2) would be straightforward. The installation of a concrete cap (Alternative 3) would be straightforward in this area. By contrast, the excavation (Alternatives 4 and 5) would be significantly challenging, requiring extensive geotechnical shoring near the GWTP Annex, deep excavations of at least 12 ft bgs, and complex waste handling and pre-treatment requirements. Among the three alternatives (excluding Alternative 2 which is a non-engineered alternative) that meet the threshold criteria, Alternative 3 is the easiest to implement, with the removal alternatives (4 and 5) considered the least satisfactory. Alternative 3 less intrusive and less complicated to implement.

10.6.4 Sewers

Alternative 3 (Grouting), Alternative 4 (Blinding/Blocking), and Alternative 5 (Grouting with Partial Excavation as Necessary) would be relatively straightforward to implement, assuming grouting could be performed on all of the sewers. Alternative 2 is the most challenging, due to the deep excavations, waste handling, pre-treatment requirements, and availability of off-Site disposal locations that will accept mercury-containing waste. Alternative 5 poses the same challenges as Alternative 2, but to a lesser degree since excavation would be undertaken only if grouting cannot be completed.

10.7 COST

10.7.1 South Plant Groundwater

Capital costs for Alternative 2 vary depending upon the final combination of technologies implemented; the 30-year net present value (NPV) costs are estimated to be not more than \$19.0 million. The 30-year NPV cost of Alternative 3 was estimated to be \$142.5 million. Alternative 2 best satisfies the requirements of this criterion because Alternative 3 is estimated to cost approximately eight times the cost of Alternative 2.

Table 7 presents capital costs, periodic and O&M costs, and total costs for each alternative.

Table 7. Summary of Costs: South Plant Groundwater

Alternative	Description	Capital Cost	Periodic and O&M Costs	Total Cost
2	Upgraded Groundwater Extraction and Treatment (+ SVE)	\$940,000	\$1,490,000	\$19,000,000
3	<i>In Situ</i> Chemical Oxidation + SVE	\$20,360,000	\$9,845,000	\$142,530,000

10.7.2 Shallow Soils

Alternative 4 is estimated to have the lowest capital cost (\$1.1 million), and though it is the only alternative with an annual O&M cost (\$10,000), it also has the lowest 30-year NPV cost (\$1.3 million), which is approximately half as costly as the other alternatives (between \$2.2 and \$2.9 million). Therefore, Alternative 4 best meets the requirements of this criterion.

Table 8 presents capital costs, periodic and O&M costs, and total costs for each alternative.

Table 8. Summary of Costs: Shallow Soils

Alternative	Description	Capital Cost	Periodic and O&M Costs	Total Cost
2	Excavation and Off-Site Disposal of Operations and Floodplain Soils Area and Floodplain Soils	<i>\$2,940,000</i>	<i>\$0</i>	<i>\$2,940,000</i>
3	Stabilization of Operations Area Soils and Excavation of Floodplain Soils	<i>\$2,160,000</i>	<i>\$0</i>	<i>\$2,160,000</i>
4	Stabilization of Operations Area Soils, Excavation of Floodplain Wet Soils, and Cover of General Floodplain Soils	<i>\$1,130,000</i>	<i>\$10,000</i>	<i>\$1,130,000</i>

10.7.3 Former Mercury Cell Building

The estimated cost for Alternative 2 has the lowest capital cost (\$40,000), lowest annual cost (\$5,000), and lowest 30-year NPV cost (\$60,000). The estimated cost for Alternative 3 has the next lowest capital cost (\$430,000), annual cost (\$11,000), and 30-year NPV cost (\$560,000). The 30-year NPV costs of Alternatives 4 and 5 are \$5.7 million and \$7.4 million, respectively. Therefore, engineering controls (Alternative 2) best meets the requirements of this criterion, followed next by capping (Alternative 3).

Table 9 presents capital costs, periodic and O&M costs, and total costs for each alternative.

Table 9. Summary of Costs: Former Mercury Cell Building

Alternative	Description	Capital Cost	Periodic and O&M Costs	Total Cost
2	Institutional and Engineering Controls	<i>\$40,000</i>	<i>\$5,000</i>	<i>\$60,000</i>
3	Capping	<i>\$430,000</i>	<i>\$11,000</i>	<i>\$560,000</i>

Alternative	Description	Capital Cost	Periodic and O&M Costs	Total Cost
4	Excavation and Off-Site Disposal of Foundation Trenches + Capping	\$5,540,000	\$12,000	\$5,690,000
5	Excavation and Off-Site Disposal of Foundation Trenches and Management	\$7,430,000	\$0	\$7,430,000

10.7.4 Sewers

Alternative 3 was estimated to have the lowest 30-year NPV cost (\$230,000). Alternative 4 has a slightly lower capital cost but has an annual O&M component that results in a 30-year NPV that is slightly higher in cost (\$250,000). Alternative 5 is estimated to have a 30-year NPV cost of \$470,000, and Alternative 2 is the highest cost overall (\$850,000), almost four times greater than Alternative 3. Alternatives 3 and 4 are relatively close in cost but Alternative 3 best satisfies the requirements of this criterion.

Table 10 presents capital costs, periodic and O&M costs, and total costs for each alternative.

Table 10. Summary of Costs: Sewers

Alternative	Description	Capital Cost	Periodic and O&M Costs	Total Cost
2	Excavation and Off-Site Disposal	\$850,000	\$0	\$850,000
3	Grouting	\$230,000	\$0	\$230,000
4	Blinding/Blocking	\$120,000	\$10,000	\$250,000
5	Grouting with Partial Excavation as Necessary	\$470,000	\$0	\$470,000

10.8 STATE ACCEPTANCE

WVDEP has concurred with the selection of the following alternatives in a letter to EPA dated December 10, 2020 (Appendix A):

- **South Plant Groundwater:** Alternative 2 Upgraded Extraction and Treatment (+SVE)
- **Soils:** Alternative 4 Stabilization of Operations Area Soils, Excavation of Floodplain Wet Soils, and Cover of General Floodplain Soils
- **Former Mercury Cell Building:** Alternative 3 Capping
- **Sewers:** Alternative 5 Grouting with Partial Excavation as Necessary

10.9 COMMUNITY ACCEPTANCE

As memorialized below in the Responsiveness Summary, EPA held a 30-day public comment period from July 10, 2020, through August 8, 2020, during which a public meeting was held on July 23, 2020, to discuss the proposed action. Two (2) members of the public and three (3) PRP representatives attended the public meeting. Several questions were asked and answered. Comments were received via electronic mail from one respondent. No other comments were received by post or telephone. Questions and responses can be found in the Responsiveness Summary.

11.0 PRINCIPAL THREAT WASTE

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (40 C.F.R. § 300.430(a)(1)(iii)(A)). The principal threat concept is applied to the characterization of source materials at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination, for example, to groundwater. Principal threat wastes are those source materials considered to be highly toxic or highly mobile, which would present a significant risk to human health or the environment should exposure occur.

As a result of the extensive removal actions taken at the Site, the RI did not identify any principal threat waste to address under the preferred alternatives for OU1. An evaluation of this analysis can be found in the Administrative Record. The contaminated soils at the Site are considered a low-level threat waste.

12.0 FINAL REMEDIAL ACTION

Following review and consideration of the information presented in the Administrative Record of this Record of Decision, the requirements of CERCLA and the NCP, State acceptance and public comments, EPA has selected the following final remedy:

- Shallow Soils - Alternative 4: Stabilization of Operations Area Soils, Excavation of Floodplain Wet Soils, and Cover of General Floodplain Soils
- Former Mercury Cell Building - Alternative 3: Capping
- Sewers - Alternative 5: *Grouting with Partial Excavation as Necessary.*

12.1 FINAL REMEDIAL ACTION COMPONENTS AND PERFORMANCE STANDARDS

The Final Remedial Action will achieve protection of human health and the environment by reducing soil contamination to the cleanup levels and evaluating residual risk when the cleanup goals are attained. The selected Final Remedial Action includes the following components and performance standards:

12.1.1 Shallow Soils: Stabilization of Operations Area Soils, Excavation of Floodplain Wet Soils, and Cover of General Floodplain Soils Stabilization of Operations Soil Cover

12.1.1.1 General Floodplain

- The estimated area to be removed is 183,500 SF or 4.21 acres. This area is generally described on Figure 13 and will be further defined in the Remedial Design phase.
- Onsite soils, which have already been confirmed as appropriate for reuse, may be used as backfill. It is anticipated that 7,840 cy are available. If additional soil is necessary, the source will have to be sampled for appropriate use.
- Cover will include 1 ft of clean soil with a vegetative cover comprised of native species using a native seed mix approved by EPA, in consultation with WVDEP.
- This area will be subject to an O&M schedule which will be detailed in an O&M plan. The plan will provide for inspections of the area annually for minimum of 4 years to ensure invasive species control, successful growth of desired vegetation, and lack of soil erosion. Inspections will also be required after flood events to ensure that the integrity of the soil and vegetative covers are maintained. The O&M plan shall also include an invasive species management plan. After 4 years, upon EPA approval, in consultation with WVDEP, the frequency of inspections may be reduced.
- Annual inspection reports shall be submitted by April 1 for the previous calendar year. Reports shall include pictures, plant survey/inventory, invasive species evaluation, inspection schedule, success rates, areas where plants were replaced and any other relevant details. Inspections after flood events will be documented in letter reports which will be submitted within 30 days of the flood event. A flood event is defined as a period of inundation due to Ohio River water elevations at or above flood stage.
- This remedy is considered complete after Remedial Action Completion Report (RACR) is submitted including 4 years of inspection reports, diagrams and pictures of work completed, and final approval by EPA and WVDEP. The RACR should include all specifications of material used and details of work performed.

12.1.1.2 Stabilization of Operations Area Soils

- PCBs are the contaminant of concern.
- Soils area is approximately 7,000 SF. Area is identified on Figures 6a, 6b, and 13 and will be further defined in the Remedial Design phase.
- Soils shall be amended with 5% stabilizers and cement. Specific method of interment will be described in Remedial Design.
- This remedy is considered complete after RACR is submitted including inspection reports, diagrams and pictures of work completed, and final approval by EPA and WVDEP. The RACR should include all specifications of material used and details of work performed.

12.1.1.3 Excavation of Floodplain Wet Soils

- COCs are arsenic, chromium, copper, lead, manganese, thallium, zinc, hexachlorobenzene (HCB), total PCBs.
- The areas for excavation are defined on Figures 6a and 6b but the final determinations of location will be defined during the Remedial Design. Excavation depth is expected to be generally 1 foot for a total of 19,200 SF.
- Excavated soils should be managed and disposed according to CERCLA, RCRA and other ARARs. It is estimated that about 710 cubic yards of wet soils will be disposed off-Site.
- Confirmation sampling following excavation is required to ensure cleanup standards are attained. The parameters of the confirmation sampling will be determined during the Remedial Design phase.
- This remedy is considered complete after RACR is submitted including inspection reports, diagrams and pictures of work completed, and final approval by EPA and WVDEP. The RACR should include all specifications of material used and details of work performed.

12.1.2 Former Mercury Cell Building Capping

- The area identified for capping is seen in Figure 14. The area is approximately 17,000 SF and consists of a 6-inch concrete cap. The completed cap will require approximately 400 cy of concrete.
- A variable thickness will be required in some locations (e.g., to fill the trenches). The formwork for the concrete should be constructed to create a slight grade (1% to 2%) to shed water to the sides and mitigate ponding. The concrete cap should extend slightly beyond the limits of the existing slab as a conservative precaution.
- Epoxy will be applied to the concrete. Specific compounds will be defined in the Remedial Design phase.
- Routine inspection and maintenance of the concrete cap and epoxy coating will be conducted on a monthly basis and recorded in an onsite log. The asphalt area north of the annex shall also be inspected for integrity and record of such inspections should be included in the monthly log. This log should be maintained and available for inspection. Annual reports shall be submitted to EPA and WVDEP by April 1 for the previous calendar year. The reports shall include a figure of areas to be inspected, the inspection log including who did the inspection and when, and a list of any deficiencies including cracks, stains, or other anomalies and work undertaken to correct any such deficiencies.
- This remedy is considered complete after RACR is submitted including inspection reports, diagrams and pictures of work completed, and final approval by EPA and WVDEP. The RACR should include all specifications of material used and details of work performed.

12.1.3 Sewers Grouting with Partial Excavation as Necessary

This remedy consists of grouting as the base remedy, but with additional clearing (via jetting, augering, or other methods) for sewers that cannot be grouted and camera inspection of the segments of impacted sewer lines that were not able to be investigated previously.

- EPA conservatively assumes that up to 20% of the sewer lines will not meet the grouting performance requirement. These segments should be excavated and transported off-site for proper disposal.
- Enhanced clearing techniques (jetting, augering, or other methods) should be implemented to attempt to clear obstructions that prevented the inspection camera from accessing approximately 400 linear feet of the five impacted sewer segments, which total approximately 790 linear feet.
- The performance standard for the grouting work will consist of a volumetric evaluation, in which the design of grout (based on length and diameter of the impacted sewer segment) will be compared to the actual quantity of grout injected. The specific steps of this evaluation will be developed during the Remedial Design.
- The grout mix will be selected to ensure that it is effective to adsorb mercury. Grout material will be defined in the Remedial Design phase.
- If the grouting performance standard cannot be achieved while grouting from one end of the sewer, presumably due to a blockage in the sewer line, grouting will be attempted from the other end of the sewer. If the performance standard still cannot be achieved, the line will be exposed via excavation, limited to 5 feet on either side of the blockage, and that section of the line will be removed or otherwise rectified to the satisfaction of EPA, in consultation with WVDEP. The open ends of the excavated sewer line will be capped, and the grouting will continue.
- This remedy is considered complete after RACR is submitted including inspection reports, diagrams and pictures of work completed, and final approval by EPA in consultation with WVDEP. The RACR should include all specifications of material used and details of work performed.

All excavated material should be managed and disposed of according to CERCLA, RCRA and other ARARs.

12.1.4 Institutional Controls

The following ICs will be implemented to prevent interference with all remedial measures installed as part of the Final Remedial Action, to ensure people are not exposed to contaminants in the subsurface soils until performance standards are achieved:

12.1.4.1 Shallow Soils

- Prevent residential use of the Site as a supplement to the current industrial zoning;

- Require that any new building that is constructed onsite include engineering controls (e.g., vapor barriers) in the design, or demonstrate that the vapor intrusion pathway is not complete;
- Restrict any actions inconsistent with an established soil management plan approved by EPA, in consultation with WVDEP;
- Provide for continued O&M of existing waste management units established by earlier removal actions.
- Implement an approved soil management plan that mitigates potential hazards remaining after implementation of the OUI active remedy with portions of the Operations Area and Hanlin Floodplain with localized, high concentrations of arsenic, manganese, mercury, and thallium. Any additional contaminated soil found after the remedial action shall be removed and appropriately managed.

The above land restrictions will be established through one or more Land Use Covenant documents executed pursuant to the West Virginia Uniform Environmental Covenants Act, WV Code § 22-22B.

12.1.4.2 Former Mercury Cell Building

- Periodically monitor for vapor intrusion in all existing enclosed structures;
- Require that any new building that is constructed include engineering controls (e.g., vapor barriers) in the design, or demonstrate that the vapor intrusion pathway is not complete;
- Prohibit disturbance of any remedial component, such as the GWTP building floor and concrete cap;
- Establish and require compliance with health and safety protocols for any future required sub-surface disturbance in which on-site workers could come in contact with elemental mercury or other hazardous conditions.

12.2 RATIONALE

12.2.1 Shallow Soils - *Alternative 4: Stabilization of Operations Area Soils, Excavation of Floodplain Wet Soils, and Cover of General Floodplain Soils*

The Final Remedial Action that best satisfies the threshold and balancing evaluation criteria is Alternative 4: Stabilization of Operations Area Soils, Excavation of SWMU Floodplain Wet Soils, and Cover of General Floodplain Soils. The estimated cost for Alternative 4 is \$1,250,000, and the major components are shown on Figure 13. EPA is selecting Alternative 4 over the other alternatives because it is protective of human health and the environment, it will comply with ARARs, it uses treatment to the maximum extent practicable, it is readily implementable, and the alternative is cost-effective. Excavating only the floodplain wet soils while covering other soils located in the floodplain is preferred over excavating all soils because limiting excavation minimizes the risk of exposure to on-Site workers undertaking the excavation and risk in the

community by reducing truck traffic from the Site while providing a protective, cost-effective remedy. Covering soils in the floodplain has been successfully implemented since the 1995 Hanlin AOC and remains protective after major storm events. Alternative 4 is the easiest to implement, and costs less than 60% of the other two active remedies.

12.2.2 Former Mercury Cell Building - *Alternative 3: Capping*

The Final Remedial Action alternative that best satisfies the threshold and balancing evaluation criteria is Alternative 3: Capping. The estimated cost for Alternative 3 is \$560,000, and the major components are shown on Figure 14. EPA is selecting Alternative 3 over the other alternatives because it is protective of human health and the environment, it will comply with ARARs, it uses treatment to the maximum extent practicable, it is readily implementable, and the alternative is cost-effective.

Alternative 3 will be protective and the comparative analysis showed that it is superior to the other alternatives, especially when considering three of balancing criteria in particular (short-term effectiveness, implementability, and cost). The capping alternative minimizes risk to on-Site workers and eliminates the need to transport contaminated concrete through the community in approximately 80 trucks. Risk reduction will be confirmed by periodic sampling of mercury vapors in existing enclosed structures. This approach is easily implemented and significantly less costly than Alternatives 4 and 5, respectively, because excavation requires additional logistics and safety precautions including shoring, complicated excavation near structures and waste handling procedures and disposal.

12.2.3 Sewers - Alternative 5: Grouting with Partial Excavation as Necessary

The Final Remedial Action alternative that best satisfies the threshold and balancing evaluation criteria is Alternative 5: Grouting with Partial Excavation as Necessary. The estimated cost for Alternative 5 is \$470,000, and the major components are shown on Figure 15. EPA is selecting Alternative 5 over the other alternatives because it is protective of human health and the environment, it will comply with ARARs, it uses treatment to the maximum extent practicable, it is readily implementable, and the alternative is cost-effective.

Alternative 5, Grouting with Partial Excavation as Necessary, will be more protective than Alternatives 3 and 4, pose less risk to the on-Site workers, and reduce transportation of waste materials through the community. Readily implementable, Alternative 5 is approximately half the cost of Alternative 2, though slightly more costly than Alternatives 3 and 4. The combination of grouting and excavation provides a permanent solution for areas that cannot be grouted while minimizing the disturbance inherent to excavation activities.

12.3 COST ESTIMATE

The estimated present worth of the total cost of the selected remedy for the Shallow Soils is \$1,250,000. This total cost includes the capital cost of \$1,130,000, as well as additional periodic and O&M costs of \$10,000 for an assumed period of 30 years.

The estimated present worth of the total cost of the selected remedy for the Former Mercury Cell Building is \$560,000. This total cost includes the capital cost of \$430,000, as well as additional periodic and O&M costs of \$11,000 for an assumed period of 30 years.

The estimated present worth of the total cost of the selected remedy for the Sewers is \$470,000. This is the total cost as there is no long-term maintenance cost.

Table 10a. Final Remedy Costs

Shallow Soils	\$1.25M
Former Mercury Cell Building	\$0.56M
Sewers	\$0.47M
TOTAL	\$2.28M

12.4 EXPECTED OUTCOMES

The purpose of this response action is to control risks posed by direct contact with soil and ground water and to minimize migration of contaminants to ground water. The results of the risk assessment indicate risk relates to the mercury, manganese, PCBs and other COCs as listed in Section 7.1 in soil and ground water. This final remedy shall address soils contaminated with mercury. The interim remedy addresses mercury in groundwater in the South Plant area and maintain the groundwater treatment system to standards that protect the Ohio River and ecosystem. The site is expected to be available for unrestricted residential land use as a result of the remedy.

12.4.1 Shallow Soils

This remedy involves *in situ* S/S of the soils in the Operations Area and a vegetative cover over the floodplain soils, except for the SWMU M vicinity wet soils, which will be excavated.

The floodplain cover is assumed to consist of one foot of clean soil cover that is suitable for support of vegetative growth. Existing stockpiles have been evaluated and found to be suitable for this purpose and are assumed to be the source of fill for the cover soils for this remedy. The fill will be hydroseeded after placement and grading. The area of the floodplain that would receive cover is approximately 4.2 acres. To promote the stability of the cover system, the establishment of vegetation and the physical stability of the cover would be monitored no less than four years after construction and thereafter re-evaluated to determine if monitoring can be discontinued or if it is needed for an additional period of time. Additionally, the presence of invasive plant species within this area will be monitored during that timeframe, and appropriate steps to limit the establishment of such species will be taken.

The SWMU M vicinity wet soils will be excavated (approximately 0.4 acres) and replaced with approximately 900 CY of backfill with hydroseeding after excavation. It is estimated that the implementation of this remedy will be completed in less than one year. The quantity of soils excavated may be significantly less than anticipated due to the limited information currently available in this area.

12.4.2 Former Mercury Cell Building

This remedy involves concrete capping of the western and southern portions of the Cell Building management area, also known as the exposed portion of the foundation without structures. A new concrete cap would not be installed over the existing asphalt cap to the north of the GWTP Annex, as this area was paved in 2005. The total area of the proposed concrete cap is approximately 17,000 SF.

An epoxy sealant would be applied over the existing surface area (17,000 SF) prior to concrete work, to seal cracks, reduce vapor migration, enhance the containment of mercury in its present location and prevent migration into adjacent media. This will be confirmed by periodic sampling to confirm that mercury vapors inside existing structures remain within the acceptable risk range.

The concrete cap design is assumed to consist of at least 6 inches of concrete poured over the full extent of the 17,000 SF area. A variable thickness will be required in some locations (e.g., to fill the trenches). The formwork for the concrete will be constructed to create a slight grade (1% to 2%) to shed water to the sides and prevent ponding. It is expected that the concrete cap will extend beyond the limits of the existing slab as a conservative precaution.

Long-term inspection and maintenance of the concrete cap and the existing asphalt pavement will be required, primarily to inspect the competency of the concrete over time and perform corrective maintenance as needed. It is estimated that the implementation of the remedy will be completed in less than one year.

12.4.3 Sewers

The selected remedy involves abandoning in place the sewers that are impacted with visible mercury by full grouting the impacted lines. Grouting will involve a pressure injection via tremie methods to inject flowable fill, or suitable equivalent. The flowable fill will encapsulate the visible mercury and would solidify in place.

Along with the above, additional clearing (via jetting, augering, or other methods) and camera inspection will be performed on the segments of impacted sewer lines that were not able to be previously investigated. If the grouting performance standard cannot be achieved while grouting from one end of the sewer, presumably due to a blockage in the line, grouting will be attempted from the other end of the sewer. If the performance standard cannot be achieved, the line would be exposed via excavation, limited to 5 feet on either side of the blockage, and that section of the line will be removed. The ends of the sewer line would be capped, and the grouting would continue. As a conservative assumption, up to 20% of the sewer lines would not meet the

grouting performance requirement. These segments will be excavated and transported off-site for proper disposal.

12.5 PROTECTION OF HUMAN HEALTH AND ENVIRONMENT

The Interim Remedial Action will achieve protection of human health and the environment by reducing groundwater contamination and preventing exposure. This interim remedy establishes discharge limits; however, groundwater cleanup levels will not be established until EPA selects the final remedy. The Interim Remedial Actions will reduce human exposure to the contaminated groundwater.

13.0 INTERIM REMEDIAL ACTION

Following review and consideration of the information presented in the Administrative Record of this Record of Decision, the requirements of CERCLA and the NCP, state acceptance and public comments, EPA has selected the following interim remedy:

South Plant Groundwater - *Alternative 2: Upgraded Groundwater Extraction and Treatment (+ SVE)*.

13.1 INTERIM REMEDIAL ACTION COMPONENTS AND PERFORMANCE STANDARDS

The Interim Remedial Action is designed to contain a potential source area of contamination, prevent groundwater use, and reduce groundwater contamination until a comprehensive final groundwater remedy is selected. These measures will substantially increase protection of human health and the environment. The selected Interim Remedial Action includes the following components and performance standards:

13.1.1 South Plant Alluvial Groundwater: Upgraded Groundwater Extraction and Treatment (+ SVE)

By implementation of pilot studies and technological upgrades, the GWTP will attain the following standards ⁹:

- Achieve 0.14 µg/L of total mercury at the GWTP end-of-pipe discharge temporarily evaluated at the Stilling Pond alternative compliance point;
- Achieve 0.012 µg/L of total mercury at the boundary of the temporary mixing zone
- Achieve 0.14 µg/L total mercury at the GWTP end-of-pipe discharge within 5 years and 3 months of the issuance of the OU1 ROD.

The process by which new technology shall be evaluated is the following:

⁹ Although mercury is the primary COC for this interim action, the remaining COCs and standards set forth in Table 1 will also be met through adjustments to the GWTP and/or other means of attainment.

Data Gap Assessment (2-3 months)

A desktop assessment will be performed to identify and resolve data needs to define the treatment solution, such that a suitable list of candidate treatment options can be developed. Data needs could include chemical complexation of mercury in the aquifer and supernatant of the clarifier, as well as representative ranges of water quality (e.g., pH and alkalinity) for the influent and effluent of the current GWTP system. This assessment is expected to take 2-3 months.

Desktop Engineering Evaluation (2-3 months)

A desktop engineering evaluation of *in situ* and *ex situ* treatment options will be performed, utilizing any newly collected data, and screening out those technologies that may not be capable of achieving the end-of-pipe treatment goal. A combination of technologies may be utilized to achieve the objective. This evaluation is expected to take 2-3 months.

Bench-Scale Treatability Study (6-9 months)

The necessity of a bench-scale treatability study will depend on the results of the data gap assessment discussed above and evaluation of treatment options. The objectives of the bench-scale treatability study include (i) confirming the best combination of treatment technologies to meet discharge criteria of 0.14 µg/L of total mercury at the temporary alternative compliance point, to meet 0.012 µg/L of total mercury at the boundary of the temporary mixing zone, and to meet 0.14 µg/L at the GWTP end-of-pipe discharge within 5 years; and (ii) providing preliminary estimates of additive dosing and residence time requirements, as applicable. This study is expected to take 6-9 months.

Field-Scale Pilot Study (12-18 months)

The selected treatment option(s) will likely require testing in the field to confirm if the water quality standard can be met consistently for the GWTP discharge. Additionally, field pilot testing will support improved estimates of expanding the system for full operation and associated costs. This study is expected to take 12-18 months.

Design and Construction (24-30 months)

Following completion of bench-scale and field-scale testing, the upgraded GWTP will be designed and constructed to implement the enhanced treatment to meet the performance standards. This work is expected to take 24-30 months.

The scope of the interim remedy ultimately will depend on the outcome of the pre-design evaluation activities which will determine the best combination of technologies to achieve the standards. Upgrades may include Pre-Aeration, Multimedia Filtration, and Ion Exchange which are shown in Figure 11. The COCs are identified in Table 2 and mercury plume schematic can be found in Figures 9a-e.

1. The GWTP will continue to operate and be upgraded using the above process until the performance standards required above are achieved within the attainment period;
2. Monitoring of groundwater will be performed regularly following the application of different treatment technologies to ensure that the performance standards for the

reduction of contaminated groundwater will be met and that containment of the source area is maintained.

13.1.2 Soil Vapor Extraction System (SVE)

The remedy includes the ongoing and continued operation of the existing SVE system. The Remedial Design phase will include the Operation and Maintenance of the SVE system.

13.1.3 Institutional Controls

The following ICs will be implemented to prevent interference with all remedial measures installed as part of the Interim Remedial Action, to ensure people are not exposed to contaminants in the groundwater until performance standards are achieved:

- Limit the South Plant Area to industrial use;
- Prohibit potable use of South Plant alluvial groundwater; and
- Prohibit disturbance of any remedial component, such as the GWTP building and monitoring and extraction wells.

13.2 RATIONALE

The selected Interim Remedial Action alternative that best satisfies the threshold and balancing evaluation criteria is Alternative 2: Upgraded Groundwater Extraction and Treatment (+ SVE). The estimated capital cost for Alternative 2 is \$940,000 and the major components are shown on Figure 11 which include pre-aeration, multimedia filtration, and ion exchange. The total Operations and Maintenance cost could be \$4,316,000 if all elements are utilized. EPA is selecting Alternative 2 over the other alternatives because it is protective of human health and the environment, it will comply with ARARs, it uses treatment to the maximum extent practicable, it is readily implementable, and is cost-effective. Alternative 2 utilizes the existing GWTP and SVE system which have been operating since the early 2000's. The SVE system has removed >336,000 lbs of volatile organic contaminants and the GWTP has treated over 1.78 million gallons of influent.

Alternative 2 includes several study and analysis steps necessary to assess which of the treatment technologies, or combination thereof, will best achieve the mercury discharge limit objective. A combination of the technologies best meets the requirements of the Overall Protection of Human Health and the Environment and the five balancing criteria (Long-Term Reliability and Effectiveness, Reduction of Toxicity, Mobility, and Volume through Treatment, Short-Term Effectiveness, Implementability, and Cost). The selected interim remedial alternative has the following advantages over Alternative 3:

- it contributes to the maximum reduction of plume mobility and source mass;
- it does not involve extensive caustic chemical handling;
- it utilizes technologies proven to be effective; and

- it costs significantly less than Alternative 3.

Capital costs for the selected Interim Remedial Action vary depending upon the final combination of technologies implemented; the 30-year NPV costs are estimated to be not more than \$19.0 million. This estimate includes capital costs of \$940,000 and Total Annual O&M Costs of \$1,490,000

13.3 EXPECTED OUTCOMES

The Interim Remedial Action is expected to achieve groundwater interim remedial goals and protect the Ohio River in accordance with the RAOs.

The selected Interim Remedial Action includes upgrades to the GWTP to ensure removal of mercury to attain the West Virginia direct discharge limit with continued operation of the current SVE system to continue removal of soil vapor. The upgrades to the GWTP will include one or more of the following technologies: Pre-Aeration, Multimedia Filtration, and Ion Exchange. It is not required that all of the upgrades are implemented provided the GWTP improvements incorporated into the remedial design will meet the performance criteria described above.

The GWTP will require study and upgrades to effectively extract COCs from the South Plant alluvial groundwater and treat the extracted groundwater to ensure that the discharge meets the water quality standard identified in the RAOs. A Data Gap Assessment, Desktop Engineering Evaluation, Bench-Scale Treatability Study and Field-Scale Pilot Study will be conducted as a pre-design evaluation to determine the best combination of technologies to achieve the treated water performance criteria.

13.4 PROTECTION OF HUMAN HEALTH AND ENVIRONMENT

The Interim Remedial Action will achieve protection of human health and the environment by reducing groundwater contamination and preventing exposure. This interim remedy establishes discharge limits; however, groundwater cleanup levels will not be established until EPA selects the final remedy. The Interim Remedial Actions will reduce human exposure to the contaminated groundwater.

Table 10b. Summary of Hanlin Allied Olin Remedies

OU1 Element	Remedy	Interim or Final
Shallow Soils	Stabilization of Operations Area Soils, Excavation of Floodplain Wet Soils, and Cover of General Floodplain Soils	Final
Former Mercury Cell Building	Capping	Final
Sewers	Grouting with Partial Excavation as Necessary	Final
South Plant Alluvial Groundwater	Upgraded Groundwater Extraction and Treatment (+ SVE)	Interim

14.0 STATUTORY DETERMINATIONS

14.1 COMPLIANCE WITH ARARS

The NCP, at 40 C.F.R. §§ 300.430(f)(5)(ii)(B) and (C), requires that a ROD describe Federal and State ARARs that the remedy will attain or, if not, provide a justification for any waivers. Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, or contaminant; remedial action; location; or other circumstance at a CERCLA site. Relevant and appropriate requirements, while not legally applicable to a hazardous substance, pollutant, or contaminant; remedial action; location; or other circumstances at a particular CERCLA site, address problems or situations sufficiently similar to those encountered at the site such that their use is considered well-suited to the particular site. Each of the components of the selected remedy will comply with ARARs (Table 11).

14.2 COST EFFECTIVENESS

Under Section 300.430(f)(1)(ii)(D) of the NCP, once a remedy satisfies the threshold criteria of overall protection of human health and the environment and compliance with ARARs, the remedy's cost-effectiveness is determined by evaluating its long-term effect and permanence; reduction in toxicity, mobility, or volume through treatment; and short-term effect. If the overall cost of the remedy is proportional to its overall effectiveness, then it is cost-effective. As discussed in detail in Section 10.7 of this ROD, the Interim and Final Remedial Actions are cost-effective because they satisfy the criteria listed above and offer a permanent solution through the treatment of contaminants in groundwater, soil, and known mercury sources. The Interim and Final Remedial Actions will achieve the RAOs in a more cost-effective manner than the other alternatives analyzed.

14.3 UTILIZATION OF PERMANENT SOLUTIONS TO THE MAXIMUM EXTENT

The Interim Remedial Action for the South Plant Groundwater represents the best option to utilize a known effective treatment system while additional technologies are evaluated to upgrade the plant. This approach allows the Site to attain discharge objectives as soon as practicable while also continuing the ongoing treatment system that is currently in place. The Final Remedial Actions for the Former Mercury Cell Building, South Plant Sewers, and Soils represents the best options to minimize impact on the community, clean up contaminated media to cleanup goals, and do so efficiently and safely.

14.4 FIVE-YEAR REVIEW REQUIREMENTS

CERCLA § 121(c) and Section 300.430(f)(4)(ii) of the NCP provide the legal basis for conducting FYRs. The Final Remedial Action will result in hazardous substances remaining on Site above levels that allow for unlimited use and unrestricted exposure. A FYR will be performed every five years following the start of the remedial action.

14.5 TOTAL COSTS

The total cost for all four remedies as seen below in Table 10c is \$2,970,000 in capital costs. Operation and Maintenance costs are \$4,337,000 for a total cost in this OU1 ROD of \$21,280,000.

Table 10c. Total OU1 Remedy Cost Estimate

Alternative	Capital Costs	O and M	NPV 30 years
Soils: Alternative 4	\$1,130,000	\$10,000	\$1,250,000
Former Mercury Cell Building: Alternative 3	\$430,000	\$11,000	\$560,000
South Plant Sewers: Alternative 5	\$470,000	\$0	\$470,000
South Plant Alluvial Groundwater: Alternative 2	\$940,000*	\$4,316,000*	\$19,000,000*
	\$2,970,000	\$4,337,000	\$21,280,000

*Capital cost and O&M are a sum of Pre-Aeration, Multimedia Filtration and Ion Exchange technologies.

III. RESPONSIVENESS SUMMARY

HANLIN-ALLIED-OLIN SUPERFUND SITE OPERABLE UNIT 1 RECORD OF DECISION

MOUNDSVILLE,
MARSHALL COUNTY, WEST VIRGINIA

RESPONSIVENESS SUMMARY

This section summarizes the questions and comments received during the public comment period for the Hanlin-Allied-Olin Superfund Site, OU1 The Proposed Remedial Action Plan was released for public comment July 10, 2020. The public comment period extended from July 10, 2020, through August 8, 2020. A public meeting was held online on July 23, 2020. Two (2) citizens and three (3) potentially responsible party (PRP) employees attended the meeting. Several questions were addressed during the event. Honeywell submitted the following comments via email. No other questions or comments were received via postal mail, electronic mail, or telephone.

Honeywell submitted comments regarding the PRAP on August 7, 2020 in a letter addressed to EPA's Remedial Project Manager for the Hanlin-Allied-Olin Superfund Site, Lisa Denmark. No other formal questions or comments were received. EPA worked with WVDEP to address each of the comments below.

Honeywell Topic 1: General Language for Remedial Action Objectives

Comment from Honeywell:

Remedial Action Objectives (RAOs) for Site media in the FS generally used language such as "mitigate or control" in reference to media concentrations that pose unacceptable risks. The PRAP generally substituted the term "prevent" for "mitigate...". In our discussion with USEPA after PRAP release, USEPA indicated that they viewed the terms as synonymous.

Response: EPA understands the concern; however, the Agency believes that "prevent" better describes the objectives of the response action, but is not a very significant change from the terms used in the FS.

Honeywell Topic 2: South Plant Groundwater, Proposed Expiration of Mixing Zone for Mercury

Comment from Honeywell:

This topic contains several interrelated aspects. The Groundwater Treatment Plant (GWTP) Discharge Limits discussed in the FS entailed the following requirements, in summary: (i) attainment of a 0.14 microgram per liter ($\mu\text{g/L}$) mercury discharge concentration at the end-of-pipe, to be attained in a five-year schedule, and (ii) attaining an additional standard of 0.012 $\mu\text{g/L}$ at the boundary of temporary mixing zone to be established by USEPA and WVDEP. The PRAP contains an additional, unexpected statement, that the temporary mixing zone will expire no later than five years and three months after the ROD (p. 28). We have the following comments on this statement:

The statement, taken together with the aforementioned discharge standards, creates a conflict in the document by suggesting that the plant discharge attain standards of both 0.14 $\mu\text{g/L}$ and

0.012 µg/L at the same time, five years and three months after the ROD. It is not clear if the language intended to say that the GWTP must attain a discharge standard of 0.012 µg/L at the end-of-pipe. If so, this is internally inconsistent and furthermore conflicts with discussions held among the Agencies and Respondents, in which attaining the 0.012 µg/L end-of-pipe discharge standard was not a required element of the OU1 remedy. Moreover, attaining 0.012 µg/L as a discharge standard at the end-of-pipe is not discussed anywhere in the Alternative 2 description (pp. 31 – 33).

Response:

1. The mixing zone is indicated as “temporary”, and as such is not intended to be granted into perpetuity. Furthermore, considering this remedy to be an ‘interim’ remedy, the permissible timeframe for the (temporary) mixing zone is not intended to be left open-ended.
2. There are four monitoring points to consider (i) the end-of-pipe discharge, which is where effluent leaves the treatment plant and heads towards the Stilling Pond; (ii) the Stilling Pond; (iii) the actual point of discharge to the Ohio River (outlet); and (iv) the edge of the temporary mixing zone. The requirements outlined in the PRAP are intended to achieve the following by 5 years and 3 months after the ROD is implemented: 0.14 µg/L Hg at the end-of-pipe, and 0.012 µg/L Hg at the end/edge of the temporary mixing zone. The temporary mixing zone will be determined pursuant to 47 CSR 2-5, with the goal of eliminating the temporary mixing zone 5 years after it is demonstrated through water sampling analysis (plan to be presented by [Responsible Party], and approved by the agencies) that the chronic aquatic life water quality standard concentration (0.012 µg/L) is achieved at the end/edge of the mixing zone. After 5 years, the temporary mixing zone will be evaluated for elimination. Said compliance must be achieved no later than 5 years and 3 months post ROD.

Comment from Honeywell: Footnote 3 on p. 28 of the PRAP states that West Virginia prohibits the use of mixing zones to measure compliance with discharge limits under the National Pollutant Discharge Elimination System (NPDES). West Virginia regulations expressly permit the use of a mixing zone. Section 47-2-5.1 of the West Virginia Code of State regulations provides: “In the permit review and planning process or upon the request of a permit applicant or permittee, the secretary may establish, on a case-by-case basis, an appropriate mixing zone.” Tellingly, while the West Virginia regulations place a number of conditions on the use of mixing zones, there is no temporal limitation.

Response: As prescribed in 47 CSR 2-5.1, a mixing zone **MAY** be granted as a case-by-case exception. This rule does not include mention of a temporal limitation. West Virginia is a compact state member of the Ohio River Valley Water Sanitation Commission (ORSANCO). ORSANCO does permit mixing zones for facilities discharging into the Ohio River prior to October 16th, 2003 (pre-2003). Originally, all pre-2003 dischargers that had been granted mixing zones, were required to have the mixing zones eliminated no later than October 16, 2015. On October 8, 2015, ORSANCO eliminated that requirement, however, the goal of eliminating mixing zones remains and was advanced by the requirement that the discharger demonstrate

actions to eliminate the need for a mixing zone “as soon as practicable”. Based on the 2019 Revision to the ORSANCO Pollution Control Standards (PCS), the compact states are now afforded the discretion to decide whether to permit a mixing zone, and the discharger must demonstrate that the measures that will be taken to reduce or eliminate the need for a mixing zone during the permitting process as well as during subsequent permit renewal cycles. Per this discretion, it is the current policy of WVDEP DWWM to not observe the ORSANCO (PCS) human health standards for NPDES permits, and case-by-case mixing zones have been recently permitted. However, the state chronic aquatic life standard remains in effect. As for temporal limitations, it is the discretion of OER to determine how long to permit implementation of a mixing zone considering site conditions and state standards.

Comment from Honeywell: Similarly, USEPA’s water quality standards handbook states that an individual mixing zone is used to establish a water quality-based effluent limit for a discharger’s NPDES permit, when a state has a mixing zone policy, such as the one promulgated by West Virginia. As with the West Virginia regulations, there is no mention in the handbook or the underlying Technical Support Document for Water Quality-based Toxics Control (1991) that mixing zones are temporary.

Response: All mixing zones along the Ohio River in West Virginia are intended to be “temporary” (only pre-2003 dischargers) as per ORSANCO. It is EPA’s understanding that WVDEP OER observes this requirement. See comment above.

Comment from Honeywell: We understand that the target of 0.012 µg/L that is discussed in the PRAP originally stems from the PCSs) of ORSANCO. In 2019, ORSANCO enacted revisions to the PCS document that emphasize ORSANCO’s increasing focus on science, assessment, and source water protection programs as opposed to regulation and further emphasizes the flexibilities that states need to receive when developing permitting strategies. ORSANCO acknowledges that states can provide permittees with regulatory flexibility for implementation of water quality standards. As such, WVDEP may therefore grant a permittee a mixing zone for bioaccumulative chemicals (i.e., mercury).

Response: 0.012 µg/L is a promulgated standard (chronic aquatic life) for Hg in 47 CSR 2 (Appendix E, Table 2, page 51). Note this standard is specifically for methylmercury and is based on a four-day average concentration, not to be exceed more than once every three years on the average. This standard is only coincidentally the same number listed in the ORSANCO PCS as the not-to-exceed concentration to be protective of human health. It is left up to the state to determine if a mixing zone will be granted as per their rules, policies and procedures. OER will grant a temporary mixing zone for 5 years as indicated above. After the 5-year period, the temporary mixing zone will be evaluated for elimination.

Comment from Honeywell: For the reasons stated above, we respectfully request that USEPA remove from the ROD the statement concerning the expiration of the mixing zone in a set timeframe after ROD issuance or clarify that the mixing zone will be reviewed as part of the standard NPDES permit renewal procedures.

Response: The mixing zone use is explained above. Please see Figure 9d and 9e for further explanation. As indicated above and as set forth in the ROD, EPA will evaluate the need to extend or eliminate the use of the mixing zone following the requisite compliance period.

Honeywell Topic 3: South Plant Groundwater, Timing of Discharge Standards for Mercury

Comment from Honeywell: During development of the FS with USEPA, Honeywell proposed a five-year compliance schedule tied to the lodging of a Consent Decree (CD) for Remedial Design. In the PRAP, USEPA proposes a five year and three-month compliance schedule that is tied to the ROD (p. 28) rather than the CD.

Response: This will add to the time it will take to achieve the remedy objectives, possibly a year or more. Therefore, the timeframe basis will not change. The timeframe should serve as an incentive for the PRP to complete the RD/RA CD negotiations in a timely manner.

Honeywell Topic 4: South Plant Groundwater, Table 2: GWTP Discharge Limits

Comment from Honeywell: Table 2 in the PRAP, found on pp. 26-28, presents discharge limits and monitoring requirements for 39 parameters separate from mercury. These additional limits were not included in the final, accepted FS, nor has the FS or other documents evaluated the feasibility of attaining these limits.

For these reasons, we respectfully request that USEPA remove these ancillary requirements from the PRAP, recognizing that the South Plant alluvial groundwater remedy element is an interim action that can be further refined in work for one or more subsequent OUs. At a minimum, if USEPA elects to retain the table, we request that USEPA expand the text to commit the agencies to support the establishment of mixing zones for some of the ancillary parameters as found to be necessary during the RD.

Response: The Site was evaluated by WVDEP DWWM in terms of meeting compliance (substantive requirements) as a permit was not technically applied for due to CERCLA ARAR exemptions. EPA consulted with WVDEP DWWM on the evaluation. As such, additional constituents (and outlets) were evaluated by WVDEP and meeting the applicable discharge limits/monitoring requirements of additional constituents are appropriate for inclusion. WVDEP DWWM indicated to EPA that it cannot calculate a default mixing zone for the organic parameters in the evaluation without background data in the Ohio River just upstream of the discharge point. No in-stream data has been provided and ORSANCO does not collect this data. WVDEP DWWM explained to EPA that it typically requires at least 10 background samples as close to critical condition as possible for each parameter that a mixing zone is requested. The additional outlets will

need to be monitored as previously indicated and will be addressed under OU2 (and re-evaluated at the appropriate time).

EPA will evaluate these substantive requirements and a mixing zone during the Remedial Design phase. Given that these additional constituents were part of WVDEP's requirements the criteria will follow WVDEP DWWM procedures as part of the ARAR process.

Honeywell Topic 5: South Plant Groundwater, Table 2: GWTP Operational Uptime

Comment from Honeywell: In the summary of the Groundwater Human Health Risk Assessment (HHRA) (PRAP pp. 21-22), USEPA states that the GWTP will operate "24 hour[s] per day, 365 day[s] per year." The recent upgrades to the clarifier system have significantly reduced system downtime; however, downtime is still inevitable to address periodic needs for well pump replacement, extraction well maintenance, or treatment system pump replacement. Hence, we recommend that the ROD include a modified version of the statement that acknowledges maintenance needs.

Response: EPA acknowledges the comment and has indicated in the Decision Summary that operation of the GWTS will require reasonable downtime for maintenance.

TABLES

Table 1: Soil COCs

Remedy	COCs
North and South Plant Soils	
Operations Area	PCBs
Wet Soils Area	Arsenic, Chromium, Copper, Lead, Manganese, Thallium, Zinc, HCB, Total PCBs
Former Mercury Cell Building Area	Mercury
Sewers	Mercury

Table 2: GWTP Discharge Limits¹⁰

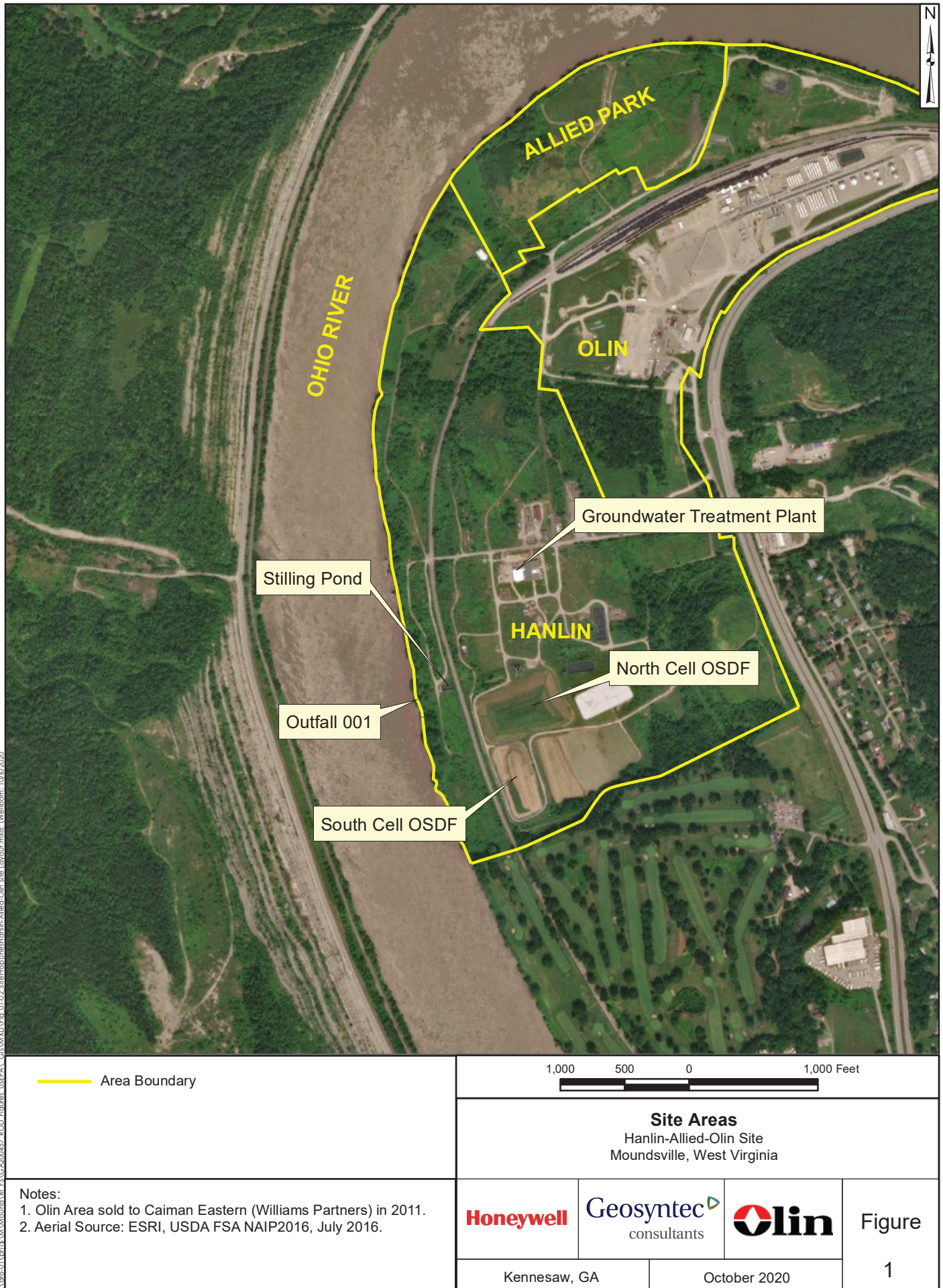
Parameter	Discharge Limit	
	Average Monthly	Max Daily
Flow (mgd)	Monitor ¹¹	Monitor
pH (s.u.)	6 (min)	9
TSS (mg/l)	43	72
COD (mg/l)	39	66
Oil and Grease (mg/l)	Monitor	Monitor
Iron, Total Rec. (mg/l)	5.9	16.8
Carbon Tetrachloride (µg/l)	0.23	0.32
Chloroform (µg/l)	5.7	14.6
Chloride (mg/l)	Monitor	Monitor
Total Residual Chlorine (µg/l)	Monitor	Monitor
Aluminum (mg/l)	Monitor	Monitor
Arsenic (mg/l)	Monitor	Monitor
Cadmium (µg/l)	1.3	2.6
Hexavalent Chromium(mg/l)	Monitor	Monitor
Copper (mg/l)	0.02	0.04
Lead (mg/l)	0.023	0.046
Nickel (mg/l)	Monitor	Monitor
Zinc (mg/l)	0.186	0.374
Sulfate (mg/l)	Monitor	Monitor
Beryllium (mg/l)	Monitor	Monitor
Benzene (µg/l)	Monitor	Monitor
2,4-Dinitrotoluene (µg/l)	Monitor	Monitor
1,2-Dichloroethane (µg/l)	0.035	0.051
1,1-Dichloroethylene (µg/l)	0.03	0.04
Trichloroethylene (µg/l)	2.5	3.6
Vinyl Chloride (µg/l)	0.025	0.036
Tetrachloroethylene (µg/l)	0.7	1.0
Thallium (µg/l)	Monitor	Monitor

¹⁰ The discharge limit for mercury is presented in Section V. Remedial Action Objectives, GWTP Discharge Objectives.

¹¹ The West Virginia NPDES permit (substantive requirements) requires monitoring and reporting of discharges of certain parameters without a specified limit.

Parameter (continued)	Discharge Limit	
	Average Monthly	Max Monthly
Bis(2-ethylhexyl)phthalate (µg/l)	Monitor	Monitor
Nitrobenzene (µg/l)	Monitor	Monitor
Dichlorobromomethane (µg/l)	0.55	0.8
1,1,2-trichloroethane (µg/l)	Monitor	Monitor
Pentachloroethane (µg/l)	Monitor	Monitor
Aniline (µg/l)	1.5	3
Hexachlorobutadiene (µg/l)	Monitor	Monitor
Hexachloroethane (µg/l)	Monitor	Monitor
Total PCBs	Monitor	Monitor
Dioxins / Furans (2,3,7,8-TCDD)	Monitor	Monitor
Chronic Whole Effluent Toxicity (Tuc) (ceriodaphnia dubia and pimephales promelas)	Monitor	Monitor

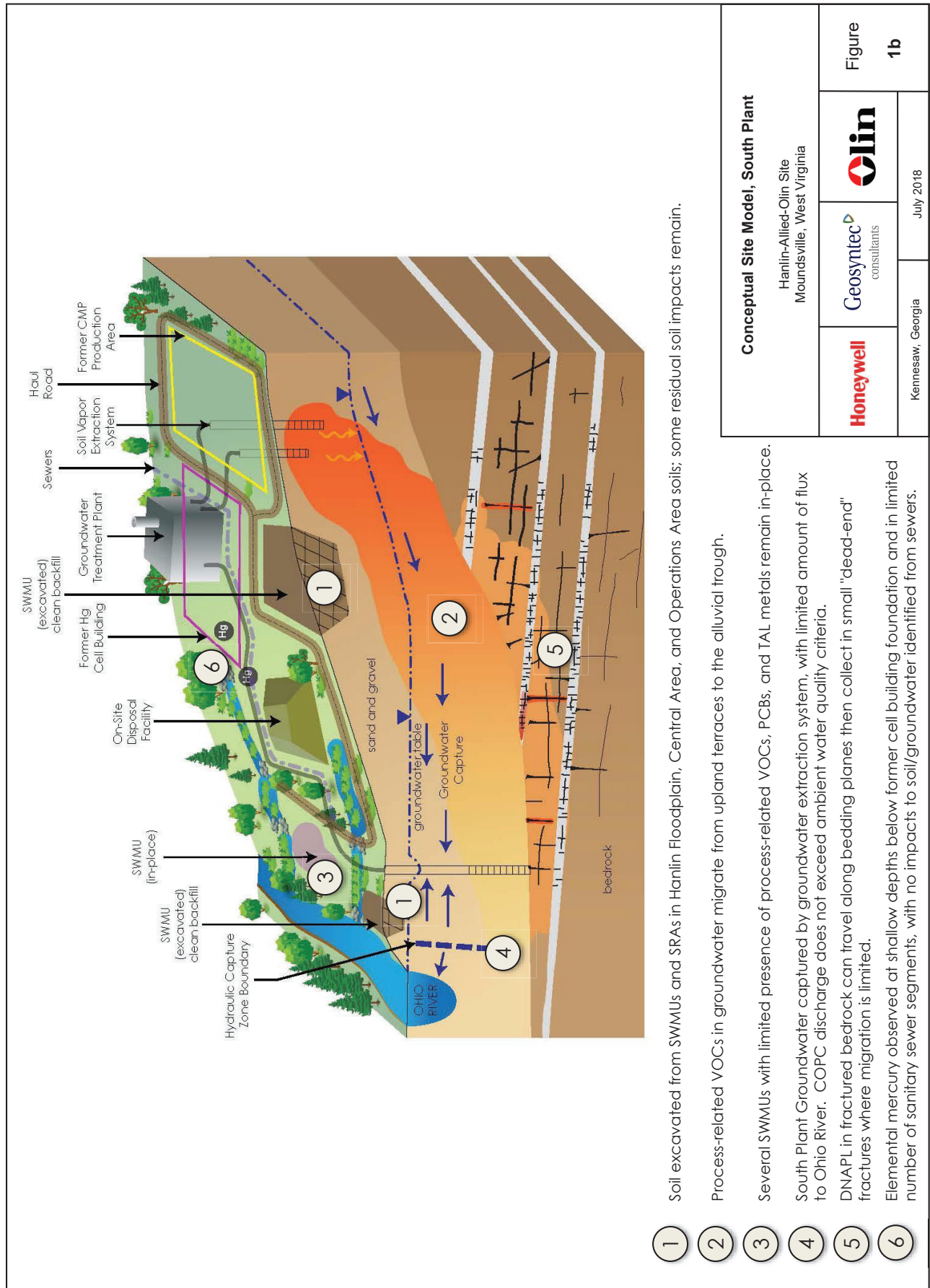
FIGURES

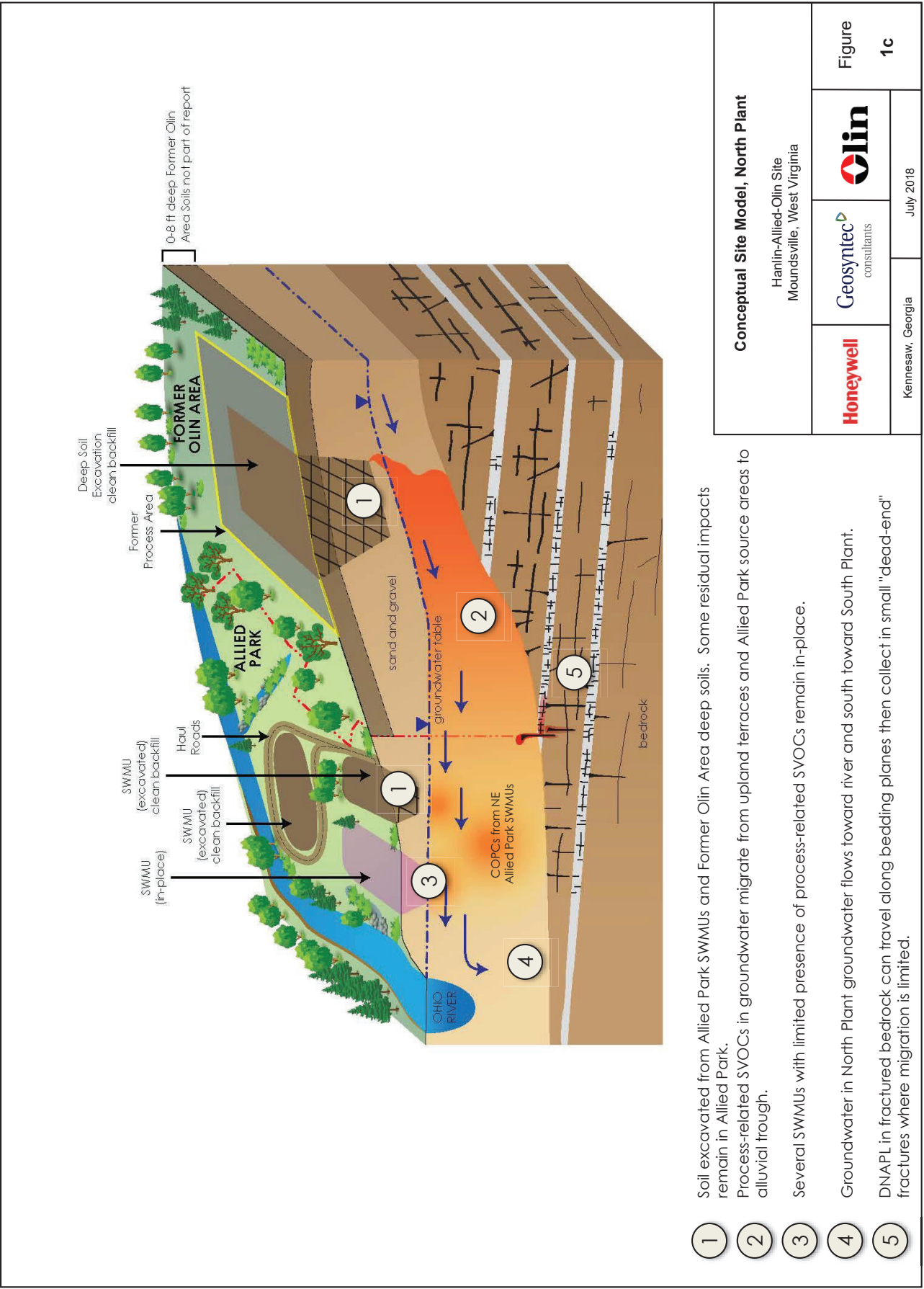


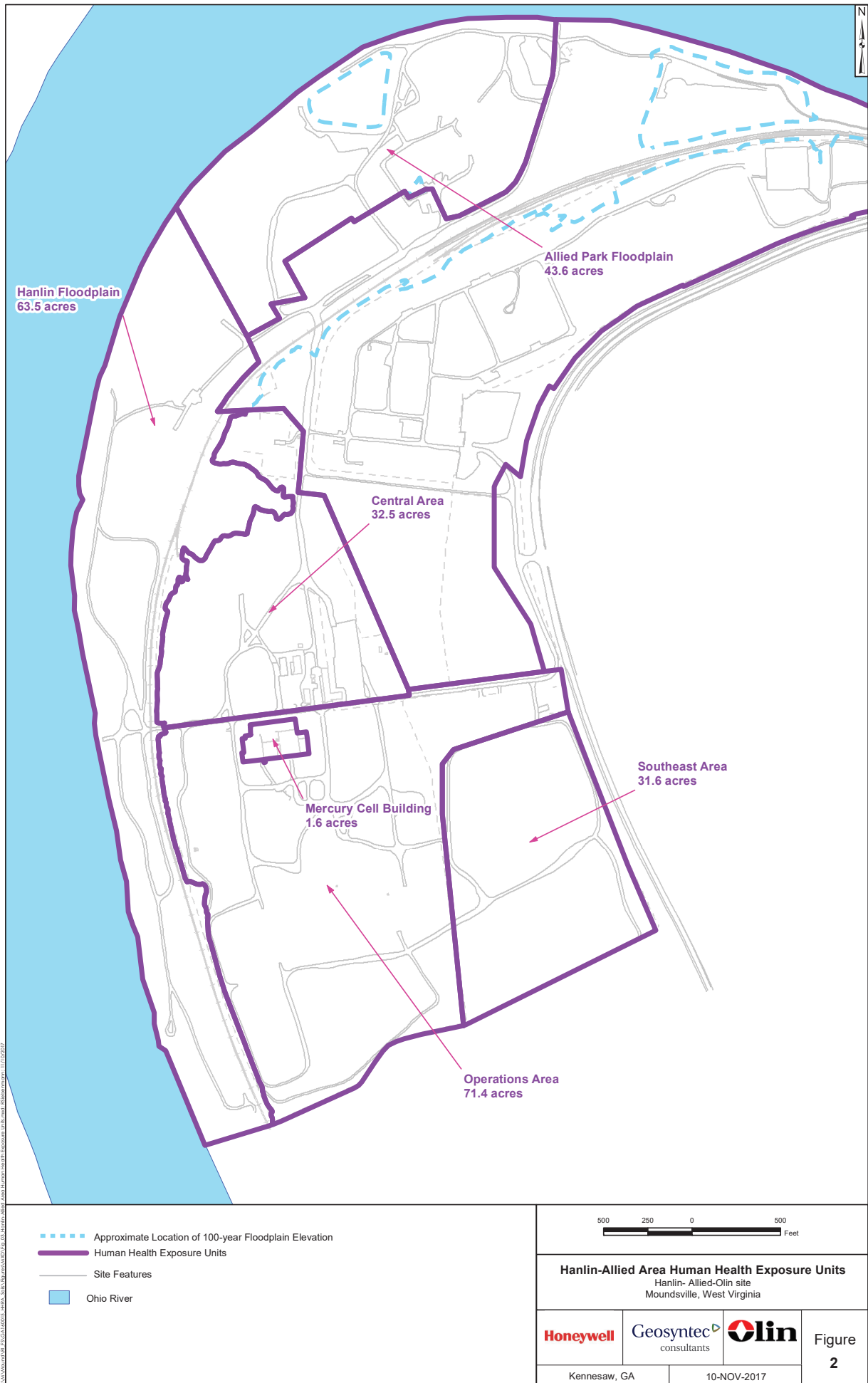
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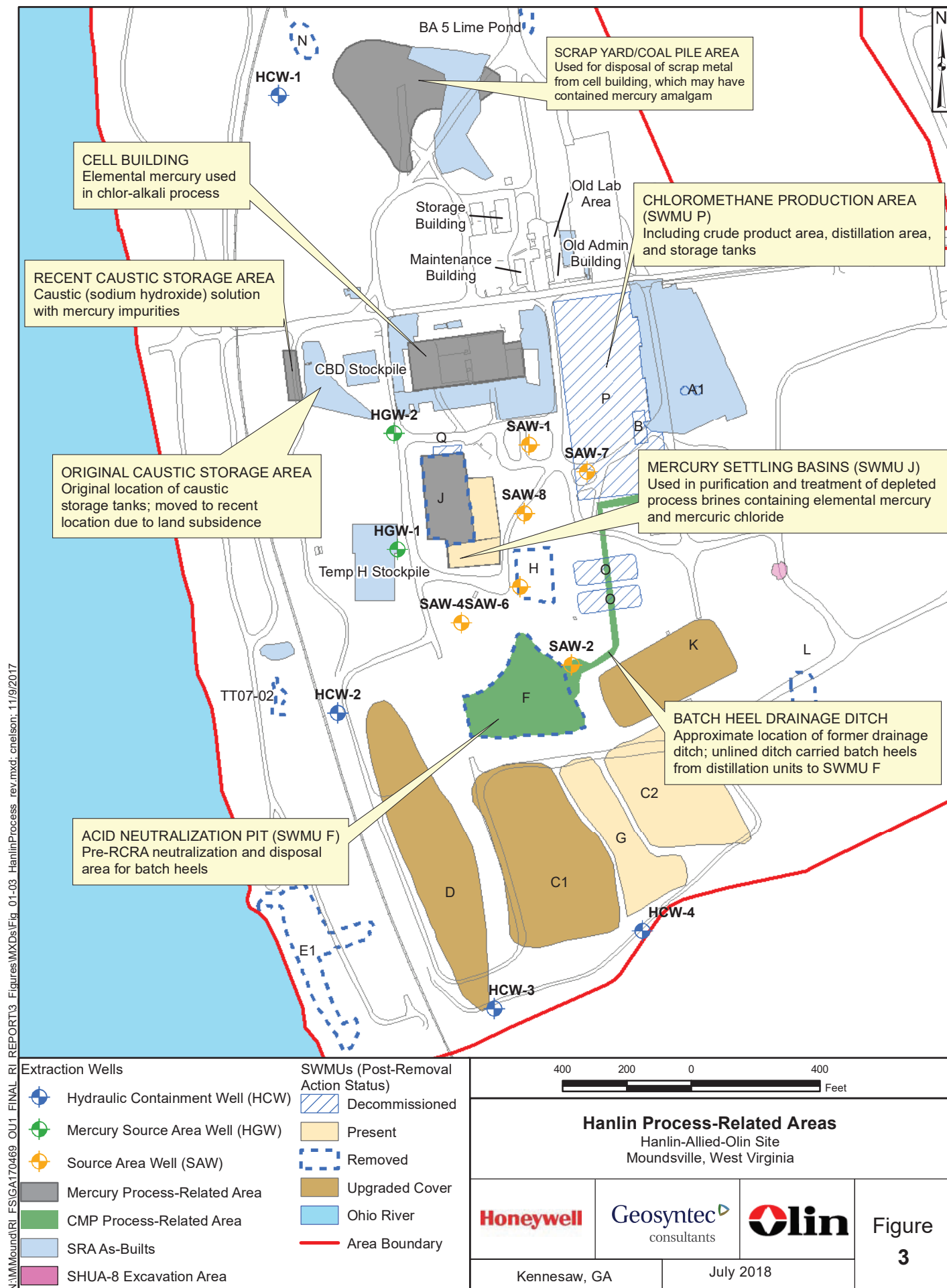
Figure 1a
Site Historical Timeline - 1953 to Present
Hanlin-Allied-Olin Site

Key Project Event	Event Dates	Final Report(s)	Remedial Activities
Manufacturing Plant Operation Milestones	1953: South and North Plant Operations Begin under Allied Chemical 1980: South Plant Sold to LCP Chemicals (Later Hanlin Chemicals) 1981: North Plant Sold to Olin Corporation 1984: North Plant Operations Cease 1991: South Plant Operations Cease	Not Applicable	Not Applicable
Issuance of WV NPDES Water Pollution Control Permit WV0004413 for Outfalls 002 and 004	December 31, 1984	Subsequent Discharge Monitoring Reports as Applicable	Not Applicable
Issuance of WV NPDES Water Pollution Control Permit WV0004405 for Outfalls 001 and 002	February 19, 1985		
Hanlin-Allied-Olin Site, Olin Area AOC for Engineering Evaluation/Cost Analysis Docket III-94-39-DC	September 29, 1994	Olin Area Engineering Evaluation and Cost Analysis (EE/CA), Revision 1, February 2005 Addendum to Olin Area Engineering Evaluation and Cost Analysis (Revision 1), November 2006	See Olin Removal Response Action below.
Hanlin-Allied-Olin Site, Hanlin-Allied Area AOC for Removal Response Action Docket III-93-55-DC	March 8, 1995	Final Report, Engineering Evaluation/Cost Analysis (EE/CA), Hanlin-Allied Area, December 2001 Addendum: Engineering Evaluation and Cost Analysis (EE/CA), Hanlin-Allied-Olin Site, February 2002	Response Action Plan Activities: 1. Site security/health and safety. 2. Maintenance of Ranney Well A and D extraction until supersession by WVDEP Order 4330 system in 2002 (see below). 3. Hazardous substance removal and Mercury Cell Building decontamination (completed December 1999). Additionally, see Hanlin-Allied Removal Action below.
Hanlin-Allied-Olin Site, Olin Area AOC for Removal Response Action Docket III-97-95-DC	June 18, 1997	Final Report, Removal Action Plan, Olin Area (October 2010) Response to Comments on Final Report (June 2011) Post-Removal Site Control Plan, Revision 2 (August 2016)	Olin Area Removal Response Action implementation, beginning with North On-Site Disposal Facility (OSDF) Cell construction (August 2004, see Hanlin-Allied Removal Action below), and continuing with excavation of Removal Action Areas (RAAs) and completing with soil removal and off-Site disposal in September 2011. Ten shallow RAAs and three deep RAAs removed. 98,140 yd ³ of impacted material placed in the OSDF, and 3,500 yd ³ disposed of off-Site.
National Priorities List (NPL) Listing	July 22, 1999	See Remedial Investigation/Feasibility Study Docket No. CERCLA-03-2001-0323 Below.	
Honeywell, Moundsville, West Virginia Site Order Issued Under the Water Pollution Control Act, West Virginia Code, Chapter 22, Article 11 (WVDEP Order 4330)	August 14, 2000	Addendum 1 to WVDEP Compliance Schedule, Groundwater Extraction Well Layout, Hanlin-Allied Area, Hanlin-Allied-Olin Site, March 2001	Startup of Groundwater Treatment Plant, October 2002
Hanlin-Allied-Olin Site AOC for Remedial Investigation/Feasibility Study Docket No. CERCLA-03-2001-0323	September 26, 2001	Final Operable Unit 1 Remedial Investigation Report, Hanlin-Allied-Olin Site, July 2018 OU1 Feasibility Study; Hanlin-Allied-Olin Site, February 2020 OU2 RI/FS in process.	As discussed in this Record of Decision for OU1 Management options development for OU2 in process.
On-Site Disposal Facility Construction, Operation, and Closure	December 2002 - September 2009	See Hanlin-Allied Area AOC for Removal Response Action Docket CERCLA-03-2003-0188DC Below.	
Hanlin-Allied-Olin Site, Hanlin-Allied Area AOC for Removal Response Action Docket CERCLA-03-2003-0188DC	June 30, 2003	Final Report, Hanlin-Allied Removal Action, Hanlin-Allied Site, Moundsville, West Virginia, April 2011 Post-Removal Site Control and Maintenance Plan, On-Site Disposal Facility, RAP Supplement #5, October 2010	Hanlin-Allied Area Removal Action implementation, beginning with well abandonment in December 2002 and partially completing with North OSDF Cell closure in September 2009. Two OSDF cells built, operated, and closed, and upgrades to three Solid Waste Management Unit (SWMU) covers constructed. Nine Soil Removal Areas, 12 SWMUs, and miscellaneous drum and debris waste disposed of in OSDF. 370,000 yd ³ of impacted material placed in the OSDF cells. Soil vapor extraction system installed in Chloromethanes Production Area and operated to present day.
Hanlin-Allied Removal Action	December 2002 - Present	See Olin Area AOC for Removal Response Action Docket III-97-95-DC Above	
Olin Removal Action	August 2004 - September 2011		
Hanlin SHUA-8 Vicinity PCB Management (Redevelopment Support)	February 2015 - March 2016	Soils Investigation Data and Closeout Report: SHUA-8 Vicinity, Revision 1, June 2017	Two investigation rounds (February and May 2015) and removal and off-Site disposal of 581 tons of PCB-impacted soils.

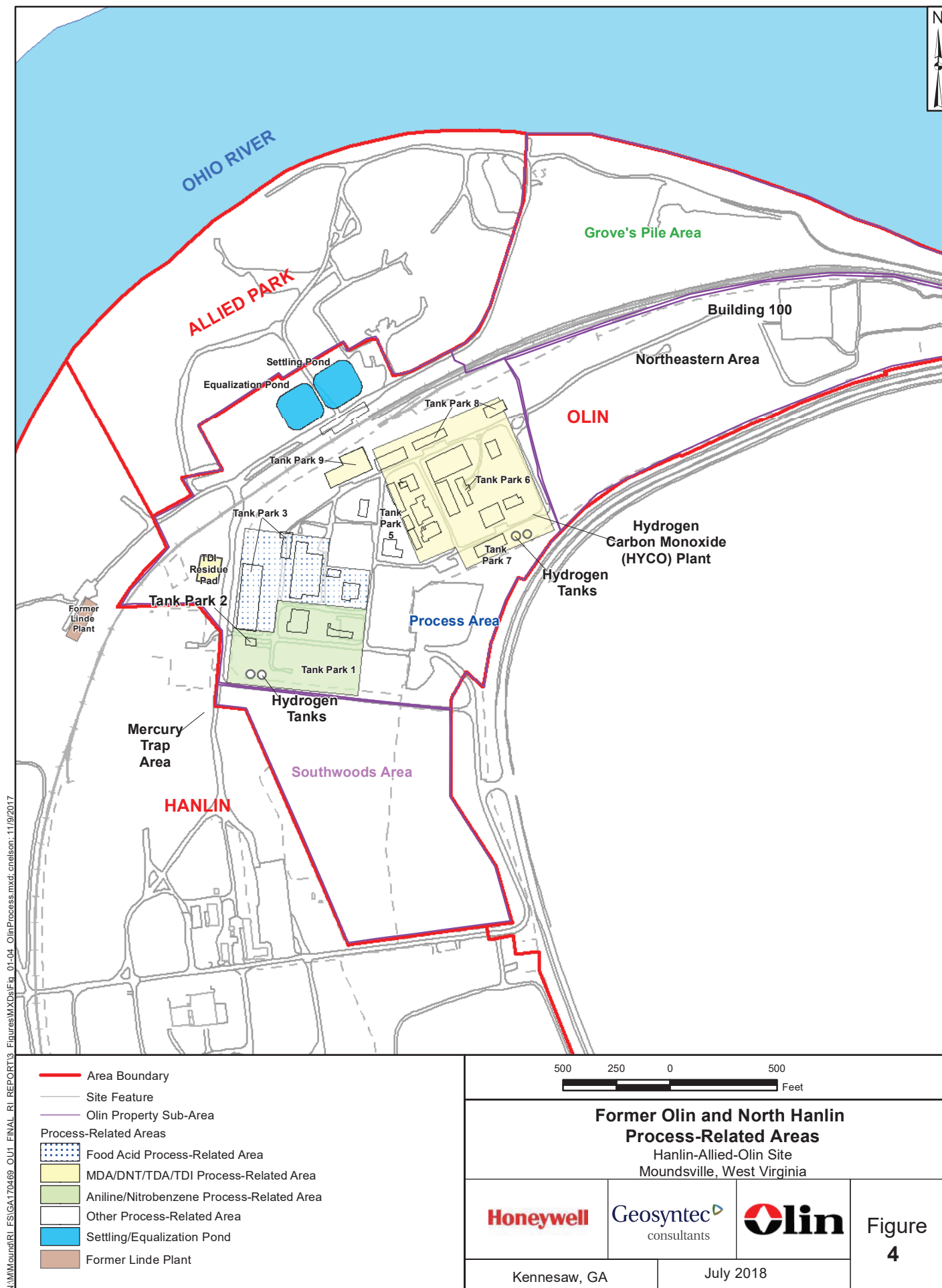


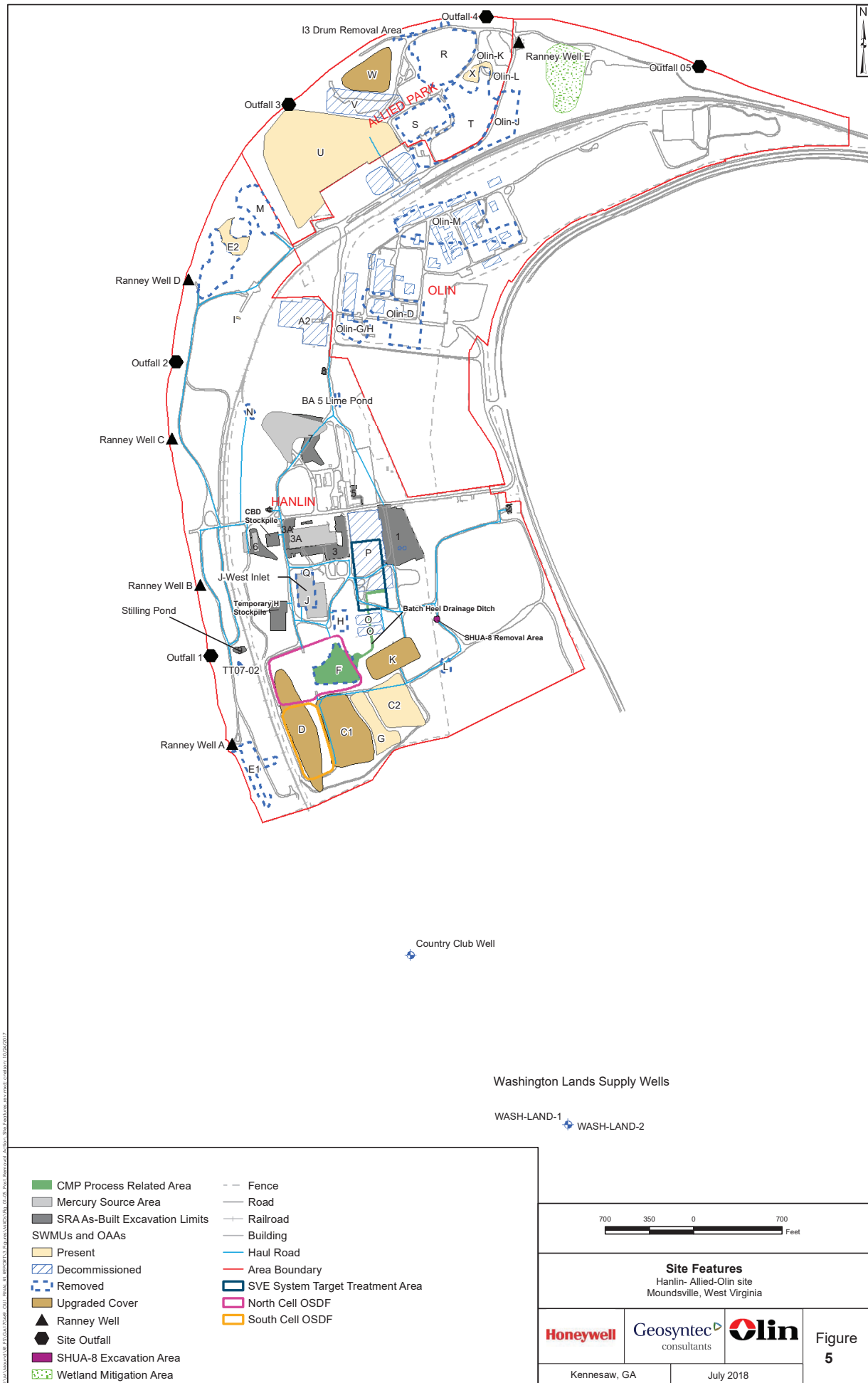






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 Floodplain SMAs

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Feet

North Hanlin and Allied Park Soil Management Areas
Hanlin-Allied-Olin Site
Moundsville, West Virginia

Honeywell

Geosyntec
consultants

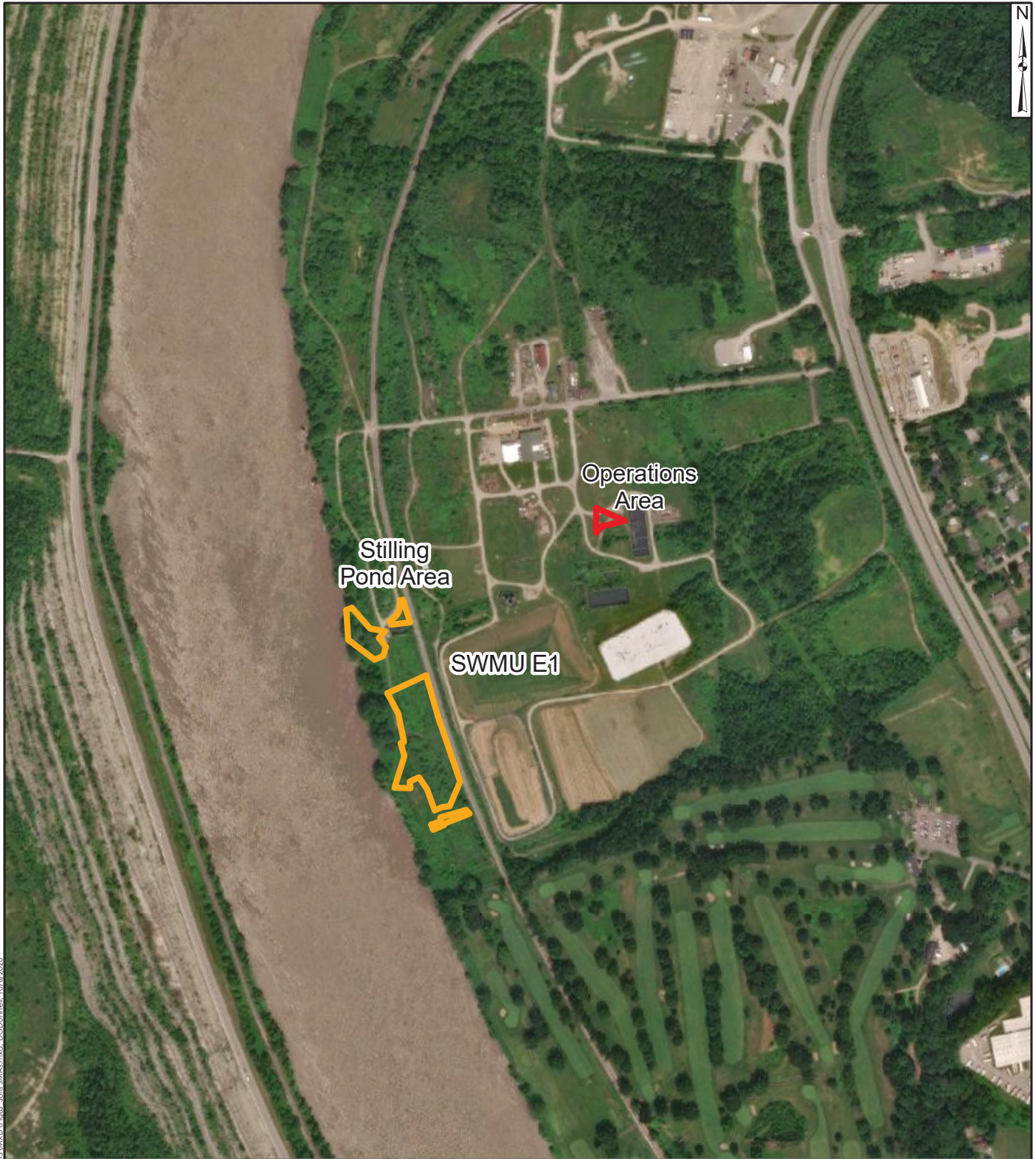
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Figure
6a

Kennesaw, GA

October 2020

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- Floodplain SMAs
- Operations Area SMA

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Feet

South Hanlin Soil Management Areas
Hanlin-Allied-Olin Site
Moundsville, West Virginia

Honeywell

Geosyntec
consultants

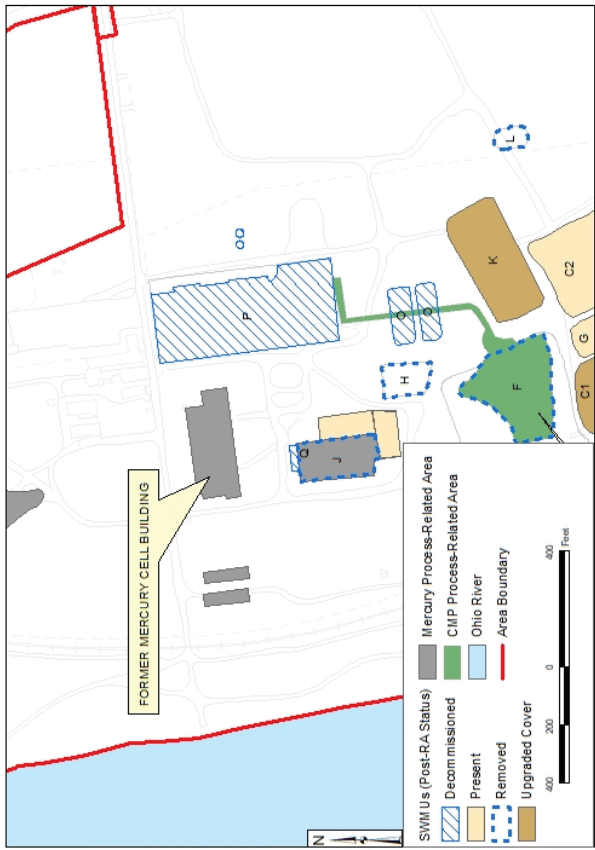
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Figure
6b

Kennesaw, GA

October 2020

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Note:
Photograph shows former Mercury Cell Building Area. The Groundwater Treatment Plant is visible in the photograph and is present over a portion of the former Cell Building foundation.

Former Mercury Cell Building		
Hanlin-Allied-Olin Site Moundsville, West Virginia		
Honeywell	Geosyntec consultants	Olin
Kennesaw, Georgia		October 2020
Figure		7

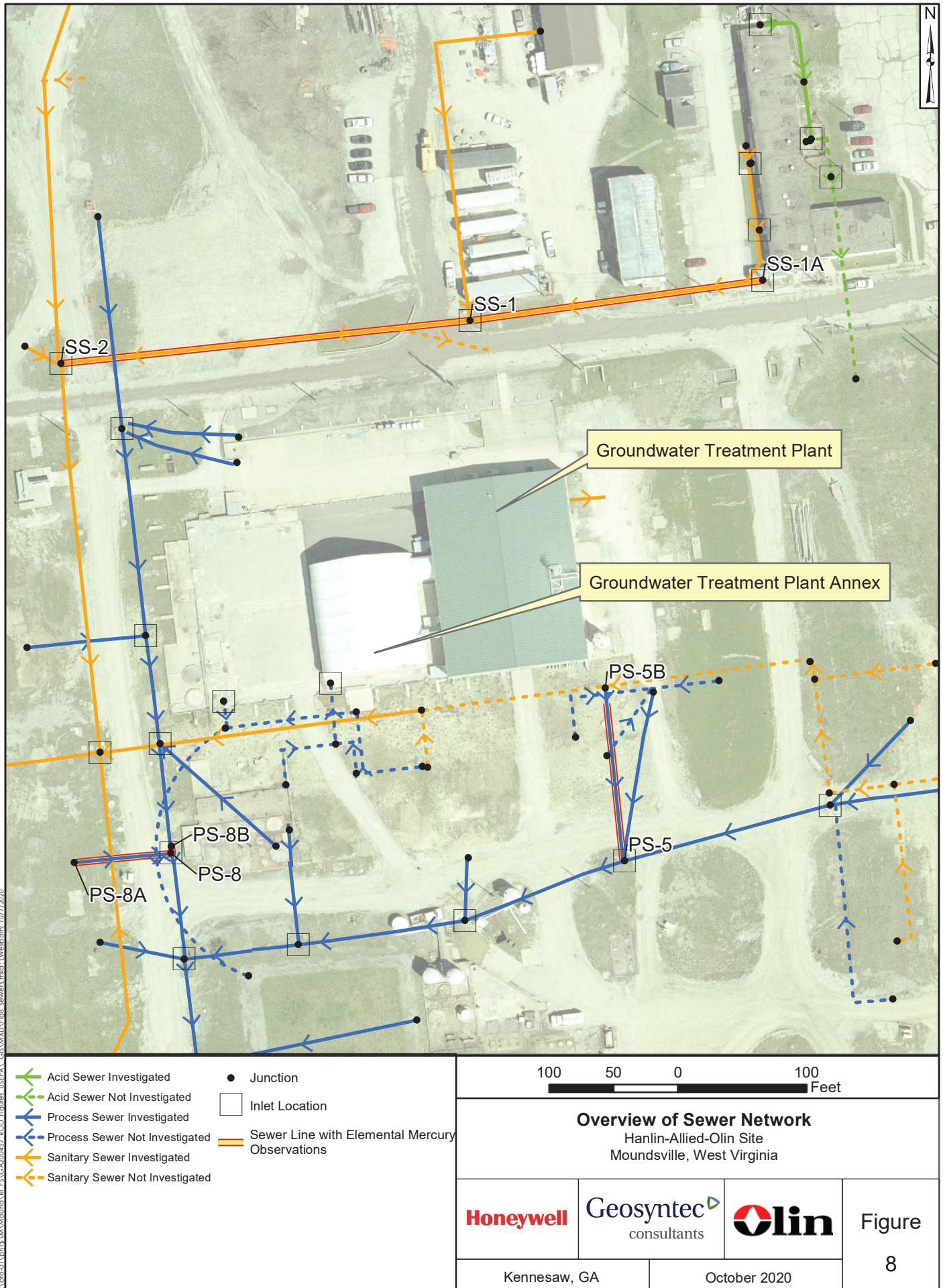
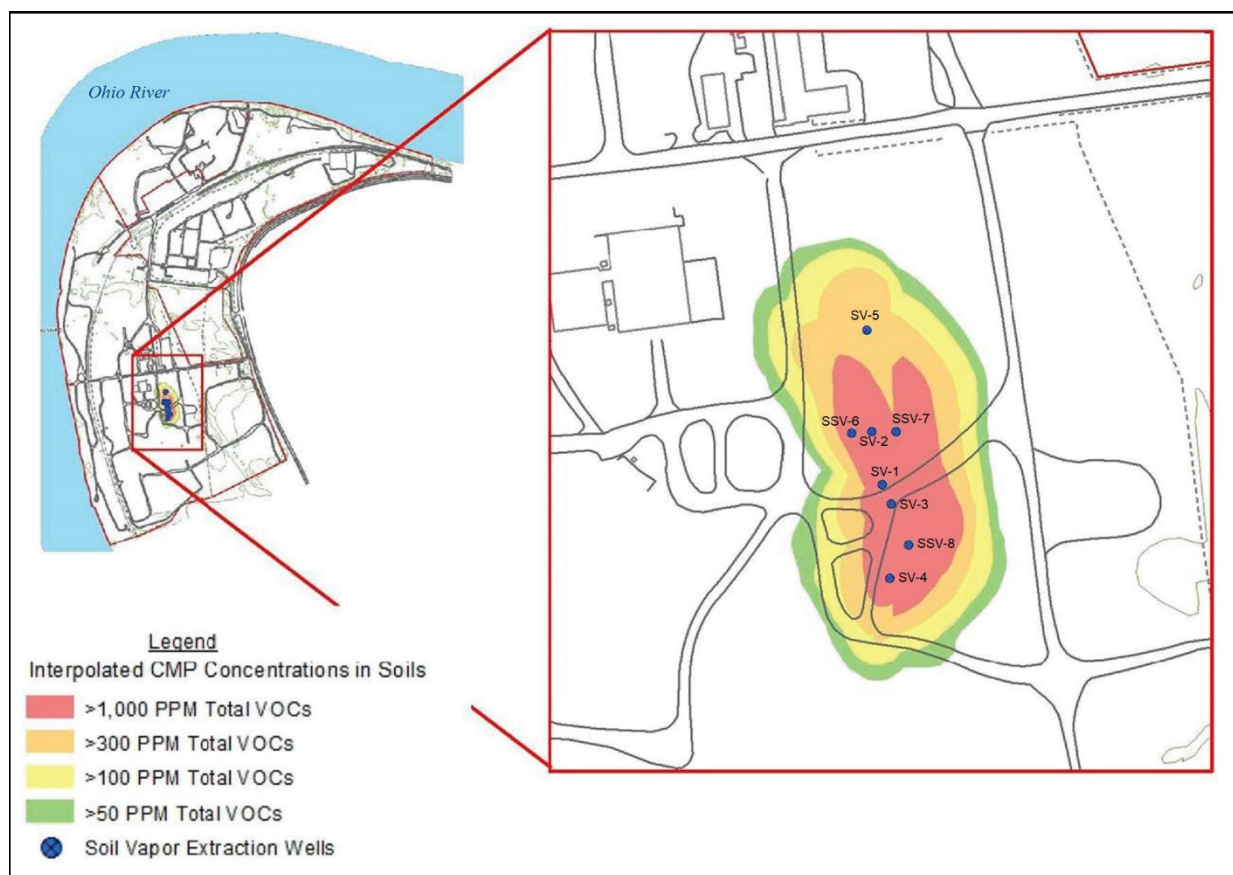
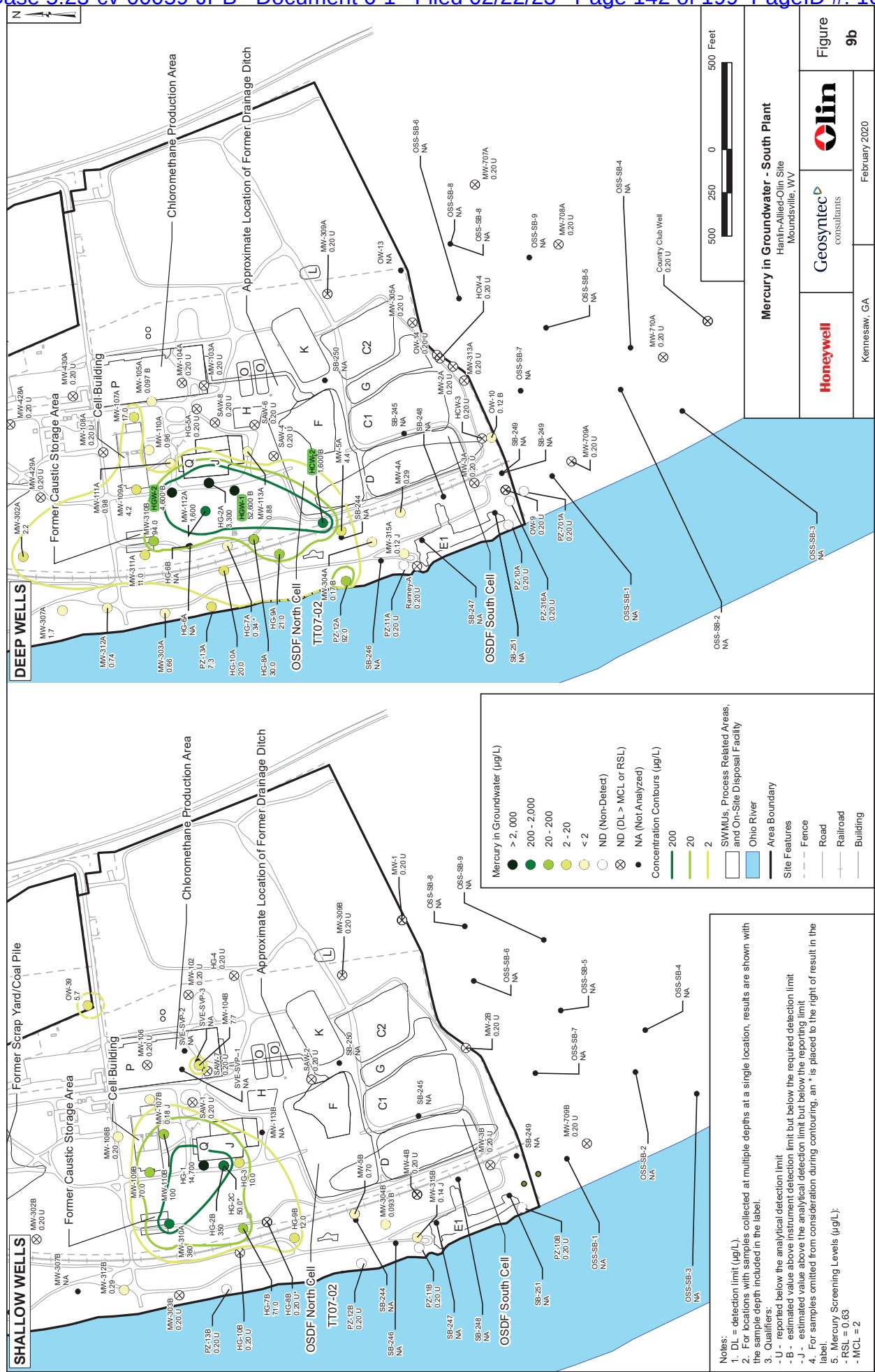


Figure 9 South Plant Groundwater







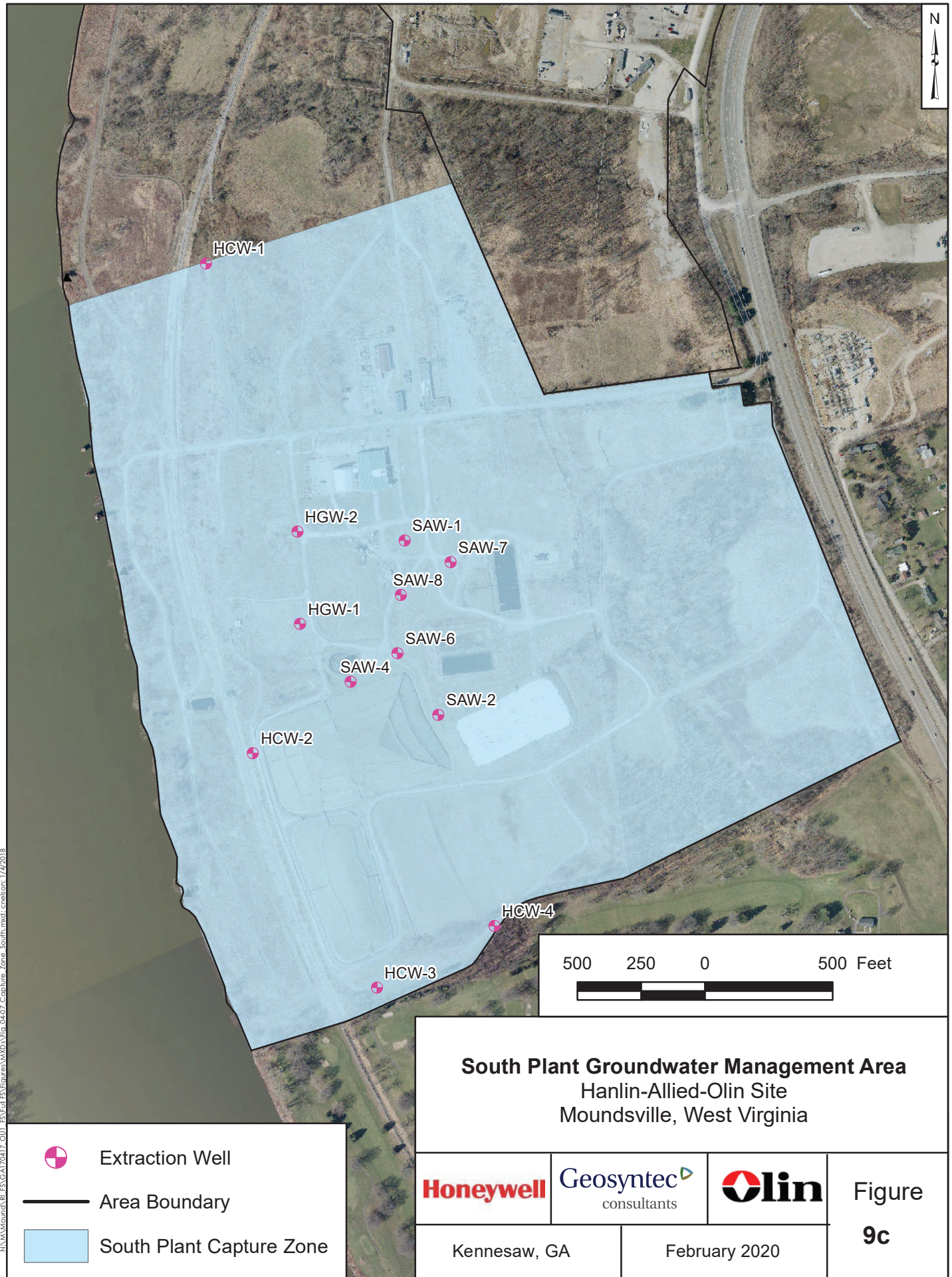
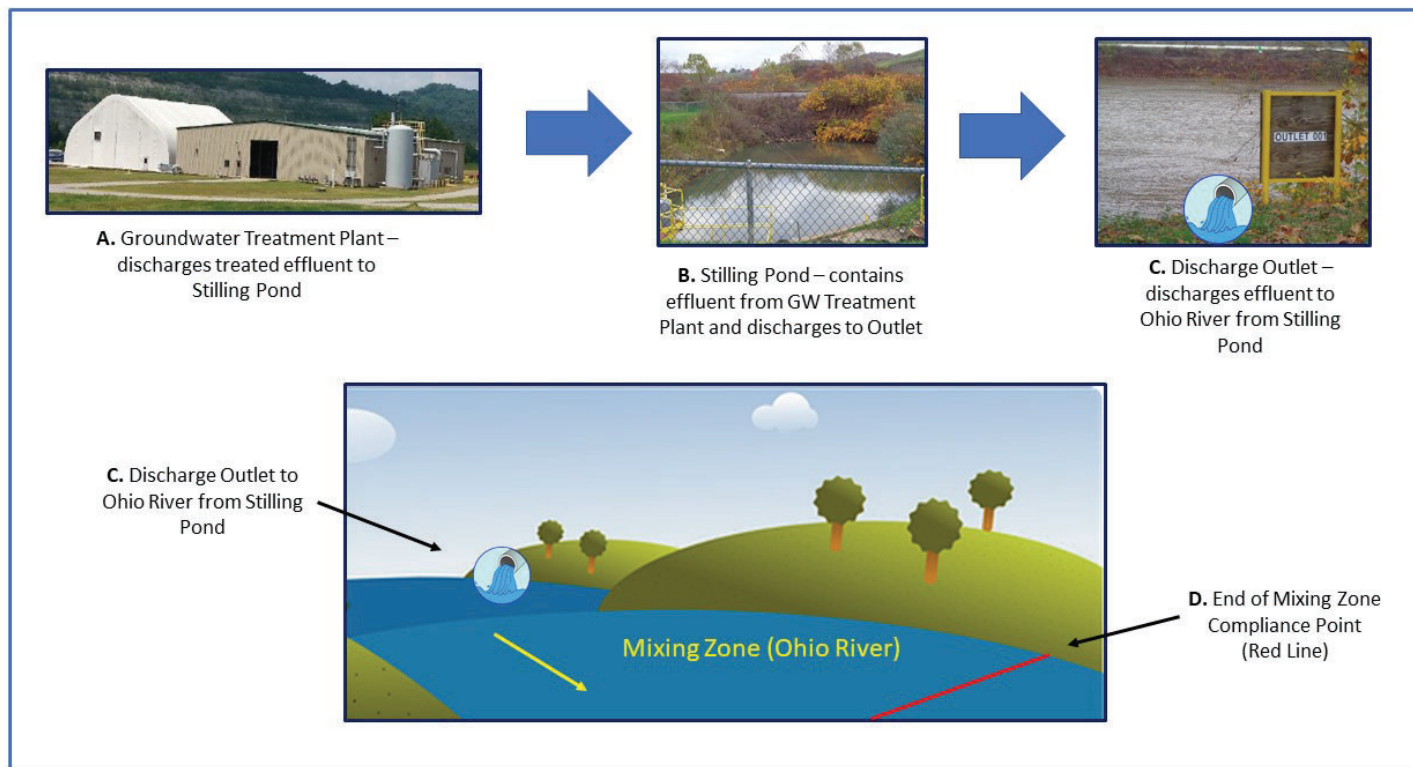
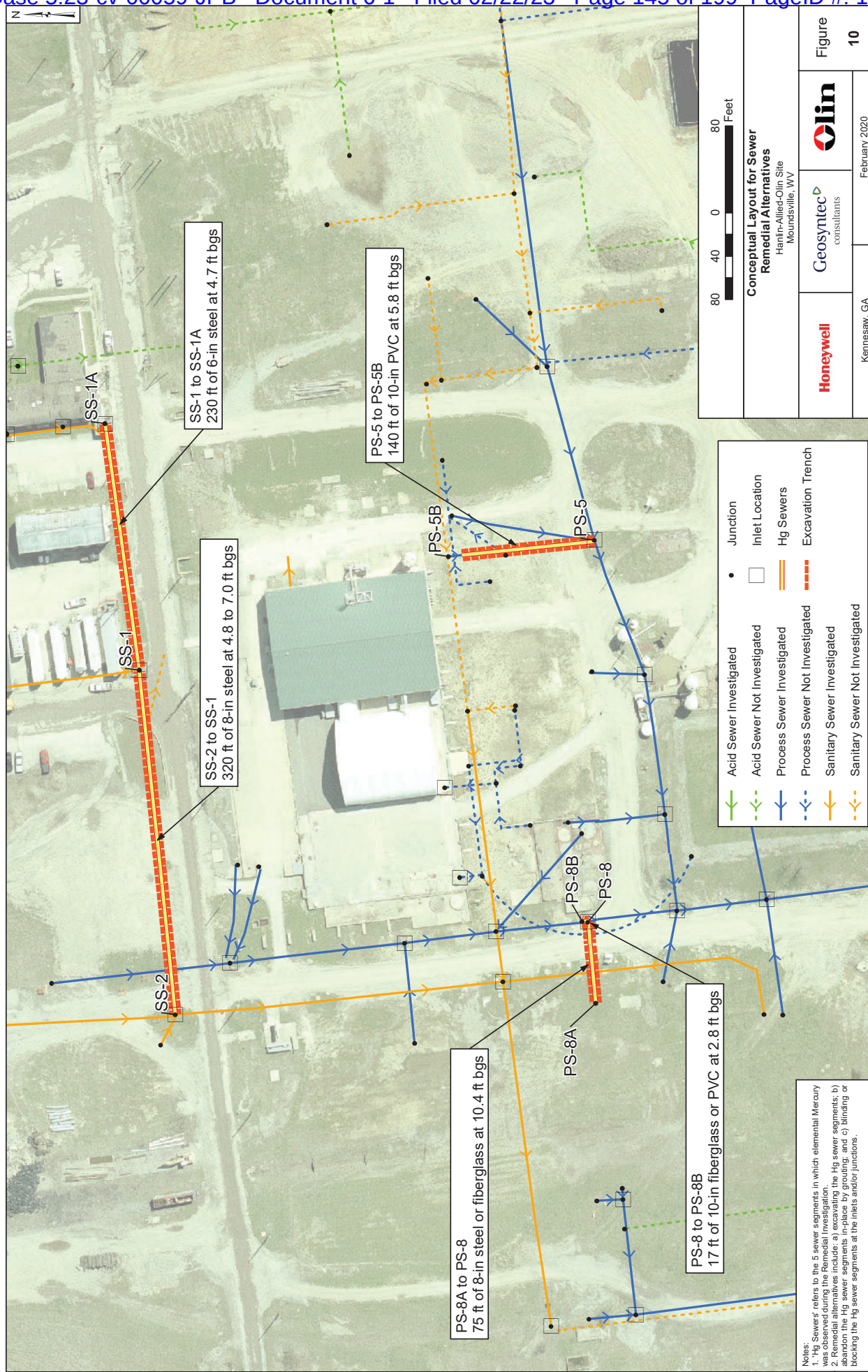


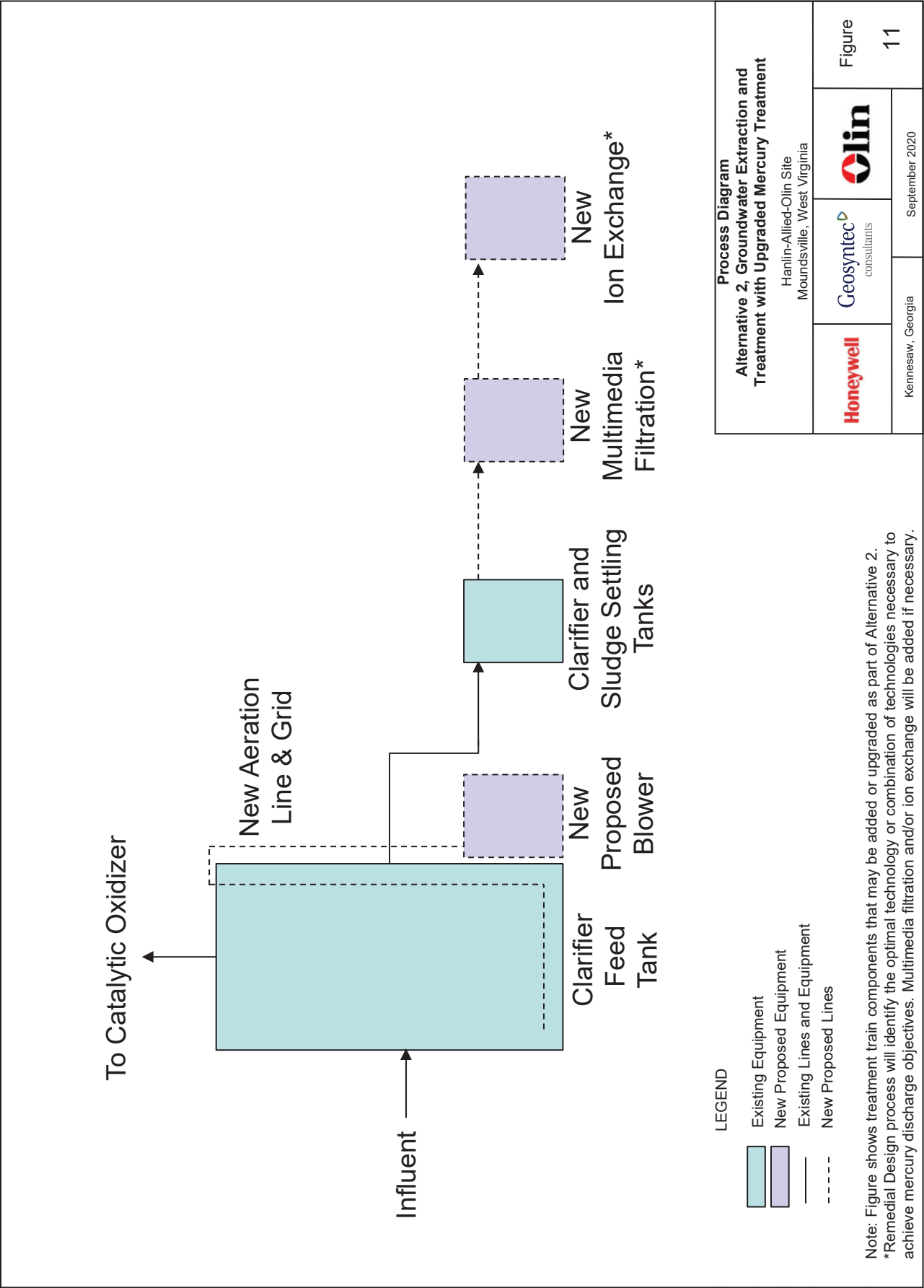
Figure 9d

Points of Compliance				Timeframe for Compliance		
Point of Compliance Designation	Point of Compliance Description	Basis for Mercury Limit	Mercury Limit	ROD DATE (Immediately following ROD signature - interim point of compliance until "A" is required.)	Must meet limit five years, three months after ROD signature	Must meet limit following the elimination of the temporary mixing zone (see "D").
A	Treatment Plant Effluent	WV ARAR 47 CSR 2	0.14 ug/L ¹		X	
B	Stilling Pond	WV ARAR 47 CSR 2	0.14 ug/L ¹	X		
C	Discharge Outlet to Ohio River	WV ARAR 47 CSR 2	0.012 ug/L ²			X
D	End of Temporary Mixing Zone in Ohio River	WV ARAR 47 CSR 2	0.012 ug/L ²		X ³	
Notes:	1. Mercury Limit represents the acute standard protective of human health (47 CSR 2, Appendix E, Table 2, page 51)					
	2. Mercury Limit represents the chronic standard protective of aquatic life (47 CSR 2 Appendix E, Table 2, page 51). Note this standard is specifically for methylmercury and is based on a four-day average concentration, not to be exceed more than once every three years on the average.					
	3. *A five year mixing zone will be granted by WV following the first date of compliance with limit, mixing zone will be permitted for a period of not less than five years.					

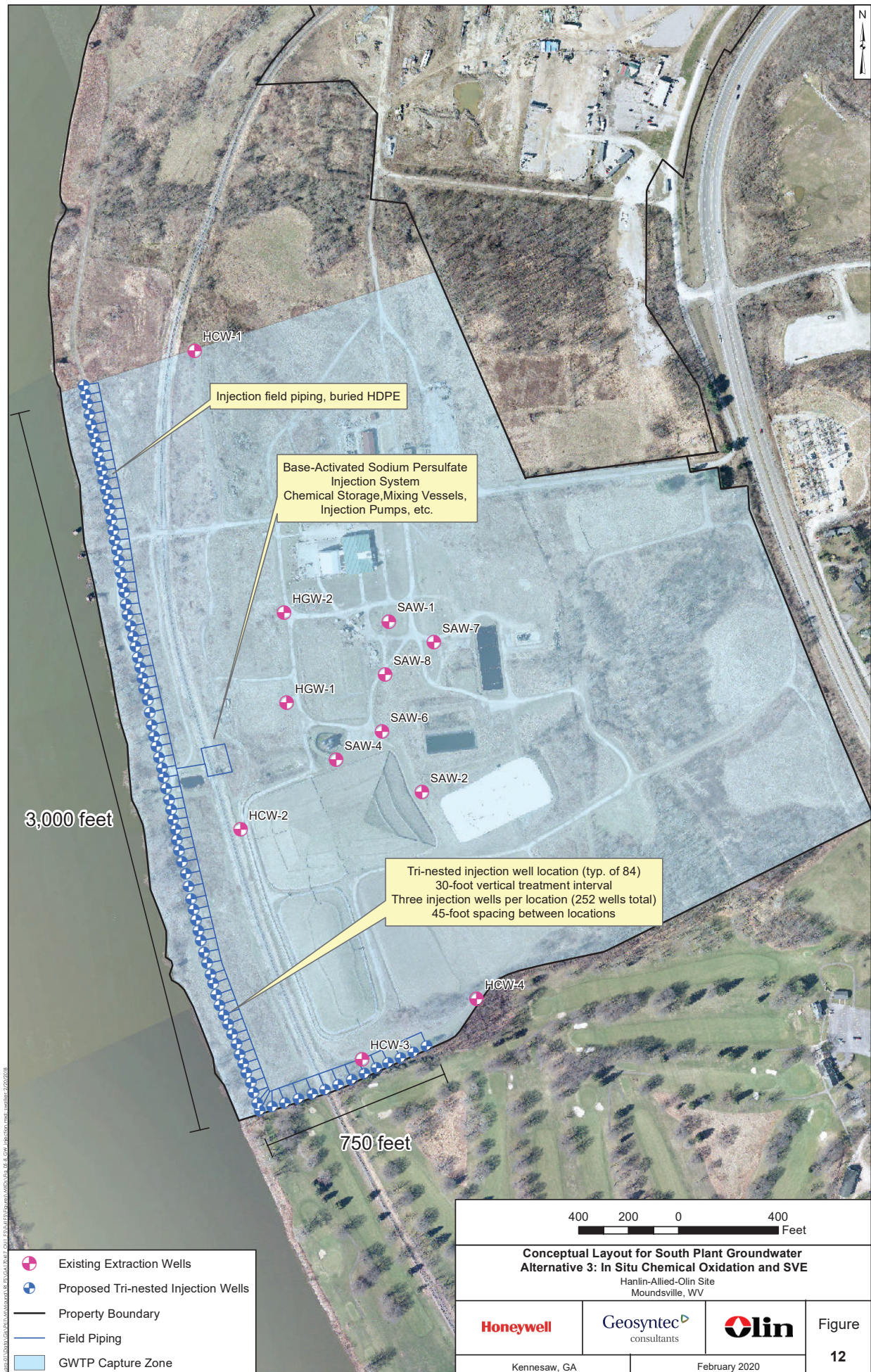
Figure 9e

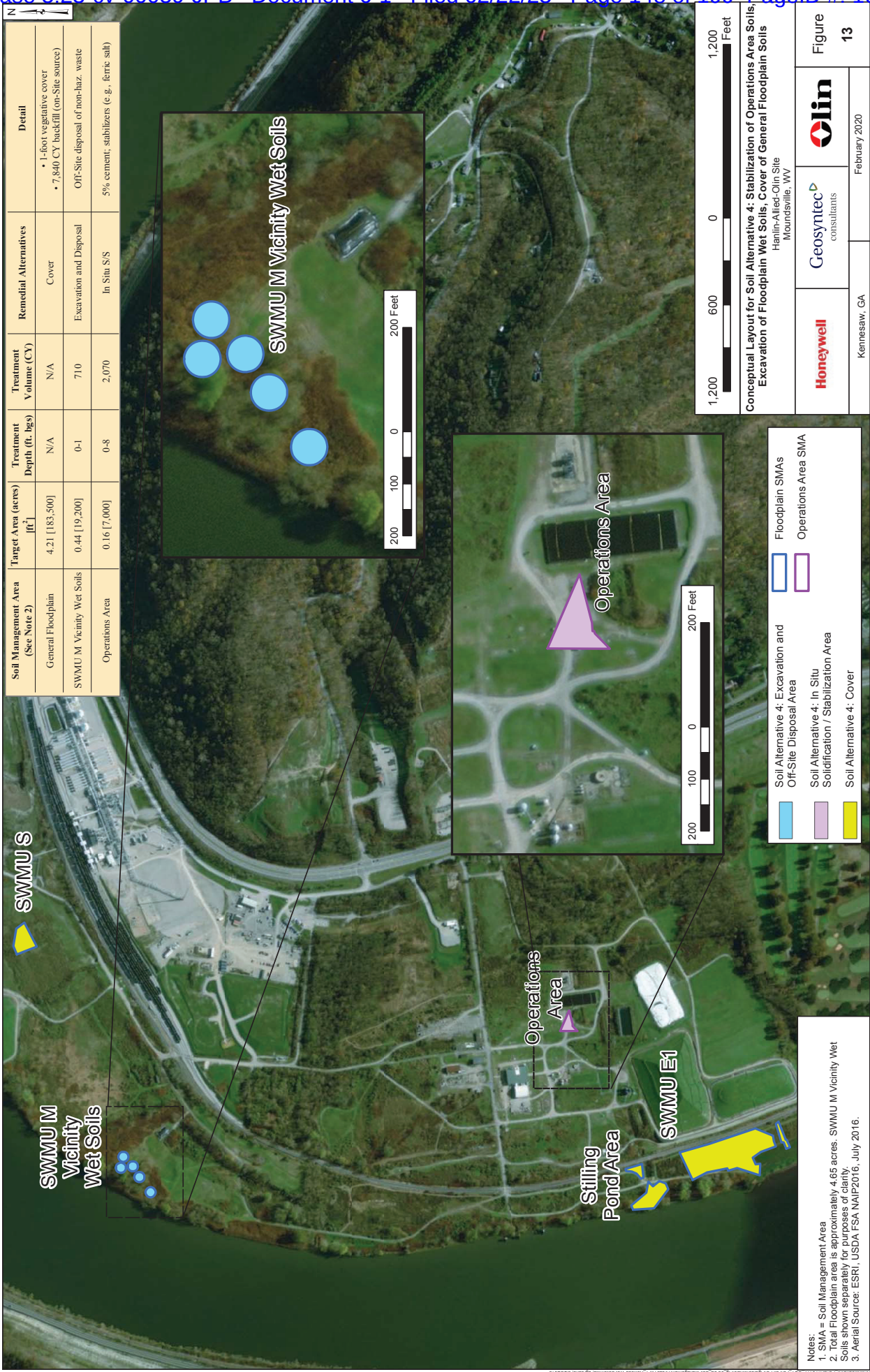






N:\Moundsville\FSIGA\200147 USEPA PRAP Aeration Figure





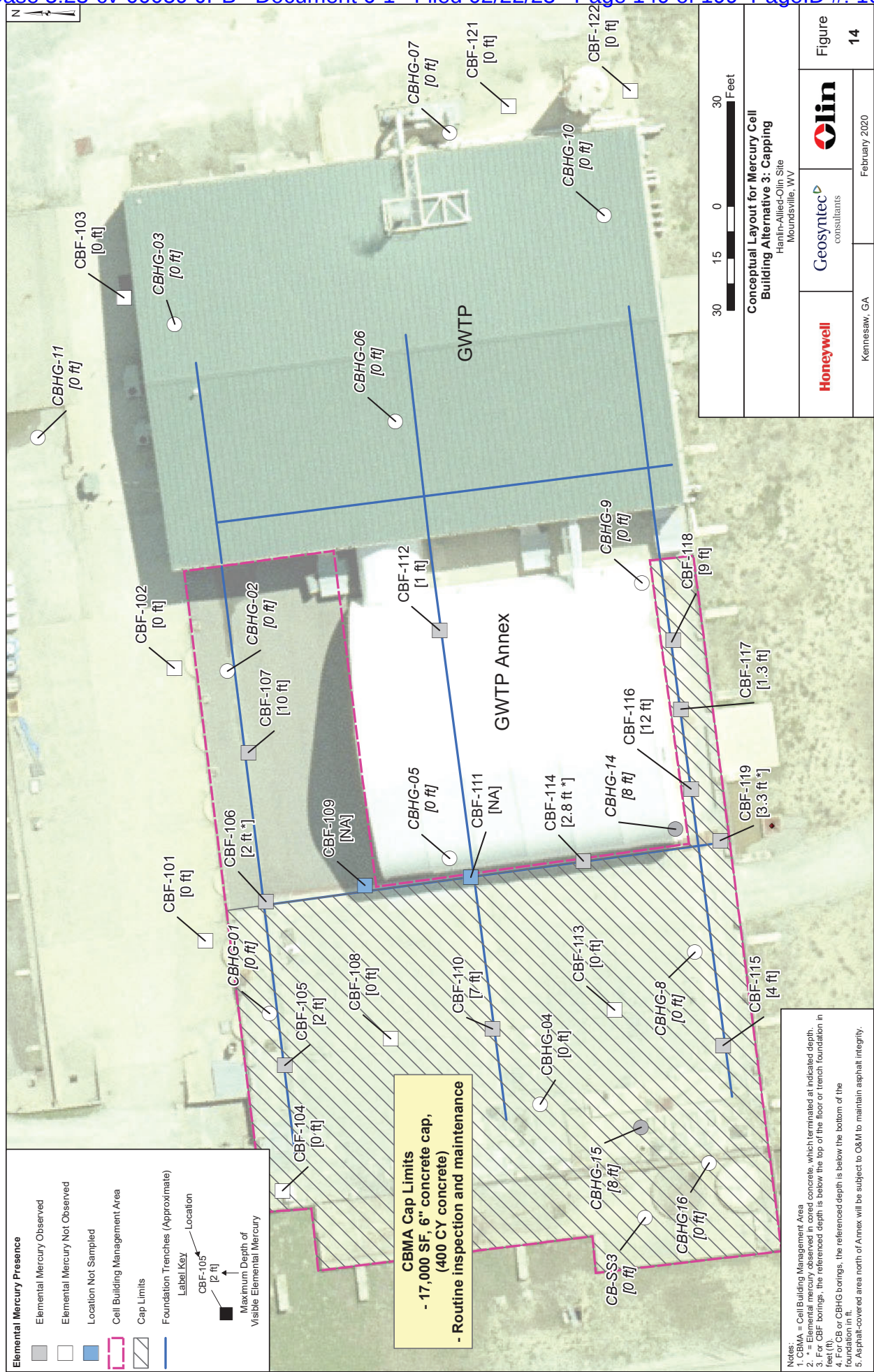


Table 11-1
 Potential Chemical-Specific Federal and State ARARs and TBCs
 Hanlin-Allied-Olin Site
 Moundsville, West Virginia

POTENTIAL ARAR		CITATION	BRIEF DESCRIPTION	ARAR/TBC STATUS	
STATE CHEMICAL-SPECIFIC ARARS					
Waste Management	Land Disposal Restrictions	WV Title 33, Series 20-10	Identifies hazardous wastes that are restricted from land disposal and defines those limited circumstances under which an otherwise restricted waste may continue to be land disposed.	Applicable - If the remedial action results in the generation of a hazardous waste that is to be land-disposed.	
	Office of Water Resources	Requirements Governing Groundwater Standards	WV Title 47, Series 12	Establishes numeric criteria for groundwater quality.	Applicable – May be considered to protect drinking water sources.
	Office of Water Resources	Requirements Governing Water Quality Standards	WV Title 47, Series 2	Establishes numeric criteria for water quality for waters of the State.	Applicable – May be considered to protect drinking water sources and aquatic life.
	Division of Air Quality	Ambient Air Quality Standards	WV Title 45, Series 8	Establishes air quality standards for sulfur oxides, particular matter, carbon monoxide, ozone, nitrogen dioxide, and lead.	TBC – To the onsite generation and emission of ambient air pollutants during remedial activities such as excavation and vapor treatment.
Emission Standards for Hazardous Air Pollutants		WV Title 45, Series 34	Incorporates emissions standard for HAPs, including the standard pertaining to emissions limitations for VOCs associated with remediation systems at HAP-major facilities.	Relevant and Appropriate - Would apply during active remediation for soil and/or groundwater; should be TBC if the facility is not a major source for HAPs	
State of West Virginia - 401 Water Quality Certification for Non-Coal Related Facilities		WV Title 60, Series 5 and Title 47, Series 2	Required for each permit or license issued by a federal agency to ensure that projects will not violate the state's water quality standards or stream designated uses. States are authorized to issue Certification under Section 401 of the Federal Clean Water Act.	Applicable - Would apply to discharges to waters of the State.	

Table 11-2
Potential Action-Specific Federal and State ARARs and TBCs
Hanlin-Allied-Olin Site
Moundsville, West Virginia

POTENTIAL ARAR		CITATION	BRIEF DESCRIPTION	ARAR/TBC STATUS
FEDERAL ACTION-SPECIFIC ARARS				
<i>Hazardous Waste Management Act</i>	<i>Transportation</i>	49 CFR Parts 100-177	Regulates transportation of hazardous materials.	Applicable – To the off-site transportation of hazardous materials and wastes.
<i>Hazardous Waste Management Act</i>	<i>Hazardous Waste Management Systems: General</i>	40 CFR 260	Establishes procedures and criteria for modification or revocation of any provision in 40 CFR Part 260-265, including the requirements for petitioning for the delisting of a particular hazardous waste stream.	Potentially Applicable – If the remedial action results in the generation of hazardous waste.
<i>Clean Air Act</i>	<i>National Emission Standards for Hazardous Air Pollutants - Site Remediation</i>	40 CFR 63, Subpart GGGGG	Operational practices associated with VOC emissions from remediation systems at HAP-major facilities.	Relevant and Appropriate – Would apply during active remediation for soil and/or groundwater; appropriate regardless of whether or not the facility itself is a major source of HAPs.
<i>Resource Conservation and Recovery Act</i>	<i>Identification and Listing of Hazardous Waste</i>	40 CFR 261	Defines solid wastes that are subject to regulation as hazardous wastes under 40 CFR Parts 262-265 and Part 270.	Applicable – All wastes must be profiled prior to disposal. If the remedial action results in the generation of hazardous waste (spoils, PPE, etc.) then additional requirements may apply.
<i>Resource Conservation and Recovery Act</i>	<i>Standards Applicable to Generators of Hazardous Waste</i>	40 CFR 262	Establishes standards for generators of hazardous waste.	Potentially Applicable – If the remedial action results in the generation of hazardous waste.
<i>Resource Conservation and Recovery Act</i>	<i>Standards Applicable to Transporters of Hazardous Waste</i>	40 CFR 263	Establishes standards that apply to entities transporting hazardous waste within the U.S.	Potentially Applicable – If the remedial action results in the offsite transportation of hazardous waste.
	<i>Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities</i>	40 CFR 264	Standards and requirements for facilities that treat, store, and dispose of hazardous waste. Requirements include: General Facility Standards (Subpart B), Preparedness and Prevention (Subpart C), Contingency Plan and Emergency Procedures (Subpart D), Manifest System (Subpart E), Use and Management of Containers (Subpart I), Waste Piles (Subpart L), Landfills (Subpart N), Corrective Action Management Units (Subpart S), and control of air emissions (Subparts AA, BB, and CC).	Potentially Applicable – To the management of hazardous waste, if generated.
	<i>Land Disposal Restrictions</i>	40 CFR 268	Identifies hazardous wastes that are restricted from land disposal and defines those limited circumstances under which an otherwise restricted waste may continue to be land disposed.	Potentially Relevant and Appropriate – If wastes will be stored onsite long-term, especially in a CAMU.
	<i>National Pollutant Discharge Elimination System (NPDES)</i>	40 CFR 122 and 125	Covers permitting requirements for aqueous discharge into navigable waters of the US, which include surface waters, as well as wetlands.	Potentially Applicable – If the remedial action will result in the discharge of water to or otherwise impact navigable waters (including wetlands).
<i>Clean Water Act</i>	<i>Section 404</i>	40 CFR 230.10 and 33 CFR 320	Regulates the discharge of dredged or fill material into waters of the United States and sets forth factors for considering mitigation measures and permitting.	Potentially Relevant and Appropriate – If the remedial action will result in the discharge of soil or sediment to or otherwise impact navigable waters (including wetlands).

Table 11-2
Potential Action-Specific Federal and State ARARs and TBCs
Hanlin-Allied-Olin Site
Moundsville, West Virginia

POTENTIAL ARAR		CITATION	BRIEF DESCRIPTION	ARAR/TBC STATUS
<i>Toxic Substances Control Act</i>	<i>Polychlorinated Biphenyls Manufacturing, Process, Distribution in Commerce, and Use Prohibitions</i>	40 CFR 761	Provides cleanup methodology and standards for PCBs.	<u>Applicable</u> - To the management and remediation of PCB-containing wastes.
<i>Occupational Safety and Health Act</i>	<i>Occupational Health and Safety Standards</i>	29 CFR 1910	Requirements for worker safety.	<u>Applicable</u> - To any portions of the remedial action not related to construction; specifically includes training and monitoring under the Hazardous Waste Operations and Emergency Response standard.
<i>Occupational Safety and Health Act</i>	<i>Safety and Health Regulations for Construction</i>	29 CFR 1926	Requirements for worker safety during construction.	<u>Applicable</u> - To any remedial action involving construction.
STATE ACTION-SPECIFIC ARARS				
<i>Waste Management</i>	<i>Identification and Listing of Hazardous Waste</i>	WV Title 33, Series 20-3	Establishes requirements for profiling solid waste streams and conducting hazardous waste determinations.	<u>Applicable</u> - To all wastes generated during the remedial action.
	<i>Standards Applicable to Generators of Hazardous Waste</i>	WV Title 33, Series 20-5	Establishes standards for generators of hazardous waste.	<u>Applicable</u> - If the remedial action results in the generation of hazardous waste.
	<i>Standards Applicable to Transporters of Hazardous Waste</i>	WV Title 33, Series 20-6	Establishes standards, which apply to persons transporting hazardous waste within the US if the transportation requires a manifest under WV Title 33, Series 20-5.	<u>Applicable</u> - If the remedial action results in the generation of hazardous waste that will be transported offsite.
	<i>Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities</i>	WV Title 33, Series 20-7	Standards and requirements for facilities that treat, store, and dispose of hazardous waste. Requirements include: General Facility Standards, Preparedness and Prevention, Contingency Plan and Emergency Procedures, Manifest System, Use and Management of Containers, Waste Piles, Landfills, Corrective Action Management Units, and control of air emissions.	<u>Applicable</u> - To the management of hazardous waste, if generated.
<i>Waste Management</i>	<i>Land Disposal Restrictions</i>	WV Title 33, Series 20-10	Identifies hazardous wastes that are restricted from land disposal and defines those limited circumstances under which an otherwise restricted waste may continue to be land disposed.	<u>Applicable</u> - If the remedial action results in the generation of a hazardous waste that is to be land-disposed.
<i>Waste Management</i>	<i>Solid Waste Management Rule</i>	WV Title 33, Series 1	Establishes requirements for the siting, bounding, installation, establishment, construction, modification, operation, and abandonment of any facility that processes, recycles, or disposes of solid waste, including in a landfill.	<u>Relevant and Appropriate</u> - If wastes will be stored onsite in a landfill.
<i>Office of Water Resources</i>	<i>National Pollutant Discharge Elimination System (NPDES) Program</i>	WV Title 47, Series 10	Establishes requirements governing the State National Discharge Elimination System Program, including a list of permits required.	<u>Applicable</u> - If wastewaters will be discharged to waters of the State (including wetlands) during remedial activities.
	<i>Monitoring Well Regulations and Monitoring Well Design Standards</i>	WV Title 47, Series 59 and 60	Requirements for certification of monitoring well drillers and for the construction/abandonment of monitoring wells.	<u>Applicable</u> - During well installation practices.

Table 11-2
Potential Action-Specific Federal and State ARARs and TBCs
Hanlin-Allied-Olin Site
Moundsville, West Virginia

POTENTIAL ARAR		CITATION	BRIEF DESCRIPTION	ARAR/TBC STATUS
<i>Division of Water and Waste Management</i>	<i>Groundwater Protection Regulations</i>	WV Title 48, Series 58	Rule establishing a series of practices for facilities/activities as they pertain to groundwater.	Relevant and Appropriate - May be considered to protect groundwater.
<i>Division of Air Quality</i>		WV Title 45, Series 1-40	Regulates a number of air pollution sources. Establishes specific requirements pertaining to objectionable odors (Series 4), fugitive particulate emissions (Series 17), and hazardous waste TSDFs (Series 25). Also includes the NESHAP for site remediation (Series 34).	Applicable; Relevant and Appropriate - To the onsite generation and emission of ambient air pollutants during remedial activities. Requirements pertaining to permits for onsite hazardous waste treatment and site remediation may be relevant and appropriate.
<i>Division of Air Quality</i>	<i>To Prevent and Control the Discharge of Air Pollutants into the Open Air Which Causes or Contributes to an Objectional Odor or Odors; To Prevent and Control Particulate Matter Air Pollution from Manufacturing Processes and Associated Operations; Compliance Test Procedures for 45CSR -- "To Prevent and Control Particulate Air Pollution from Manufacturing Process Operations"; To Prevent and Control Air Pollutants from the Emission of Sulfur Oxides; Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Admin. Updates, Temporary Permits, General Permits, Permission to Commence...; and To Prevent and Control the Emissions of Toxic Air Pollutants</i>	WV Title 45, Series 4, 7, 7A, 10, 13, and 27	Establishes specific requirements pertaining to objectionable odors (Series 4), particulate air pollution (Series 7), compliance testing (Series 7A), sulfur oxides (Series 10), construction, modification, relocation and operation of stationary sources of air pollutants (Series 13), and prevention of toxic air pollutant emissions (Series 27).	Applicable - Applicable to the groundwater treatment and soil vapor extraction system.
<i>Department of Transportation - Division of Highways</i>	<i>Transportation of Hazardous Wastes Upon the Roads and Highways</i>	WV Title 157, Series 7	Establishes transportation requirements, which apply to persons transporting hazardous waste within the US if the transportation requires a manifest under WV Title 33, Series 20-5.	Applicable - If the remedial action results in the generation of hazardous waste that will be transported offsite using roads and/or highways.

Table 11-3
Potential Location-Specific Federal and State ARARs and TBCs
Hanlin-Allied-Olin Site
Moundsville, West Virginia

POTENTIAL ARAR		CITATION	BRIEF DESCRIPTION	ARAR/TBC STATUS
FEDERAL LOCATION-SPECIFIC ARARs				
<i>Endangered Species Act</i>				
		16 USC 1531 - 1544	Provides a means for the protection of flora and fauna.	Potentially Relevant and Appropriate – If the proposed remedial action would affect these resources.
	<i>Fish and Wildlife Coordination Act</i>	16 USC 661	Any activity that proposes to modify a body of water or potentially affect fish and wildlife services is addressed under CWA Section 404 requirements.	Potentially Relevant and Appropriate – If the proposed remedial action would affect these resources.
	<i>Native American Graves Protection and Repatriation</i>	25 USC 3002 et seq 43 CFR 10	Must stop activities in the area of the discovery of Native American remains or objects and take reasonable effort to secure and protect the objects discovered before resuming activity.	Potentially Relevant and Applicable – If the proposed remedial action entails existing or newly discovered Native American burial sites, remains, or objects.
	<i>Advisory Council on Historic Preservation</i>	36 CFR 800	Provides for evaluation of potential impacts to cultural resources prior to an undertaking and protection thereof.	Potentially Relevant and Applicable – If the proposed remedial action entails existing or newly discovered cultural resources.
	<i>Comprehensive Environmental Response, and Liability Act (CERCLA)</i>	40 CFR 300	Provides for Federal oversight and planning dealing with releases of hazardous substances and remedial actions.	Applicable – Defines the Federal-level decision-making process for NPL sites.
<i>Floodplain Management and Protection of Wetlands</i>				
		44 CFR 9	Federal actions affecting or affected by floodplains.	Potentially Applicable - To the soil remedy.
<i>Floodplain Management</i>				
		Executive Order 11988	Federal actions that involve potential impacts to or take place within floodplains.	Applicable - To the soil remedy.
	<i>Clean Water Act</i>	40 CFR 122 and 125	Covers permitting requirements for aqueous discharge into navigable waters of the US, which include surface waters, as well as wetlands.	Potentially Applicable – If the remedial action will result in the discharge of water to or otherwise impact navigable waters (including wetlands).
		40 CFR 230.10, 33 CFR 320	Regulates the discharge of dredged or fill material into waters of the United States and sets forth factors for considering mitigation measures and requirements for permitting.	Potentially Relevant and Appropriate – If the remedial action will result in the discharge of soil or sediment to or otherwise impact navigable waters (including wetlands).

Table 12: Summary of SWMU Descriptions, Investigative Scope and Findings, and Closure Status

Unit/Area	Description	History	Area (1)	Closure Status	Field Observations	Removed/Present/ Sampling Status
B/P Hanlin	Chloromethanes Production Area and Former Drum Storage Area	Unit P contained production units, loading/unloading terminals, and storage facilities. Unit A/B is also in area. Methyl chloride, methylene chloride, chloroform, and carbon tetrachloride were produced in the area. Decommissioning included neutralization and removal. Unit B was a warehouse that was used to store drums of CMP dryer residue, CMP sludge, and mercury-containing SWMU material. Since 1986, this warehouse was used to store drums of mercury-containing SWMU material. Due to the fact that SWMU B is completely surrounded by SWMU P and taking into consideration the low number of Industrial RBC exceedances (one), the lack of waste within the boundaries of the unit, and the soil vapor extraction (SVE) system in this area, SWMU B will be incorporated into SWMU P for any further consideration.	161,000 ft ² Large unlined area	Unlined. Subject to remediation through SVE. Building with concrete floor. Subject to remediation through SVE.	The building has been decommissioned; the concrete foundation slab remains. Soil borings show elevated mercury and VOC concentrations. Residually saturated soils observed in some places.	Decommissioned – Process Equipment Removed; Buildings Removed Undergoing SVE
C1 Hanlin	Spent Lime Pond	In operation from 1957 to 1965. Closed in 1982. Received spent lime and muds from the purification of raw brine from the chlor-alkali production area and caustic from the chloromethanes production area.	146,000 ft ² Approx. depth: 26 to 36 ft	Bottom unlined; capped with 12 in. clay overlain by 12 in. of topsoil. Cap was re-graded in 2007 to drain surface water runoff.	Material is uniform in character, consisting of light gray to white sludge in a plastic state. The SWMU material is underlain with moderate yellowish-brown, very dense, gravely sand silt.	Upgraded Cap
C2 Hanlin	Spent Lime Pond	In operation from 1965 to 1978. Received similar SWMU material as C1.	116,000 ft ² Approx. depth: 20 ft	Lower 16 ft lined with polyethylene liner (unknown thickness). Upper 4 ft constructed with native soil material (unlined). Capped with 12 in. clay overlain by 12 in. of topsoil	Excavated into a hillside behind Unit G and Unit C1. Depth of the unit was not confirmed. SWMU material is similar in nature to that found in Unit C1, consisting primarily of grayish-white sludge. The uppermost material is dark reddish-brown and yellowish-brown in color.	Present
D Hanlin	Spent Lime Pond	In use from 1953 to 1957 for disposal of spent lime and muds from the purification of raw brine from the chlor-alkali production area. Used five years later for disposal of hydrochloric acid.	133,000 ft ² Approx. depth: 11 to 21 ft	Bottom unlined; capped with 12 in. clay overlain by 12 in. of topsoil. Waste was partially removed during construction of the OSDF. Waste was stockpiled and then placed in the South OSDF Cell. Remaining waste is mostly covered by the OSDF.	Contains white, chalky sludge, similar in appearance to the SWMU material in SWMU C1. The SWMU material is a low-plasticity sludge. The cover consists of compacted silty clay. The underlying soil consists of dark yellowish-brown silt with some gravel.	Upgraded Cap Covered by the OSDF
E2 Hanlin	North Refuse Dump	Received general plant trash and ash from 1969 to 1980. No records of SWMU material exist but small amounts of lab reagents and sample bottles may have been buried here. Closed by filling to grade with soil and boiler ash and placing compacted 12 in. clay layer on top.	94,000 ft ² 10 to 24 ft deep	Approximately 33,375 cubic yards of waste was removed and placed in the North OSDF Cell. Remaining waste is unlined and covered with a soil cap.	The unit is approximately 10 ft deep in the middle and southern thirds of the unit and was at least 24 ft deep in the northern third. The upper 5 to 10 ft consisted mostly of black ash. In the southern half of the unit, the ash was underlain mostly with construction debris. In the northern half of the unit, the black ash was underlain by grayish-white sludge. The black ash in Unit E2 appeared less uniform in texture than the boiler ash in Unit M.	Partially Removed
G Hanlin	Storage Pond	Used as surge pond for storing mercury contaminated wastewater for treatment from 1971 to 1978. Prior to closure, sludges were excavated, stabilized in Unit F and replaced in Unit G as fill. Unit was found to be leaking prior to closure.	65,400 ft ²	Lining found to be leaking prior to closure; unsure if repaired; capped with 12 in. clay overlain by 12 in. of topsoil.	Contains a gray cement-like SWMU material and hard yellowish-brown soil. The soil appears to be partially cemented. The strength of the cement-like SWMU material was variable. All of the SWMU material observed appears to be solidified.	Present

Source: OUI Feasibility Study Hanlin-Allied-Olin Site, Moundsville, West Virginia (February 2020)

Table 12: Summary of SWMU Descriptions, Investigative Scope and Findings, and Closure Status

Unit/Area	Description	History	Area ⁽¹⁾	Closure Status	Field Observations	Removed/Present/ Sampling Status
I Hanlin	Asbestos Burial Area	Two small areas used for asbestos disposal.	2 circular areas, one is roughly 200 square feet and the other is roughly 400 square feet	SWMU material bagged prior to disposal.	No sampling has been performed on Unit I due to historical knowledge of area and disposal procedures. Delineation performed during RI/FS activities.	Present
J Hanlin	Mercury Settling Basin	The Settling and Standby Ponds were used to collect mercury-containing wastewaters generated in the chlor-alkali production area. In service from 1977 until 1986 when leaks in liners were detected. Closure activities included stabilization with cement and fly ash. Prior to these ponds the area was a single mercury settling pond. The sludges from this pond were stabilized and sent to Unit H.	27,400 ft ²	Closed with modified RCRA cap. The remaining portions of the unit are lined.	Waste consists of a grey solidified material covered with flyash.	Present
J-West Inlet Hanlin	Mercury Settling Basin	The West Inlet was used to collect mercury-containing wastewaters generated in the chlor-alkali production area. In service from 1977 until 1986 when leaks in liners were detected. Closure activities included stabilization with cement and fly ash. Prior to these ponds, the area was a single mercury settling pond. The sludges from this pond were stabilized and sent to Unit H.	37,600 ft ²	Waste was removed and placed in the North OSDF Cell.	Waste consists of a grey solidified material covered with fly ash. 14,700 cubic yards of waste were removed and placed in the North OSDF Cell.	Removed
K Hanlin	Raw Brine Purification Mud	Received spent lime and muds from the purification of raw brine from the chlor-alkali production area.	74,000 ft ²	Lined; geosynthetic cap system is under construction. Unit will be capped following dewatering and consolidation of the SWMU material. Phase I consolidation and dewatering has been completed, with Phase II in progress currently. A third consolidation phase may be necessary prior to installation of the cover system components.	Depth of the SWMU material is greater than 12 ft but was not measured due to presence of bottom liner. The SWMU material is grayish to brownish-white. Accumulated rainwater was present in the impoundment at depths of approximately 1 ft and was ponded primarily in the western end of the unit. The presence of standing water suggested that the liner was likely working properly.	Upgraded Cap Capping in progress with intact bottom liner
O Hanlin	Clarification Ponds (North and South)	Used to settle solids from treated wastewater prior to discharge through a lined surface ditch to Hanlin's 001 outfall (unit is active).	27,500 ft ² ; approximately 15 ft deep	South Pond O: Synthetic liner and geotextile fabric sublayer. The South Pond O is currently being used as excess stormwater storage capacity. North Pond O: liner has been disposed of. Pond O sludges were removed and placed in the South OSDF Cell.	The sediment consisted of a very light gray sludge that was discolored to brownish-orange in the upper few inches probably due to oxidation. The sludge was very soft and was in the liquid state; lime kiln dust was used to amend the sludge prior to disposal in the South OSDF Cell.	Decommissioned – No Longer Receiving Process Liquids
Q Hanlin	Wastewater Treatment Tanks	Eight tanks installed in October 1985. Each tank holds approximately 10,000 gallons. All have covers. Seven of the eight tanks have been removed from the site; one tank remains.	2,460 ft ²	Unlined.	The structures of this unit were underlain by native soil with some fly ash. The samples collected consisted of native soils beneath unlined tank impoundments where tanks have been removed. In most areas, these soils appeared unaffected. An approximately 1 in. thick layer of black, oily liquid was encountered in one boring at a depth of approximately 2 ft, as was noted in historical borings. This was not observed during trenching performed in 2007; however, a layer of black fly ash was encountered and was sampled.	Decommissioned – Tanks Removed

Source: OU 1 Feasibility Study Hanlin-Allied-Olin Site, Moundsville, West Virginia (February 2020)

Table 12: Summary of SWMU Descriptions, Investigative Scope and Findings, and Closure Status

Unit/Area	Description	History	Area ⁽¹⁾	Closure Status	Field Observations	Removed/Present/ Sampling Status
U Allied	Lime Waste Pond	In operation prior to 1967, Unit contains lime SWMU material from acetylene production. The lime was reused for acid neutralization in the north and south plants.	753,000 ft ²	Unlined and capped with approximately 2 ft of yellowish-brown silty clay.	Has no clear surface expression. Unit was up to 18 ft deep and consisted primarily of white to gray, chalky sludge. The moisture content of the sludge varied but was always less than the liquid limit and generally below the plastic limit. Unit also contained a little ash. Unit was underlain by firm to loose, olive-gray to yellowish-brown silt.	Present
V Allied	Waste Pond 2	Approximately 4.5 million gallons of sludge were removed and placed in Unit W. Only underlying native soil remains. Pond was used as a mixing basin to treat the "black water" from Unit W with formaldehyde. The formaldehyde facilitated a reaction whereby the toluene diamine precipitated as sludge. The unreacted formaldehyde was pumped from the unit and treated.	108,000 ft ²	Unlined and capped with approximately 2 ft of dark yellowish-brown silty clay. Waste was consolidated into SWMU W in the 1980's; subgrade remains.	Has no clear surface expression but consists of a flat area that slopes gently toward the Ohio River. The material encountered beneath the cap was a dark gray silt with localized traces of gravel. At a depth of around 10 ft, this dark soil reverted to the yellowish-brown silt that was observed beneath SWMU U. One sample of the dark gray soil from the north end, near SWMU S, registered 100 ppm on the PID when the probe was held directly over the sample as the sampling spoon was opened. No organic vapors were detected in the breathing zone. No organic vapors were detected in material taken from the middle or southern end.	Decommissioned – Pond Contents Consolidated into SWMU W; Liner Removed; Area Backfilled with Soil
W Allied	Waste Pond 3	Former holding pond for toluene diamine (TDA) SWMU material.	91,300 ft ²	EPDM lined. Capped with clay and a geosynthetic cap system.	Rises about 25 ft above surrounding land. Waste is stabilized and hard. Test pits were excavated prior to cap installation and revealed a striated solid formation with water freely flowing from fracture apertures. The waste has a "rotten fish" odor. Hydraulic studies were conducted in 2005 and 2006, indicating no hydraulic connection between the unit and the underlying aquifer. A geosynthetic and soil cap was installed in 2006.	Upgraded Cap Capped with intact bottom liner

Source: *OU1 Feasibility Study Hanlin-Allied-Olin Site, Moundsville, West Virginia* (February 2020)Notes:
Areas calculated using ArcView software.

APPENDIX A

WVDEP Letter of Concurrence



west virginia department of environmental protection

Office of Environmental Remediation
131A Peninsula Street
Wheeling, WV 26003
(304) 238-1220

Harold D. Ward, Cabinet Secretary
dep.wv.gov

May 6, 2021

Ms. Linda Dietz, Acting Director
Superfund Emergency and Management Division (SEMD)
US EPA Region 3
1650 Arch Street, 3SD00
Philadelphia, PA 19103-2029

**RE: State Concurrence with the Record of Decision (ROD), May 2021
Hanlin-Allied-Olin Superfund Site – Operable Unit 1
Moundsville, Marshall County, West Virginia
EPA Identification No. WV024185373**

Dear Ms. Dietz:

This letter is to officially express that the State of West Virginia, Department of Environmental Protection (WVDEP), Office of Environmental Remediation (OER) has reviewed and is in concurrence with the ROD dated May 2021 for the Hanlin-Allied-Olin Superfund Site (site), Operable Unit 1, located in Moundsville, Marshall County, West Virginia.

WVDEP OER has participated in the investigation as well as the evaluation and selection of the remedies proposed for the site. WVDEP OER looks forward to the implementation of the selected final and interim remedies, which we believe will be protective both to human health and the environment, as well as provide for cost-effective remediation of the site.

Sincerely,

Casey Korbini
Deputy Director for Remediation Programs
Division of Land Restoration

ec: Lisa Denmark, Remedial Project Manager, U.S. EPA
ec: Jason McDougal, Program Manager, OER
ec: William Huggins Jr., Project Manager, OER

EXHIBIT B

REMEDIAL DESIGN/REMEDIAL ACTION
MOUNDVILLE SUPERFUND SITE STATEMENT OF WORK

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1. INTRODUCTION

1.1 Purpose of SOW. This Statement of Work (“SOW”) sets forth the procedures and requirements for implementing the Work.

1.2 Structure of the SOW

- Section 2 (Community Involvement) sets forth EPA’s and Settling Defendants’ responsibilities for community involvement.
- Section 3 (Coordination and Supervision) contains the provisions for selecting the Supervising Contractor and Project Coordinators regarding the Work.
- Section 4 (Remedial Design) sets forth the process for developing the Remedial Design, which includes the submission of specified primary deliverables.
- Section 5 (Remedial Action) sets forth requirements regarding the completion of the Remedial Action, including primary deliverables related to completion of the Remedial Action.
- Section 6 (Reporting) sets forth Settling Defendants’ reporting obligations.
- Section 7 (Deliverables) describes the contents of the supporting deliverables and the general requirements regarding Settling Defendants’ submission of, and EPA’s review of, approval of, comment on, and/or modification of, the deliverables.
- Section 8 (Schedules) sets forth the schedule for submitting the primary deliverables, specifies the supporting deliverables that must accompany each primary deliverable, and sets forth the schedule of milestones regarding the completion of the Remedial Action.
- Section 9 (State Participation) addresses State participation.
- Section 10 (References) provides a list of references, including URLs.

1.3 The Scope of the Remedy includes the actions described in Section 4.0 of the Record of Decision, including an interim remedial approach for South Plant alluvial groundwater and a final remedy for Shallow Soils, the former Mercury Cell Building area, and Hanlin Area sewers at the Site. The major components include the following.

- The final remedy for shallow soils is a combination of stabilization of Operations Area soils, excavation of floodplain wet soils, and cover of general floodplain soils. Institutional Controls will be developed and maintained pursuant to Section 12.1.4 of the ROD. Additional soils generated during Site maintenance or redevelopment will be managed to attain risk-based objectives consistent with a Soil Management Plan (SMP) using similar approaches to those included in the Soil Management Activity Work Plan – Honeywell International Controlled Property, Revision 3 (Moundsville Power, LLC, August 2016).
- The final remedy for the former Mercury Cell Building is concrete capping pursuant to section 12.4.2 of the ROD. Institutional Controls will be developed and maintained pursuant to Section 12.1.4 of the ROD. The SMP described above will be applied.

- The final remedy for the Sewers is grouting with partial excavation as necessary. Institutional Controls will be developed and maintained pursuant to Section 12.1.4 of the ROD.
- The interim remedy for South Plant alluvial groundwater is upgraded groundwater extraction and treatment (with continued soil vapor extraction). This interim remedy includes a step-wise technology evaluation process to achieve a total mercury concentration of 0.14 micrograms per liter at the end-of-pipe and a total mercury concentration of 0.012 micrograms per liter at the physical boundary of a mixing zone within 5 years and 3 months of the lodging of the Consent Decree (the period during which this step-wise process is undertaken is referred to as the compliance period in the ROD). The end-of-pipe compliance point will be temporarily measured at an alternative compliance point through samples taken at the Stilling Pond. As set forth in the ROD, the compliance period will include a pilot study evaluation of whether the water quality standard can be met consistently for the upgraded groundwater extraction and treatment system discharge. If the pilot study confirms that the water quality standard of 0.14 micrograms per liter at the end-of-pipe and the 0.012 micrograms per liter at the boundary of the mixing zone can be attained during the compliance period¹, the use of a mixing zone will be incorporated into the Final Remedial Design. The mixing zone period shall not exceed 5 years after Completion of Construction, and the compliance period and the mixing zone period together shall not exceed 10 years and 3 months from the date of the lodging of the Consent Decree, except if the mixing zone period is extended by EPA, in consultation with WVDEP, in writing. To the degree that the compliance period may exceed 5 years and 3 months, the mixing zone period will equally reduce to ensure that the total period does not exceed 10 years and 3 months. Depending upon several factors, including but not limited to, the status of the remedial action at OU2, the success of the enhanced treatment measures, technical feasibility, and any unforeseen circumstances, Honeywell may request an extension of the use of a mixing zone following the expiration of the initial mixing zone period. EPA, in consultation with WVDEP, will make the unilateral decision whether to grant the request and, in its discretion, select the duration of the extension. If EPA denies Honeywell's request to extend the initial mixing zone period at the expiration of the interim remedial action's implementation period of 10 years and 3 months or grants a shorter extension than requested by Honeywell, no stipulated penalty provision pursuant to the Consent Decree or other penalties will apply to end of pipe exceedances of the performance standard, and Honeywell shall not be deemed in violation of the Consent Decree for such exceedances.

1.4 The terms used in this SOW that are defined in CERCLA, in regulations promulgated under CERCLA, or in the Consent Decree ("Decree"), have the meanings assigned to them in CERCLA, in such regulations, or in the Decree, except that the term "Paragraph"

¹ If it is determined that the water quality standard of 0.14 micrograms per liter at the end-of-pipe and the 0.012 micrograms per liter at the boundary of the mixing zone cannot be attained during the compliance period, EPA, in consultation with WVDEP, will decide whether to issue a new ROD or ROD amendment consistent with the statutory requirements of CERCLA Section 121.

or “¶” means a paragraph of the SOW, and the term “Section” means a section of the SOW, unless otherwise stated.

2. COMMUNITY INVOLVEMENT

2.1 As requested by EPA, Settling Defendants shall conduct community involvement activities under EPA’s oversight as provided for in, and in accordance with this Section. Such activities must include designation of a Community Involvement Coordinator (“CI Coordinator”) and implementation of a technical assistance plan.

2.2 Community Involvement Responsibilities

- (a) EPA has the lead responsibility for developing and implementing community involvement activities at the Site. Previously during the Remedial Investigation and Feasibility Study (“RI/FS”) phase, EPA developed a Community Involvement Plan (“CIP”) for the Site. In accordance with 40 C.F.R. § 300.435(c), EPA shall review the existing CIP and determine whether it should be revised to describe further public involvement activities during the Work that are not already addressed or provided for in the existing CIP and/or any Technical Assistance Plan (“TAP”).
- (b) **Settling Defendants’ CI Coordinator.** As requested by EPA, Settling Defendants shall, within 15 days, designate and notify EPA of Settling Defendants’ CI Coordinator (Settling Defendants’ CI Coordinator). Settling Defendants may hire a contractor for this purpose. Settling Defendants’ notice must include the name, title, and qualifications of the Settling Defendants’ CI Coordinator. Settling Defendants’ CI Coordinator shall coordinate his/her activities with EPA’s CI Coordinator, provide support regarding EPA’s community involvement activities, and, as requested by EPA’s CI Coordinator, provide draft responses to the public’s inquiries including requests for information or data about the Site. The Settling Defendants’ CI Coordinator has the responsibility to ensure that when they communicate with the public, the Settling Defendants protect any “Personally Identifiable Information” (“PII”) (e.g. sample results from residential properties) in accordance with “EPA Policy 2151.0: Privacy Policy.”
- (c) As requested by EPA, Settling Defendants shall participate in community involvement activities, including participation in: public meetings that may be held or sponsored by EPA to explain activities at or relating to the Site (with interpreters present for community members with limited English proficiency). Settling Defendants’ support of EPA’s community involvement activities may include providing online access to initial submissions and updates of deliverables to: (1) any Community Advisory Groups, (2) any Technical Assistance Grant (“TAG”) recipients and their advisors, and (3) other entities to provide them with a reasonable opportunity for review and comment. EPA may describe in its CIP Settling Defendants’ responsibilities for community involvement activities. All community involvement activities conducted by Settling Defendants at EPA’s

request are subject to EPA's oversight. Upon EPA's request, Settling Defendants shall establish, as early as is feasible, a community information repository at or near the Site, as provided in the CIP, to house one copy of the administrative record.

- (d) **Information for the Community.** As requested by EPA, Settling Defendants shall develop and provide to EPA information about the design and implementation of the remedy including: (1) any validated data from monitoring of impacts to communities as provided in the Community Impact Mitigation Plan under ¶ 7.7(f); (2) results from unvalidated sampling as provided under ¶ 7.7(e)(7); (3) a copy of the Community Impacts Mitigation Plan required under ¶ 7.7(f); (4) schedules prepared under Section 8; (5) dates that Settling Defendants completed each task listed in the schedules; and (6) digital photographs of the Work being performed, together with descriptions of the Work depicted in each photograph, the purpose of the Work, the equipment being used, and the location of the Work. The EPA Project Coordinator may use this information for communication to the public via EPA's website, social media, or local and mass media. The information provided to EPA should be suitable for sharing with the public and the education levels of the community as indicated in EPA's environmental justice mapping tool "EJ Screen"; see <https://www.epa.gov/ejscreen> for further information. Translations should be in the dominant language(s) of community members with limited English proficiency.

2.3 Settling Defendants' Responsibilities for Technical Assistance

- (a) At EPA's request, Settling Defendants shall arrange for a qualified community group to receive the services of a technical advisor(s) who can: (1) help group members understand Site cleanup issues (specifically, to interpret and comment on Site-related documents developed under this SOW); and (2) share this information with others in the community. The technical advisor(s) will be independent from the Settling Defendants. Settling Defendants' assistance will be limited to \$50,000, except as provided in ¶ 2.3(d)(3), and will end when EPA issues the Certification of Work Completion under ¶ 5.10. Settling Defendants shall implement this requirement under a Technical Assistance Plan ("TAP").
- (b) At EPA's request, Settling Defendants shall cooperate with EPA in soliciting interest from community groups regarding a TAP at the Site. If more than one community group expresses an interest in a TAP, Settling Defendants shall cooperate with EPA in encouraging the groups to submit a single, joint application for a TAP.
- (c) At EPA's request, Settling Defendants shall, within 30 days, submit a proposed TAP for EPA approval. The TAP must describe the Settling Defendants' plans for the qualified community group to receive independent technical assistance. The TAP must include the following elements:

- (1) For Settling Defendants to arrange for publication of a notice in local media that they have received a Letter of Intent (“LOI”) to submit an application for a TAP. The notice should explain how other interested groups may also try to combine efforts with the LOI group or submit their own applications, by a reasonable specified deadline;
- (2) For Settling Defendants to review the application(s) received and determine the eligibility of the community group(s). The proposed TAP must include eligibility criteria as follows:
 - (i) A community group is eligible if it is: (a) comprised of people who are affected by the release or threatened release at the Site; and (b) able to demonstrate its ability to adequately and responsibly manage TAP-related obligations.
 - (ii) A community group is ineligible if it is: (a) a potentially responsible party (PRP) at the Site, represents such a PRP, or receives money or services from a PRP (other than through the TAP); (b) affiliated with a national organization; (c) an academic institution; (d) a political subdivision; (e) a tribal government; (f) a group established or presently sustained by any of the above ineligible entities; or (g) a group in which any of the above ineligible entities is represented;
- (3) For Settling Defendants to notify EPA of their determination on eligibility of the applicant group(s) to ensure that the determination is consistent with the SOW before notifying the group(s);
- (4) If more than one community group submits a timely application, for Settling Defendants to review each application and evaluate each application based on the following elements:
 - (i) The extent to which the group is representative of those persons affected by the Site; and
 - (ii) The effectiveness of the group’s proposed system for managing TAP-related responsibilities, including its plans for working with its technical advisor and for sharing Site-related information with other members of the community.
- (5) For Settling Defendants to document their evaluation of, and their selection of, a qualified community group, and to brief EPA regarding their evaluation process and choice. EPA may review Settling Defendants’ evaluation process to determine whether the process satisfactorily follows the criteria in ¶ 2.3(c)(4). TAP assistance may be awarded to only one qualified group at a time;

- (6) For Settling Defendants to notify all applicant(s) about Settling Defendants' decision;
 - (7) For Settling Defendants to designate a person (TAP Coordinator) to be their primary contact with the selected community group;
 - (8) A description of Settling Defendants' plans to implement the requirements of ¶ 2.3(d) (Agreement with Selected Community Group); and
 - (9) For Settling Defendants to submit quarterly progress reports regarding the implementation of the TAP.
- (d) Agreement with Selected Community Group
- (1) Settling Defendants shall negotiate an agreement with the selected community group that specifies the duties of Settling Defendants and the community group. The agreement must specify the activities that may be reimbursed under the TAP and the activities that may not be reimbursed under the TAP. The list of allowable activities must be consistent with 40 C.F.R. § 35.4070 (*e.g.*, obtaining the services of an advisor to help the group understand the nature of the environmental and public health hazards at the Site and the various stages of the response action, and communicating Site information to others in the community). The list of non-allowable activities must be consistent with 40 C.F.R. § 35.4075 (*e.g.*, activities related to litigation or political lobbying).
 - (2) The agreement must provide that Settling Defendants' review of the Community Group's recommended choice for Technical Advisor will be limited, consistent with 40 C.F.R. §§ 35.4190 and 35.4195, to criteria such as whether the advisor has relevant knowledge, academic training, and relevant experience as well as the ability to translate technical information into terms the community can understand.
 - (3) The agreement must provide that the Community Group is eligible for additional TAP assistance (not to exceed an additional \$50,000), if it can demonstrate that it has effectively managed its TAP responsibilities to date, and that at least three of the following 10 factors are satisfied:
 - (i) EPA expects that more than eight years (beginning with the initiation of the RI/FS) will pass before construction completion will be achieved;
 - (ii) EPA requires treatability studies or evaluation of new and innovative technologies;
 - (iii) EPA reopens the Record of Decision;

- (iv) The public health assessment (or related activities) for the Site indicates the need for further health investigations and/or health-related activities;
 - (v) After Settling Defendants' selection of the Community Group for the TAP, EPA designates additional operable units at the Site;
 - (vi) EPA issues an Explanation of Significant Differences for the Record of Decision;
 - (vii) After Settling Defendants' selection of the Community Group, a legislative or regulatory change results in significant new Site information;
 - (viii) Significant public concern about the Site exists, as evidenced, *e.g.*, by relatively large turnout at meetings, the need for multiple meetings, the need for numerous copies of documents to inform community members, etc.;
 - (ix) Any other factor that, in EPA's judgment, indicates that the Site is unusually complex; or
 - (x) An RI/FS costing at least \$2 million was performed at the Site.
- (4) Settling Defendants are entitled to retain any unobligated TAP funds upon EPA's Certification of Work Completion under ¶ 5.10.
 - (5) Settling Defendants shall submit a draft of the proposed agreement to EPA for its comments.

3. COORDINATION AND SUPERVISION

3.1 Project Coordinators

- (a) Settling Defendants' Project Coordinator must have sufficient technical expertise to coordinate the Work. Settling Defendants' Project Coordinator may not be an attorney representing any Settling Defendant in this matter and may not act as the Supervising Contractor. Settling Defendants' Project Coordinator may assign other representatives, including other contractors, to assist in coordinating the Work.
- (b) EPA shall designate and notify the Settling Defendants of EPA's Project Coordinator and Alternate Project Coordinators. EPA may designate other representatives, which may include its employees, contractors, and/or consultants, to oversee the Work. EPA's Project Coordinator/Alternate Project Coordinator will have the same authority as a remedial project manager and/or an on-scene coordinator, as described in the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"). This includes the authority, after consultation with

the State's Office of Environmental Remediation Project Manager or Program Manager, to halt the Work and/or to conduct or direct any necessary response action when it is determined that conditions at the Site constitute an emergency or may present an immediate threat to public health or welfare or the environment due to a release or threatened release of Waste Material.

- (c) The State has notified EPA and Settling Defendants that it has designated William Huggins as the Project Coordinator and Jason McDougal as the Alternate Project Coordinator. The State may designate other representatives, including its employees, contractors and/or consultants to oversee the Work. For any meetings and inspections in which EPA's Project Coordinator participates, the State's Project Coordinator also may participate. Settling Defendants shall notify the State reasonably in advance of any such meetings or inspections.
- (d) Settling Defendants' Project Coordinators shall communicate with EPA's and the State's Project Coordinators at least monthly.

3.2 Supervising Contractor. Settling Defendants' proposed Supervising Contractor must have sufficient technical expertise to supervise the Work and a quality assurance system that complies with the most recent version of *Quality Systems for Environmental Data and Technology Programs -- Requirements with Guidance for Use* (American National Standard), ANSI/ASQC E4 (Feb. 2014).

3.3 Procedures for Disapproval/Notice to Proceed

- (a) Settling Defendants shall designate, and notify EPA, within 10 days after the Effective Date, of the name[s], title[s], contact information, and qualifications of the Settling Defendants' proposed Project Coordinator and Supervising Contractor, whose qualifications shall be subject to EPA's review for verification based on objective assessment criteria (*e.g.*, experience, capacity, technical expertise) and do not have a conflict of interest with respect to the project.
- (b) EPA shall issue notices of disapproval and/or authorizations to proceed regarding any proposed Project Coordinator and Supervising Contractor, as applicable. If EPA issues a notice of disapproval, Settling Defendants shall, within 30 days, submit to EPA a list of supplemental proposed Project Coordinators and/or Supervising Contractors, as applicable, including a description of the qualifications of each. Settling Defendants may select any coordinator/contractor covered by an authorization to proceed and shall, within 21 days, notify EPA of Settling Defendants' selection.
- (c) EPA may disapprove the proposed Project Coordinator, the Supervising Contractor, or both, based on objective assessment criteria (*e.g.*, experience, capacity, technical expertise), if they have a conflict of interest regarding the project, or any combination of these factors.
- (d) Settling Defendants may change their Project Coordinator and/or Supervising Contractor, or both, by following the procedures of ¶¶ 3.3(a) and 3.3(b).

4. REMEDIAL DESIGN

4.1 Remedial Design Work Plan (“RDWP”). Settling Defendants shall submit an RDWP for EPA approval. The RDWP must include:

- (a) Plans for implementing all Remedial Design activities identified in this SOW, in the RDWP, or required by EPA to be conducted to develop the Remedial Design;
- (b) A description of the overall management strategy for performing the Remedial Design, including a proposal for phasing of design and construction, if applicable;
- (c) A description of the proposed general approach to contracting, construction, operation, maintenance, and monitoring of the Remedial Action as necessary to implement the Work;
- (d) A description of the responsibility and authority of all organizations and key personnel involved with the development of the Remedial Design;
- (e) Descriptions of any areas requiring clarification and/or anticipated problems (*e.g.*, data gaps);
- (f) Description of any proposed pre-design investigation; if necessary
- (g) Description of any proposed treatability study;
- (h) Descriptions of any applicable permitting requirements and other regulatory requirements;
- (i) Description of plans for obtaining access in connection with the Work, such as property acquisition, property leases, and/or easements; and
- (j) The following supporting deliverables described in ¶ 7.7 (Supporting Deliverables): Health and Safety Plan and Emergency Response Plan.

4.2 Institutional Controls Implementation and Assurance Plan (“ICIAP”). Settling Defendants shall submit a proposed ICIAP for EPA approval. The ICIAP should describe plans to implement, maintain, monitor, and enforce the Institutional Controls (“ICs”) at the Site. The ICIAP shall include plans to commence implementing ICs as early as is feasible, including before EPA approval of the 100% design under ¶ 4.7. The ICIAP also should include procedures for effective and comprehensive review of implemented ICs, procedures for the solicitation of input from affected communities regarding the implementation of ICs, procedures to periodically review and determine if the ICs are having their intended effect, and if not, procedures for the development, approval and implementation of alternative, more effective ICs. Settling Defendants shall develop the ICIAP in accordance with *Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites*, OSWER 9355.0-89, EPA/540/R-09/001 (Dec. 2012), and *Institutional Controls: A Guide to Preparing Institutional Controls Implementation and Assurance Plans at Contaminated*

Sites, OSWER 9200.0-77, EPA/540/R-09/02 (Dec. 2012). Settling Defendants also shall consider including in the ICIAP the establishment of effective Long-Term Stewardship procedures including those described in EPA Memorandum: *Advanced Monitoring Technologies and Approaches to Support Long-Term Stewardship* (July 20, 2018). The ICIAP must include the following additional requirements:

- (a) Locations of recorded real property interests (*e.g.*, easements, liens) and resource interests in the property that may affect ICs (*e.g.*, surface, mineral, and water rights) including accurate mapping and geographic information system (GIS) coordinates of such interests; and
- (b) Legal descriptions and survey maps that are prepared according to current American Land Title Association (“ALTA”) Survey guidelines and certified by a licensed surveyor.

4.3 Settling Defendants shall communicate regularly with EPA to discuss design issues as necessary, as directed or determined by EPA.

4.4 Treatability Study (“TS”).

- (a) Settling Defendants shall perform a TS for the purpose of evaluating effectiveness of groundwater treatment options.
- (b) Settling Defendants shall submit a TS Work Plan (“TSWP”) for EPA approval. Settling Defendants shall prepare the TSWP in accordance with EPA’s *Guide for Conducting Treatability Studies under CERCLA, Final* (Oct. 1992), as supplemented for Remedial Design by the *Remedial Design/Remedial Action Handbook*, EPA 540/R-95/059 (June 1995).
- (c) Following completion of the TS, Settling Defendants shall submit a TS Evaluation Report for EPA comment.
- (d) EPA may require Settling Defendants to supplement the TS Evaluation Report and/or to perform additional treatability studies.

4.5 Initial (50%) Remedial Design. Settling Defendants shall submit an Initial (50%) Remedial Design for EPA’s comment. The Initial Remedial Design must include:

- (a) A design criteria report, as described in the *Remedial Design/Remedial Action Handbook*, EPA 540/R-95/059 (June 1995);
- (b) Preliminary drawings and specifications;
- (c) Descriptions of permit requirements, if applicable;
- (d) Preliminary Operation and Maintenance (“O&M”) Plan and O&M Manual;

- (e) A description of how the Remedial Action will be implemented in a manner that minimizes environmental impacts in accordance with EPA's *Principles for Greener Cleanups* (Aug. 2009);
- (f) A description of monitoring and control measures to protect human health and the environment, such as air monitoring, and measures to reduce and manage traffic, noise, odors, and dust, during the Remedial Action in accordance with the Community Involvement Handbook pp. 53-66 (text box on p. 55) to minimize community impacts;
- (g) Any proposed revisions to the Remedial Action Schedule that is set forth in ¶ **Error! Reference source not found.** (Remedial Action Schedule); and
- (h) Updates of all supporting deliverables required to accompany the RDWP and the following additional supporting deliverables described in ¶ 7.7 (Supporting Deliverables): Field Sampling Plan; Quality Assurance Project Plan; Site Wide Monitoring Plan; Community Impacts Mitigation Plan, Construction Quality Assurance/Quality Control Plan; Transportation and Off-Site Disposal Plan; and O&M Plan.

4.6 Pre-Final (95%) Remedial Design. Settling Defendants shall submit the Pre-final (95%) Remedial Design for EPA's comment. The Pre-final Remedial Design must be a continuation and expansion of the previous design submittal and must address EPA's comments regarding the Initial Remedial Design. The Pre-final Remedial Design will serve as the approved Final (100%) Remedial Design if EPA approves the Pre-final Remedial Design without comments. The Pre-final Remedial Design must include:

- (a) A complete set of construction drawings and specifications that are: (1) certified by a registered professional engineer; (2) suitable for procurement; and (3) follow the Construction Specifications Institute's MasterFormat 2020;
- (b) A survey and engineering drawings showing existing Site features, such as elements, property borders, easements, and Site conditions;
- (c) Pre-Final versions of the same elements and deliverables as are required for the Initial Remedial Design;
- (d) A specification for photographic documentation of the Remedial Action; and
- (e) Updates of all supporting deliverables required to accompany the Initial (50%) Remedial Design.

4.7 Final (100%) Remedial Design. Settling Defendants shall submit the Final (100%) Remedial Design for EPA approval. The Final Remedial Design must address EPA's comments on the Pre-final Remedial Design and must include final versions of all Pre-final Remedial Design deliverables.

5. REMEDIAL ACTION

5.1 Remedial Action Work Plan (“RAWP”). Settling Defendants shall submit a RAWP for EPA approval that includes:

- (a) A proposed Remedial Action Construction Schedule in Gantt chart format, or equivalent;
- (b) An updated health and safety plan that covers activities during the Remedial Action; and
- (c) Plans for satisfying permitting requirements, if any, including obtaining permits for off-site activity and for satisfying substantive requirements of permits for on-site activity.

5.2 Independent Quality Assurance Team (“IQAT”). Settling Defendants shall notify EPA of Settling Defendants’ designated IQAT. The IQAT must be independent of, and cannot include the Remedial Action Constructor. Settling Defendants may hire a third party for this purpose. Settling Defendants’ notice must include the names, titles, contact information, and qualifications of the members of the IQAT. The IQAT will have the responsibility to determine whether Work is of expected quality and conforms to applicable plans and specifications. The IQAT will have the responsibilities as described in ¶ 2.1.3 of the *Guidance on EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties*, EPA/540/G-90/001 (Apr. 1990).

5.3 Meetings and Inspections

- (a) **Preconstruction Conference.** Settling Defendants shall hold a preconstruction conference with EPA and the State and others as directed or approved by EPA and as described in the *Remedial Design/Remedial Action Handbook*, EPA 540/R-95/059 (June 1995). Settling Defendants shall prepare minutes of the conference and shall distribute the minutes to all Parties.
- (b) **Periodic Communications.** During the construction portion of the Remedial Action (Remedial Action Construction), Settling Defendants shall communicate weekly with EPA and the State, and others as directed or determined by EPA, to discuss construction issues. Settling Defendants shall distribute an agenda and list of attendees to all Parties prior to each meeting or telephone call. Settling Defendants shall prepare minutes of the meetings or calls and shall distribute the minutes to all Parties.
- (c) **Inspections**
 - (1) EPA or its representative shall conduct periodic inspections of or have an on-site presence during the Work. At EPA’s request, the Supervising Contractor or other designee shall accompany EPA or its representative during inspections. The State, after consultation with EPA, may conduct periodic inspections of or have an on-site presence during the Work.

- (2) Settling Defendants shall provide personal protective equipment needed for EPA and State personnel and any oversight officials to perform their oversight duties.
- (3) Upon notification by EPA of any deficiencies in the Remedial Action Construction, Settling Defendants shall take all necessary steps to correct the deficiencies and/or bring the Remedial Action Construction into compliance with the approved Final Remedial Design, any approved design changes, and/or the approved RAWP. If applicable, Settling Defendants shall comply with any schedule provided by EPA in its notice of deficiency.

5.4 Permits

- (a) As provided in CERCLA § 121(e), and Section 300.400(e) of the NCP, no permit is required for any portion of the Work conducted entirely on-site (*i.e.*, within the areal extent of contamination or in very close proximity to the contamination and necessary for implementation of the Work). Where any portion of the Work that is not on-site requires a federal or state permit or approval, Settling Defendants shall submit timely and complete applications and take all other actions necessary to obtain all such permits or approvals.
- (b) Settling Defendants may seek relief under the provisions of Section **XI** (Force Majeure) of the Decree for any delay in the performance of the Work resulting from a failure to obtain, or a delay in obtaining, any permit or approval referenced in ¶ 5.4(a) and required for the Work, provided that they have submitted timely and complete applications and taken all other actions necessary to obtain all such permits or approvals.
- (c) Nothing in the Decree or this SOW constitutes a permit issued under any federal or state statute or regulation.

5.5 Emergency Response and Reporting

- (a) **Emergency Action.** If any event occurs during performance of the Work that causes or threatens to cause a release of Waste Material on, at, or from the Site and that either constitutes an emergency situation or that may present an immediate threat to public health or welfare or the environment, Settling Defendants shall: (1) immediately take all appropriate action to prevent, abate, or minimize such release or threat of release; (2) immediately notify the authorized EPA officer (as specified in ¶ 5.5(c)) orally; and (3) take such actions in consultation with the authorized EPA officer and in accordance with all applicable provisions of the Health and Safety Plan, the Emergency Response Plan, and any other deliverable approved by EPA under the SOW.
- (b) **Release Reporting.** Upon the occurrence of any event during performance of the Work that Settling Defendants are required to report under CERCLA § 103 or Section 304 of the Emergency Planning and Community Right-to-Know Act

(“EPCRA”), Settling Defendants shall immediately notify the authorized EPA officer orally.

- (c) The “authorized EPA officer” for purposes of immediate oral notifications and consultations under ¶ 5.5(a) and ¶ 5.5(b) is the EPA Project Coordinator, the EPA Alternate Project Coordinator (if the EPA Project Coordinator is unavailable), or the EPA Emergency Response Unit, Region 3 at 800-438-2474 (if neither EPA Project Coordinator is available).
- (d) For any event covered by ¶ 5.5(a) and ¶ 5.5(b), Settling Defendants shall:
 - (1) within 14 days after the onset of such event, submit a report to EPA describing the actions or events that occurred and the measures taken, and to be taken, in response thereto; and
 - (2) within 30 days after the conclusion of such event, submit a report to EPA describing all actions taken in response to such event.
- (e) The reporting requirements under ¶ 5.5 are in addition to the reporting required by CERCLA § 103 or EPCRA § 304.

5.6 Off-Site Shipments

- (a) Settling Defendants may ship hazardous substances, pollutants, and contaminants from the Site to an off-Site facility only if they comply with CERCLA § 121(d)(3), and 40 C.F.R. § 300.440. Settling Defendants will be deemed to be in compliance with CERCLA § 121(d)(3) and 40 C.F.R. § 300.440 regarding a shipment if Settling Defendants obtain a prior determination from EPA that the proposed receiving facility for such shipment is acceptable under the criteria of 40 C.F.R. § 300.440(b).
- (b) Settling Defendants may ship Waste Material from the Site to an out-of-state waste management facility only if, prior to any shipment, they provide notice to the appropriate state environmental official in the receiving facility’s state and to the EPA Project Coordinator. This notice requirement will not apply to any off-Site shipments when the total quantity of all such shipments does not exceed 10 cubic yards. The notice must include the following information, if available: (1) the name and location of the receiving facility; (2) the type and quantity of Waste Material to be shipped; (3) the schedule for the shipment; and (4) the method of transportation. Settling Defendants also shall notify the state environmental official referenced above and the EPA Project Coordinator of any major changes in the shipment plan, such as a decision to ship the Waste Material to a different out-of-state facility. Settling Defendants shall provide the notice after the award of the contract for Remedial Action construction and before the Waste Material is shipped.
- (c) Settling Defendants may ship Investigation Derived Waste (IDW) from the Site to an off-Site facility only if they comply with CERCLA § 121(d)(3), 40 C.F.R. § 300.440, *EPA’s Guide to Management of Investigation Derived Waste*, OSWER 9345.3-03FS (Jan. 1992), and any IDW-specific requirements contained in the

Record of Decision. Wastes shipped off-Site to a laboratory for characterization, and RCRA hazardous wastes that meet the requirements for an exemption from RCRA under 40 C.F.R. § 261.4(e) shipped off-site for treatability studies, are not subject to 40 C.F.R. § 300.440.

5.7 Remedial Action Construction Completion

- (a) For purposes of this ¶ 5.7, “Remedial Action Construction” comprises, for any Remedial Action that involves the construction and operation of a system to achieve Performance Standards (for example, groundwater or surface water restoration remedies), the construction of such system and the performance of all activities necessary for the system to function properly and as designed.
- (b) **Inspection of Constructed Remedy.** Settling Defendants shall schedule an inspection to review the construction and operation of the system and to review whether the system is functioning properly and as designed. The inspection must be attended by Settling Defendants, EPA and/or their representatives, and the State and/or their representatives. A reinspection must be conducted if requested by EPA or the State.
- (c) **Shakedown Period.** There shall be a shakedown period of up to one year for EPA to review whether the remedy is functioning properly and performing as designed. Settling Defendants shall provide such information as EPA requests for such review.
- (d) **Remedial Action Report.** Following the shakedown period, Settling Defendants shall submit a “Remedial Action Report” requesting EPA’s determination that Remedial Action Construction has been completed. The Remedial Action Report must: (1) include statements by a registered professional engineer and by Settling Defendants’ Project Coordinator that the construction of the system is complete and that the system is functioning properly and as designed; (2) include a demonstration, and supporting documentation, that construction of the system is complete and that the system is functioning properly and as designed; (3) include as-built drawings signed and stamped by a registered professional engineer; (4) be prepared in accordance with Chapter 2 (Remedial Action Completion) of EPA’s *Close Out Procedures for NPL Sites* guidance (May 2011), as supplemented by *Guidance for Management of Superfund Remedies in Post Construction*, OLEM 9200.3-105 (Feb. 2017); and (5) be certified in accordance with ¶ 7.5 (Certification).
- (e) If EPA determines that Remedial Action Construction is not complete, EPA shall so notify Settling Defendants. EPA’s notice must include a description of, and schedule for, the activities that Settling Defendants must perform to complete Remedial Action Construction. EPA’s notice may include a schedule for completion of such activities or may require Settling Defendants to submit a proposed schedule for EPA approval. Settling Defendants shall perform all activities described in the EPA notice in accordance with the schedule.

- (f) If EPA determines, based on the initial or any subsequent Remedial Action Report, that Remedial Action Construction is complete, EPA shall so notify Settling Defendants.

5.8 Certification of Remedial Action Completion

- (a) **Monitoring Report.** Settling Defendants shall submit a Monitoring Report to EPA requesting EPA's Certification of Remedial Action Completion. The report must: (1) include certifications by a registered professional engineer and by Settling Defendants' Project Coordinator that the Remedial Action is complete; (2) be prepared in accordance with Chapter 2 (Remedial Action Completion) of EPA's *Close Out Procedures for NPL Sites* guidance (May 2011), as supplemented by *Guidance for Management of Superfund Remedies in Post Construction*, OLEM 9200.3-105 (Feb. 2017); (3) contain monitoring data to demonstrate that Performance Standards have been achieved; and (4) be certified in accordance with ¶ 7.5 (Certification).
- (b) If EPA concludes that the Remedial Action is not Complete, EPA shall so notify Settling Defendants. EPA's notice must include a description of any deficiencies. EPA's notice may include a schedule for addressing such deficiencies or may require Settling Defendants to submit a schedule for EPA approval. Settling Defendants shall perform all activities described in the notice in accordance with the schedule.
- (c) If EPA concludes, based on the initial or any subsequent Monitoring Report requesting Certification of Remedial Action Completion, that the Remedial Action is Complete, EPA shall so certify to Settling Defendants. This certification will constitute the Certification of Remedial Action Completion for purposes of the Decree, including Section XIV of the Decree (Covenants by Plaintiffs). Certification of Remedial Action Completion will not affect Settling Defendants' remaining obligations under the Decree.

- 5.9 **Periodic Review Support Plan ("PRSP").** Settling Defendants shall submit the PRSP for EPA approval. The PRSP addresses the studies and investigations that Settling Defendants shall conduct to support EPA's reviews of whether the Remedial Action is protective of human health and the environment in accordance with CERCLA § 121(c) (also known as "Five-year Reviews"). Settling Defendants shall develop the plan in accordance with *Comprehensive Five-year Review Guidance*, OSWER 9355.7-03B-P (June 2001), and any other relevant five-year review guidances.

5.10 Certification of Work Completion

- (a) **Work Completion Inspection.** Settling Defendants shall schedule an inspection for the purpose of obtaining EPA's Certification of Work Completion. The inspection must be attended by Settling Defendants and EPA and/or their representatives.

- (b) **Work Completion Report.** Following the inspection, Settling Defendants shall submit a report to EPA requesting EPA's Certification of Work Completion. The report must: (1) include certifications by a registered professional engineer and by Settling Defendants' Project Coordinator that the Work, including all O&M activities, is complete; and (2) be certified in accordance with ¶ 7.5 (Certification). If the Monitoring Report submitted under ¶ 5.8(a) includes all elements required under this ¶ 5.10(b), then the Monitoring Report suffices to satisfy all requirements under this ¶ 5.10(b).
- (c) If EPA concludes that the Work is not complete, EPA shall so notify Settling Defendants. EPA's notice must include a description of the activities that Settling Defendants must perform to complete the Work. EPA's notice must include specifications and a schedule for such activities or must require Settling Defendants to submit specifications and a schedule for EPA approval. Settling Defendants shall perform all activities described in the notice or in the EPA-approved specifications and schedule.
- (d) If EPA concludes, based on the initial or any subsequent report requesting Certification of Work Completion, that the Work is complete, EPA shall so certify in writing to Settling Defendants. Issuance of the Certification of Work Completion does not affect the following continuing obligations: (1) activities under the Periodic Review Support Plan; (2) obligations under Sections **VI** (Property Requirements), and **XVII** (Records) of the Decree; (3) Institutional Controls obligations as provided in the ICIAP; (4) reimbursement of EPA's Future Response Costs under Section **IX** (Payments for Response Costs) of the Decree.

6. REPORTING

6.1 Progress Reports. Commencing with the month following lodging of the Decree and until EPA approves the Remedial Action Construction Completion, Settling Defendants shall submit progress reports to EPA on a monthly basis, or as otherwise requested by EPA. The reports must cover all activities that took place during the prior reporting period, including:

- (a) The actions that have been taken toward achieving compliance with the Decree;
- (b) A summary of all results of sampling, tests, and all other data received or generated by Settling Defendants;
- (c) A description of all deliverables that Settling Defendants submitted to EPA;
- (d) A description of all activities relating to Remedial Action Construction that are scheduled for the next six weeks;
- (e) An updated Remedial Action Construction Schedule, together with information regarding percentage of completion, delays encountered or anticipated that may

affect the future schedule for implementation of the Work, and a description of efforts made to mitigate those delays or anticipated delays;

- (f) A description of any modifications to the work plans or other schedules that Settling Defendants have proposed or that have been approved by EPA; and
- (g) A description of all activities undertaken in support of the Community Involvement Plan (“CIP”) during the reporting period and those to be undertaken in the next six weeks.

6.2 Notice of Progress Report Schedule Changes. If the schedule for any activity described in the Progress Reports, including activities required to be described under ¶ 6.1(d), changes, Settling Defendants shall notify EPA of such change at least seven days before performance of the activity.

7. DELIVERABLES

7.1 Applicability. Settling Defendants shall submit deliverables for EPA approval or for EPA comment as specified in the SOW. If neither is specified, the deliverable does not require EPA’s approval or comment. Paragraphs 7.2 (In Writing) through 7.4 (Technical Specifications) apply to all deliverables. Paragraph 7.5 (Certification) applies to any deliverable that is required to be certified. Paragraph 7.6 (Approval of Deliverables) applies to any deliverable that is required to be submitted for EPA approval.

7.2 In Writing. As provided in ¶ 72 of the Decree, all deliverables under this SOW must be in writing unless otherwise specified.

7.3 General Requirements for Deliverables. All deliverables must be submitted by the deadlines in the Remedial Design Schedule or Remedial Action Schedule, as applicable. Settling Defendants shall submit all deliverables to EPA in electronic form. Technical specifications for sampling and monitoring data and spatial data are addressed in ¶ 7.4. All other deliverables shall be submitted to EPA in the electronic form specified by the EPA Project Coordinator. If any deliverable includes maps, drawings, or other exhibits that are larger than 8.5” by 11”, Settling Defendants shall also provide EPA with paper copies of such exhibits.

7.4 Technical Specifications

- (a) Sampling and monitoring data should be submitted in standard regional Electronic Data Deliverable (“EDD”) format. The Settling Defendants should follow guidance outlined in the EPA Region 3 website <https://www.epa.gov/superfund/region-3-superfund-electronic-data-submission>. Note that EPA Region 3’s website links to a developer’s site to download the Electronic Data Processor, which currently states that EPA Region 3 is in the process of finalizing the preferred EDD format; until the EPA Region 3 format is finalized, the Settling Defendants should follow the guidance outlined in the EPA Region 2 website at <https://www.epa.gov/superfund/region-2-superfund-electronic-data-submission>. At a minimum, all electronic data deliverables are to

be submitted to EPA, and made available to the State upon request, in the Staged Electronic Data Deliverable (SEDD) 2a, 2b or SEDD 3 format². The Settling Defendants are responsible for ensuring the laboratory can generate a compliant SEDD file. Other delivery methods may be allowed if electronic direct submission presents a significant burden or as technology changes.

- (b) Spatial data, including spatially-referenced data and geospatial data, should be submitted: (1) in the ESRI File Geodatabase format; and (2) as unprojected geographic coordinates in decimal degree format using North American Datum 1983 (“NAD83”) or World Geodetic System 1984 (WGS84) as the datum. If applicable, submissions should include the collection method(s). Projected coordinates may optionally be included but must be documented. Spatial data should be accompanied by metadata, and such metadata should be compliant with the Federal Geographic Data Committee (“FGDC”) Content Standard for Digital Geospatial Metadata and its EPA profile, the EPA Geospatial Metadata Technical Specification. An add-on metadata editor for ESRI software, the EPA Metadata Editor (“EME”), complies with these FGDC and EPA metadata requirements and is available at <https://edg.epa.gov/EME/>.
- (c) Each file must include an attribute name for each site unit or sub-unit submitted. Consult <https://www.epa.gov/geospatial/geospatial-policies-and-standards> for any further available guidance on attribute identification and naming.
- (d) Spatial data submitted by Settling Defendants does not, and is not intended to, define the boundaries of the Site.

7.5 Certification. All deliverables that require compliance with this paragraph must be signed by the Settling Defendants’ Project Coordinator, or other responsible official of Settling Defendants, and must contain the following statement:

I certify under penalty of perjury that this document and all attachments were prepared under my direction or supervision in accordance with a system 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, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

² For more information on Staged Electronic Data Deliverables, refer to <https://www.epa.gov/clp/staged-electronic-data-deliverable-sedd>.

7.6 Approval of Deliverables

(a) Initial Submissions

- (1) After review of any deliverable that is required to be submitted for EPA approval under the Decree or the SOW, EPA shall: (i) approve, in whole or in part, the submission; (ii) approve the submission upon specified conditions; (iii) disapprove, in whole or in part, the submission; or (iv) any combination of the foregoing.
- (2) EPA also may modify the initial submission to cure deficiencies in the submission if: (i) EPA determines that disapproving the submission and awaiting a resubmission would cause substantial 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.

- (b) **Resubmissions.** Upon receipt of a notice of disapproval under ¶ 7.6(a) (Initial Submissions), or if required by a notice of approval upon specified conditions under ¶ 7.6(a), Settling Defendants shall, within 30 days or such longer time as specified by EPA in such notice, correct the deficiencies and resubmit the deliverable for approval. After review of the resubmitted deliverable, EPA may: (1) approve, in whole or in part, the resubmission; (2) approve the resubmission upon specified conditions; (3) modify the resubmission; (4) disapprove, in whole or in part, the resubmission, requiring Settling Defendants to correct the deficiencies; or (5) any combination of the foregoing.

- (c) **Implementation.** Upon approval, approval upon conditions, or modification by EPA under ¶ 7.6(a) (Initial Submissions) or ¶ 7.6(b) (Resubmissions), of any deliverable, or any portion thereof: (1) such deliverable, or portion thereof, will be incorporated into and enforceable under the Decree; and (2) Settling Defendants shall take any action required by such deliverable, or portion thereof. The implementation of any non-deficient portion of a deliverable submitted or resubmitted under ¶ 7.6(a) or ¶ 7.6(b) does not relieve Settling Defendants of any liability for stipulated penalties under Section XIII (Stipulated Penalties) of the Decree.

- (d) If: (1) an initially submitted deliverable contains a material defect and the conditions are met for modifying the deliverable under ¶ 7.6(a)(2); or (2) a resubmitted deliverable contains a material defect; then the material defect constitutes a lack of compliance for purposes of this Paragraph.

7.7 Supporting Deliverables. Settling Defendants shall submit each of the following supporting deliverables for EPA approval, except as specifically provided. Settling Defendants shall develop the deliverables in accordance with all applicable regulations, guidances, and policies (see Section 10 (References)). Settling Defendants shall update

each of these supporting deliverables as necessary or appropriate during the course of the Work, and/or as requested by EPA.

- (a) **Health and Safety Plan (“HASP”).** The HASP describes all activities to be performed to protect on site personnel and area residents from physical, chemical, and all other hazards posed by the Work. Settling Defendants shall develop the HASP in accordance with EPA’s *Emergency Responder Health and Safety Manual* and Occupational Safety and Health Administration (“OSHA”) requirements under 29 C.F.R. §§ 1910 and 1926. The HASP should cover Remedial Design activities and should be, as appropriate, updated to cover activities during the Remedial Action and updated to cover activities after Remedial Action completion. EPA does not approve the HASP but will review it to ensure that all necessary elements are included and that the plan provides for the protection of human health and the environment.

- (b) **Emergency Response Plan (“ERP”).** The ERP must describe procedures to be used in the event of an accident or emergency at the Site (for example, power outages, water impoundment failure, treatment plant failure, slope failure, etc.). The ERP must include:
 - (1) Name of the person or entity responsible for responding in the event of an emergency incident;
 - (2) Plan and date(s) for meeting(s) with the local community, including local, State, and federal agencies involved in the cleanup, as well as local emergency squads and hospitals;
 - (3) Spill Prevention, Control, and Countermeasures (“SPCC”) Plan (if applicable), consistent with the regulations under 40 C.F.R. part 112, describing measures to prevent, and contingency plans for, spills and discharges;
 - (4) Notification activities in accordance with ¶ 5.5(b) (Release Reporting) in the event of a release of hazardous substances requiring reporting under CERCLA § 103 or EPCRA § 304; and
 - (5) A description of all necessary actions to ensure compliance with ¶ 5.5 of the SOW in the event of an occurrence during the performance of the Work that causes or threatens a release of Waste Material from the Site that constitutes an emergency or may present an immediate threat to public health or welfare or the environment.

- (c) **Field Sampling Plan (“FSP”).** The FSP addresses all sample collection activities. The FSP must be written so that a field sampling team unfamiliar with the project would be able to gather the samples and field information required. Settling Defendants shall develop the FSP in accordance with *Guidance for Conducting Remedial Investigations and Feasibility Studies*, EPA/540/G 89/004 (Oct. 1988).

- (d) **Quality Assurance Project Plan (“QAPP”).** The QAPP must include a detailed explanation of Settling Defendants’ quality assurance, quality control, and chain of custody procedures for all treatability, design, compliance, and monitoring samples. Settling Defendants shall develop the QAPP in accordance with EPA Directive CIO 2105.1 (Environmental Information Quality Policy, 2021), the most recent version of *Quality Management Systems for Environmental Information and Technology Programs – Requirements with Guidance for Use*, ASQ/ANSI E-4 (Feb. 2014, and *Guidance for Quality Assurance Project Plans*, EPA QA/G-5, EPA Office of Environmental Information (Dec. 2002). Settling Defendants shall collect, produce, and evaluate all environmental information at the Site in accordance with the approved QAPP.
- (e) **Site Wide Monitoring Plan (“SWMP”).** The purpose of the SWMP is to obtain baseline information regarding the extent of contamination in affected media at the Site; to obtain information, through short- and long- term monitoring, about the movement of and changes in contamination throughout the Site, before and during implementation of the Remedial Action; to obtain information regarding contamination levels to determine whether Performance Standards are achieved; and to obtain information to determine whether to perform additional actions, including further Site monitoring. The SWMP must include:
- (1) Description of the environmental media to be monitored;
 - (2) Description of the data collection parameters, including existing and proposed monitoring devices and locations, schedule and frequency of monitoring, analytical parameters to be monitored, and analytical methods employed;
 - (3) Description of how performance data will be analyzed, interpreted, and reported, and/or other Site-related requirements;
 - (4) Description of verification sampling procedures;
 - (5) Description of deliverables that will be generated in connection with monitoring, including sampling schedules, laboratory records, monitoring reports, and monthly and annual reports to EPA and State agencies;
 - (6) Description of proposed additional monitoring and data collection actions (such as increases in frequency of monitoring, and/or installation of additional monitoring devices in the affected areas) in the event that results from monitoring devices indicate changed conditions (such as higher than expected concentrations of the contaminants of concern or groundwater contaminant plume movement);
 - (7) A plan to promptly provide to EPA any unvalidated sampling data from Community Areas as defined in ¶ 7.7(f) affected by the remedy that exceed removal management levels or three times remedial cleanup levels, whichever is lower; and

- (8) A plan to expedite sampling and analysis in Community Areas as defined in ¶ 7.7(f) affected by the remedy (particularly in situations where EPA determines that unvalidated sampling data indicates substantial exceedances of cleanup standards), including procedures for expedited analysis, validation, and communication of sampling results to affected communities.
- (f) **Community Impact Mitigation Plan (“CIMP”).** The CIMP describes all activities including any to address concerns of disadvantaged communities to be performed: (1) to reduce and manage the impacts from remedy implementation (e.g., air emissions, traffic, noise, odor, temporary or permanent relocation) to residential areas, schools, playgrounds, healthcare facilities, or recreational or impacted public areas (“Community Areas”) from and during remedy implementation, (2) to conduct monitoring in Community Areas of impacts from remedy implementation, (3) to expeditiously communicate validated remedy implementation monitoring data, (4) to make adjustments during remedy implementation in order to further reduce and manage impacts from remedy implementation to affected Community Areas, (5) to expeditiously restore community resources damaged during remediation such as roads and culverts, and (6) to mitigate the economic effects that the Remedial Action will have on the community by structuring remediation contracts to allow more local business participation where practicable. The CIMP should contain information about impacts to Community Areas that is sufficient to assist EPA’s Project Coordinator in performing the evaluations recommended under the *Superfund Community Involvement Handbook*, OLEM 9230.0-51 (March 2020), pp. 53-56.
- (g) **Construction Quality Assurance Plan (“CQAP”) and Construction Quality Control Plan (“CQCP”).** The purpose of the CQAP is to describe planned and systemic activities that provide confidence that the Remedial Action construction will satisfy all plans, specifications, and related requirements, including quality objectives. The purpose of the CQCP is to describe the activities to verify that Remedial Action construction has satisfied all plans, specifications, and related requirements, including quality objectives. The CQAP/CQCP (“CQA/CP”) must:
- (1) Identify, and describe the responsibilities of, the organizations and personnel implementing the CQA/CP;
 - (2) Describe the Performance Standards required to be met to achieve Completion of the Remedial Action;
 - (3) Describe the activities to be performed: (i) to provide confidence that Performance Standards will be met; and (ii) to determine whether Performance Standards have been met;
 - (4) Describe verification activities, such as inspections, sampling, testing, monitoring, and production controls, under the CQA/CP;

- (5) Describe industry standards and technical specifications used in implementing the CQA/CP;
 - (6) Describe procedures for tracking construction deficiencies from identification through corrective action;
 - (7) Describe procedures for documenting all CQA/CP activities; and
 - (8) Describe procedures for retention of documents and for final storage of documents.
- (h) **Transportation and Off-Site Disposal Plan (“TODP”).** The TODP describes plans to ensure compliance with ¶ 5.6 (Off-Site Shipments). The TODP must include:
- (1) Proposed times and routes for off-site shipment of Waste Material;
 - (2) Identification of communities, including underserved communities referred to in Executive Order 14008, § 222(b) (Feb. 1, 2021), affected by shipment of Waste Material; and
 - (3) Description of plans to minimize impacts (*e.g.*, noise, traffic, dust, odors) on affected communities.
- (i) **O&M Plan.** The O&M Plan describes the requirements for inspecting, operating, and maintaining the Remedial Action. Settling Defendants shall develop the O&M Plan in accordance with *Guidance for Management of Superfund Remedies in Post Construction*, OLEM 9200.3-105 (Feb. 2017). The O&M Plan must include the following additional requirements:
- (1) Description of Performance Standards required to be met to implement the Record of Decision;
 - (2) Description of activities to be performed: (i) to provide confidence that Performance Standards will be met; and (ii) to determine whether Performance Standards have been met;
 - (3) **O&M Reporting.** Description of records and reports that will be generated during O&M, such as daily operating logs, laboratory records, records of operating costs, reports regarding emergencies, personnel and maintenance records, monitoring reports, and monthly and annual reports to EPA and State agencies;
 - (4) Description of corrective action in case of systems failure, including: (i) alternative procedures to prevent the release or threatened release of Waste Material which may endanger public health and the environment or may cause a failure to achieve Performance Standards; (ii) analysis of vulnerability and additional resource requirements should a failure occur;

- (iii) notification and reporting requirements should O&M systems fail or be in danger of imminent failure; and (iv) community notification requirements; and
- (5) Description of corrective action to be implemented in the event that Performance Standards are not achieved; and a schedule for implementing these corrective actions.
- (j) **O&M Manual.** The O&M Manual serves as a guide to the purpose and function of the equipment and systems that make up the remedy. Settling Defendants shall develop the O&M Manual in accordance with *Guidance for Management of Superfund Remedies in Post Construction*, OLEM 9200.3-105 (Feb. 2017) and shall submit to EPA 14 days prior to Final Inspection.

8. SCHEDULES

- 8.1 Applicability and Revisions.** All deliverables and tasks required under this SOW must be submitted or completed by the deadlines or within the time durations listed in the Remedial Design and Remedial Action Schedules set forth below. Settling Defendants may submit proposed revised Remedial Design Schedules or Remedial Action Schedules for EPA approval. Upon EPA's approval, the revised Remedial Design and/or Remedial Action Schedules supersede the Remedial Design and Remedial Action Schedules set forth below, and any previously-approved Remedial Design and/or Remedial Action Schedules.

8.2 Remedial Design Schedule

(a) For Final Remedial Elements

	Description of Deliverable, Task	¶ Ref.	Deadline
1	TAP	2.3(c)	30 days after EPA request
2	Designate TAP Coordinator	2.3(c)(7)	30 days after EPA request
3	RDWP	4.1	60 days after EPA's Authorization to Proceed regarding Supervising Contractor (¶ 3.3(c))
4	ICIAP	4.2	60 days after EPA Authorization to Proceed regarding Supervising Contractor (¶ 3.3(c))
5	Treatability Study Work Plan	4.4(b)	60 days after Approval of Remedial Design Work Plan
6	Treatability Study Evaluation Report	4.4(c)	60 days after receipt of treatability study data results
7	Initial (50%) Remedial Design	4.5	45 days after submission of Treatability Study Evaluation Report
8	Pre-final (95%) Remedial Design	4.6	45 days after EPA comments on Initial Remedial Design
9	Final (100%) Remedial Design	4.7	30 days after EPA comments on Pre-final Remedial Design

(b) For Interim Remedial Elements

	Description of Deliverable, Task	¶ Ref.	Deadline
1	Data Gap Assessment		60 days after CD Lodging
2	Submit Desktop Engineering Evaluation		60 days after EPA approves Data Gap Assessment
3	Bench-Scale Treatability Workplan	4.4(b)	30 days after EPA Approves Desktop Engineering Evaluation
4	Bench-Scale Treatability Study	4.4(c)	180 days after Bench-Scale Treatability Work Plan approval
5	Field-Scale Pilot Workplan		60 days after approval of Bench-Scale Treatability Study
6	Field-Scale Pilot Study		12 months after Field-Scale Pilot Workplan approval
7	RDWP		60 days after Field-Scale Pilot Study Approval
8	Initial (50%) Remedial Design	4.5	45 days after approval of RDWP
9	Pre-Final (95%) Remedial Design	4.6	45 days after EPA comments on Initial Remedial Design
10	Final (100%) Remedial Design	4.7	30 days after EPA comments on Pre-final Remedial Design

Note 1: EPA shall review the deliverables above and notify the Settling Defendants whether each deliverable is approved within 30 days after its respective submittal. If the deliverable is not approved within 30 days, subsequent deadlines shall be extended by the time required for EPA approval in-excess of 30 days.

Note 2: As discussed in Section 1.3, if the field-scale pilot study confirms that the water quality standard of 0.14 micrograms per liter at the end-of-pipe and the 0.012 micrograms per liter at the boundary of the mixing zone can be attained during the compliance period, the use of a mixing zone will be incorporated into the Final Remedial Design. The mixing zone period shall not exceed 5 years after Completion of Construction, and the compliance period and the mixing zone period together shall not exceed 10 years and 3 months from the date of the lodging of the Consent Decree, except if the mixing zone period is extended.

8.3 Remedial Action Schedule

(a) For Final Remedial Elements

	Description of Deliverable / Task	¶ Ref.	Deadline
1	Award Remedial Action contract		60 days after EPA Notice of Authorization to Proceed with Remedial Action
2	RAWP	5.1	45 days after EPA Notice of Authorization to Proceed with Remedial Action
3	Designate IQAT	5.2	30 days after EPA notice of authorization to proceed with Remedial Action
4	Pre-Construction Conference	5.3(a)	14 days after Approval of RAWP
5	Start of Construction		30 days after Approval of RAWP
6	Completion of Construction		Per RA schedule developed in RD
7	Inspection of Constructed Remedy	5.7(b)	30 days after completion of construction
8	Commence to Implement ICIAP	4.2	60 days after completion of construction
9	Remedial Action Report	5.7(d)	60 days after inspection of construction remedy
10	Monitoring Report	5.8(a)	Per 5.8(a)
11	Work Completion Report	5.10(b)	Per 5.10(b)
12	Periodic Review Support Plan	5.9	Five years after Start of Remedial Action Construction

(b) For Interim Remedial Elements

	Description of Deliverable / Task	¶ Ref.	Deadline
1	Award Remedial Action contract		60 days after EPA Notice of Authorization to Proceed with Remedial Action
2	RAWP	5.1	45 days after RA contract awarded
3	Designate IQAT	5.2	30 days after EPA notice of authorization to proceed with Remedial Action
4	Pre-Construction Conference	5.3(a)	30 days after Approval of RAWP
5	Start of Construction		30 days after Approval of RAWP
6	Completion of Construction		Per RA schedule developed in RD
7	Inspection of Constructed Remedy	5.7(b)	30 days after completion of construction
8	Remedial Action Report	5.7(d)	60 days after inspection of construction remedy
9	Monitoring Report	5.8(a)	Per 5.8(a)
10	Work Completion Report	5.10(b)	Per 5.10(b)
11	Periodic Review Support Plan	5.9	Five years after Start of Remedial Action Construction

Note 1: EPA shall review the deliverables above and notify the Settling Defendants whether each deliverable is approved within 30 days after its respective submittal. If the deliverable is not approved within 30 days, subsequent deadlines shall be extended by the time required for EPA approval in excess of 30 days.

Note 2: As discussed in Section 1.3, if the field-scale pilot study confirms that the water quality standard of 0.14 micrograms per liter at the end-of-pipe and the 0.012 micrograms per liter at the boundary of the mixing zone can be attained during the compliance period, the use of a mixing zone will be incorporated into the Final Remedial Design. The mixing zone period shall not exceed 5 years after Completion of Construction, and the compliance period and the mixing zone period together shall not exceed 10 years and 3 months from the date of the lodging of the Consent Decree, except if the mixing zone period is extended.

9. STATE PARTICIPATION

9.1 Copies. Settling Defendants shall, at any time they send a deliverable to EPA, send a copy of such deliverable to the State. EPA shall, at any time it sends a notice, authorization, approval, disapproval, or certification to Settling Defendants, send a copy of such document to the State.

9.2 Review and Comment. The State will have a reasonable opportunity for review and comment prior to:

- (a) Any EPA notice to proceed under ¶ 3.3 (Procedures for Disapproval/Notice to Proceed);

- (b) Any EPA approval or disapproval under ¶ 7.6 (Approval of Deliverables) of any deliverables that are required to be submitted for EPA approval; and
- (c) Any approval or disapproval of the Construction Phase under ¶ 5.7 (Remedial Action Construction Completion), any disapproval of, or Certification of Remedial Action Completion under ¶ 5.8 (Certification of Remedial Action Completion), and any disapproval of, or Certification of Work Completion under ¶ 5.10 (Certification of Work Completion).

10. REFERENCES

10.1 The following regulations and guidance documents, among others, apply to the Work. Any item for which a specific URL is not provided below is available on one of the three EPA web pages listed in ¶ 10.2:

- (a) A Compendium of Superfund Field Operations Methods, OSWER 9355.0-14, EPA/540/P-87/001a (Aug. 1987).
- (b) CERCLA Compliance with Other Laws Manual, Part I: Interim Final, OSWER 9234.1-01, EPA/540/G-89/006 (Aug. 1988).
- (c) Guidance for Conducting Remedial Investigations and Feasibility Studies, OSWER 9355.3-01, EPA/540/G-89/004 (Oct. 1988).
- (d) CERCLA Compliance with Other Laws Manual, Part II, OSWER 9234.1-02, EPA/540/G-89/009 (Aug. 1989).
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- (p) Institutional Controls: Third-Party Beneficiary Rights in Proprietary Controls, OECA (Apr. 2004).
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- (z) Plan EJ 2014: Legal Tools, EPA Office of General Counsel (Dec. 2011), <https://www.epa.gov/environmentaljustice/plan-ej-2014-legal-tools>.

- (aa) Construction Specifications Institute's MasterFormat 2020, available from the Construction Specifications Institute, <https://www.csiresources.org/standards/masterformat>.
- (bb) Updated Superfund Response and Settlement Approach for Sites Using the Superfund Alternative Approach, OSWER 9200.2-125 (Sep. 2012)
- (cc) Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites, OSWER 9355.0-89, EPA/540/R-09/001 (Dec. 2012), <https://semspub.epa.gov/work/HQ/175446.pdf>.
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- (gg) Guidance for Evaluating Completion of Groundwater Restoration Remedial Actions, OSWER 9355.0-129 (Nov. 2013).
- (hh) Groundwater Remedy Completion Strategy: Moving Forward with the End in Mind, OSWER 9200.2-144 (May 2014).
- (ii) Quality Management Systems for Environmental Information and Technology Programs -- Requirements with Guidance for Use, ASQ/ANSI E-4 (February 2014), available at <https://webstore.ansi.org/>.
- (jj) Guidance for Management of Superfund Remedies in Post Construction, OLEM 9200.3-105 (Feb. 2017), <https://www.epa.gov/superfund/superfund-post-construction-completion>.
- (kk) Advanced Monitoring Technologies and Approaches to Support Long-Term Stewardship (July 20, 2018), <https://www.epa.gov/enforcement/use-advanced-monitoring-technologies-and-approaches-support-long-term-stewardship>.
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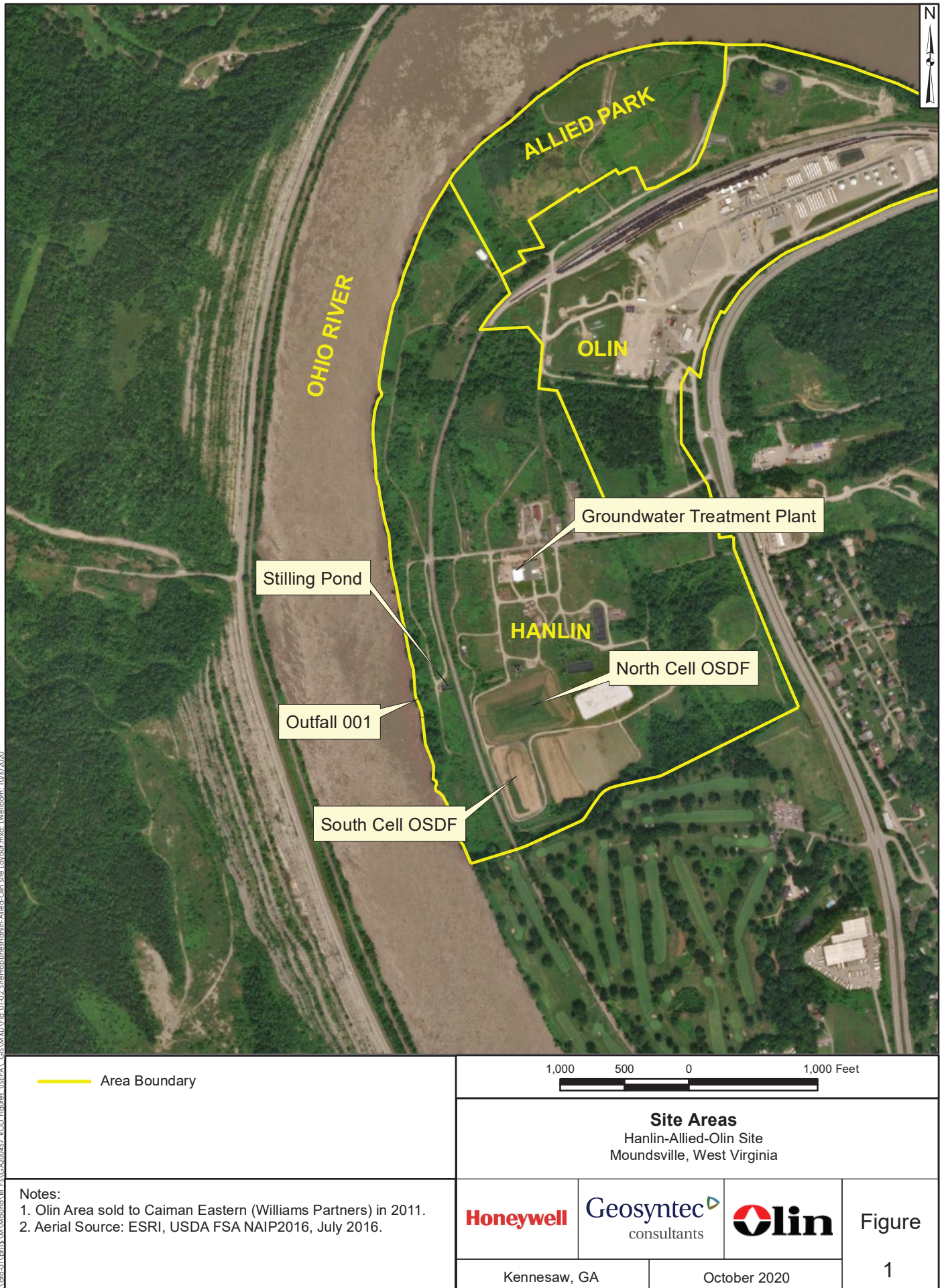
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- (nn) The 2016 version: Five-Year Review Recommended Template, OLEM Directive 9200.0-89, With Transmittal Memorandum
- (oo) EPA, 1991. Risk Assessment Guidance for Superfund, Volume I, Part C: Risk Evaluation of Remedial Alternatives. Publication 9285.7-01C.

10.2 A more complete list may be found on the following EPA web pages:

- (a) Laws, Policy, and Guidance at <https://www.epa.gov/superfund/superfund-policy-guidance-and-laws>;
- (b) Search Superfund Documents at <https://www.epa.gov/superfund/search-superfund-documents>; and
- (c) Test Methods Collections at: <https://www.epa.gov/measurements/collections-methods>.

For any regulation or guidance referenced in the Decree or SOW, the reference will be read to include any subsequent modification, amendment, or replacement of such regulation or guidance. Such modifications, amendments, or replacements apply to the Work only after Settling Defendants receive notification from EPA of the modification, amendment, or replacement.

EXHIBIT C



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EXHIBIT D

LIST OF DEFENDANTS

- 1) HONEYWELL INTERNATIONAL INC.
- 2) OLIN CORPORATION