UNITED STATES DISTRICT COURT
DISTRICT OF SOUTH CAROLINA
ROCK HILL DIVISION

UNITED STATES OF AMERICA,

Plaintiff,

v. Civil Action No. 0:26-cv-1144

ABB, INC.,

Defendant.

CONSENT DECREE

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I. BACKGROUND

1. 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").

2. 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 Henry's Knob Superfund Site in Clover, South Carolina ("Site"), together with accrued interest; and (2) performance by the defendant of a response action at the Site consistent with the National Contingency Plan, 40 C.F.R. part 300 ("NCP").

3. In accordance with the NCP and section 121(f)(1)(F) of CERCLA, EPA notified the State of South Carolina ("State") on June 26, 2020, of negotiations with the potentially responsible party ("PRP") 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").

4. In accordance with section 122(j)(1) of CERCLA, EPA notified the National Oceanic and Atmospheric Administration, U.S. Department of Interior, and U.S. Fish & Wildlife Service on June 26, 2020, of negotiations with the PRP 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.

5. The defendant that has entered into this Decree ("Settling Defendant") does not admit any liability to Plaintiff arising out of the transactions or occurrences alleged in the complaint, nor does it 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.

6. Settling Defendant is ABB, Inc., a Delaware corporation and a United States subsidiary of ABB, Ltd., a Swiss-Swedish multinational corporation headquartered in Zurich, Switzerland. Settling Defendant is liable under section 107(a)(2) of CERCLA as the successor to the owner and operator of the Site at the time of disposal of hazardous substances.

7. In response to a release or a substantial threat of a release of hazardous substances at or from the Site, Settling Defendant completed a Remedial Investigation for the Site in June 2011, and a Feasibility Study for the Site in August 2019, in accordance with 40 C.F.R. § 300.430.

8. 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 August 23, 2019, 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, including at a public meeting held on August 29, 2019, at the Larne Building located at 103 Main Street, Clover, South Carolina. A copy of the documents presented at the public meeting and comments received are available to the public as part of the administrative record upon which the Acting Director of the Superfund and Emergency Management Division, EPA Region 4, based the selection of the remedial action.

9. EPA selected a remedial action to be implemented at the Site, which is embodied in an Interim Record of Decision ("Interim Record of Decision"), executed on September 30, 2019. The remedial action selected in the IROD includes institutional controls for groundwater and institutional controls, maintenance, and monitoring for source areas. EPA deferred a final Record

of Decision for the Site to allow time for further evaluation of the effectiveness of previously implemented source control actions and natural attenuation processes in reducing contamination in the overburden groundwater zone and for monitoring the effects of that remediation on contamination within bedrock groundwater and surface water. The Interim 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.

10. EPA modified the remedial action selected in the Interim Record of Decision with an Explanation of Significant Differences ("ESD"), executed on March 30, 2021. The ESD calls for construction of additional groundwater monitoring wells to provide the data necessary for implementation of the remedial action selected in the Interim Record of Decision. EPA satisfied public participation requirements for the ESD by making the ESD and supporting information available to the public in the administrative record and by publishing a notice summarizing the ESD in a major local newspaper of general circulation.

11. EPA expects to evaluate whether any further remedial action will be necessary at the Site beyond those remedial actions specified in the Interim Record of Decision and, if so, the extent of such further remedial action. EPA's selection of a final groundwater or surface water remedy will be memorialized in a Record of Decision document.

12. Based on the information currently available, EPA has determined that the Work will be properly and promptly conducted by Settling Defendant if conducted in accordance with this Decree.

13. 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:

II. JURISDICTION AND VENUE

14. This Court has jurisdiction over the subject matter of this action under 28 U.S.C. §§ 1331 and 1345, and sections 106 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 Defendant may not challenge the terms of this Decree or this Court's jurisdiction to enter and enforce this Decree.

III. PARTIES BOUND

15. This Decree is binding upon the United States and upon Settling Defendant and its successors. Unless the United States otherwise consents, (a) any change in ownership or corporate or other legal status of Settling Defendant, including any transfer of assets, or (b) any Transfer of the Site or any portion thereof, does not alter any of Settling Defendant's obligations under this Decree. Settling Defendant's responsibilities under this Decree cannot be assigned except under a modification executed in accordance with ¶ 78.

16. In any action to enforce this Decree, Settling Defendant may not raise as a defense the failure of any of its officers, directors, employees, agents, contractors, subcontractors, or any person representing Settling Defendant to take any action necessary to

comply with this Decree. Settling Defendant shall provide notice of this Decree to each person representing Settling Defendant with respect to the Site or the Work. Settling Defendant 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.

IV. DEFINITIONS

17. 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 September 24, 2022, and the Effective Date; and (b) pays after the Effective Date in implementing, overseeing, or enforcing this Decree, including, but not limited to: (i) developing, reviewing and approving deliverables generated under this Decree; (ii) overseeing Settling Defendant's performance of the Work; (iii) assisting or taking action to obtain access or use restrictions under ¶ 24.e; (iv) securing, implementing, monitoring, maintaining, or enforcing Institutional Controls, including any compensation paid; (v) taking action under ¶ 32 (Access to Financial Assurance); (vi) taking response action described in ¶ 60 because of Settling Defendant's failure to take emergency action under ¶ 5.4 of the SOW; (vii) implementing a Work Takeover under ¶ 23; (viii) implementing community involvement activities including the cost of any technical assistance grant provided under section 117(e) of CERCLA; (ix) enforcing this Decree, including all costs paid under Section XII (Dispute Resolution) and all litigation costs except those costs EPA incurs to defend a dispute by the Settling Defendant if the Settling Defendant prevails in the dispute; and (x) conducting periodic reviews in accordance with section 121(c) of CERCLA. Future Response Costs also includes all Interest accrued from September 24, 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.

"Interim Record of Decision" means the EPA decision document that memorializes the selection of the interim remedial action relating to the Site signed on September 30, 2019, by the Director of the Superfund and Emergency Management Division, EPA Region 4, and all attachments thereto, as modified by the Explanation of Significant Differences ("ESD") signed on March 30, 2021, by the Acting Director of the Superfund & Emergency Management Division, EPA Region 4. The Interim Record of Decision is attached as Appendix A. The ESD is attached as Appendix B.

"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.

"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 and Settling Defendant.

"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 September 23, 2022, plus all interest on such costs accrued under section 107(a) of CERCLA through such date.

"Performance Standards" means the measures of achievement of the remedial action objectives, as set forth in the Interim Record of Decision.

"Plaintiff" means the United States.

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

"Remedial Action" means the remedial action selected in the Interim Record of Decision as modified by the Explanation of Significant Differences.

"Remedial Design" means those activities to be undertaken by Settling Defendant 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 Defendant" means ABB, Inc.

"Site" means the Henry's Knob Superfund Site, comprising approximately 185 acres, located in the vicinity of State Highway 55 and Henry's Knob Road in Clover, York County, South Carolina, 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 South Carolina.

"Statement of Work" or "SOW" means the document attached as Appendix D, which describes the activities Settling Defendant 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 44-56-20(6) of the South Carolina Hazardous Waste Management Act or R.61-79.261 of the South Carolina Hazardous Waste Management Regulations.

"Work" means all obligations of Settling Defendant under Sections VI (Performance of the Work) through IX (Indemnification and Insurance).

"Work Takeover" means EPA's assumption of the performance of any of the Work in accordance with ¶ 23.

V. OBJECTIVES

18. The objectives of the Parties in entering into this Decree are to protect public health, welfare, and the environment through the design, implementation, operation,

maintenance, and monitoring of the Remedial Action at the Site by Settling Defendant, to pay Past and Future Response Costs of Plaintiff, and to resolve and settle the claims of Plaintiff against Settling Defendant as provided in this Decree.

VI. PERFORMANCE OF THE WORK

19. Settling Defendant shall finance, design, 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.

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

21. **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 Defendant's rights, under sections 113(k)(2) or 117 of CERCLA, to comment on any modified or further response actions proposed by EPA. 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 Defendant shall implement the modification as provided in ¶ 21.b.

b. Upon receipt of notice from EPA that it has modified the Remedial Action as provided in ¶ 21.a and requesting that Settling Defendant implement the modified Remedial Action, Settling Defendant shall implement the modification, subject to its right to initiate

dispute resolution under Section XII within 30 days after receipt of EPA's notice. Settling Defendant shall modify the SOW, or related work plans, or both in accordance with the Remedial Action modification or, if Settling Defendant invokes 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.

22. **Compliance with Applicable Law**. Nothing in this Decree affects Settling Defendant's obligations to comply with all applicable federal and state laws and regulations. Settling Defendant must also comply with all applicable or relevant and appropriate requirements of all federal and state environmental laws as set forth in the Interim 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).

23. **Work Takeover**

a. If EPA determines that Settling Defendant (i) has ceased to perform any of the Work required under this Section; (ii) is seriously or repeatedly deficient or late in performing the Work required under this Section; or (iii) is 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 Defendant, including a description of the grounds for the notice and a period of time ("Remedy Period") within which Settling Defendant 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 Defendant does not remedy to EPA's satisfaction the circumstances giving rise to the notice of Work Takeover, EPA may notify Settling Defendant 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 Defendant remedies, 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.

VII. PROPERTY REQUIREMENTS

24. **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 Defendant shall use best efforts to secure from the owner(s), other than Settling Defendant and the owner of York County Parcel Number 2750000026, of all Affected Property, an agreement, enforceable by Settling Defendant and by Plaintiff, requiring such owner to provide Plaintiff and Settling Defendant, 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 ¶ 24.b must commit the owner to refrain from using its property in any manner that EPA determines will pose an unacceptable risk to public health or welfare or 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. Each agreement required under ¶ 24.b must commit the owner to refrain from using as human drinking water any untreated groundwater that contains contaminant levels exceeding the remedial goals selected in the IROD if EPA determines the contamination has resulted from the operation of the former mine at the Site.

d. As used in this Section, "best efforts" means the efforts that a reasonable person in the position of Settling Defendant 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 Defendant shall provide to EPA a copy of each agreement required under ¶ 24.b. If Settling Defendant cannot accomplish what is required through best efforts in a timely manner, it 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 Defendant, or take independent action, to obtain such access or use restrictions.

25. **Access and Noninterference by Settling Defendant**. The Settling Defendant shall: (a) provide Plaintiff and its representatives, contractors, and subcontractors with access at all reasonable times to the Site to conduct any activity regarding the Decree, including those listed in ¶ 24.b; and (b) refrain from using the Site in any manner that EPA 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.

26. 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 Defendant shall use best efforts to cooperate with EPA's efforts to secure and ensure compliance with such Institutional Controls.

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

a. Settling Defendant shall, within 15 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 a potentially responsible party has 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. 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. 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 Remedial Action regarding the Site, that a potentially responsible party has 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 of the name and address of the proposed transferee and provide EPA with a copy of the notice that it provided to the proposed transferee.

28. Notwithstanding any provision of the Decree, EPA retains all of its access authorities and rights, as well as all of its 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.

VIII. FINANCIAL ASSURANCE

29. To ensure completion of the Work required under Section VI, Settling Defendant shall secure financial assurance, initially in the amount of $1,152,918.00 ("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 Defendant 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; or

d. a policy of insurance that provides EPA with acceptable rights as a beneficiary thereof and that is issued by an insurance carrier that has the authority to issue insurance policies in the applicable jurisdiction(s) and whose insurance operations are regulated and examined by a federal or state agency.

30. Settling Defendant shall, within 45 days after the Effective Date, seek EPA's approval of the form of Settling Defendant's financial assurance. Within 30 days after such approval, Settling Defendant 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 EPA Program Analyst and to DOJ in accordance with ¶ 76.

31. Settling Defendant shall diligently monitor the adequacy of the financial assurance. If 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, Settling Defendant shall notify EPA of such information within seven 7 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 Settling Defendant of such determination. Settling Defendant 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 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 Defendant shall follow the procedures of ¶ 33 in seeking approval of, and submitting documentation for, the revised or alternative financial assurance mechanism. Settling Defendant's inability to secure financial assurance in accordance with this Section does not excuse performance of any other requirement of this Decree.

32. **Access to Financial Assurance**

a. If EPA issues a notice of a Work Takeover under ¶ 23.b, then, in accordance with any applicable financial assurance mechanism, EPA may require that any funds guaranteed be paid in accordance with ¶ 32.d.

b. If EPA is notified that the issuer of a financial assurance mechanism intends to cancel the mechanism, and 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 ¶ 32.d.

c. If, upon issuance of a notice of a Work Takeover under ¶ 23.b EPA is unable for any reason to promptly secure the resources guaranteed under any applicable financial assurance mechanism, whether in cash or in kind, to continue and complete the Work, 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 Defendant shall, within 30 days after such demand, pay the amount demanded as directed by EPA.

d. Any amounts required to be paid under this ¶ 32 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.

33. **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 Defendant 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 ¶ 30, 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 Defendant of its decision regarding the request. Settling Defendant may initiate dispute resolution under Section XII regarding EPA's decision within 30 days after receipt of the decision. Settling Defendant 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 Defendant 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.

34. **Release, Cancellation, or Discontinuation of Financial Assurance**. Settling Defendant may release, cancel, or discontinue any financial assurance provided under this Section only: (a) if EPA issues a Certification of Work Completion under ¶ 5.8 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.

IX. INDEMNIFICATION AND INSURANCE

35. **Indemnification**

a. Plaintiff does not assume any liability by entering into this Decree or by virtue of any designation of Settling Defendant as EPA's authorized representative under section 104(e)(1) of CERCLA. Settling Defendant shall indemnify and save and hold harmless Plaintiff and its 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 Defendant, officers, directors, employees, agents, contractors, subcontractors, and any persons acting on Settling Defendant's behalf or under its control, in carrying out activities under this Decree, including any claims arising from any designation of Settling Defendant as EPA's authorized representative under section 104(e)(1) of CERCLA. Further, Settling Defendant agrees to pay Plaintiff all costs it incurs including attorneys' fees and other expenses of litigation and settlement arising from, or on account of, claims made against Plaintiff based on negligent or other wrongful acts or omissions of Settling Defendant, its officers, directors, employees, agents, contractors, subcontractors, and any persons acting on its behalf or under its control in carrying out activities under this Decree. Plaintiff may not be held out as a party to any contract entered into by or on behalf of Settling Defendant in carrying out activities under this Decree. Settling Defendant and any such contractor may not be considered an agent of Plaintiff.

b. Plaintiff shall give Settling Defendant notice of any claim for which Plaintiff plans to seek indemnification in accordance with this ¶ 35, and shall consult with Settling Defendant prior to settling such claim.

36. Settling Defendant covenants not to sue and shall not assert any claim or cause of action against Plaintiff for damages or reimbursement or for set-off of any payments made or to be made to Plaintiff, arising from or on account of any contract, agreement, or arrangement between Settling Defendant 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 Defendant shall indemnify and save and hold Plaintiff harmless with respect to any claims for damages or reimbursement arising from or on account of any contract, agreement, or

arrangement between Settling Defendant and any person for performance of work at or relating to the Site, including claims on account of construction delays.

37. **Insurance**. Settling Defendant shall secure, by no later than 15 days before commencing any on-site Work, the following insurance: (a) commercial or comprehensive general liability insurance with limits of liability of $1 million per occurrence and annual aggregate; (b) automobile liability insurance with limits of liability of $1 million per accident; and (c) umbrella liability insurance with limits of liability of $5 million per occurrence and annual aggregate in excess of the required commercial/comprehensive general liability and automobile liability limits. The insurance policy must name Plaintiff as an additional insured with respect to all liability arising out of the activities performed by or on behalf of Settling Defendant under this Decree. Settling Defendant shall maintain this insurance until the first anniversary after issuance of EPA's Certification of Remedial Action Completion under ¶ 5.7 of the SOW. In addition, for the duration of this Decree, Settling Defendant shall satisfy, or shall ensure that its 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 Defendant in furtherance of this Decree. Prior to commencement of the Work, Settling Defendant shall provide to EPA certificates of such insurance and a copy of each insurance policy. Settling Defendant shall resubmit such certificates, as well as copies of any changed policies, each year on the anniversary of the Effective Date. If Settling Defendant demonstrates 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 Defendant need provide only that portion of the insurance described above that is not maintained by the contractor or

subcontractor. Settling Defendant shall ensure that all submittals to EPA under this Paragraph identify the Henry's Knob Superfund Site in Clover, South Carolina, Site/Spill ID Number A46W and the civil action number of this case.

X. PAYMENTS FOR RESPONSE COSTS

38. **Payment for Past Response Costs**. Within 30 days after the Effective Date, Settling Defendant shall pay EPA, in reimbursement of Past Response Costs in connection with the Site, $471,405.16. The Financial Litigation Unit ("FLU") of the United States Attorney's Office for the District of South Carolina shall provide to Settling Defendant, in accordance with ¶ 76, instructions for making this payment, including a Consolidated Debt Collection System ("CDCS") reference number. Settling Defendant shall make such payment at https://www.pay.gov in accordance with the FLU's instructions, including references to the CDCS Number, Site/Spill ID Number A46W, and DJ Number 90-11-3-12317. Settling Defendant shall send notices of this payment to DOJ and the EPA Program Analyst in accordance with ¶ 76. If the payment required under this Paragraph is late, Settling Defendant 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.

39. **Payments by Settling Defendant for Future Response Costs**

a. **Periodic Bills**. On a periodic basis, EPA will send Settling Defendant a bill for Future Response Costs, including a standard cost summary listing direct and indirect costs paid by EPA, its contractors, subcontractors, and DOJ. Settling Defendant 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 Defendant must specify in the Notice of Dispute the contested costs and the basis for the objection.

b. **Payment of Bill**. Settling Defendant shall pay the bill, or if it initiates dispute resolution, the uncontested portion of the bill, if any, within 30 days after receipt of the bill. Settling Defendant shall pay the contested portion of the bill determined to be owed, if any, within 30 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 Defendant 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 ¶ 76 and the purpose of the payment. Settling Defendant shall send notices of this payment to DOJ and the EPA Program Analyst in accordance with ¶ 76.

40. **Deposit of Payments**. EPA may, in its unreviewable discretion, deposit the amounts paid under ¶¶ 38 and 39.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.

XI. FORCE MAJEURE

41. "Force majeure," for purposes of this Decree, means any event arising from causes beyond the control of Settling Defendant, of any entity controlled by Settling Defendant, or of Settling Defendant's contractors that delays or prevents the performance of any obligation

under this Decree despite Settling Defendant's best efforts to fulfill the obligation. Given the need to protect public health and welfare and the environment, the requirement that Settling Defendant exercises "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.

42. If any event occurs for which Settling Defendant will or may claim a force majeure, Settling Defendant shall notify EPA's Project Coordinator by email. The deadline for the initial notice is 3 days after the date Settling Defendant first knew or should have known that the event would likely delay performance. Settling Defendant shall be deemed to know of any circumstance of which any contractor of, subcontractor of, or entity controlled by Settling Defendant knew or should have known. Within 7 days thereafter, Settling Defendant shall send a further notice to EPA that includes: (i) a description of the event and its effect on Settling Defendant's 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 Defendant to complete the requirements of the Decree; (iv) a statement as to whether, in the opinion of Settling Defendant, such event may cause or contribute to an endangerment to public health or welfare, or the environment; and (v) all available proof supporting its claim of force majeure. Failure to comply with the notice requirements herein regarding an event precludes Settling Defendant 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 ¶ 41 and whether Settling Defendant has exercised best efforts under ¶ 41, EPA may, in its unreviewable discretion, excuse in writing Settling Defendant's failure to submit timely or complete notices under this Paragraph.

43. EPA will notify Settling Defendant of its determination whether Settling Defendant is entitled to relief under ¶ 41, 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 Defendant may initiate dispute resolution under Section XII regarding EPA's determination within 15 days after receipt of the determination.In any such proceeding, Settling Defendant has the burden of proving that it is entitled to relief under ¶ 41 and that its proposed extension was or will be warranted under the circumstances.

44. 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 Defendant from timely completing a requirement of the Decree, Settling Defendant may seek relief under this Section.

XII. DISPUTE RESOLUTION

45. Unless otherwise provided in this Decree, Settling Defendant must use the dispute resolution procedures of this Section to resolve any dispute arising under this Decree. Settling Defendant shall not initiate a dispute challenging the Interim 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.

46. 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 ¶ 76. 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 is binding unless Settling Defendant initiates formal dispute resolution under ¶ 47. 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.

47. **Formal Dispute Resolution**

a. **Statements of Position**. Settling Defendant may initiate formal dispute resolution by serving on the Plaintiff, within 20 days after the conclusion of informal dispute resolution under ¶ 46, an initial Statement of Position regarding the matter in dispute. The Plaintiff's responsive Statement of Position is due within 60 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 10 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 4, 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 Defendant unless it timely seeks judicial review under ¶ 48.

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.

48. **Judicial Review**

a. Settling Defendant 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 ¶ 23; (iv) determinations about financial assurance under Section VIII; (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 Defendant bears 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 ¶ 48.b shall be governed by applicable principles of law.

49. **Escrow Account**. For disputes regarding a Future Response Cost billing, Settling Defendant 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 ¶ 76, 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 Defendant shall cause the escrow agent to pay the amounts due to EPA under ¶ 39, if any, by the deadline for such payment in ¶ 39. Settling Defendant is responsible for any balance due under ¶ 39 after the payment by the escrow agent.

50. 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 ¶ 53.

XIII. STIPULATED PENALTIES

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

a. for any failure: (i) to pay any amount due under Section X; (ii) to establish and maintain financial assurance in accordance with Section VIII; (iii) to obtain insurance in accordance with Section IX; (iv) to submit timely or adequate deliverables under Section 7 of the SOW:

Period of Noncompliance	Penalty Per Noncompliance Per Day
1st through 14th day	$2,000
15th through 30th day	$3,500

31st day and beyond	$6,000

b. for any failure to submit timely or adequate deliverables required by this Decree other than those specified in ¶ 51.a:

Period of Noncompliance	Penalty Per Noncompliance Per Day
1st through 14th day	$1,250
15th through 30th day	$2,500
31st day and beyond	$5,000

52. **Work Takeover Penalty**. If EPA commences a Work Takeover, Settling Defendant is liable for a stipulated penalty in the amount of $250,000. This stipulated penalty is in addition to the remedy available to EPA under ¶ 32 (Access to Financial Assurance) to fund the performance of the Work by EPA.

53. **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 Defendant has been notified of its noncompliance, and regardless of whether Settling Defendant has 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 Defendant 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 Defendant's reply thereto (if any) is received until the date of the Formal Decision under ¶ 47.b; or

c. with respect to a matter that is the subject of judicial review by the Court under ¶ 48, 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.

54. **Demand and Payment of Stipulated Penalties**. EPA may send Settling Defendant 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 Defendant may initiate dispute resolution under Section XII within 30 days after receipt of the demand. Settling Defendant shall pay the amount demanded or, if it initiates dispute resolution, the uncontested portion of the amount demanded, within 30 days after receipt of the demand. Settling Defendant 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 Defendant 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 ¶ 76, and the purpose of the payment. Settling Defendant shall send a notice of this payment to DOJ and the

EPA Program Analyst in accordance with ¶ 76. The payment of stipulated penalties and Interest, if any, does not alter any obligation by Settling Defendant under the Decree.

55. Nothing in this Decree limits the authority of the United States: (a) to seek any remedy otherwise provided by law for Settling Defendant's failure to pay stipulated penalties or interest; or (b) to seek any other remedies or sanctions available by virtue of Settling Defendant's noncompliances 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.

56. 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 PLAINTIFF

57. **Covenants for Settling Defendant**. Subject to ¶ 59, the United States covenants not to sue or to take administrative action against Settling Defendant under sections 106 and 107(a) of CERCLA regarding the Work, Past Response Costs, and Future Response Costs.

58. The covenants under ¶ 57: (a) take effect upon the Effective Date; (b) are conditioned on the satisfactory performance by Settling Defendant of the requirements of this Decree; (c) extend to the successors of Settling Defendant but only to the extent that the alleged liability of the successor of Settling Defendant is based solely on its status as a successor of Settling Defendant; and (d) do not extend to any other person.

59. **General Reservations**. Notwithstanding any other provision of this Decree, the United States reserves, and this Decree is without prejudice to, all rights against Settling Defendant regarding the following:

a. liability for failure by Settling Defendant 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 Defendant's ownership of the Site when such ownership commences after Settling Defendant's signature of this Decree;

d. liability based on Settling Defendant's operation of the Site when such operation commences after Settling Defendant's signature of this Decree and does not arise solely from Settling Defendant's performance of the Work;

e. liability based on Settling Defendant's 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 Defendant, other than as provided in the Interim Record of Decision, under this Decree, or ordered by EPA;

f. liability for additional operable units at the Site or the final response action;

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 ¶ 21.a; and

h. criminal liability.

60. Subject to ¶ 57, nothing in this Decree limits any authority of Plaintiff 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 DEFENDANT

61. **Covenants by Settling Defendant**

a. Subject to ¶ 62, Settling Defendant covenants not to sue and shall not assert any claim or cause of action against the United States 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 State Constitution, State law, or at common law regarding the Work, past response actions relating to the Site, Past Response Costs, and Future Response Costs.

b. Subject to ¶ 62, Settling Defendant covenants not to seek reimbursement from the Fund through CERCLA or any other law for costs of the Work, past response actions regarding the Site, Past Response Costs, and Future Response Costs.

62. **Settling Defendant's Reservation**. The covenants in ¶ 61 do not apply to any claim or cause of action brought, or order issued, after the Effective Date by the United States to the extent such claim, cause of action, or order is within the scope of a reservation under ¶¶ 59.a through 59.h.

63. **De Micromis Waiver**. Settling Defendant shall not assert any claims and waives all claims or causes of action (including claims or causes of action under sections 107(a) and 113 of CERCLA) that it may have for all matters relating to the Site against any person where the person's liability to Settling Defendant with respect to the Site is based solely on having

arranged for disposal or treatment, or for transport for disposal or treatment, of hazardous substances at the Site, or having accepted for transport for disposal or treatment of hazardous substances at the Site, if all or part of the disposal, treatment, or transport occurred before April 1, 2001, and the total amount of material containing hazardous substances contributed by such person to the Site was less than 110 gallons of liquid materials or 200 pounds of solid materials. This waiver does not apply to any claim or cause of action against any person otherwise covered by such waiver if EPA determines that: (i) the materials containing hazardous substances contributed to the Site by such person contributed significantly or could contribute significantly, either individually or in the aggregate, to the cost of the response action or natural resource restoration at the Site; or (ii) such person has failed to comply with any information request or administrative subpoena issued under sections 104(e) or 122(e)(3)(B) of CERCLA or section 3007 of RCRA, or has impeded or is impeding, through action or inaction, the performance of a response action or natural resource restoration with respect to the Site; or (iii) such person has been convicted of a criminal violation for the conduct to which the waiver would apply and that conviction has not been vitiated on appeal or otherwise. This waiver does not apply with respect to any defense, claim, or cause of action that Settling Defendant may have against any person otherwise covered by this waiver if such person asserts a claim or cause of action relating to the Site against Settling Defendant.

64. Settling Defendant agrees not to seek judicial review of the final rule listing the Site on the NPL based on a claim that changed site conditions that resulted from the performance of the Work in any way affected the basis for listing the Site.

XVI. EFFECT OF SETTLEMENT; CONTRIBUTION

65. 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 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 (c) 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 contribution protection under the preceding sentence extends to the successors of Settling Defendant but only to the extent that the alleged liability of the successor of Settling Defendant is based solely on its status as a successor of Settling Defendant. The "matters addressed" in this Decree are the Work, Past Response Costs, and Future Response Costs, provided, however, that if the United States exercises rights under the reservations in ¶¶ 59.a through 59.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.

66. Settling Defendant shall, with respect to any suit or claim brought by it for matters related to this Decree, notify DOJ and EPA no later than 60 days prior to the initiation of such suit or claim. Settling Defendant shall, with respect to any suit or claim brought against it for matters related to this Decree, notify DOJ and EPA within 10 days after service of the complaint on Settling Defendant. In addition, Settling Defendant shall notify DOJ and EPA 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.

67. **Res Judicata and Other Defenses**. In any subsequent administrative or judicial proceeding initiated against Settling Defendant by Plaintiff for injunctive relief, recovery of response costs, or other appropriate relief relating to the Site, Settling Defendant 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 in the subsequent proceeding were or should have been brought in the instant case.

68. 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

69. **Settling Defendant Certification**. Settling Defendant certifies 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 documents and electronically stored information relating to the Site, including 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 requests for information under sections 104(e) and 122(e) of CERCLA, and section 3007 of RCRA.

70. **Retention of Records and Information**

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

(1) All records regarding Settling Defendant's 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 Defendant in the course of performing the Remedial Action.

b. Settling Defendant 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 Defendant shall notify EPA that it has 90 days to request the Settling Defendant's Records subject to this Section. Settling Defendant shall retain and preserve its 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.

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

72. **Privileged and Protected Claims**

a. Settling Defendant may assert that all or part of a record requested by Plaintiff is privileged or protected as provided under federal law, in lieu of providing the record, provided that Settling Defendant complies with ¶ 72.b, and except as provided in ¶ 72.c.

b. If Settling Defendant asserts a claim of privilege or protection, it shall provide Plaintiff 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 Defendant shall provide the record to Plaintiff in redacted form to mask the privileged or protected portion only. Settling Defendant shall retain all records that it claims to be privileged or protected until Plaintiff has had a reasonable opportunity to dispute the privilege or protection claim and any such dispute has been resolved in Settling Defendant's favor.

c. Settling Defendant 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 Defendant is required to create or generate in accordance with this Decree.

73. **Confidential Business Information (CBI) Claims**. Settling Defendant may claim that all or part of a record provided to Plaintiff 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 Defendant shall segregate and shall clearly identify all records or parts thereof submitted under this Decree for which it claims is CBI by labeling each page or each electronic file

"claimed as confidential business information" or "claimed as CBI." Records that Settling Defendant claims 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, or if EPA notifies Settling Defendant 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 Defendant.

74. 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.

75. Notwithstanding any provision of this Decree, Plaintiff retains all of its 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

76. 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 # 90-11-3-12317

As to EPA:	*via email to*: freeman.caroline@epa.gov and saha.anita@epa.gov Re: Site/Spill ID # A46W
As to the EPA Program Analyst:	*via email to*: painter.paula@epa.gov Re: Site/Spill ID # A46W
As to Settling Defendant:	*via email to*: robin.m.staszak@us.abb.com

XIX. APPENDIXES

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

"Appendix A" is the Interim Record of Decision.

"Appendix B" is the Explanation of Significant Differences.

"Appendix C" is the map of the Site.

"Appendix D" is the SOW.

XX. MODIFICATIONS TO DECREE

78. Except as provided in ¶ 21 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 Interim 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

79. The undersigned representative of the United States and the undersigned representative of Settling Defendant each 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

80. If for any reason the Court should decline to approve this Decree in the form presented, this agreement, except for ¶ 81 and ¶ 82, is voidable at the sole discretion of any Party and its terms may not be used as evidence in any litigation between the Parties.

81. 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.

82. Settling Defendant agrees not to oppose or appeal the entry of this Decree.

XXIII. INTEGRATION

83. 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

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

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

_____

United States District Judge

Signature Page for Consent Decree in *U.S. v. ABB, Inc.* (D. S.C.)

FOR THE UNITED STATES OF AMERICA:

ADAM R.F. GUSTAFSON
Principal Deputy Assistant Attorney General
U.S. Department of Justice
Environment and Natural Resources Division

Date: March 19, 2026

BY: */s/ Brian Schaap*
BRIAN SCHAAP (D.C. Bar No. 1780655)
Trial Attorney
U.S. Department of Justice
Environment and Natural Resources Division
Environmental Enforcement Section
P.O. Box 7611
Washington, D.C. 20044-7611
Tel. (202) 598-0116
Email: brian.schaap@usdoj.gov

Signature Page for Consent Decree in *U.S. v. ABB, Inc.* (D. S.C.)

FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY:

JAIME BROWN Digitally signed by JAIME BROWN Date: 2025.06.27 12:41:50 -04'00'

For Caroline Freeman
Director
Superfund & Emergency Management Division
U.S. Environmental Protection Agency, Region 4
61 Forsyth Street, S.W.
Atlanta, Georgia 30303

JOHN SHEESLEY Digitally signed by JOHN SHEESLEY Date: 2025.05.28 11:31:43 -04'00'

JOHN SHEESLEY
Associate Regional Counsel
U.S. Environmental Protection Agency, Region 4
61 Forsyth Street, S.W.
Atlanta, Georgia 30303

Signature Page for Consent Decree in *U.S. v. ABB, Inc.* (D. S.C.)

FOR: ABB, Inc.

2/11/25
Dated

2/12/25 Robin M Staszak

Name: Michael Gray
Title: President
Address: Cary, NC.

Robin M. Staszak
Env. Project Mgr
ABB Inc
45 Griffin Road South
Bloomfield, CT 06002

If the Decree is not approved by the Court within 60 days after the date of lodging, and the United States requests, 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. **Settling Defendant hereby designates the agent below to accept service of the complaint by mail and to execute the Rule 4 waiver of service.** 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: Robin M. Staszak
Title: Environmental Project Manager
Company: ABB Inc.
Address: 45 Griffin Road South
Bloomfield, CT 06002
Phone: 860-278-6717
Email: robin.m.staszak@us.abb.com

APPENDIX A
INTERIM RECORD OF DECISION

HENRY'S KNOB SUPERFUND SITE

CLOVER, YORK COUNTY, SOUTH CAROLINA

PREPARED FOR:
U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 4
SUPERFUND AND EMERGENCY MANAGEMENT DIVISION
ATLANTA, GEORGIA

PREPARED BY:
BLACK & VEATCH SPECIAL PROJECTS CORP.
6 CONCOURSE PARKWAY, SUITE 1600
ATLANTA, GEORGIA 30328

DCN: 49050-0213-04-B-01733R0
EPA ID: SCN000407376

11134206

INTERIM RECORD OF DECISION

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

ACRONYMS AND ABBREVIATIONS

ABB	Asea Brown Boveri, Inc.
ADD	average daily dose
AGC	Agricultural Conservation District
AMEC	AMEC Environment & Infrastructure, Inc. (now Wood)
Amec FW	Amec Foster Wheeler Environment & Infrastructure, Inc. (now Wood)
AOC	area of concern
ARAR	applicable or relevant and appropriate requirement
AWQC	Ambient Water Quality Criteria
BAF	bioaccumulation factor
BERA	Baseline Ecological Risk Assessment
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
COC	chemical(s) of concern
COPC	chemical(s) of potential concern
COPEC	chemical(s) of potential ecological concern
CSF	cancer slope factor
CSM	conceptual site model
CTE	central tendency exposure
DO	dissolved oxygen
EA	exposure area
EE/CA	Engineering Evaluation / Cost Analysis
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
FeS_2	pyrite
FS	Feasibility Study
HHRA	Human Health Risk Assessment
HI	hazard index
HQ	hazard quotient
IC	institutional control(s)
ICIAP	Institutional Control Implementation and Assurance Plan
IROD	Interim Record of Decision
Kd	soil-water partition coefficient
LADD	lifetime average daily dose
LOAEL	lowest observed adverse effect level
MCL	Maximum Contaminant Level
µg/L	micrograms per liter
µmhos/cm	micromhos per centimeter
meq/L	milliequivalents per liter

ACRONYMS AND ABBREVIATIONS (Con't)

mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MNA	monitored natural attenuation
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOAEL	no observed adverse effect level
NTCRA	Non-Time Critical Removal Action
O&M	operation and maintenance
ORP	oxidation reduction potential
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response
PA	Preliminary Assessment
pH	hydrogen ion concentration
PTW	Principal Threat Waste
4Q18	fourth quarter 2018
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RfC	reference concentration
RfD	reference dose
RI	Remedial Investigation
RME	reasonable maximum exposure
RML	Removal Management Level
RS	Responsiveness Summary
RSL	Regional Screening Level
RUD-1	Rural Residential District 1
SARA	Superfund Amendments and Reauthorization Act
SCDHEC	South Carolina Department of Health and Environmental Control
SDWA	Safe Drinking Water Act
SI	site investigation
Site	Henry's Knob Superfund Site
s.u.	standard unit (units of pH measurement)
TBC	To Be Considered
TCLP	Toxicity Characteristic Leaching Procedure
TI	Technical Impracticability
TRV	toxicity reference value
UCL	upper confidence limit
USGS	United States Geological Survey
Wood	Wood Environment & Infrastructure Solutions, Inc.

PART 1: DECLARATION

1.0 Site Name and Location

Henry's Knob Superfund Site

Clover, York County, South Carolina

Superfund Site Identification Number SCN000407376

2.0 Statement of Basis and Purpose

This Interim Record of Decision (IROD) presents the Selected Remedy for the overburden groundwater zone at the Henry's Knob Superfund Site (Site) in Clover, South Carolina (Figure 1). The Selected Remedy for remedial action was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) 42 U.S.C. Section 9617 of the Superfund and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) as set forth in 40 Code of Federal Regulations (CFR) Part 300.430(f)(2). This decision is based on the Administrative Record for the Site and represents an interim remedy selected for the Site to address the risks posed by overburden groundwater. The EPA has deferred selection of a final groundwater and surface water remedy for the Site pending further evaluation of the effectiveness of previously implemented source controls actions and natural attenuation processes in reducing contamination in the overburden groundwater zone and to monitor the effects of that remediation on contamination within bedrock groundwater and surface water.

The U.S. Environmental Protection Agency (EPA) is the lead agency for Site activities, and the South Carolina Department of Health and Environmental Control (SCDHEC) is the support agency. In accordance with 40 CFR Part 300.430(f)(2), SCDHEC has provided input during the remedial investigation (RI) and feasibility study (FS) and decision-making process and thus the State of South Carolina concurs with the Selected Remedy (see Appendix A).

3.0 Assessment of the Site

The response action selected in this IROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances to the environment; and pollutants or contaminants from this Site which may present an imminent and substantial endangerment to public health or welfare.

4.0 Description of Selected Remedy

The Selected Remedy includes Institutional Controls (ICs) and monitoring for the groundwater, and ICs, maintenance and monitoring for the source areas.

The Selected Remedy for groundwater is comprised of IC and monitoring components from the groundwater alternatives evaluated in the FS. Interim ICs including informational devices or enforcement tools, to mitigate human exposure to untreated, contaminated Site groundwater in the short term will be implemented until a final remedy is selected and the need for more permanent ICs including proprietary controls (such as restrictive covenants) for affected residential parcels has been further evaluated. Groundwater will be monitored according to the Final Groundwater Monitoring Plan to

permit further evaluation of the effectiveness of natural attenuation processes on reducing concentrations of contaminants within the overburden groundwater and to monitor the effects of that remediation on contamination within the bedrock groundwater zone as well as impacts on surface water. Groundwater will be monitored for metals, as well as chloride, sulfate, and alkalinity. Groundwater will also be analyzed in the field for water quality parameters including hydrogen ion concentration (pH), temperature, specific conductance, dissolved oxygen (DO), oxidation reduction potential (ORP), and turbidity.

The Selected Remedy for the source areas includes ICs, including proprietary controls, to prevent disturbance of the previously implemented source controls (i.e., vegetative cover systems, stormwater channel controls, and dam stabilization and rip rap armoring), access controls (i.e., fencing around mine pit/pond), and monitoring and maintenance of the mine pit fencing, tailings areas vegetative cover systems, the engineered drainage channels in Areas of Concern (AOCs) 1, 2, 3, and 5 previously installed as interim actions, and the tailings dams. This remedy will provide protection to the environment by ensuring the continued integrity and functioning of the completed source control actions, which reduce the infiltration of surface water into tailings and reduces the generation of acid mine drainage. Monitoring and maintenance of the dams would result in long-term stability of the structures.

The Selected Remedy will be implemented through post-IROD, EPA-approved remedial design and remedial action work plan documents. The specific IC device(s) for the Site and the identification of affected or potentially affected residential properties will be detailed in an EPA-approved Institutional Control Implementation and Assurance Plan (ICIAP) to be developed during the remedial design phase. At this time, the EPA has deferred selection of a final groundwater and surface water remedy to permit further evaluation of the effectiveness of natural attenuation processes on reducing concentrations of contaminants within the overburden groundwater, to monitor the effects of that remediation on contamination within the bedrock groundwater zone as well as impacts on surface water, and to develop Site groundwater and surface water background level data. The monitoring during this interim phase is expected to occur for approximately five years in order to support the selection of a final remedy. The outcome of this evaluation will be documented in an RI Report Addendum and/or an Appendix to the Feasibility Study Report as deemed necessary by the EPA prior to final remedy selection.

5.0 Statutory Determinations

This interim action is protective of human health and the environment in the short term and is intended to provide adequate protection until a final ROD is signed, complies with those federal and state requirements that are applicable or relevant and appropriate for this limited-scope action, and is cost effective. This action is an interim solution only and is not expected to attain chemical-specific "applicable or relevant and appropriate" requirements (ARARs) for groundwater cleanup which include Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs). These will become part of a total final remedial action that will attain groundwater ARARs, unless a Technical Impracticability (TI) waiver under CERCLA Section 121(d)(4) is deemed appropriate by the EPA in the final ROD. As an interim solution only, this limited scope action is not intended to utilize permanent solutions and alternative treatment technologies to the maximum extent practicable for this Site. Because this action

does not constitute the final remedy for the Site, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element will be addressed by the final response action. Subsequent actions are planned to address fully the threats posed by conditions at this Site. Because this remedy will result in hazardous substances remaining onsite 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 RA. Because this is an interim action ROD, review of this Site and remedy will be ongoing as the EPA continues to develop remedial alternatives for the Site.

6.0 Data Certification Checklist

The following information is included in the Decision Summary Section of this IROD. Additional information can be found in the Administrative Record file for this Site.

- Chemicals of concern and their respective concentrations (Section 7)
- Baseline risk represented by the chemicals of concern (Section 7)
- Cleanup levels established for chemicals of concern and the basis for these levels (Section 8)
- How source materials constituting principal threats will be addressed (Section 11)
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessment and IROD (Section 6)
- Potential land and groundwater use that will be available at the Site as a result of the Selected Remedy (Section 6)
- Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected (Section 10)
- Key factors that led to selecting the remedy (i.e., describe how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision) (Section 12)

7.0 Authorizing Signature

for

Franklin E. Hill, Director
Superfund & Emergency Management Division
U.S. Environmental Protection Agency, Region 4

9/30/19
Date

PART 2: THE DECISION SUMMARY

1.0 Site Name, Location, and Brief Description

The Henry's Knob Superfund Site (Site), is located at the intersection of South Carolina Highway 55 and Henry Knob Road, near the town of Clover in York County, South Carolina, (Environmental Protection Agency [EPA] ID: SCN000407376). The EPA is the lead agency for Site activities, and the SCDHEC is the support agency.

The Site consists of approximately 185 acres of land located north of Highway 55 and east of Henry Knob Road that contain the remnants of the open pit mine, the infiltration beds or settling ponds (tailings impoundments), and spoil piles, and the tailings impoundments located on the west side of Henry Knob Road (Figure 1).

The Site has ten identified AOCs:

- AOC 1, West Tailings Ponds (tailings impoundment)
- AOC 2, North Tailings Ponds (tailings impoundment)
- AOC 3, Former Mill Operations Buildings
- AOC 4, Mine Pit Pond
- AOC 5, East Tailings Ponds (tailings impoundment)
- AOC 6, South Fork of Crowders Creek (SFCC)
- AOC 7, Random Dumping Areas
- AOC 8, Waste Rock Area (North Side)
- AOC 9, Waste Rock Area (South Side)
- AOC 10, Site Groundwater

Figure 2 illustrates locations of the AOCs. AOCs 1, 2, 3, 4, 5, 8 and 9 that are associated with mining activities and the exposure of large amounts of rock and rock fragments (tailings and waste rock areas) that contain naturally-occurring pyrite (and other iron sulfide minerals). AOCs 1, 2, and 5 are tailings impoundments. AOC 3 represents the area of mining operations (evidenced by former building foundations and other structures) and includes a small area of tailings that contain a reported former pyrite storage area. AOC 4 is the Mine Pit, which is the location where the kyanite quartzite was removed. AOC 6, although identified as the South Fork of Crowders Creek, represents surface water that has the potential to be impacted by the mine or mining operations and includes the East and West tributaries to South Fork of Crowders Creek as well as a second order tributary to Allison Creek. AOC 7 represents areas of the Site where unauthorized disposal of household appliances and other debris was identified. AOCs 8 and 9 are areas in which waste rock was placed during mining operations. AOC 10 is for groundwater at the Site.

2.0 Site History and Activities

2.1 Site Operational History

From 1947 to 1970, an open pit mine was operated at Henry Knob by Commercialores, Inc. for the extraction of kyanite, an aluminum silicon oxide used in the manufacture of high-alumina brick and

other high-temperature, refractory materials. Mine tailings from the mining operation are present at several large areas and consist of fine-grained mineral sediment located down slope of former mineral processing facilities. When the kyanite mining operations ceased in 1970, the seven-acre open pit mine was allowed to collect precipitation, creating a one-acre, acidic pond. The remnants of ore processing facilities, such as building and storage foundations, remain at the Site.

Following discontinuation of mining operations in 1970, Commercialores, Inc. deeded the property to Shamrock Properties in 1971. Subsequently, Shamrock Properties deeded the parcel to York County for recreational use in 1974. The parcel was then sold by York County to Phoenix Industries in 1982. In 1988, Phoenix Industries sought rezoning of the property from York County to "reclaim" the Site by filling the open mine pit with waste tires; the request was subsequently withdrawn. In 1991, the property was transferred from Phoenix Industries to an individual. The Site owner at the commencement of the RI, according to York County tax records, was another individual. From 2010 to 2015 Asea Brown Boveri, Inc. (ABB) purchased property that included AOC 1, AOC 2, AOC 3, and AOC 5 from private landowners. The top of Henry Knob, the access road extending down toward Henry Knob Road, and land extending down toward Highway 55 remains in private ownership. Other than two residences and a cellular communications tower/equipment that currently occupy the privately-owned portion of the Site, no additional development has been conducted at the Site since mining operations ceased in 1970. The property is reported to have been used for recreational purposes through 2002.

2.2 Regulatory History

The following is a summary of the regulatory history of the Site as presented in the 2004 Administrative Order on Consent (USEPA, 2004).

The hazardous substances of concern at the Site are the metals and other inorganic compounds discovered during the March 2000 Phase I and Phase II Environmental Assessments conducted by Katawba Environmental under contract with York County, South Carolina (Katawba, 2000a and 2000b). These metals and other inorganic compounds were mobilized by past mining practices and resulted in acid mine drainage when exposed.

Samples collected during these Environmental Assessments revealed elevated levels of arsenic, barium, cadmium, chromium, cobalt, copper, magnesium, nickel, lead, zinc, and mercury in the Site's groundwater. Of these metals, cadmium and lead were above the EPA's Regional Screening Levels (RSLs). Cadmium and lead were also above the EPA's SDWA MCLs. The groundwater samples analyzed had an average pH of 3.45 standard units (s.u.), with a specific conductivity of 2,390 micromhos per centimeter (µmhos/cm) Katawba reported elevated concentrations of antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, selenium and tin in surface soil samples; however, only arsenic was detected at levels above RSLs. Two additional soil samples were analyzed for arsenic using the Toxicity Characteristic Leaching Procedure (TCLP); however, there was no detection of arsenic in the leachate. Surface water collected from the mine pit pond indicated elevated levels of chromium, copper, cobalt, magnesium, nickel, and zinc. The pH of the Mine Pit Pond water sample was 2.83 and the specific conductance was 1823 µmhos/cm. Sediment samples collected from the pit had an average pH of 3.35 and the detected concentrations of arsenic, barium, chromium, copper, and lead.

In September and October 2000, the SCDHEC Site Assessment Section conducted a Pre-Comprehensive Environmental Response, Compensation, and Liability Information System (Pre-CERCLIS) Site Screening (SCDHEC, 2001). Onsite and offsite wells yielded groundwater samples containing elevated

levels of metals (concentrations greater than three times background levels), including aluminum, barium, beryllium, cadmium, calcium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, thallium, vanadium, and zinc. Of these metals, beryllium was found above its MCL of 4 µg/L in a private, offsite well sample (19 µg/L) and in a sample from an onsite monitoring well (4.8 mg/L). Thallium was detected above its MCL of 2 µg/L in the same onsite monitoring well (24 µg/1). Surface soil samples contained elevated levels of metals, including antimony, arsenic, barium, chromium, cobalt, copper, iron, lead, magnesium, manganese, selenium, silver, thallium, and vanadium. Soil samples also indicated pH levels significantly lower than the average soil pH for the area of 5.6 to 6. Several samples indicated pH levels of 2.11, 2.73. 3.7, and 2.28. Subsurface soil samples also contained elevated levels of metals, including aluminum, barium, lead, magnesium, manganese, and potassium. Surface water samples contained elevated levels of metals, including aluminum, barium, beryllium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, thallium, vanadium, and zinc. Sediment samples also indicated elevated levels of aluminum, barium, beryllium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, thallium, vanadium, and zinc.

An Administrative Order on Consent between the EPA Region 4 and ABB was executed on September 24, 2004 (Consent Order) that required ABB to conduct a Remedial Investigation/Feasibility Study (RI/FS) at the Site.

2.3 Previous Investigations and Interim Actions

2.3.1 Environmental Investigations and Studies

There have been several environmental investigations, studies and data reviews completed at the Henry's Knob Site. These include the following:

Environmental Investigations and Studies at Henry's Knob

Date Completed	Investigations / Response Actions / Report	Scope
2000	Phase I and Phase II Site Assessment (Katawba, 2000a, 2000b)	Katawba reported elevated concentrations of antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, selenium and tin in surface soil samples; however, only arsenic was detected at levels above RSLs. Two additional soil samples were analyzed for arsenic using the Toxicity Characteristic Leaching Procedure (TCLP); however, there was no detection of arsenic in the leachate. Surface water collected from the mine pit pond indicated elevated levels of chromium, copper, cobalt, magnesium, nickel, and zinc. The pH of the mine pit water sample was 2.83. Sediment samples collected from the pit had an average pH of 3.35 and detected concentrations of arsenic, barium, chromium, copper, and lead. Groundwater samples revealed elevated levels of arsenic, barium, cadmium, chromium, cobalt, copper, magnesium, nickel, lead, zinc, and mercury. Of these metals, cadmium and lead were above the EPA's RSLs for groundwater. Cadmium and lead were also above the SDWA MCLs.
2001	Pre-CERCLIS Site Checklist and Site Screening Report (SCDHEC, 2001)	Onsite and offsite wells yielded groundwater samples containing elevated levels of metals (concentrations greater than three times background levels), including aluminum, barium, beryllium, cadmium. calcium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, thallium, vanadium, and zinc. Of

		these metals, beryllium was found above its MCL of 4 ug/L in a private, offsite well sample (19 ug/L) and in a sample from an onsite monitoring well (4.8 mg/L). Thallium was detected above its MCL of 2 ug/L in the same onsite monitoring well (24 ug/L). Surface soil samples contained elevated levels of metals, including antimony, arsenic, barium, chromium, cobalt, copper, iron, lead, magnesium, manganese, selenium, silver, thallium, and vanadium. Soil samples also indicated pH levels significantly lower than the average soil pH for the area of 5.6 to 6. Several samples indicated pH levels of 2.11, 2.73. 3.7, and 2.28. Subsurface soil samples also contained elevated levels of metals, including aluminum, barium, lead, magnesium, manganese, and potassium. Surface water samples contained elevated levels of metals, including aluminum, barium, beryllium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, thallium, vanadium, and zinc. Sediment samples also indicated elevated levels of arsenic, barium, iron, lead, selenium, and thallium.
2002	Limited Scope Preliminary Assessment /Site Inspection (PA/SI) (SCDHEC, 2002)	Detected concentrations above the secondary MCL for iron and manganese identified in the Limited Scope PA/SI were widespread. Sulfate also appeared to be somewhat elevated to the north/northwest of Henry's Knob (HK-004-GW and HK-005-GW) and flanking the formation to the southeast of Henry's Knob (HK-006-GW and HK-011-GW). Similar concentrations of sulfate were also detected in well HK-015-GW. Two wells located on either side of the tailings ponds (HK-018-GW and HK-019-GW) also contained elevated concentrations of sulfate (400,000 ug/L and 2,000,000 ug/L, respectively) that exceeded the secondary MCL for sulfate. These two wells also contained elevated concentrations of other inorganics and base metal concentrations (e.g., barium, cadmium, nickel, lead, and zinc). Cadmium was also present above the MCL of 5 ug/L in HK-018- GW at a concentration of 120 ug/L.
2003	Aerial Photographic Analysis (USEPA, 2003a	Aerial photographic analysis showing historical mining operations.
2011	Remedial Investigation (RI) Report (MACTEC, 2011a)	The RI data were collected in three steps in accordance with work plans for the Step 1, Step 2, and Step 3 RI investigations that were completed between 2005 and 2010 (MACTEC, 2011a). Site characterization consisted of a review of previous reports, a review of available literature and references, and collecting surface soil, sediment, surface water, and groundwater samples for laboratory chemical analysis. As described in the RI Report, the nature and distribution of potential contaminants in soil, surface water, sediment, and groundwater have been sufficiently characterized (MACTEC, 2011a). One of the sources of constituents detected in these media is related to acid mine drainage that has been created by the weathering of naturally occurring iron sulfide minerals in the waste rock and tailings areas. Acid mine drainage has created an acidic condition (generally with pH ranging from 2.5 standard units (s.u.) to 4.5 s.u.) that has caused naturally occurring inorganic

		constituents such as aluminum, cobalt, iron, and manganese to be leached from soil to groundwater, and to migrate with groundwater flow. Groundwater flows radially from the Site in the overburden and bedrock, and discharges to the headwaters of the East and West Tributaries, with only minor flow components southward into AOC 3 and the Allison Creek Tributary. Details of the results of the RI are presented in Section 5 of this IROD.
2011	Human Health Risk Assessment (MACTEC, 2011b)	A baseline human health risk assessment was performed as part of the RI conducted in 2011. The purpose of the assessment was to quantify the human health risks associated with potential exposures to Site-related contaminants under current and possible future land use conditions, in the absence of any remedial action. The results of the assessment indicated that noncancer hazards exceeded the threshold (HI > 1) for future uses of groundwater as a potable water resource. Current and potential future exposures to other media (soil, sediment and surface water) were within the acceptable cancer risk range and below the noncancer hazard threshold. Details of the baseline human health risk assessment are presented in Section 7 of this IROD.
2011	Baseline Ecological Risk Assessment (MACTEC, 2011c)	The baseline ecological risk assessment considered four assessment endpoints to evaluate risk in aquatic exposure areas, and two assessment endpoints to evaluate risk in terrestrial exposure areas. Potential unacceptable risks to terrestrial receptors were found to be unlikely. However, the low pH in surface water bodies at and near the Site (Mine Pit Pond, East Tributary, West Tributary, and Allison Creek Tributary) was identified as a condition of concern. There is a potential unacceptable risk to fish in Allison Creek Tributary due to low pH; however, risk to fish in the South Fork of Crowders Creek is unlikely. Fish were not observed in the other study areas. Benthic community impairment may be indicated for West Tributary to Reach 2 of the South Fork of Crowders Creek and Allison Creek Tributary based on a comparison to reference streams. Low pH in the West Tributary to South Fork of Crowders Creek and Allison Creek Tributary contributed, in part, to impairment to benthic communities. Exposure to metals in surface water may also contribute to impairment. The low pH (between 2 and 4) of the water measured in Mine Pit Pond, West Tributary to South Fork of Crowders Creek and Allison Creek Tributary was identified as a condition of concern for the populations inhabiting these exposure areas. The measured concentrations of pH in the Mine Pit Pond and in aquatic resource areas downgradient of the mine do not meet the South Carolina Water Quality Criteria of pH between 6.0 and 8.5. Such conditions can be acutely toxic to fish and other aquatic life which can be adversely affected or absent at locations with pH less than 4. Details of the baseline ecological risk assessment are presented in Section 7 of this IROD.
2012	Engineering Evaluation / Cost Analysis (EE/CA) (AMEC, 2012a)	The EE/CA provided an engineering evaluation to support the selection of a Non-Time Critical Removal Action (NTCRA) for potable groundwater in the vicinity of the Site that has been

		impacted by metals from former mine-related activities. The remedial action objective (RAO) for the EE/CA was to prevent the use of groundwater as drinking water within the area impacted by mining operations that contains metals at concentrations that pose a potential non-cancer risk to human health as a potable water source. The EE/CA evaluated several removal action alternatives "for affected residences with contaminated drinking water wells" including: an extension of the existing public water supply system; the installation of a community groundwater extraction and treatment system; installation of individual wellhead water treatment systems for affected residences; and bottled water supply. The EE/CA recommended extension of the public water supply as the preferred alternative for NTCRA implementation. However, due to a lack of community support for the EE/CA's preferred alternative, the EPA issued an Action Memorandum in 2013 for installation of individual wellhead water treatment systems for affected residences as the selected removal action alternative for NTCRA implementation.
2012	Geochemical Investigation and Geotechnical Study (AMEC, 2012b)	A limited geochemical investigation was completed to characterize geochemical properties of the tailings areas (AOCs 1, 2, and 5), the pyrite storage area at AOC 3, and the waste rock areas (AOCs 8 and 9) in support of the development and evaluation of remedial alternatives. The geotechnical investigation was performed to investigate the stability of the tailings impoundment dams at AOCs 1, 2, and 5 in support of the development and evaluation of remedial alternatives. The studies consisted of exploratory soil borings, test pit excavations and laboratory testing of soil samples to: identify the types and geochemical characteristics of the materials; estimate the depth and volume of tailings; develop a preliminary loading estimate for the Site to assess the potential tailings source areas for contaminant loadings to the receiving environment; and assess the lithologic and geotechnical characteristics of interior strata in the impoundment dams and foundation soils. A total of 52 test pits were completed at AOCs 1, 2, 3, 5 and 9 (with most of the test pits completed in the southern end of AOC 1 as this area was expected to have a relatively higher potential to generate acid mine drainage) to support the geochemical investigation. A total of 15 soil borings were completed at AOCs 1, 2 and 5 to support geotechnical study.
2013	Vegetative Cover Pilot Study (AMEC, 2013a)	In August 2013, ABB submitted the Revised Vegetative Cover Study Pilot Work Plan for the Henry Knob Former Mine Site (AMEC, 2013a). This Work Plan outlined proposed pilot studies to be conducted to support a site-specific evaluation of constructing a vegetative cover over tailings to mitigate the tailings as a source of acid mine drainage. The initial study focused on evaluating establishing a vegetative cover at the Site in order to: (1) increase pH of the shallow tailings so that revegetation can occur; (2) reduce the amount of water that infiltrates and percolates through the tailings; and (3) mitigate the tailings as an acid mine drainage source to groundwater and surface water to meet surface water discharge requirements.

		Under the initial study vegetative cover pilot test areas were proposed at AOCs 1 and 3. The pilot test area at AOC 1 was approximately 100 feet by 100 feet and the pilot test area at AOC 3 extended across the unvegetated portions of AOC 3.
2013 – 2016	AOC 1 Ridge and Furrow Vegetative Cover Test Plot (AMEC, 2013b)	Construction of the AOC 1 Ridge and Furrow Revegetation Test Plot was completed in November 2013. This test plot was designed following the successful application of the technique to revegetate tailings areas at the Graves Mountain site in Lincoln County, Georgia. The AOC 1 Ridge and Furrow Revegetation Test Plot was monitored and maintained through the spring of 2016. In the summer of 2016 the AOC 1 Ridge and Furrow Revegetation Test Plot was abandoned due to lack of establishment of vegetation. Low precipitation and a lower depth to groundwater at the Henry Knob Site compared to the Graves Mountain site were identified as the primary factors contributing to the poor results.
2014	AOC 1 Standard Farming Test Plot (AMEC, 2014a and 2014e)	Based on the poor results of the AOC 1 Ridge and Furrow Revegetation Test Plot study, ABB submitted the AOC 1 Vegetative Cover Study Work Plan Addendum (AMEC, 2014a). The addendum proposed additional test plots at AOC 1 that included incorporating leaf compost, composted horse/turkey manure, wheat straw, hay mulch, lime, limestone, and fertilizer into the upper 18 inches of tailings to create a growth media for vegetation. These test plots were referred to as the Standard Farming Test Plots. Construction of the AOC 1 Standard Farming Test Plots was completed in October 2014 and was documented in the Construction Completion Report AOC 1 Vegetative Cover Study Addendum Test Plots (AMEC, 2014e). The AOC 1 Standard Farming Test Plots have been monitored and maintained since completion in 2014. The vegetative cover system is fully established and has not required any maintenance to date. Based on the success of the AOC 1 Standard Farming Test Plots, this revegetation approach was used in the design of full-scale interim actions at AOCs 1, 2, and 5.
2014	Regional and Telescoped Groundwater Modeling Report (AMEC, 2014b)	The Groundwater Modeling Report documented the regional and local (telescoped) groundwater flow and fate and transport modeling at the Site. The model developed for the Site had two objectives: 1) Site-wide modeling to evaluate the stability of groundwater impacts from cobalt and manganese; and 2) AOC specific modeling to evaluate fate and transport of pH impacts to surface water bodies. These models were used to further refine the extent of impacted groundwater at the Site and to evaluate potential remedial options. Modeling indicates that both cobalt and manganese plumes do not move significantly during the 30-year simulation time frame. Movement of these compounds is retarded due to their high pH dependent soil-water partition coefficient (Kd) at the Site. Additionally, analytical data indicates that cobalt and manganese may be present at naturally occurring levels above the cleanup level in areas that have not been impacted by acid mine drainage. Based on data from long-term water level monitoring, there appears to be some limited hydraulic connectivity between the surface water in the

		Mine Pit Pond and groundwater to the southwest of the Mine Pit Pond. To mitigate the low pH groundwater plume, this model was used to evaluate monitored natural attenuation (MNA) as a passive remedial alternative. The model results indicated that neither capping nor MNA were effective in mitigating the pH groundwater plume. The modeling of excavation with either onsite or offsite disposal showed significant reduction of groundwater impacts within 30 years but did not eliminate groundwater impacts. The modeling of establishment of a vegetative cover indicated a significant reduction in the horizontal extent of low pH groundwater at the Site within 30 years, comparable to the more invasive excavation alternatives. In addition, the modeling of a vegetative cover was predicted to result in groundwater directly adjacent to the East and the West tributaries with pH levels around or above 5.0 s.u. and a pH of 4.5 s.u. adjacent to the Allison Creek Tributary (south of AOC-3 and the Mine Pit Pond).
2014	Field Study Report (AMEC, 2014d)	The Field Study Report provided a summary of the investigation results pertaining to the physical characteristics of AOC 1 and AOC 2, Site-wide groundwater flow conditions, the extent and concentration of cobalt and manganese in the soil (including tailings) and groundwater, the chemical and geotechnical analyses of borehole soil samples, groundwater level data, hydraulic conductivity data, groundwater flow analysis, groundwater and surface water chemical analytical results, whole rock analytical results, and an overview of the pH-dependent Kd calculations for manganese and cobalt. This data, as well as data previously obtained from other investigations conducted at the Site, was used to formulate a Site-wide groundwater flow model and three AOC-specific flow and transport models. The data obtained was integrated into a numerical model to support further development and refinement of the conceptual site model (CSM) (see Section 5.1 of this IROD) and assess the impacts of potential remedial techniques being considered for the tailings areas at the Site.
2015 - 2016	AOC 1, AOC 2, and AOC 5 Dam Stability Evaluation (AMECFW, 2015c and 2016c)	In 2015 additional field investigations and stability evaluations were performed for AOCs 1, 2, and 5 in preparation of the design of interim actions under a phased approach to site remediation. The results of the evaluation for AOC 1 indicated that the dam is stable for most long-term static and seismic conditions. However, during times of elevated phreatic surface, where the groundwater table is above average conditions within the tailings, through the dam and at the toe of the dam, the AOC 1 dam did not meet the targeted factor of safety. The results of the evaluation for AOCs 2 and 5 indicated that the sections of the AOC 2 dams did not meet the targeted factor of safety for the long-term static case and/or the seismic case under existing conditions and that the AOC 5 dams met or exceeded the targeted factor of safety for the long-term static case and the seismic case at each section under existing conditions. Additionally, the presence of large trees and other heavily vegetation on the faces of the dams at AOCs 1, 2 and 5 represented potential hazards to the long-term stability of the

		dams. Because of these factors, improvements to stabilize the dams and/or reduce infiltration behind the dams were recommended.
2015 - 2017	Groundwater Monitoring (AmecFW, 2018a)	Quarterly groundwater and surface water monitoring was conducted from June 2015 to March 2017 in accordance with the Final Groundwater Monitoring Plan (AmecFW, 2015a). The objective of the groundwater and surface water sampling was to monitor groundwater plume stability in the impacted area, monitor surface water for chemicals of concern (COCs), and to monitor the effectiveness of wellhead treatment systems that have been installed in the impacted area in accordance with the EE/CA. The monitoring program identified a network of seven overburden wells and 25 bedrock wells as bounding wells used to delineate the extent of the area of groundwater impacted by mining operations. Groundwater elevations and groundwater flow are comparable to previous groundwater elevations and flow determined during previous phases of investigation. The network of seven overburden bounding monitoring wells show decreasing trends for cobalt and manganese. The 26 bedrock bounding wells (including residential wells that are assumed to be installed in bedrock) show decreasing trends for cobalt. With respect to manganese in this same group of 26 wells, there are three monitoring wells (BM-10-14, BM-10-19, and BM-10-22) and ten residential wells that show an increasing trend for manganese. Even though these wells show increasing trends, the historical concentrations are, with a few exceptions, significantly below the cleanup level for manganese. The distribution of cobalt, manganese, and sulfate in groundwater is similar to previous sampling events and the extent of distribution appears to be stable. Trend analysis shows upward trends for both cobalt and manganese at each of the four surface water locations sampled under the monitoring program.
2018	Mine Pit Water Evaluation (Wood, 2018)	To support the evaluation of remedial alternatives associated with the Mine Pit Pond, a report evaluating the Mine Pit Pond and mine influenced water contained in the pond was completed and submitted to the EPA (Wood, 2018). The report included evaluation of the impacts of the local and regional geology on water quality in the area of the Mine Pit, characterization of water and sediment within the Mine Pit, a watershed analysis and Mine Pit water balance determination, research on potential treatment options for mine influenced water, and proposed next steps for managing the water contained within the Mine Pit Pond. Observed concentrations of aluminum, cadmium, cobalt, copper, lead, manganese, nickel, selenium and zinc in surface water exceed South Carolina water quality standards and concentrations of iron and selenium in sediment exceed ecological risk-based levels. Groundwater quality in the immediate vicinity of the Mine Pit Pond is similar to that of the surface water in the pond. However, limited connectivity between the Mine Pit Pond and nearby groundwater supports the conclusion that the chemistry of groundwater in the area surrounding the mine pit (low pH and elevated concentration of metals) is driven predominantly by acid rock drainage associated

		with the groundwater interaction along the strike of the ore body as well as from the surrounding geology and is less attributable to the minimal seepage of the mine pit water to groundwater. With no surface water discharges from the Mine Pit Pond, limited connection of the Mine Pit Pond to groundwater, and the natural chemistry of groundwater in the area of the mine pit being driven predominantly by acid rock drainage, treatment of the water in the Mine Pit Pond is not expected to have a measurable effect on the downgradient groundwater quality.
2019	Feasibility Study (Wood, 2019)	The FS developed and evaluated remedial alternatives for shallow groundwater and the tailings/mine pit source areas associated with the Site. Remedial action alternatives were developed by assembling combinations of technologies into overall alternatives that addressed groundwater and source area contamination associated with the Site. A range of options were presented to address media posing unacceptable risks to human health and the environment. Remedial alternatives for groundwater included institutional controls (ICs), long term groundwater monitoring, monitored natural attenuation, installation of a permeable reactive barrier and groundwater extraction and treatment. Remedial alternatives for the tailings/mine pit source areas included ICs, monitoring and maintenance.

2.3.2 CERCLA Actions and Interim Actions

Non-Time Critical Removal Action - Due to the lack of community and public support for the preferred alternative in the Engineering Evaluation/Cost Analysis (EE/CA) to extend the public water supply, the EPA issued an Action Memorandum (USEPA, 2013) for installation of individual wellhead water treatment systems for affected residences as the selected removal action alternative for Non-Time Critical Removal Action (NTCRA) implementation.

Under the NTCRA 32 landowners with dwellings located within the area of groundwater impacted by mining operations were offered wellhead treatment systems to improve water quality. The NTCRA has resulted in the installation of 19 individual wellhead treatment systems to date and verification of an existing system at one residence. A treatment system was designed specifically for each residential well based on sampling results. A typical treatment system includes both pre- and post-filtration in conjunction with one or more of the following: neutralization, ion exchange, activated carbon, organic removal, reverse osmosis, and chemical injection to achieve the cleanup levels and RAOs as identified in the Action Memorandum. As required in the Action Memorandum, ABB performs ongoing O&M at the residences where the untreated water supply exceeds human health risk-based cleanup levels for cobalt and/or manganese (currently 3 of the 19 systems). O&M at residences where the untreated water supply is below cleanup levels is conducted by the homeowner. Bottled potable water is still supplied to two residents within the area of impacted groundwater, as these residents have elected to continue to receive bottled water in lieu of installing a wellhead treatment system.

Mine Pit Fence Installation - In April 2016, approximately 3,125 liner feet of six-foot high chain-link fence was installed around the perimeter of the Mine Pit. The fence was installed to mitigate physical hazards associated with the Mine Pit and restrict access to water in the Mine Pit Pond. The fence included installation of three access gates secured with a lock to allow for authorized access.

AOC 1 Interim Actions - The AOC 1 Rehabilitation Design Plan was submitted for regulatory review in December 2015 and approval followed in January 2016. Commencement of construction occurred on June 13, 2016 and the work was substantially completed on November 15, 2016. The construction was completed in accordance with the plans and technical specifications prepared by Amec Foster Wheeler (AmecFW, 2016a). Slight field adjustments were made to the location of installed drainage channels to improve constructability and minimize overall ground disturbances. Implementation of the AOC 1 Rehabilitation Design was conducted to reduce acid mine drainage to groundwater and surface water at the Site, to mitigate erosion, and improve stormwater drainage from AOC 1 to the West Tributary to the South Fork of Crowders Creek. The AOC 1 Rehabilitation included the following components: constructing dam stability improvements including, removal of existing woody vegetation, grading and armoring of the dam surface; constructing stormwater controls including grading and drainage improvements and permanent stabilization of channels; and constructing a vegetative cover on the AOC 1 tailings impoundment.

In December 2016, four inclinometer casings were installed at the base of the AOC 1 terminal dam to monitor potential movement of the underlying base soils. Movement of the base soils may be an indicator of deep-seated rotational failure that could be associated with potential failure of the dam. Periodic monitoring of the inclinometers is conducted as part of the post-completion monitoring program.

The interim actions completed at AOC 1 were documented in the Construction Completion Report and Post Completion Monitoring/Inspection Schedule (AmecFW, 2017a) and are illustrated on Figure 3.

AOC 2 Interim Actions - The AOC 2 Rehabilitation Design Plan was submitted for regulatory review in September 2016 and approval followed in October 2016. Commencement of construction occurred on November 16, 2016 and the work was substantially completed on May 12, 2017. The construction was completed in accordance with the plans and technical specifications prepared by Amec Foster Wheeler (AmecFW, 2016b). Implementation of the AOC 2 Rehabilitation Design was conducted to reduce acid mine drainage to groundwater and surface water at the Site, mitigate erosion, and improve stormwater drainage from AOC 2 to the East Tributary to the South Fork of Crowders Creek. The AOC 2 Rehabilitation included the following components: constructing dam stability improvements including, removal of existing woody vegetation, grading and armoring of the surface of the Intermediate Dam and Terminal Dam; constructing stormwater controls including grading and drainage improvements and permanent stabilization of channels; and constructing a vegetative cover on poorly vegetated and disturbed areas of the AOC 2 tailings impoundment.

In June 2017, seven inclinometer casings were installed at the AOC 2 dams to monitor potential movement of the underlying base soils. Two inclinometer casings were installed at the base and one inclinometer casing was installed at the crest of the AOC 2 terminal dam, and four inclinometer casings were installed at the base of the AOC 2 intermediate dam. Movement of the base soils may be an indicator of deep-seated rotational failure that could be associated with potential failure of the dam. Periodic monitoring of the inclinometers is conducted as part of the post-completion monitoring program.

The interim actions completed at AOC 2 were documented in the Construction Completion Report and Post Completion Monitoring/Inspection Schedule (AmecFW, 2017b) and are illustrated on Figure 3.

AOC 3 Vegetative Cover Remedy - The AOC 3 Vegetative Cover Design Plan was submitted for regulatory review in May 2014 and approval followed in June 2014 (AMEC. 2014c). Construction of

the AOC 3 vegetative cover remedy was completed in September 2015 AMECFW, 2015b). The work included installation of stormwater drainage controls within AOC 3 and along the northern side of State Highway 55 to mitigate erosion, consolidation of tailings, and establishment of vegetation over the AOC 3 tailings area to reduce acid mine drainage to groundwater and surface water at the Site (see Figure 3). The AOC 3 vegetative cover and stormwater controls have been monitored and maintained since completion in 2015. The vegetative cover system is fully established, and the stormwater drainage channel remains in good operating condition.

AOC 5 Interim Actions - The AOC 5 Rehabilitation Design Plan was submitted for regulatory review in April 2017 and approval followed in May 2017. Commencement of construction occurred on June 20, 2017 and the work was substantially completed on December 15, 2017. The construction was completed in accordance with the plans and technical specifications prepared by Amec Foster Wheeler, (AmecFW, 2017c). Implementation of the AOC 5 Rehabilitation Design was conducted to reduce acid mine drainage to groundwater and surface water at the Site, to mitigate erosion, and improve stormwater drainage from AOC 5 to the West Tributary to the South Fork of Crowders Creek. The AOC 5 Rehabilitation included the following components: constructing dam stability improvements including, removal of existing woody vegetation, grading and armoring of the surface of the AOC 5 North Dam and West Dam; constructing stormwater controls including grading and drainage improvements and permanent stabilization of channels; and constructing a vegetative cover on poorly vegetated and disturbed areas of the AOC 5 tailings impoundment.

During construction of a temporary access road from Henry Knob Road to AOC 5 an isolated area containing four buried 55-gallon metal drums was encountered. ABB notified the EPA and SCDHEC, and with their concurrence, the drum carcasses, non-hazardous drum contents, and associated impacted soils were characterized and disposed offsite at the Republic Charlotte Motor Speedway Landfill, Charlotte, North Carolina. Confirmatory soil samples were collected to demonstrate that soil impacted by the drum contents had been removed. During initial grading of AOC 5, remnants of a former silo structure located on the southeastern portion of the Site, adjacent to the former mill complex, were observed to be in very poor structural condition and presented a safety hazard. ABB notified the EPA and SCDHEC of the condition and approval to knock-down the remnants of the former silo structure was provided by the EPA.

Three inclinometer casings were installed at the base of the AOC 5 North Dam to monitor potential movement of the underlying base soils. Movement of the base soils may be an indicator of deep-seated rotational failure that could be associated with potential failure of the dam. Periodic monitoring of the inclinometers is conducted as part of the post-completion monitoring program.

The interim actions completed at AOC 5 were documented in the Construction Completion Report and Post Completion Monitoring/Inspection Schedule (AmecFW, 2018b) and are illustrated on Figure 3.

3.0 Community Participation

The EPA has conducted a range of community involvement activities to solicit community input and make sure the public remains informed about Site activities throughout the cleanup process. Outreach efforts have included public notices, interviews and information meetings.

The EPA relies heavily upon public meetings as a communication tool. The purpose of the public meeting is to present information to the audience, as well as receive information back from them. The EPA in conjunction with other members of the Site team have held the following meetings:

- On April 17, 2008, the EPA held a community meeting at the Bethany Elementary School in Clover. This meeting was convened to share information about Site activities, respond to citizens' questions and comments and to outline the next steps in the Superfund process.

- On June 5, 2012, the EPA held a community meeting at the Bethany Elementary School in Clover. This meeting was convened to share information about the NTCRA at the Site and to solicit comments regarding alternatives presented in the EE/CA.

- On October 21, 2014, the EPA held a community meeting at the Bethany Elementary School in Clover. This meeting was convened to share information on the installation of wellhead treatment systems and the cleanup work scheduled for the 2015 construction season.

- On June 7, 2016, the EPA held a community meeting at the Bethany Elementary School in Clover. This meeting was convened to provide an update on the status of the NTCRA wellhead treatment systems, the quarterly groundwater monitoring program, interim actions to address re-vegetative, storm water controls, dam rehabilitation and the tentative schedule for the Feasibility Study.

- On August 8, 2017, the EPA held a community meeting at the Bethany Elementary School in Clover. This meeting was convened to provide an update on the status of the wellhead treatment systems, groundwater monitoring program, continued actions to address re-vegetative storm water controls, dam rehabilitation and the Site's selection for the EPA Regional Site Reuse Award.

The public has been informed of the progress on the RI and FS and other Superfund actions through community notification flyers, presentations, and updates. The Proposed Plan for the Site was released for public comment on August 23, 2019. The Proposed Plan and other Site-related documents were made available to the public in the Administrate Record file maintained in the information repository located at the Clover Branch Library, 107 Knox Street, Clover, South Carolina 29710, and at the EPA Region 4 Superfund Records Center located at 61 Forsyth Street, Atlanta, Georgia. The notice of availability of these documents was published in the *Rock Hill Herald* on, August 23, 2019. A public comment period was held from August 23, 2019 to September 21, 2019.

A public meeting was held on August 29, 2019, at the Larne Building located at 103 Main Street, Clover, South Carolina, to discuss the findings of the RI and FS and to present the EPA's Proposed Plan to the community. At this meeting, the EPA representatives discussed the environmental impacts at the Henry's Knob Site, presented the details of the Proposed Plan, and answered questions regarding the preferred cleanup remedy. The EPA also used this meeting to solicit input from a wider cross-section of the community. Comments that were received by the EPA at the public meeting and in writing during the public comment period are summarized and addressed in the Responsiveness Summary (see Part 3 and Appendices B and C).

4.0 Scope and Role of the Response Action

The purpose of this interim action is to further evaluate the effectiveness of previously implemented source controls actions and natural attenuation processes in reducing contamination in the overburden groundwater zone, and to monitor the effects of that remediation on contamination within bedrock groundwater and impacts from groundwater discharge to surface water. Constituents detected in groundwater and surface water at and immediately downgradient of mine tailings areas are related to acid mine drainage that has been created by the weathering of naturally occurring iron sulfide minerals.

Acid mine drainage results from the interaction of mine waste materials with precipitation and the subsequent leaching of metals and inorganic constituents to groundwater and storm water run-off. Acid mine drainage impacts to the surface water bodies occur by overland flow and the infiltration of precipitation through mine wastes, and the subsequent migration and discharge of acid mine drainage-impacted groundwater to surface water. In addition to acid mine drainage, the groundwater and surface water in the vicinity of the Site are impacted by naturally occurring acid rock drainage resulting from the natural oxidation of iron sulfide minerals in bedrock.

The EPA, SCDHEC, and ABB are following a phased approach for remediation of the Site. The phased approach employs a step-wise design, implementation, and evaluation of technically appropriate, and cost-effective remedial actions. Evaluation of these actions will provide site-specific information to support the determination of final cleanup levels for the Site. The phased approach for this Site entails implementing remedial actions for tailings (source control) and stormwater management first and evaluating those remedial actions for improvements to downgradient surface and groundwater quality. This information will be used to determine the final cleanup levels and associated remedial actions for the Site. Interim actions for tailings (source control) and stormwater management have been implemented at several tailings areas and the former mill operations area. A fence was also installed around the Mine Pit as an interim action to restrict access. In addition, a NTCRA was implemented as a remedial measure to prevent the potable use of impacted groundwater from existing residential wells.

Based on completed interim source control actions and the NTCRA, as well as subsequent inspections and monitoring results, these response actions have: (1) partially addressed human and ecological exposure to contamination associated with the tailings areas and the Mine Pit Pond; and (2) are protective of human and ecological receptors in the short term. For these remedial actions to be protective in the long term, ICs are needed to: (1) prevent disturbance of the engineering components of the completed source control actions (i.e., the vegetative cover systems, stormwater channel controls, and dam stabilization and rip rap armoring) so they function as intended to mitigate leaching to groundwater and acid mine drainage-impacted groundwater discharges to surface water; and (2) to prevent uncontrolled access (i.e., Mine Pit fencing), controls to physical hazards; and (3) to restrict potable uses of untreated Site groundwater exceeding drinking water levels protective of human health. Implementation of these interim actions at Areas of Concern 1, 2, 3, and 5 mitigated impacts of acid mine drainage to surface water. However, on-going collection of surface water monitoring data will be used to determine whether additional remedial actions are needed to address ecological risk to surface water to ensure long-term protectiveness of ecological receptors. Surface water quality will be assessed by comparing against SCDHEC narrative and numeric Ambient Water Quality Criteria (AWQC) for the associated surface water use classification(s). Monitoring and maintenance of the previously completed response actions will continue pursuant to an EPA-approved O&M Plan, and the results will be used to verify that the response actions continue to be protective and effective.

At this time, a final Site groundwater and surface water remedy is deferred to permit further the EPA evaluation of the effectiveness of the completed source control actions and natural attenuation processes on reducing concentrations of contaminants within the overburden groundwater and to monitor the effects of that remediation on contamination within the bedrock groundwater zone and surface water. This phased approach is being used to further evaluate natural attenuation processes at the Site, develop Site groundwater background level data, and gather additional groundwater and surface water monitoring data. The outcome of this evaluation will be documented in an RI Report Addendum and/or an Appendix to the Feasibility Study Report as deemed necessary by the EPA prior to final remedy selection.

The Five-Year Review process (5 years of monitoring data) will be used to determine if natural attenuation processes are effective in reducing contamination in groundwater and surface water during the review period. While natural attenuation processes are expected to result in a reduction of contaminant concentrations during the review period, it may not be possible to attain final cleanup levels based upon chemical-specific applicable or relevant and appropriate requirements (ARARs) (i.e., SDWA MCLs, or risk-based drinking water concentrations, throughout the plume due to elevated background concentrations of certain contaminants and a TI Waiver Evaluation may be performed as appropriate prior to developing a final ROD. Under CERCLA Section 121(d)(4), compliance with ARARs such as MCLs may be waived when demonstrated that it is not practicable from an engineering perspective due to site conditions and/or limitations in technologies used to treat the contaminants.

5.0 Site Characteristics

5.1 Conceptual Site Model

The Conceptual Site Model (CSM) incorporates information on the potential chemical sources, affected media, release mechanisms, routes of migration, and known or potential human and ecological receptors. In this way, it illustrates the physical, chemical, and biological relationships between contaminant sources and affected resources.

The nature and extent of potential contaminants in soil, surface water, sediment, and groundwater were characterized through the RI process, as described in the 2011 RI Report, prior to completing the source control actions. Constituents detected in groundwater and surface water at and downgradient of AOCs 1, 2, 3 and 5 are related to acid mine drainage that has been created by the weathering of naturally occurring iron sulfide minerals in the tailings areas. The interaction of precipitation with the tailings and with the natural rock formation creates an acidic condition that has caused naturally occurring inorganic constituents such as aluminum, cobalt, iron, and manganese to be leached from tailings to groundwater, and migrate with groundwater flow impacting downgradient groundwater and surface water. Precipitation contacts tailings either via surface water run-on/run-off or infiltration through the tailings to groundwater. Groundwater flows radially from the Site in the overburden and bedrock, and discharges to the headwaters of the East and West Tributaries and the Allison Creek Tributary.

Acid mine drainage is a common environmental impact at former mining sites where iron sulfide minerals (principally pyrite) are present and exposed to water and oxygen (e.g., the atmosphere). The weathering of iron sulfides results in waters with low pH (acidity) and high concentrations of dissolved iron and sulfate. These acidic waters also promote the weathering of other rock forming minerals. The acid mine drainage impact to groundwater and surface waters is frequently associated with elevated concentrations of other rock forming elements, notably metals that were once part of the ore and host rock (Jennings, et al, June 2008). The rate of iron sulfide mineral oxidation and the generation of acid mine drainage are enhanced through mining and milling processes where oxidation reactions are initiated. Mining increases the exposed surface area of pyrite-bearing rocks allowing for excess acid generation beyond natural buffering capacities found in host rock and water resources. Since large masses of sulfide minerals are exposed quickly during the mining, milling, and residual management processes, the surrounding environment can often not attenuate the resulting low pH conditions.

Similar acid weathering conditions occur in the absence of mining operations from the oxidation of iron sulfide minerals from bedrock, most notably at and between the water table and land surface. This process is commonly referred to as acid rock drainage and is a recognized environmental condition regionally in the vicinity of the Site. Evidence of acid rock drainage, including exposed outcrops with weathered sulfide minerals and anomalously elevated metals in stream sediments, are present regionally

in the vicinity of the Site due to the geological features (aluminous quartzite containing large reserves of kyanite and smaller reserves of sillimanite) noted in the upper Battleground Formation of the Kings Mountain geological sequence in the Piedmont Physiographic Province.

The RI indicated that due to the geology of the area, metals appear to naturally occur in groundwater (acid rock drainage) and groundwater discharging to surface water in the Site area as well as numerous private water supply wells located outside of the Site boundary. In addition, some nearby wells appear to contain elevated metal concentrations associated with impacts from the Site (acid mine drainage). Using hydrogeological interpretation of groundwater flow, with data describing the groundwater, surface water, and sediment chemistry, the areas of groundwater that have been potentially affected by Site-related acid mine drainage have been identified and differentiated from groundwater affected by acid rock drainage.

Figures 4, 5 and 6 present the geologic map and cross-sections that depict the surface and groundwater flow conditions that characterize and support the CSM.

Based on the current CSM and factors that affect the fate and transport of metals and attenuation of acidity or pH, the following bullets summarize the factors controlling acid mine drainage impacts related to operations at the former mine Site:

- The tailings impoundments are the primary continuing sources of acid mine drainage and affect overburden and bedrock groundwater that discharges to the West and East Tributaries to South Fork of Crowders Creek and Allison Creek Tributary.
- Groundwater is not present in the overburden in the immediate vicinity of the Mine Pit Pond, however the Mine Pit Pond may provide some limited recharge to bedrock groundwater and is a potential source of acid mine drainage.
- The extent of groundwater impact and locations where surface water is impacted have been delineated and are expected to remain stable.

5.2 Geologic, Hydrogeologic, and Topographic Information

Henry's Knob itself is a small isolated conical hill located in York County, South Carolina. The crest of the knob stood approximately 340 feet above the surrounding Piedmont surface prior to mining activities (USGS, 1960). Henry's Knob currently stands approximately 260 feet (1,120 feet mean sea level) above the surrounding area (1,040 to about 1,080 feet mean sea level). The central portion of the Henry's Knob, striking generally north 30 degrees east, was excavated during mining of the kyanite quartzite ore body that occurred at the Site. The mined area is approximately 500 feet in width and 1,500 feet in length. Waste rock from the excavated area was deposited around the flanks of the excavation in large piles. The kyanite quartzite ore was processed to extract the kyanite. Following the processing, tailings comprised mostly of sands and fine materials (silts and clays) was discharged into ponds/holding areas located on the western flank of the Henry's Knob (AOC # 2, and #5). As mining continued, additional sediments were discharged into and existing creek bed just to the west of Henry Knob Road (AOC #1). This area was dammed in two separate areas along the existing creek and was eventually completely filled with sediments/tailings. Site topography is presented on Figure 4.

The Piedmont surface surrounding Henry's Knob is comprised of primarily open land consisting of a mix of agricultural and rural residential land use. The two main drainage features in this area are the South Fork of Crowders Creek, located north of Highway 55, and Allison Creek, located south of

Highway 55. Several small tributaries head water in the area of the Site and flow north into the South Fork of Crowders Creek or south into Allison Creek.

Highway 55, which generally trends east-west along the southern boundary of the Site, is located on a ridge that creates a local watershed basin divide. The area north of Highway 55, including the Site, is located within the Crowders Creek drainage basin, which discharges to Catawba River/Lake Wylie located northeast of the Site. Precipitation that falls north of Highway 55 results in overland sheet flow, directed by surface topography to several unnamed tributaries to the South Fork of Crowders Creek, which is a tributary to Crowders Creek. Crowders Creek generally flows west to east and is located approximately one-mile north of the Site. Precipitation that falls south of Highway 55 results in overland sheet flow directed by surface topography to several unnamed tributaries to Allison Creek. Allison Creek generally flows west to east and is located approximately one mile south of the Site.

Precipitation runoff at the Site is dominated by Henry's Knob, which directs runoff radially to tributaries that flow generally northward to the South Fork of Crowders Creek. The East Tributary to the South Fork of Crowders Creek headwaters just to the north of the Site at the end of AOC #2. To the west of Henry Knob Road is the West Tributary to the South Fork of Crowders Creek which headwaters at the end of AOC #1. Just to the west of the West Tributary to the South Fork of Crowders Creek across a low ridge line is Amy's Tributary. Amy's Tributary headwaters near the intersection of Highway 55 and Highway 161 and runs generally northward into the South Fork of Crowders Creek.

Both the East and West Tributaries appear to receive groundwater discharge emanating from the AOC where they headwater. Surface water flow and sediment transport from AOC #5 and AOC #1 primarily discharge to the West Tributary to the South Fork of Crowders Creek with only minor flow components from AOC #5 flowing out to AOC #2 and the East Tributary and southward into AOC #3 and the eastern headwater channel of the second order tributary to Allison Creek. Surface water flow and sediment transport from AOC #2 discharges to the East Tributary to the South Fork of Crowders Creek. Sediment and surface water discharge from this area appears to be greatly reduced due to generally well-established vegetation that covers this AOC. Sediment and surface water discharge from AOC #8, located along the northwestern rim of the Knob, appears to flow primarily into AOC #2 with only minor flow going towards AOC #5. As with AOC #2, sediment and surface water discharge from AOC #8 appears to be greatly reduced due to generally well-established vegetation that covers this AOC.

In the Piedmont Physiographic Province, groundwater is present in both the fractured bedrock and the overlying saprolite. Typically, groundwater moves through the preferential pathways created by fractures and foliation within the bedrock as well as through the relic bedrock structure within the overburden (saprolite). The bedrock, with increased depth, commonly displays decreased fracturing. In this event, the deeper bedrock can yield minimal flow through the matrix of the rock. The shallow bedrock and overlying saprolite unit tend to act as a single aquifer. While flow in the saprolite occurs along relic fracture and jointing features, a significant portion of groundwater flow in the saprolite is also directly through the soil matrix. It is common in the Piedmont for the shallow bedrock to have a transition zone. This is a portion of the bedrock where the underlying bedrock "transitions" into the saprolite. It is common for this subsurface unit to represent a zone of increased permeability and a preferential unit for groundwater migration.

Typically, shallow groundwater movement within the Piedmont mimics the surface topography. In general, groundwater moves from topographic high areas flowing toward topographic low areas discharging into creeks, lowlands, and drainage swales.

5.3 Sampling Strategy

Multi-media sampling was guided by the CSM that was refined as understanding of the Site increased over time. Samples were collected and evaluated to determine the nature and extent of soil, sediment, surface water and groundwater contamination, support assessment of risks, improve hydrogeologic understanding, and evaluate potential remedy alternatives, including treatment options.

The RI data were collected in three steps in accordance with work plans for the Step 1, Step 2, and Step 3 RI investigations that were completed between 2005 and 2010 (MACTEC, 2011a). Site characterization consisted of a review of previous reports, a review of available literature and references, and collection of surface soil, sediment, surface water, and groundwater samples for laboratory chemical analysis.

Samples used for the Site characterization included:

- Surface soil (both on Site and background), sediment, and surface water samples collected from each area of concern during the Step 1 field investigation.
- Groundwater samples from monitoring wells installed in or near the AOCs (including one background monitoring well pair) and a limited number of residential wells, surface soil samples, sediment samples, and surface water samples collected during the Step 2 field investigation.
- Groundwater samples collected from monitoring wells and residential wells, and surface soil samples and surface water samples collected during the first phase of the Step 3 field investigation.
- Groundwater samples collected from monitoring wells and residential wells and surface water samples collected during the second phase of the Step 3 field investigation.
- Soil, surface water, and sediment samples collected as a part of the baseline ecological risk assessment.

Details of the findings from the RI performed from 2005 to 2010 are included in the RI Report (MACTEC, 2011a).

5.4 Known or Suspected Sources of Contamination

One of the sources of constituents detected in these media is related to acid mine drainage that has been created by the weathering of naturally occurring iron sulfide minerals in the waste rock and tailings areas. Acid mine drainage has created an acidic condition (generally with pH ranging from 2.5 standard units (s.u.) to 4.5 s.u.) that has caused naturally occurring inorganic constituents such as aluminum, cobalt, iron, and manganese to be leached from soil to groundwater, and migrate with groundwater flow. Groundwater flows radially from the Site in the overburden and bedrock, and discharges to the headwaters of the East and West Tributaries, with only minor flow components southward into AOC 3 and the Allison Creek Tributary.

Similar acid weathering conditions occur in the absence of mining operations from the oxidation of iron sulfide minerals in bedrock, most notably at and between the water table and land surface. This process is commonly referred to as acid rock drainage. Evidence of acid rock drainage is present at the Site, including exposed outcrops with weathered sulfide minerals and anomalously elevated metals in stream

sediments. These naturally occurring acid rock drainage impacts are all tools used by mineral exploration geologist to locate sulfide based mineral deposits (similar to the deposits surrounding the Site).

The primary sources of contamination include:

- AOC 1 (West Tailings Ponds),
- AOC 2 (North Tailings Ponds),
- AOC 3 (Former Mill Operations Buildings), and
- AOC 5 (East Tailings Ponds)

There are areas both inside and outside the Site boundary where the naturally occurring bedrock, depending on its geology, is a source of acid rock drainage. Naturally occurring bedrock that contains kyanite quartzite is present in the remnants of the mined kyanite quartzite ore body and as an outlier kyanite quartzite formation located northwest of the mined ore body.

5.5 Nature and Extent of Contamination

This section presents a summary of the nature and extent of contamination at the Site based on the data and analyses presented in the 2011 RI Report and subsequent studies prior to implementing source control actions. While the focus of this section is on groundwater, a general description of soil, surface water and sediment is included to provide an overall summary of the nature and extent of contamination at the Site.

The primary environmental impacts attributed to the Site have been identified to be from acid mine drainage, resulting from the interaction of mine waste materials with precipitation and the subsequent leaching of metals and inorganic constituents to groundwater and storm water run-off. Acid mine drainage impacts to the surface water bodies occur by overland flow and the infiltration of precipitation through mine wastes, and the subsequent migration and discharge of acid mine drainage-impacted groundwater to surface water. Acid mine drainage-impacts to groundwater and surface water were delineated in the RI. In addition to acid mine drainage, the groundwater and surface water in the vicinity of the Site are impacted by naturally occurring acid rock drainage resulting from the natural oxidation of iron sulfide minerals in bedrock.

The nature and distribution of potential contaminants in soil, surface water, sediment, and groundwater were characterized and described in the RI Report (MACTEC, 2011a). Tables 1, 2, and 3 present the occurrence, distribution and selection of the COCs in groundwater, surface water and sediment, respectively. One of the sources of constituents detected in these media is related to Acid mine drainage that has been created by the weathering of naturally occurring iron sulfide minerals in the waste rock and tailings areas. Acid mine drainage has created an acidic condition (generally with pH ranging from 2.5 standard units (s.u.) to 4.5 s.u.) that has caused naturally occurring inorganic constituents such as aluminum, cobalt, iron, and manganese to leach from soil to groundwater and migrate with groundwater flow. Groundwater flows radially from the Site in the overburden and bedrock, and discharges to the headwaters of the East and West Tributaries, with only minor flow components southward into AOC 3 and the Allison Creek Tributary.

Similar acid weathering conditions occur in the absence of mining operations from the oxidation of pyrite from in-place bedrock, most notably at and between the water table and land surface. This process is commonly referred to as acid rock drainage. Evidence of acid rock drainage is present at the Site, including exposed outcrops with weathered sulfide minerals and anomalously elevated metals in stream sediments. These naturally occurring acid rock drainage impacts are all tools used by mineral exploration geologist to locate sulfide-based mineral deposits (similar to the deposits surrounding the Site).

The RI indicated that due to the geology of the area, metals naturally occur in groundwater in the Site area as well as some residential water supply wells located outside of the Site boundary. Using hydrogeological interpretation of groundwater flow, with data describing the groundwater, surface water, and sediment chemistry, the extent of the media that have been potentially affected by Site-related acid mine drainage has been evaluated. As described in the RI, groundwater impacts are bounded by monitoring wells or private water supply wells where the groundwater samples indicate the absence of elevated metals above the EPA Regional Screening Levels (in effect at the time of the 2011 RI) and the geochemical signatures of the groundwater do not indicate impacts of acid mine drainage. The area of groundwater that has the potential to be affected by acid mine drainage (i.e., the area of groundwater potentially impacted by mining operations) extends beyond the 185-acre Site proper and is depicted by the Impacted Groundwater Bounding Line shown on Figure 7.

The groundwater COCs at the Site are metals and other inorganic compounds mobilized by past mining practices that resulted in acid mine drainage. Groundwater and surface water samples generated during this interim action are not expected to contain RCRA listed wastes. No RCRA listed wastes from non-specific industry sources (i.e., F-list wastes), industry specific sectors (i.e, K-list wastes), or P/U-list hazardous wastes from discarded commercial chemical products have been observed in Site groundwater. No soil generation or disposal activities are planned as part of the selected interim remedy.

5.5.1 Soil Contamination

Soil samples were collected to characterize the naturally-occurring background concentrations of constituents in soil as well as from specific AOCs identified at the Site. A statistical difference in the composition of background soil samples collected from the mineralized zone (soils weathered from kyanite quartzite) and the non-mineralized zone (soils weathered from other geological formations) was not identified. Therefore, the background soil samples were considered as one data set.

Kyanite quartzite and white mica schist, based on their mineralogy, contain abundant amounts of aluminum and iron. Aluminum and iron concentrations are not particularly elevated in AOC soils when compared to background soils. Therefore, elevated aluminum or iron concentrations can occur outside of the Site boundaries. Manganese is present in background soils that are not associated with the mine or mining operations. The highest concentration of manganese detected in soils was in a background sample from the non-mineralized zone. Manganese concentrations appear to be higher in the non-mineralized zone soils when compared to the mineralized zone soils or AOC soils. Therefore, elevated manganese concentrations occur outside of the Site boundaries. A detailed discussion of Site background determination was included in the Step 1 Technical Memorandum (presented in the RI Report, Appendix B).

During the limited geochemical investigation performed in June 2012, average paste pH values of tailings samples were found to be in the range of 2.9 to 3.8 s.u. The tailings samples were determined to predominantly be potentially acid generating, which indicates that the tailings have the potential to produce acidic drainage. The southern portion of AOC 1 was found to have elevated potential for acid

generation and metal leaching. The study also concluded that the watershed catchment inclusive of AOC 1 and AOC 5 contributes the majority of surface water acid mine drainage loadings to the environment. Based on results of acid base accounting and paste pH data collected during the RI, waste rock (AOC 8 and AOC 9) exhibited minimal potential for acid generation and therefore is not considered to be a significant source of acid mine drainage.

5.5.2 Groundwater Contamination

During the RI, an overburden monitoring well (OM-10-10) and a bedrock monitoring well (BM-10-10) were installed southwest of the Site near the mineralized zone to allow the collection of background or reference groundwater samples from similar portions of the aquifer as the onsite wells installed at the Mine Pit Pond. Metals appear to naturally occur in groundwater in the vicinity of the Site as evidenced by groundwater monitoring results from the background monitoring well pair OM-10-10 and BM-10-10 as well as numerous private water supply wells located outside of the Site boundary. This is attributed to the natural occurring acid rock drainage observed regionally as a result of the regional geology and not specifically related to former mining operations (acid mine drainage).

Weathering of minerals that were mined as part of the ore materials (e.g., the tailings impoundments) resulted in leaching of dissolved constituents to underlying groundwater These weathering processes result in the long-term generation of acidic waters enriched in iron, sulfate, aluminum, manganese, and trace metals and is referred to as acid mine drainage or acid mine drainage impacts. As a result of acid mine drainage, mobilization and leaching of the naturally-occurring metals in soil to groundwater is accelerated within the tailings areas resulting in elevated concentrations of metals above what may normally be considered background. Acid mine drainage also contributed to elevated concentrations of sulfate and acidity in groundwater within the Site boundary. Geochemical processes that contribute to acid mine drainage and the fate and transport of Site-related constituents are summarized below.

Both monitoring wells and residential wells sampled after the start of the Step 3 RI investigation were sampled for geochemical parameters as well as total and or dissolved metals. The geochemical parameters consisted of major anions (bicarbonate, chloride, and sulfate), major cations (calcium, magnesium, sodium, and potassium), ferrous iron, ferric iron, sulfide, acidity, and total alkalinity.

Analyte composition and anion-cation balances for these geochemical parameters or indicator data were used to generate Stiff diagrams in the RI. These diagrams were used to describe and compare geochemical differences in groundwater based on charge balances of the cation and anion species by calculating and plotting equivalent charge concentrations in milliequivalents per liter (meq/L). The purpose of generating the Stiff diagrams is to illustrate any common characteristics of the plotted ions in groundwater. Patterns in Stiff diagrams are useful in making a rapid visual comparison of geochemical data and allow discrimination between water from different sources.

The geochemical signature of mine impacted groundwater (acid mine drainage) as well as naturally occurring groundwater from the kyanite quartzite ore body and surrounding country rock (acid rock drainage) indicates a charge imbalance that is skewed toward high sulfate concentrations (relative to the cations) and depleted bicarbonate (due to acidity) consistent with geochemical processes responsible for acid mine drainage and acid rock drainage. However, since there are other cations present in the groundwater samples at relatively high concentrations (e.g., aluminum, iron, and manganese), the groundwater samples are somewhat charge balanced. The predominance of potassium and sodium in some samples is likely a function of the natural geology. The presence of potassium- and sodium-bearing minerals in the geologic formations at the Site (e.g., sericite, muscovite, biotite and plagioclase) tends to result in these elements being released during the weathering process. The Stiff

diagrams corroborate the nature and distribution of groundwater impacts in both the overburden and bedrock groundwater systems as discussed in the RI. The Stiff diagrams from the RI are presented on Figures 8 and 9, respectively, for the overburden and bedrock monitoring wells. The Stiff diagram evaluation indicated that groundwater with high sulfate concentrations (meq/L) resulted in a "pennant" shape that is consistent with groundwater that had been impacted by acid mine drainage from the tailings (e.g., monitoring wells OM-10-04 on Figure 8 and BM-10-01 on Figure 9) or groundwater impacted by acid rock drainage due to the natural geology of the bedrock (e.g., monitoring wells OM-10-07 and OM-10-13 on Figure 8 and BM-10-05, BM-10-06, and BM-10-07 on Figure 9). Where sulfate concentrations (meq/L) are not elevated, the "pennant" shape of the Stiff diagram was not observed, and the groundwater was interpreted to not have been impacted by acid mine drainage (e.g., monitoring wells OM-10-19 on Figure 8 and BM-10-19 on Figure 9). Generally, groundwater impacted by acid rock drainage has a higher pH and lower acidity than groundwater impacted by acid mine drainage.

The most significant acid mine drainage impacts to groundwater are observed immediately downgradient of AOC 3 and the tailings areas (AOCs 1, 2 and 5), and the acid mine drainage impacts generally attenuate with increasing distance from the AOCs. Figure 7 which shows the groundwater and surface water sample locations, depicts the area of groundwater that has the potential to be impacted by mining operations at the Site. Figures 10 and 11 depict the overburden and bedrock water table elevation contours based on the 2018 monitoring event conducted in November/December 2018 (4Q18). Tables 4 and 5 summarize groundwater data for cobalt and manganese within the vicinity of the Site for residential wells, overburden monitoring wells and bedrock monitoring wells, respectively, as of 4Q18. On-going collection of groundwater monitoring data during the next five years will include sampling for all groundwater COCs identified in Table 1 to address the scope and purpose of this interim action to further evaluate the effectiveness of previously implemented source controls actions and natural attenuation processes in reducing contamination in the overburden groundwater zone, and to monitor the effects of that remediation on contamination within bedrock groundwater, and impacts from groundwater discharge to surface water.

As noted in the RI, groundwater acidity concentrations within the overburden are the greatest at AOC 2 and AOC 5. Acidity concentrations appear to decrease by an order of magnitude within a few hundred feet of these AOCs, which indicates that natural attenuation processes may be limiting the lateral migration of acid mine drainage-impacted groundwater. The attenuation of acidity in groundwater is a function of advective transport, dispersion, dilution, mixing with groundwater with limited neutralization capacity, and reactive transport processes. In the bedrock, acidity concentrations are generally lower than in the overburden and suggest that acid rock drainage is the dominant process in the bedrock.

Bedrock groundwater along the East Tributary drainage does not appear to be significantly acidic, which indicates that natural attenuation processes are occurring as overburden groundwater migrates downward to recharge groundwater in the underlying aquifer. Groundwater in the overburden and bedrock is impacted by acidity, to a lesser extent, near the headwaters of the Allison Creek Tributary. Acidity concentrations near the headwaters of Allison Creek Tributary also decrease by an order of magnitude over a distance of several hundred feet, indicating that natural attenuation processes are effective at providing some neutralization of impacted groundwater as it migrates away from the source areas.

The lateral distribution of sulfate concentrations in overburden groundwater is similar to isoconcentrations of acidity observed in overburden groundwater and decrease by one or more orders of magnitude over a distance of a few hundred feet from the source areas. The higher concentrations of

sulfate in overburden are in or downgradient from AOC 1, AOC 2, AOC 3, and AOC 5. The lateral extent of sulfate-impacted groundwater in bedrock generally resembles the lateral extent of sulfate-impacted overburden groundwater, with the exception that the concentrations are generally lower, indicating that sulfate-impacted groundwater in the bedrock groundwater is likely a function of acid rock drainage.

The spatial distribution of cobalt and manganese (identified as COCs in the Human Health Risk Assessment; see Section 7.1) in overburden and bedrock groundwater resemble the patterns observed for acidity and sulfate but with more limited geographic extents that are more closely confined to the AOC 1, 2, 3, and 5 source areas. In monitoring wells located farther away from the tailings/waste rock areas or the Mine Pit, concentrations of metals and evidence of acid mine drainage impacts decrease to the point where the impacts were not observed which indicates that natural attenuation processes are occurring.

Figures 12 through 17 present concentration contour maps for sulfate, cobalt, and manganese in the overburden and bedrock groundwater based on data collected from the 4Q18 monitoring event. Contour lines for sulfate, cobalt, and manganese (corresponding to 100 µg/L, 4.7 µg/L, and 320 µg/L, respectively) shown on these figures exceed the impacted groundwater bounding line and/or the 250-foot buffer. As discussed previously, on-going collection of groundwater monitoring data during the next five years will be used to further evaluate the effectiveness of previously implemented source controls actions and natural attenuation processes in reducing contamination in the overburden groundwater zone, and to monitor the effects of that remediation on contamination within bedrock groundwater.

Because tailings are composed of fine to coarse sand-sized material with little clay- and silt-sized particles and are generally more transmissive than surrounding native soils, precipitation or runoff onto the tailings areas tends to infiltrate rather than runoff. Infiltration of precipitation through tailings is a source of acid mine drainage impacts to groundwater. Acid mine drainage-impacted groundwater from AOC 1 and a portion of AOC 5 flows toward the West Tributary of South Fork of Crowders Creek, acid mine drainage-impacted groundwater from AOC 2 and a portion of AOC 5 flows toward the East Tributary of South Fork of Crowders Creek, and acid mine drainage-impacted groundwater from AOC 3 and a portion of AOC 5 flows toward the headwaters to Allison Creek Tributary.

5.5.3 Surface Water Contamination

Geochemical comparisons of surface water quality were conducted to determine which surface water bodies were affected by acid mine drainage impacts at the Site. The surface water acid mine drainage impacts associated with infiltration of precipitation through mine impacted lands and waste materials, and the subsequent migration and discharge of impacted overburden and bedrock groundwater is restricted to the headwaters of West Tributary, East Tributary, and Allison Creek Tributary. The geochemistry of the Amy's Tributary surface waters, and groundwater flow conditions indicate that acid rock drainage, and not acid mine drainage, may account for the water quality impacts in Amy's Tributary. The South Fork of Crowders Creek is the receiving water body for the West Tributary and the East Tributary as well as Amy's Tributary.

Detailed discussions of the surface water quality for each of the streams are presented in the RI Report. Table 2 summarizes the occurrence and distribution, of COCs in surface water based on the data presented in the RI Report. Surface water quality data for the four locations sampled as part of the Final Groundwater Monitoring Plan in 4Q18 are summarized on Table 6. Total aluminum concentrations ranged from 9.9 mg/L to 32 mg/L and pH ranged from 3.13 to 4.46 s.u. Total cobalt concentrations ranged from 0.049 to 2.1 mg/L and total manganese concentrations ranged from 0.8 to 94 mg/L. These

results from 4Q18 exceed two times background and are consistent with concentrations presented in the RI Report (MACTEC, 2011a). On-going collection of surface water monitoring data during the next five years will include sampling for all surface water COCs identified in Table 2 to address the scope and purpose of this interim action to further evaluate the effectiveness of previously implemented source controls actions and natural attenuation processes in reducing contamination in the overburden groundwater zone and to monitor the effects of that remediation on impacts from groundwater discharge to surface water.

At AOCs 1, 2, and 5, precipitation that does not infiltrate into tailings results in stormwater runoff and overland flow to surface drainages, as evidenced by erosional features present at the Site. Acid mine drainage-impacted groundwater discharges to the surface water bodies impacting surface water quality.

5.5.4 Sediment Contamination

Sediment analytical results indicate the presence of aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium manganese, nickel, potassium, selenium, silver, thallium, vanadium, and zinc at levels that exceeded two times background in one or more samples. Table 3 summarizes the occurrence and distribution, of COCs in sediment based on the data presented in the RI Report. A discussion of the nature and extent of mine-impacted sediment for each surface water body is presented in the following sections.

Mine Pit Pond - The sediments in the Mine Pit Pond are contained within the excavated kyanite quartzite ore body. Concentrations of aluminum, arsenic, barium, copper, iron, lead, nickel, selenium, thallium, vanadium, and zinc exceed two times background in one or more samples.

East Tributary -The headwaters of the East Tributary are located downstream from the dam at AOC #2 and groundwater from beneath AOC #2 discharges to the headwaters. Concentrations of aluminum, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, thallium, vanadium, and zinc exceed two times background in one or more samples. Concentrations of cadmium, mercury, nickel, and thallium that exceed two times background were only detected in one sample collected in November 2005 (SD-06-02). Table 3 summarizes the occurrence and distribution, of COCs in East Tributary sediment based on the data presented in the RI Report and compares concentrations to risk-based screening levels for sediment. Using the July 2007 data set from the headwaters to the confluence with SFCC, a consistent pattern of declining constituent concentrations was not observed for all analytes as was the case at the West Tributary. Concentrations of aluminum, barium, cobalt, and zinc generally show a decreasing pattern downstream. Concentrations of arsenic, chromium, iron, manganese, selenium, and vanadium are relatively constant. Copper and lead concentrations decrease at all locations except location SD-06-13 where concentrations increase. The subtle differences in the concentrations and patterns in concentration between West and East Tributary are likely to be a function of hydrology and stream morphology and resulting differences in depositional environments. From a general geochemical perspective, the precipitation reactions and sorption of metals to reactive oxide surfaces in both streams are expected to be similar.

West Tributary - The headwaters of the West Tributary are located downstream from the dam at AOC #1 and groundwater from beneath AOC #1 discharges to the headwaters. Concentrations of aluminum, arsenic, barium, chromium, cobalt, copper, iron, lead, manganese, selenium, thallium, vanadium, and zinc exceed two times background in one or more samples. Table 3 summarizes the occurrence and distribution, of COCs in West Tributary sediment based on the data presented in the RI Report and compares concentrations to risk-based screening levels for sediment. Using the July 2007 data set from the headwaters to the confluence with SFCC (July 2007), concentrations of constituents in sediments

generally decrease progressively downstream. Other than aluminum and copper, the other constituents are below two times background below sample location SD-06-11.

Amy's Tributary - Amy's Tributary is in a drainage basin to the west of the West Tributary and discharges to the SFCC upstream from the West Tributary's confluence with SFCC. The headwaters of Amy's Tributary are not located adjacent to any areas of mining operations or residuals and are not expected to receive groundwater discharge from the Site. Concentrations of aluminum, barium, cobalt, copper, iron, manganese, selenium, vanadium, and zinc exceed two times background in one or more samples. Concentrations of aluminum, barium, cobalt, iron, manganese, vanadium, and zinc were detected at two times background only in the most upstream two sample locations (SD-06-59 and SD-06-58). Concentrations of copper decrease downstream to the confluence with SFCC. Concentrations of selenium generally increase downstream to the confluence with SFCC.

South Fork of Crowders Creek - The section of South Fork of Crowders Creek downstream from the background area of South Fork of Crowders Creek i.e., downstream from the confluence with Amy's Tributary) is the receiving water body from surface waters in Amy's Tributary, West Tributary, and East Tributary. Concentrations of aluminum, chromium, cobalt, copper, iron, lead, manganese, nickel, selenium, thallium, and vanadium exceed two times background in one or more samples. Iron, nickel, selenium, and thallium that exceed two times background were only detected in the November 2005 samples (SD-06-03 through SD-06-05). Table 3 summarizes the occurrence and distribution, of COCs in SFCC sediment based on the data presented in the RI Report and compares concentrations to risk-based screening levels for sediment. Using the September 2008 data set from just below the confluence with West Tributary to below the confluence with East Tributary, concentrations of aluminum, chromium, lead and vanadium only exceed two times background in the sample immediately downstream from the confluence of West Tributary (SD-06-47) and are below two times background for the remainder of the section of SFCC sampled. Cobalt, copper, and manganese concentrations show a decreasing pattern from the confluence of the West Tributary and then an increasing pattern below the confluence with East Tributary.

Allison Creek Tributary - The eastern headwaters of Allison Creek Tributary are located down slope from AOC #3 and AOC #9 and groundwater from beneath AOC #3 and AOC #9 discharges to the headwaters. There are three headwater channels to the main Allison Creek Tributary channel: the Eastern Headwater Channel, the Central Headwaters Channel, and the Western Headwater Channel. Concentrations of aluminum, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, nickel, selenium, vanadium, and zinc were detected at a concentration two times background in one or more samples from the headwater channels and the main Allison Creek Tributary channel. Table 3 summarizes the occurrence and distribution, of COCs in Allison Creek Tributary sediment based on the data presented in the RI Report and compares concentrations to risk-based screening levels for sediment. Arsenic was only detected at a concentration that exceeded two times background in one sample collected from the Eastern Headwater Channel in June 2007. Barium and cadmium were only detected at a concentration greater than two times background in the Eastern Headwater Channel. Aluminum, cobalt, lead, nickel, and zinc were only detected exceeding two times background in the Eastern Headwater Channel and the main Allison Creek Tributary channel. Chromium, manganese, and vanadium were only detected exceeding two times background in the Western Headwater Channel and the main Allison Creek Tributary channel. Copper, iron, and selenium were detected exceeding two times background in all the headwater channels and the main Allison Creek Tributary channel. In the main Allison Creek Tributary channel, the concentrations of cobalt and manganese were relatively consistent throughout the channel. The concentrations of lead, selenium, and zinc decreased downstream. The concentrations of aluminum, chromium, copper, iron, nickel, and

vanadium generally decreased downstream with the exception of the last downstream sampling location (SD-06-19) where concentrations increased.

5.6 Contaminant Fate and Transport

The environmental fate and transport of contaminants is controlled by the physical and chemical properties of the contaminants and by the physical, chemical, and biological processes that occur in the environment where the contaminant exists. The identification and understanding of environmental fate and transport mechanisms is basic to making rational decisions about the potential for human and ecological receptor exposure risk and about the effectiveness of remedial alternatives. Examples of contaminant properties that affect fate and transport include water solubility, density or specific gravity, particle size (for solids), and vapor pressure. Examples of environmental processes affecting contaminant fate and transport include wind and water erosion and deposition, chemical sorption and desorption, chemical degradation, biodegradation, and food chain transport/accumulation. These contaminant properties and environmental processes combine to affect contaminant fate (persistence), transport (advection, dilution, diffusion, dispersion, volatilization), and availability for exposure to receptors.

Due to the large areas of tailings at the Site, wind erosion and transport was investigated to identify if there were human health or ecological risks associated with potential airborne dusts from the tailings. Potential for ambient air quality impacts from the Site were evaluated using the EPA AERMOD dispersion model (version 09292). The model examined ambient impacts of fugitive dust emissions from the tailings areas. The results of the dust modeling were used in the human health risk assessment to develop exposure point concentrations and calculate health risks associated with potential dust inhalation exposures by the receptors evaluated in the human health risk assessment. The human health and ecological risk assessments concluded there is no unacceptable human health or ecological risk for exposure to dust or soils. Overall, wind erosion and transport was determined not to pose unacceptable risk at the Site and is not a significant transport mechanism in terms of acid mine drainage generation. Therefore, this transport mechanism is not discussed further in this report.

The primary fate and transport processes resulting in environmental impacts from the Site are a result of precipitation and the subsequent AMD and ARD produced. There are four commonly accepted chemical reactions that describe the chemistry of pyrite (FeS_2) weathering to form AMD/ARD. An overall summary reaction is as follows:

$$4\ FeS_2 + 15\ O_2 + 14\ H_2O \rightarrow 4\ Fe(OH)_3\ (s)\downarrow + 8\ H_2SO_4$$

Pyrite + Oxygen + Water → "Yellowboy" + Sulfuric Acid

It is common at acid mine drainage-affected sites for the groundwater enriched in ferrous iron that discharges to surface water bodies to result in the precipitation and deposition of ferric oxyhydroxides known as "yellowboy". This overall summary equation greatly simplifies the geochemical processes responsible for acid mine drainage but highlights the importance of oxygen, water, and pyrite in combination to produce acidity, iron precipitates, and excess sulfate which also forms mineral precipitates under appropriate geochemical conditions. The head waters areas of the West and East Tributaries, in addition to Allison Creek Tributary and Amy's Creek have iron hydroxide precipitates. The form of these iron precipitates includes both orange/red filamentous aggregates (yellowboy) and darker reddish-brown mineral coatings on stream bottom substrate and organic leaf matter (possibly including amorphous goethite) – various forms of iron oxides or oxyhydroxides predicted by the acid mine drainage/acid rock drainage reaction.

The overall reaction is actually a summation of four intermediate reactions, which are important to the Site with respect to generation of acidity and its persistence. The first reaction in the weathering of pyrite includes the oxidation of pyrite by oxygen. Sulfide sulfur is oxidized to sulfate, and ferrous iron is released. This reaction generates two moles of acidity for each mole of pyrite oxidized:

$$2\ FeS_2 + 7\ O_2 + 2\ H_2O \rightarrow 2\ Fe^{+2} + 4\ SO_4^{-2} + 4\ H^+$$

Pyrite + Oxygen + Water → Ferrous Iron + Sulfate + Acidity

The second reaction involves the conversion of ferrous iron to ferric iron. The conversion of ferrous iron to ferric iron consumes one mole of acidity per mole of iron. Certain bacteria increase the rate of oxidation from ferrous to ferric iron. This reaction rate is pH dependent with the reaction proceeding slowly under acidic conditions (pH of 2-3 standard units) because of the lack of bacteria present, and several orders of magnitude faster at pH values near 5 s.u. with conditions more favorable to bacteria. This reaction is referred to as the "rate determining step" in the overall acid-generating sequence because its rate is slower than the other steps.

$$4\ Fe^{+2} + O_2 + 4\ H^+ \rightarrow 4\ Fe^{+3} + 2\ H_2O$$

Ferrous Iron + Oxygen + Acidity → Ferric Iron + Water

The third reaction that can occur is the hydrolysis of iron. Three moles of acidity per mole of iron are generated as a byproduct. The formation of ferric hydroxide precipitate (solid) is pH dependent. Solids form if the pH is above about 3.5 s.u. but below pH of 3.5 s.u. little or no solids will precipitate. This reaction is important within surface water bodies at the Site where acid mine drainage-impacted groundwater discharges and results in precipitation reactions that create additional acidity.

$$4\ Fe^{+3} + 12\ H_2O \rightarrow 4\ Fe(OH)_3\ (s)\downarrow + 12\ H^+$$

Ferric Iron + Water → Ferric Hydroxide ("Yellowboy") + Acidity

The fourth reaction is the oxidation of additional pyrite by ferric iron. The ferric iron is generated in reaction steps 1 and 2. This is the cyclic and self-propagating part of the overall reaction and takes place very rapidly and continues until either ferric iron or pyrite is depleted. Note that in this reaction, iron is the oxidizing agent, not oxygen, so it can continue to occur in areas depleted of oxygen as long as a continuing source of ferric iron is available. This reaction step is also important at the Site as a mechanism for continued long-term oxidation of pyrite in the general absence of oxygen.

$$FeS_2 + 14\ Fe^{+3} + 8\ H_2O \rightarrow 15\ Fe^{+2} + 2\ SO_4^{-2} + 16\ H^+$$

Pyrite + Ferric Iron + Water → Ferrous Iron + Sulfate + Acidity

Consequently, the ability of the tailings and native host rock at the Site to continue to produce acid and leach metals is limited only by the presence and amount of pyrite, soluble salts, oxygen, and availability of water in the form of infiltrating precipitation.

As oxidation of the sulfides persist, the elevated concentrations of sulfate, iron, potassium, aluminum, and manganese will result in the formation/precipitation of soluble effervescent sulfate salts and other sulfate minerals, also subject to solubilization and flushing from the waste material such as the tailings during rain events (especially after dry periods). Although mineralogical studies were not performed to

identify specific soluble sulfate salts, their presence at mine sites is common within oxidized zones within unsaturated mine tailings.

The fate and transport of metals and acidity at the Site is summarized below:

- The elevated concentration of metals and acidity of groundwater downgradient of acid mine drainage sources is present as a result of continued generation of acid mine drainage from the source areas.

- The attenuation of metals, anions (sulfate) and acidity in groundwater is a function of advective transport, dispersion, dilution, mixing with groundwater with limited neutralization capacity, and reactive transport processes including precipitation reactions involving iron hydroxides and acid sulfates, and sorption of metals to reactive oxide surfaces.

- The attenuation of metals, anions (sulfate) and acidity in surface water is a function of dilution and mixing with surface water with limited attenuation (neutralization) capacity, discharging groundwater, and reactive transport processes including precipitation reactions involving iron hydroxides and acid sulfates, and sorption of metals to reactive oxide surfaces.

- Acidity in both groundwater and surface water is expected to be present until the rate of acidity production related to ferric hydroxide precipitation is balanced by the ambient capacity of groundwater and surface waters to attenuate that acidity.

- Downstream dilution by larger stream systems is important in the natural attenuation of acid mine drainage surface water impacts.

The interim actions completed at AOCs 1,2, 3, and 5 were designed to mitigate erosion, minimize infiltration of precipitation through the tailings, and increase storm water runoff and overland flow to surface drainages.

6.0 Current and Potential Future Land and Water Uses

6.1 Land Uses

The Site is located approximately 2.5 miles west of the Town of Clover, York County, South Carolina. The Site is located in a Mixed Land Use area of York County, and is comprised of five individual parcels totaling approximately 185 acres. Current land uses include residential, commercial and agricultural. Current zoning classification for the Site includes both Agricultural Conservation District (AGC) and Rural Residential District 1 (RUD-1). AGC zoning has a minimum lot size of five acres and allows site-built homes, modular homes, and mobile homes (two per lot and the lot must stay in the same name). RUD-1 has a minimum lot size of one acre and allows site-built homes and modular homes (one per lot), but no mobile homes. According to York County records, the largest parcel is currently undergoing rezoning. Other than two mobile-home dwellings that currently occupy the property, no additional development has been conducted at the Site since mining operations ceased in 1970. After mining operations stopped in 1970, it is reported that the property had been used for recreational purposes (all-terrain vehicular trails).

The area surrounding the Site is primarily open land consisting of a mix of agricultural and rural residential land use. To the west of the Site, the land is zoned as RUD-1. To the east of the Site, the land is zoned as AGC. To the south of the Site, the land is zoned as RUD-1 or mixed RUD-1/AGC.

The primary natural resource of the area is agricultural land. Construction sand and gravel and crushed stone (gravel) are also mined in small quantities within York County.

6.2 Water Uses

Based on records review, discussions with local governmental officials and a drive-by visual assessment of the area previously conducted within a one-mile radius of the Site, there is no public water available in the Site vicinity. Based on the results of the Step 1 investigation, it is assumed that approximately 198 private water wells are located within one mile of the Site, including 47 private water wells located within one-quarter mile of the Site. Based on these assumptions, it is estimated that approximately 541 people within a one-mile radius of the Site are served by private potable water wells. A detailed discussion of the water well survey conducted at the Site can be found in Appendix B of the Final RI Report (MACTEC, 2011a).

Currently, there is no public water available in the Site vicinity. During the RI, bottled potable water was provided to the area residences with wells affected by mine-impacted groundwater. Under the NTCRA, residents within the area of groundwater impacted by mining operations were offered and provided a wellhead treatment system to address potential impacts to residential water supply wells.

7.0 Summary of Site Risks

A baseline risk assessment was conducted to estimate the current and future risks to human health and the environment associated with the Site contaminants. A baseline risk assessment is an analysis of the potential adverse human health and ecological effects of releases of hazardous substances from a site in the absence of any actions or controls to mitigate such releases, under current and future land uses. The baseline risk assessment includes a baseline human health risk assessment and a baseline ecological risk assessment. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the IROD summarizes the results of the baseline risk assessment for the Site. The baseline human health and ecological risk assessments were prepared as part of the 2011 RI Report.

7.1 Human Health Risk Assessment

A four-step process is utilized for assessing site-related human health risks for a reasonable maximum exposure scenario:

- Hazard Identification – uses the analytical data collected to identify the chemicals of potential concern (COPC) at the Site for each medium, with consideration of several factors explained below;
- Exposure Assessment - estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways by which humans are potentially exposed;
- Toxicity Assessment - determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response); and
- Risk Characterization - summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site-related risks. The risk characterization also identifies contamination with concentrations which exceed acceptable levels, defined by the NCP as an excess lifetime cancer risk greater than 1×10^{-6} to 1×10^{-4}, or a Hazard Index (HI) greater than 1.0; contaminants at these concentrations are considered chemicals of concern

(COCs) and are typically those that will require remediation at the Site. Also included in this section is a discussion of the uncertainties associated with these risks.

The HHRA estimates what risks the Site poses if no action were taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the IROD summarizes the results of the HHRA for the Site.

7.1.1 Hazard Identification

The baseline HHRA began with selecting COPCs in each media (soil, groundwater, surface water and sediment) that could potentially cause adverse health effects in exposed populations. The COPCs were selected by comparing maximum detected concentrations in each media to risk-based screening levels (inorganic and organic chemicals) and, where available, background sample concentrations (inorganic chemicals only). A comprehensive list of all COPCs can be found in the HHRA (MACTEC, 2011b).

COCs were identified in accordance with the EPA Region 4 Human Health Risk Assessment Supplemental Guidance (cancer risk estimates exceeding 1E-04 or non-cancer hazard indices exceeding 1). Table 1 presents a summary of the COCs identified for the Site. The drivers for unacceptable exposure are metals in groundwater used for potable drinking water by current and future residents. No COCs for protection of human health were identified for soil, surface water or sediment for any receptor group evaluated.

7.1.2 Exposure Assessment

The exposure assessment calculates potential chemical intake, or exposure concentration, for the exposure pathways evaluated in the HHRA. Exposure is a function of the chemical concentration at the point of contact (i.e. exposure point concentrations or EPCs) and parameters that characterize the activity patterns of the potentially exposed receptors. Presently, the Site and surrounding area is a mix of rural residential development and open space that consists of forests and pastures. Nine exposure areas (EAs), which encompass one or more AOCs, were identified for purposes of characterizing human exposures and risk. The EAs were defined by land use(s) and associated activities, the spatial distribution and concentrations of COPCs and potentially complete pathways. Potential receptors and potentially complete exposure pathways were identified for both current and future land uses. The future use of the Site and surrounding area is not expected to change. However, the HHRA assumed that additional exposure pathways to Site media could be complete under future land use conditions. In summary, the following scenarios were evaluated:

- A current and future resident scenario, which evaluated young children, older children/adolescents, and adults, was used to evaluate health risks associated with potential exposures to COPCs in soil at the Mine Proper (where two residential properties are presently located).

- A current trespasser scenario, which evaluated an older child/adolescent, was used to evaluate health risks associated with potential exposures to COPCs in soil at the AOC 1 tailings area (which, at the time, was unvegetated open space).

- A current and future passive recreational exposure scenario to surface water and sediment in the Mine Pit Pond, East Tributary, West Tributary, South Fork of Crowders Creek, and Allison Creek Tributary by area residents.

- A current area resident scenario, which also evaluated young children, older children/adolescents, and adults, was used to evaluate health risks associated with potential exposures to COPCs in dust that could migrate from the tailings areas to a down-wind residence, as well as passive recreational use exposures to COPCs in surface water and sediment at the Mine Pit Pond, East and West Tributaries, South Fork of Crowders Creek, and Allison Creek Tributary.

- During the HHRA, households within the Site boundary that had private groundwater supply wells where inorganic constituents were initially detected at concentrations greater than secondary drinking water standards and later at concentrations that exceed the cleanup levels established in the Action Memorandum, were using bottled water that was supplied by the potentially responsible party. However, the assessment used the area resident scenario to evaluate health risks associated with potable use of groundwater from private water supply wells within the Site boundary where bottled water was not supplied because no substances were detected at concentrations greater than secondary drinking water standards or cleanup levels.

- A future residential land use exposure to soil at the AOC 1 Tailings Area under the assumption that area is developed for residential use.

- A future potable use of groundwater using the overburden and bedrock RI monitoring well data to represent groundwater exposure conditions.

- A future construction worker exposure to soil at the Mine Proper and AOC 1 Tailings Area under the assumption that development of those areas occurs.

- A future potable use scenario of groundwater from private wells under the assumption that no supplemental source or treatment of drinking water (e.g., no bottled water) is supplied, in order to evaluate 'baseline' exposure conditions (i.e., conditions that could exist in the absence of any interim or remedial actions).

The EPCs used for the exposure assessment for the COCs in groundwater are provided in Table 1. The exposure parameters used to calculate the risk to receptors are summarized in Table 3-12 in the 2011 HHRA (MACTEC, 2011b).

7.1.3 Toxicity Assessment

The toxicity assessment summarizes the health effects that may be associated with exposure to the COPCs selected for the risk assessment and identifies doses that may be associated with those effects. It involves evaluating the potential for a constituent to cause an increase in the incidence of adverse effects in exposed individuals and quantitatively characterizing the chemical dose and the incidence of adverse health effects in the exposed receptor. The potential toxicological effects induced by a given dose of a chemical are classified as either non-cancer effects or cancer effects. Toxicity values typically employed to calculate baseline non-carcinogenic hazards include reference doses (RfDs) for oral and dermal exposures and reference concentrations (RfCs) for inhalation exposures; oral and dermal cancer slope factors (CSFs) and inhalation unit risks (IURs) are typically used to estimate carcinogenic risks. Constituent-specific toxicity values were used to calculate potential effects for these two types of effects. Toxicological criteria were selected following the EPA's hierarchy (USEPA, 2003b), as follows for the HHRA:

- Tier 1 - EPA's Risk Assessment Information System (IRIS), (USEPA, 2011).

- Tier 2 - EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs), (USEPA, 2008).
- Tier 3 - Other toxicity values including the EPA and non-EPA sources of toxicity information including, but are not limited to:
  - EPA Health Effects Assessment Summary Table (HEAST) values (USEPA, 1997).

Tables 7 and 8 summarize the toxicological criteria that were used in the HHRA for each COC evaluated for the groundwater pathway (oral and dermal cancer and chronic non-cancer toxicity values). Inhalation criteria were not necessary for the evaluation of the groundwater exposure pathway.

7.1.4 Risk Characterization

The objective of the risk characterization for the HHRA was to integrate the exposure and toxicity assessments into quantitative and qualitative expressions of risk. This evaluation provides an evaluation of the nature and degree of potential carcinogenic and non-carcinogenic health risks posed to current and future receptors at the Site.

Cancer risk estimates are expressed as the incremental probability that the individual described by an exposure scenario might develop cancer during his or her lifetime as a result of exposure to COPCs in the area under study. The term "incremental" reflects the fact that the calculated risk associated with any exposures is in addition to the background risk of cancer experienced by all individuals in the course of daily life. Lifetime cancer risks are calculated as the product of the estimated dose and the expression of the carcinogenic potency of a chemical (e.g., CSF or inhalation unit risk [IUR]). Excess incremental lifetime cancer risk from oral and dermal exposures is calculated as:

$$Cancer\ Risk\ (unitless) = LADD \times CSF$$

Where:

LADD	=	lifetime average daily dose of the chemical (mg/kg-
CSF	=	cancer slope factor (kg-day/mg)

Cancer risks are summed for all COPCs and across all relevant exposure pathways to estimate cumulative incremental cancer risk for a receptor. Both federal and state regulatory agencies define what they consider to be an acceptable level of incremental cancer risk associated with exposure to chemicals in environmental media. For cancer risk, the EPA considers 10^{-4} to 10^{-6} to be the acceptable risk range. These risks are probabilities that usually are expressed in scientific notation (e.g., 1E-06). An excess lifetime cancer risk of 1E-06 indicates that an individual experiencing the reasonable maximum exposure (RME) estimate has a 1 in 1,000,000 chance of developing cancer over a 70-year lifetime as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. Increased cancer risks less than 1E-06 indicate no action is required. Cancer risks between 1E-06 and 1E-04 generally do not warrant cleanup unless dictated by site-specific circumstances or other considerations. Increased cancer risks greater than 1E-04 indicate some type of action needs to be considered.

Noncancer health risks are termed hazards. To evaluate noncancer hazards, the ratio of the estimated exposure (e.g., average daily dose [ADD]) to the corresponding noncancer toxicity reference value (e.g., RfD) is calculated. The hazard quotient (HQ) is calculated for oral and dermal exposures as:

$$HQ\ (unitless) = \frac{ADD}{RfD}$$

Where:

ADD	=	average daily dose of the chemical (mg/kg-
RfD	=	reference dose (mg/kg-day)

All the HQ values for chemicals within each exposure pathway are summed to yield the HI for that pathway. Each pathway HI within a land use scenario is summed to yield the total HI for the receptor. If the total receptor HI exceeds 1, then more precise HIs are developed for each target organ and/or toxic effect which are then used to form the basis for the COC selection. If the value of the total target organ HI is less than 1, it is concluded that the non-carcinogenic hazard to that target organ is low. If the total target organ HI is greater than 1, it is indicative of some degree of non-carcinogenic hazard, and COCs contributing to that target organ HI are selected.

To evaluate cumulative noncancer effects for a receptor, HQs are summed for all COPCs and across all relevant exposure pathways to determine a noncancer HI as:

$$HI\ (unitless) = HQ_1 + HQ_2 + \ldots + HQ_i$$

Where:

HI	=	hazard index
HQ	=	hazard quotient for a specified exposure route (unitless)

There were no unacceptable cancer risks or non-cancer hazards for exposure to COPCs in soil, surface water or sediment for any receptor group evaluated. Tables 9 and 10 present the cancer risks and non-cancer hazards from exposure to the COCs in groundwater for the current and future potable use. The following conclusions were made regarding exposure to groundwater based on the results of the risk characterization:

Cancer Risk

The results of the HHRA indicated that excess lifetime cancer risks for current and potential future uses of groundwater as a potable water resource were within the EPA acceptable excess lifetime cancer risk range of 10^{-6} (one in a million) to 10^{-4} (one in ten-thousand) (Table 9).

Noncancer Hazard

Non-cancer hazards were unacceptable (HIs > 1) for future uses of groundwater as a potable water resource. The COCs for groundwater include aluminum, arsenic, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, nickel, and vanadium (Table 10).

7.1.5 Uncertainties

Uncertainties in the HHRA included several factors. There are numerous areas of uncertainty in any risk assessment, and assumptions made in the absence of information are often intentionally conservative. Such assumptions can lead to overestimates of risk. Some uncertainties could also lead to underestimates of risk. Uncertainties exist in each step, including the data collection and analysis, the

estimation of potential Site exposures, and the toxicity assessment. Site-specific uncertainties that could have a bearing on the interpretation of the risk assessment results included conservative modeling of exposures to dust emissions from tailings areas, dermal exposure to all COPCs in groundwater from overburden, bedrock and private wells used as potable water, and conservative assumptions incorporated in the development of the RfDs for manganese and cobalt.

7.2 Ecological Risk Assessment

A BERA was conducted for the Site as part of the RI conducted in 2011 prior to completion of the interim actions taken at AOCs 1, 2, 3 and 5 between 2015 and 2017. The objective of the BERA was to evaluate the risk of ecological harm associated with site-related contaminants which consist primarily of high acidity and metals. The BERA considered assessment endpoints to evaluate risk in aquatic and terrestrial EAs. For the BERA, the media of concern included surface water and sediment. The BERA did not identify unacceptable risks from soil and did not evaluate ecological risk from groundwater.

The BERA consisted of 4 major components:

- Problem Formulation
- Ecological Exposure Assessment
- Ecological Effects Assessment
- Ecological Risk Characterization

7.2.1 Problem Formulation

Problem formulation identifies the major factors to be considered in the BERA, including chemical of potential ecological concern (COPEC) characteristics, ecosystems and/or species potentially at risk, and ecological effects to be evaluated. It establishes the goals, breadth, and focus of the assessment, develops a conceptual model, and selects assessment endpoints, which are explicit expressions of the environmental value that is to be protected. In a HHRA, only one species (humans) is evaluated and the cancer and non-cancer effects are the usual endpoints. In contrast, a BERA involves multiple species that are likely to be exposed to differing degrees and respond differently to the same contaminant.

Assessment endpoints focus the risk assessment on particular components of the ecosystem that could be adversely affected by contaminants from the Site. The Henry's Knob BERA considered four primary assessment endpoints to evaluate risk in aquatic EAs, and two primary assessment endpoints to evaluate risk in terrestrial EAs:

Aquatic Assessment Endpoints

1) Maintenance of benthic invertebrate communities in EAs similar to those found in reference areas,
2) Maintenance of fish communities in aquatic EAs similar to those found in reference area,
3) Maintenance of piscivorous bird populations in aquatic EAs similar to those found in the reference areas.
4) Maintenance of semi-aquatic mammal populations in aquatic EAs similar to those found in the reference areas.

Terrestrial Assessment Endpoints

5) Maintenance of insectivorous populations of songbirds in terrestrial EAs

similar to those found in the reference areas.

6) Maintenance of omnivorous populations of small mammals in terrestrial EAs similar to those found in reference areas.

7.2.2 Ecological Exposure Assessment

Reference locations were identified and paired with EAs based on important habitat characteristics including substrate and flow patterns for aquatic reference areas, and surrounding land use and natural community composition for terrestrial areas. The reach of the SFCC before its confluence with the West Tributary was identified as a reference area for the downstream reaches of the SFCC. An unnamed tributary to ACT was identified as a reference area for ACT. Soil reference sampling locations were selected, as described in the RI report, to represent areas not impacted by the Site.

Both reasonable maximum exposure (RME) and central tendency exposure (CTE) cases were considered in assessing and characterizing exposure. The CTE EPC is based on the average (arithmetic mean) concentration and represents the most likely concentration to which a population of receptors would be exposed. An upper bound on the risk estimates is provided by the RME case and includes an EPC that is calculated as the lower of the 95 percent upper confidence limit (UCL) or the maximum detected concentration.

Exposure to benthic invertebrate communities were evaluated by the COPEC EPCs in surface water and sediment and quantitative benthic invertebrate surveys. Exposure to fish communities were evaluated by the COPEC EPCs in surface water and fish tissue as well as fish condition factors. Exposure to receptors in aquatic habitats were also evaluated by synoptic pH field surveys and laboratory pH measurements of surface water samples.

Exposures in aquatic and terrestrial habitats were evaluated by the results of a food chain model that estimated dietary intake of the COPECs. Dietary intakes for the receptors of concern were estimated for ingestion of food items, drinking water ingestion, and incidental ingestion of soil and/or sediment while foraging or preening/grooming. EPCs for prey items (tissue) were estimated using literature-based bioaccumulation factors (BAFs). Receptors of concern evaluated with food chain models in the aquatic EAs included the Belted Kingfisher (a piscivorous bird) and the Raccoon (a semi-aquatic omnivorous mammal). Receptors of concern evaluated with food chain models in the terrestrial EAs included the American Robin (an omnivorous bird) and the Short-tailed Shrew (a worm-eating small mammal).

7.2.3 Ecological Effects Assessment

The effects assessment evaluates the potential for COPECs to cause adverse effects in the ecological receptors and characterizes the relationship between the level of exposure and the severity of effects. This effects assessment presents the pertinent literature and selects the toxicity reference values (TRVs) used to interpret the potential for adverse effects. TRVs are literature-derived concentrations or doses, below which adverse effects are unlikely and are based on no observed adverse effect levels (NOAELs) and lowest observed adverse effect levels (LOAELs).

7.2.4 Ecological Risk Characterization

Risk of harm to semi-aquatic piscivorous birds and semi-aquatic mammals is unlikely for contact with chemicals of potential ecological concern measured in the aquatic EAs evaluated including the Mine Pit Pond, East and West Tributary to South Fork of Crowders Creek Reach 1 and Reach 2 of the South Fork of Crowders Creek and Allison Creek Tributary. Potential unacceptable risk to fish is present in Allison

Creek Tributary due to low pH; however, unacceptable risk to fish in South Fork of Crowders Creek is unlikely. Fish were not observed in the other study areas.

Benthic community impairment may be indicated for West Tributary and Reach 2 of South Fork of Crowders Creek and Allison Creek Tributary based on a comparison to reference streams. Low pH in the West Tributary to South Fork of Crowders Creek and Allison Creek Tributary contributed, in part, to impairment to benthic communities. Exposure to aluminum in surface water may also contribute to impairment in Allison Creek Tributary. Naturally occurring conditions (i.e., lack of riffles or pools, intermittent dryness, and large substrate particles such as cobbles observed during the habitat survey) and silt accumulation due to surrounding land use were also identified as contributing factors in the observed impairments for these two study areas. Impairment indicated in South Fork of Crowders Creek Reach 2 is likely due to surrounding land use (i.e., agricultural activities). The low pH (between 2 and 4) of the water measured in Mine Pit Pond, West Tributary to South Fork of Crowders Creek and Allison Creek Tributary was identified as a condition of concern for the populations inhabiting these EAs. The measured concentrations of pH in the Mine Pit Pond and in aquatic resource areas downgradient of the mine do not meet the South Carolina Water Quality Criteria of pH between 6.0 and 8.5. Such conditions can be acutely toxic to fish and other aquatic life which can be adversely affected or absent at locations with pH less than 4. No aquatic receptors were observed in the Mine Pit Pond.

Risk of harm to terrestrial bird and mammal communities is unlikely in the Mine Proper area and AOC 1 given that incremental risk associated with the Site is less than risk associated with the reference soil concentrations. Also, there is little growth medium for plants at the Site, and because it is poor habitat for terrestrial invertebrates, it is an unlikely foraging site for potential receptors.

Tables 2 and 3 present the occurrence, distribution and screening levels for COCs in surface water and sediment based on the 2011 BERA.

Surface water samples collected in 2018 found concentrations of cobalt ranging from 0.049 mg/L to 2.1 mg/L compared to the current ecological screening value of 0.019 mg/L suggesting a potential ecological risk due to cobalt, and concentrations of manganese ranging from 0.8 mg/L to 94 mg/L compared to the current ecological screening value of 0.093 mg/L suggesting a potential ecological risk due to manganese. In addition, concentrations of aluminum were found to range from 9.9 mg/L to 16 mg/L compared to the ecological screening value of 0.087 mg/L, and pH concentrations ranged from 3.13 to 4.46 compared to the South Carolina Water Quality Criteria of pH between 6.0 and 8.5.

The implementation of the interim source control actions at AOCs 1, 2, 3, and 5 have partially mitigated impacts of acid mine drainage to surface water. However, on-going collection of surface water monitoring data over the next five years will be used to determine whether additional remedial actions are needed to address unacceptable ecological risk in surface water as part of a final remedy for the Site.

7.3 Basis for Action

It is the lead agency's current judgment that the Selected Remedy identified in this IROD is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment. The tailings act as a source for acid mine drainage, which impacts groundwater and surface water onsite and downgradient of the Site. The selected interim action is necessary to ensure the integrity and function of the completed source and access control actions, and to prevent unacceptable risks to Site groundwater while a final remedy is being developed.

8.0 Remedial Action Objectives

Before developing cleanup alternatives for a Superfund site, the EPA establishes remedial action objectives (RAOs) to protect human health and the environment. RAOs are specific goals to protect human health and the environment. These objectives are based on available information and standards, such as ARARs, to-be-considered (TBC) guidance, and site-specific, risk-based levels.

The HHRA demonstrated that the COCs at the Site (cobalt, manganese and other metals) pose a non-cancer hazard to human health through ingestion of and dermal contact with groundwater in overburden wells, bedrock wells and private wells. The FS report includes RAOs for a final groundwater remedy. The following RAOs for this proposed interim remedial action are:

- Prevent potable use of groundwater that contains concentrations of metals that pose potential non-cancer risks to human health.
- Ensure the integrity of previously implemented interim actions so the engineering controls function as intended to mitigate leaching to groundwater and to prevent uncontrolled access.
- Protect downgradient surface water resources by reducing contaminant concentrations in overburden groundwater so that discharges to surface water are protective of aquatic life.

CLEANUP LEVELS

The aim of Cleanup levels is to establish concentrations for contaminants of concern in a particular media (e.g., soil, surface water, or groundwater) such that human health and the environment are protected. This can be achieved by eliminating exposure pathways and/or reducing contaminant concentrations in the identified media to attain those cleanup levels.

In general, preliminary remedial goals (PRGs) are used to develop the long-term contaminant concentrations needed to be achieved to meet RAOs by the remedial alternatives. Per the NCP, PRGs are identified in the FS and presented in a Proposed Plan, but are subsequently renamed as "cleanup levels" once incorporated into a final remedy as documented in a ROD. The cleanup levels for groundwater remedies are typically based on chemical-specific ARARs such as SDWA promulgated MCLs (including more stringent promulgated State MCLs), or risk-based concentrations if ARARs are not available or not sufficiently protective. Groundwater cleanup levels were developed for the Henry's Knob Site by selecting the MCL, or in the absence of an MCL, the human health risk-based drinking water concentration. Groundwater cleanup levels are presented on Table 11. Surface water cleanup levels were developed by selecting the available South Carolina AWQC, or in the absence of an AWQC, the baseline ecological risk-based concentration. Surface water cleanup levels are presented on Table 12. For sediment, cleanup levels were based on the available threshold effect concentrations (TECs) and probable effect concentrations (PECs) from the Region 4 Ecological Risk Assessment Supplemental Guidance (EPA 2018). Sediment cleanup levels are presented on Table 13.

The limited scope of this proposed interim action, which does not include restoration of the groundwater to beneficial use as a drinking water source, is not expected to attain groundwater cleanup levels. However, on-going monitoring data will be compared against the cleanup levels presented in Table 11 to further evaluate efficacy of monitored natural attenuation as a potential remedy in a final groundwater remedy. Upon further review by the EPA of background conditions for naturally occurring metals, site-specific background levels may be identified as cleanup levels in a final groundwater remedy provided they are deemed protective of human health.

Surface water monitoring data gathered during this interim action will be assessed against the cleanup levels presented in Table 12 to further evaluate the effects of the previously implemented source control actions on acid mine drainage-impacted groundwater discharge to surface water and to evaluate whether additional actions are needed to address unacceptable risks to ecological receptors in surface water.

9.0 Description of Alternatives

As stated in 40 CFR 300.430(a)(1)(i) the national goal of the remedy selection process is to select remedies that are protective of human health and the environment, that maintain protection over time, and that minimize untreated waste. The EPA generally considers the following expectations in developing appropriate remedial alternatives for the Site:

- Use treatment alternatives to address the principal threats posed by a site, wherever practicable.
- Use engineering controls, such as containment, for waste that poses a relatively low long-term threat or where treatment is impracticable.
- Use a combination of methods, as appropriate, to achieve protection of human health and the environment.
- Use ICs, such as informational devices, enforcement tools, governmental controls, or water or land use restrictions to supplement engineering controls as appropriate for short- and long-term management to prevent or limit exposure to hazardous substances, pollutants or contaminants.
- Consider using innovative technology when such technology offers the potential for comparable or superior treatment performance or implementability, fewer or lesser adverse impacts than other available approaches, or lower costs for similar levels of performance than demonstrated technologies.
- Return usable ground waters to their beneficial uses wherever practicable, within a timeframe that is reasonable given the particular circumstances of the site.

CERCLA Section 121(b)(1), 42 U.S.C. Section 9621(b)(1) requires that each selected site remedy be protective of human health and the environment, be cost-effective, comply with federal or more stringent environmental laws and regulations, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. In addition, the statute includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances.

After identifying and considering numerous potential treatment technologies, four remedial alternatives for the groundwater response action were retained for detailed evaluation in the FS. The groundwater alternatives apply to the area that has been impacted by Site-related mining operations (i.e., impacted groundwater area), plus a 250-foot buffer zone around this impacted groundwater boundary as shown on Figure 7. In addition to the groundwater remedial alternatives, one tailings/mine pit alternative was retained for detailed evaluation. The groundwater and tailings/mine pit alternatives are summarized below. More detailed descriptions of the remedial alternatives can be found in the FS report (Wood, 2019).

The groundwater and tailings/mine pit alternatives presented in this IROD take into account the substantial remediation work that has already been completed at the Site, including the rehabilitation efforts accomplished in AOCs 1, 2, 3, and 5 to address tailings, stormwater, dam stability, and fence installation around the Mine Pit to restrict access to the Mine Pit and Mine Pit Pond. Capital costs are

those expenditures that are required to construct a remedial alternative. O&M costs are those post-construction costs necessary to ensure or verify the continued effectiveness of a remedial alternative and are estimated on an annual basis. Periodic costs are the project costs necessary for five-year reviews, and yearly monitoring of groundwater and remedy performance. Present value is the amount of money which, if invested in the current year, would be sufficient to cover all the costs over time associated with a project, calculated using a discount rate of seven percent and a 30-year time interval. All cost estimates assume a 7% discount rate. Construction time is the time required to construct and implement the alternative and does not include the time required to design the remedy, negotiate performance of the remedy with the responsible parties, or procure contracts for design and construction. Because hazardous substance will be left behind at levels that do not allow for unlimited use and unrestricted exposure, five-year reviews will be required for each alternative, as required by CERCLA 121(c) and the NCP [40 C.F.R. §300.430(f)(4)(ii)].

Groundwater Alternative GW-1 - No Action

Estimated Capital Cost: $0
Total Estimated Annual Operation and Maintenance Cost for 30 years: $0
Total Periodic Costs for 30 years: $0
Net Present Value: $0
Estimated Construction Timeframe: 0 year
Estimated Time to Achieve RAOs: Will not achieve RAOs

The NCP requires that a "No Action" alternative be developed as a baseline for comparing other remedial alternatives. The No Action alternative does not include remedial action components to prevent exposure to contaminated Site groundwater, reduce acid mine drainage generation or the migration of acid mine drainage and would not implement an environmental monitoring program to assess long-term changes in groundwater quality. The No Action alternative provides for an assessment of the environmental conditions if no remedial actions are implemented.

Groundwater Alternative GW-2 – Monitored Natural Attenuation (MNA), Institutional Controls and Monitoring

Estimated Capital Cost: $5,000
Total Estimated Annual Operation and Maintenance Cost for 30 years: $660,000
Total Periodic Costs for 30 years: $2,668,000
Net Present Value: $1,406,000
Estimated Construction Timeframe: Not applicable
Estimated Time to Achieve RAOs: Greater than 100 years

This alternative would include the following key components:

- Continuation of the long-term monitoring program currently implemented at the Site
- ICs
- Five-Year Reviews

MNA relies on naturally occurring processes in the aquifer onsite to achieve cleanup levels throughout the plume. Rehabilitation work at the Site was performed to direct stormwater flow and reduce stormwater water infiltration through the tailings into groundwater and mitigate that pathway for acid mine drainage. This alternative includes continuation of long-term monitoring to observe changes in

onsite groundwater concentrations resulting from the installation of vegetative covers and stormwater controls at AOCs 1, 2, 3, and 5. Improvements to groundwater quality would be monitored as part of the on-going groundwater monitoring program and compared against cleanup levels presented in Table 11 to evaluate concentrations of COCs in groundwater and monitor groundwater plume stability. It has been estimated that the restoration timeframe to attain cleanup levels will exceed 100 years.

Groundwater would continue to be monitored according to the Final Groundwater Monitoring Plan, which includes sampling for metals, as well as chloride, sulfate, and alkalinity in groundwater. Groundwater samples would also be analyzed in the field for water quality parameters including pH, temperature, specific conductance, DO, ORP, and turbidity. The current groundwater monitoring program was initiated in June 2015 and includes monitoring of 27 Site monitoring wells, 34 residential wells, and 4 surface water locations. A significant amount of data has been collected and evaluated using the EPA recommended tiered approach to develop multiple lines of evidence to support the appropriateness of considering MNA as a potential remedial alternative for groundwater associated with the Site. The groundwater contaminant plume associated with the area of impacted groundwater is stable, groundwater flow direction is known, and groundwater contaminant concentrations and groundwater chemistry data have been collected and evaluated (Tier I). Hydrogeologic and groundwater chemistry data have been collected and evaluated, and the subsurface mineralogy is well understood (Tier II). Data collected to date and the results of groundwater modeling indicate that the area of impacted groundwater is expected to remain stable over time (Tier III).

For this limited scope action, all groundwater alternatives (except the no action alternative) require implementation of interim ICs measures such as informational devices or enforcement tools, to mitigate human exposure to untreated, contaminated Site groundwater in the short term until a final remedy is selected and the need for more permanent ICs including proprietary controls has been evaluated. Informational devices may include issuance of advisories in coordination with the Town of Clover; and continuation of ABB's educational outreach and written notification efforts, in coordination with EPA, to affected or potentially affected residential landowners of potential health risks associated with consumptive uses (i.e., drinking, cooking use) of contaminated groundwater and the offer to install individual wellhead treatment systems on residential wells. Enforcement tools with IC components include S.C. Reg 61-44 (Individual Residential Well and Irrigation Well Permitting requirements), and requirements in legal agreements, such as Remedial Design/Remedial Action Consent Decrees that limit certain activities, or require responsible parties to conduct specific activities, such as undertaking best efforts to enter into enforceable written agreements between responsible parties implementing the remedial action and affected landowners regarding access, non-interference, and limitations on uses that EPA determines will pose an unacceptable risk to human health or interfere with implementation, integrity or protectiveness of the remedial action. EPA may determine such agreements are necessary where individual wellhead treatment systems have been or will be installed to ensure their continued effectiveness in mitigating risks to human health.

An ICIAP, identifying the specific IC device(s), parties responsible for IC implementation and providing details on how groundwater ICs will be implemented, maintained, enforced, modified and terminated (if applicable), will be developed and approved by the EPA during the remedial design phase of IROD implementation.

Groundwater Alternative GW-3 – Permeable Reactive Barrier (PRB) Installation

Estimated Capital Cost: $5,743,000
Total Estimated Annual Operation and Maintenance Cost for 30 years: $1,110,000

Total Periodic Costs for 30 years: $5,384,000
Net Present Value: $8,632,000
Estimated Construction Timeframe: 3 to 5 months
Estimated Time to Achieve RAOs: Greater than 100 years

Alternative GW-3 consists of installation of permeable reactive barrier (PRB) walls along the north end of AOC 1, along the north end of AOC 2, and along the southern portion of AOC 3 (see Figure 18) to intercept and treat groundwater and precipitation that infiltrates through the tailings. The PRB system would be designed to promote anaerobic sulfate-reducing conditions to increase the groundwater pH thereby mitigating the impacts of acid mine drainage to groundwater quality. These reducing conditions will also reduce the soluble fraction of inorganic COCs in groundwater that exceed human health cleanup levels or MCLs (manganese, beryllium, and cobalt). Each PRB wall would extend through the fill down to approximately 10 feet below the top of the groundwater to an estimated average depth of 35 feet below ground surface (bgs). Treatment of acid mine drainage -impacted groundwater via a PRB would mitigate acid mine drainage impacts to underlying overburden and bedrock groundwater. By treating acid mine drainage-impacted groundwater, groundwater quality is expected to improve. Monitoring wells would be constructed upgradient and downgradient of each PRB and sampled in accordance with a monitoring program in order to monitor PRB performance. Groundwater would continue to be monitored according to the Final Groundwater Monitoring Plan, which includes sampling for metals, as well as chloride, sulfate, and alkalinity in groundwater. This alternative would include the following key components:

- Conduct a pre-design field study to evaluate the optimum location and alignment for the PRB installation
- Treatability studies in the form of column tests would be conducted to evaluate and select the reactive media for the PRB
- PRB design and construction
- Installation of performance monitoring wells in close proximity of the PRB
- Water level monitoring and analytical sampling of performance monitoring wells
- Continuation of the long-term monitoring program currently implemented at the Site
- ICs
- Five-Year Reviews

Due to the continuing impacts of acid rock drainage on groundwater, Alternative GW-3 would not immediately attain chemical-specific ARARs identified in the FS. Treatment of overburden groundwater via a PRB is expected to improve groundwater quality downgradient of the PRB. It has been estimated that the timeframe to meet ARARs will exceed 100 years.

Groundwater Alternative GW-4 - Groundwater Extraction and Treatment

Estimated Capital Cost: $3,791,000
Total Estimated Annual Operation and Maintenance Cost for 30 years: $30,510,000
Total Periodic Costs for 30 years: $2,668,000
Net Present Value: $17,539,000
Estimated Construction Timeframe: 8 to 12 months
Estimated Time to Achieve RAOs: Greater than 100 years

Alternative GW-4 consists of the extraction and treatment of acid mine drainage-impacted groundwater from the overburden and within the tailings. A permanent extraction well network would be installed at AOCs 1, 3, and 5 at the downgradient extent of the tailings at each of these AOCs. The network would consist of individual six-inch diameter extraction wells with the proposed extraction well locations shown on Figure 6. The treatment system would be designed to adjust the pH and remove metals from extracted groundwater to meet surface water discharge criteria. A treatability study would be conducted to determine the best method of treatment and would identify wastes to be generated in the process.

The purpose of groundwater extraction is to capture water that has been impacted by infiltration of precipitation through the tailings and has been impacted by acid mine drainage prior to flowing toward downgradient wells. Treatment of acid mine drainage-impacted groundwater from the tailings would mitigate the migration of acid mine drainage-impacted groundwater. Treated groundwater would be discharged via a constructed drainage channel to one of the streams adjacent to the Site. The design of the groundwater extraction and treatment system would incorporate a point-of-compliance boundary approach to establish treatment goals. This alternative would include the following key components:

- Conducting bench- and/or pilot-scale testing to determine the optimal treatment train
- Performance of a capture zone analysis for design of the extraction network
- Construction, operation, and maintenance of a groundwater extraction and treatment system, including wells, pumps, and piping to treat extracted groundwater for pH and metals
- Permitting and construction of a surface water discharge for treated water
- Performance monitoring of the groundwater extraction and treatment system
- Continuation of the long-term monitoring program currently implemented at the Site
- ICs
- Five-Year Reviews

Due to the continuing impacts of acid rock drainage on groundwater, Alternative 4 would not immediately attain chemical-specific ARARs identified in the FS. It has been estimated that the timeframe to meet ARARs will exceed 100 years. Extraction and treatment of impacted groundwater is expected to improve groundwater quality in the area. Improvements to groundwater would be monitored as part of the on-going groundwater monitoring program to evaluate compliance with chemical-specific ARARs.

Tailings/Mine Pit Alternative T/MP-1: No Action

Estimated Capital Cost: $0
Total Estimated Annual Operation and Maintenance Cost for 30 years: $0
Total Periodic Costs for 30 years: $0
Net Present Value: $0
Estimated Construction Timeframe: 0 year
Estimated Time to Achieve RAOs: Not applicable

Interim source and access control actions have been implemented to address the physical hazards and erosion concerns associated with the tailings areas (AOCs 1, 2, 3, and 5) of the Site and Mine Pit, and to reduce the generation of acid mine drainage to surface water and groundwater. The tailings do not pose a direct exposure, ingestion, or inhalation exposure risk to human or environmental receptors. A 6-foot high chain link fence topped with barbed wire has been installed around the perimeter of the Mine Pit. However, additional actions are needed to ensure the integrity and long-term protectiveness of these previously implemented actions. The NCP requires that a "No Action" alternative be developed as a

baseline for comparing other remedial alternatives. The No Action alternative does not include components to ensure the integrity of completed source and access control actions and would not implement an environmental monitoring and maintenance program to ensure long-term protectiveness and continued functioning of engineering components.

Tailings/Mine Pit Alternative T/MP-2: Institutional Controls, Maintenance & Monitoring

Estimated Capital Cost: $5,000
Total Estimated Annual Operation and Maintenance Cost for 30 years: $1,470,000
Total Periodic Costs for 30 years: $2,003,000
Net Present Value: $1,534,000
Estimated Construction Timeframe: 0 year
Estimated Time to Achieve RAOs: 5 years (IC implementation)

Alternative T/MP-2 includes (1) ICs to prevent disturbance of the previously implemented source controls (i.e., vegetative cover systems, stormwater channel controls, and dam stabilization and rip rap armoring) and access controls (i.e., fencing around Mine Pit), and (2) monitoring and maintenance of the Mine Pit fencing, tailings areas vegetative cover systems, the engineered drainage channels in AOCs 1, 2, 3, and 5 previously installed as interim actions, and the tailings dams.

This would include periodic inspections of the Mine Pit fencing and access road, vegetative cover areas for percent vegetative coverage, overall vegetative health, and agricultural testing for pH, buffer pH, phosphorous, potassium, calcium, magnesium, zinc, manganese, copper, boron, and sodium. Periodic inspection of the stormwater controls and tailings dams would also be conducted to identify any required repairs or maintenance. Monitoring would also include dam stability monitoring via inclinometers installed at each tailings dam. Maintenance may require occasional reseeding in areas of the vegetative cover and patchwork repair of stormwater controls or dam armoring, particularly after large storm events. Disturbed vegetated areas would be covered with imported organic materials, seeded, and mulched to establish vegetation as needed. Disturbed stormwater controls and dam armoring would be repaired as needed by relocating existing rip rap or placing additional rip rap in disturbed areas. By covering the tailings, the main acid mine drainage source to groundwater and surface water has been mitigated. Improvements to groundwater and surface water quality would continue to be evaluated under the long-term groundwater monitoring program already in place.

ICs may include a recorded environmental restrictive covenant, a deed notice, or other proprietary controls with requirements to protect and prevent disturbance of the engineering components of the completed source controls actions and access controls. An ICIAP, identifying the specific IC device(s), parties responsible for IC implementation and providing details on how ICs will be implemented, maintained, enforced, modified and terminated (if applicable), will be developed and approved by the EPA during the remedial design phase of IROD implementation. The long-term maintenance and monitoring requirements will be incorporated in an EPA-approved O&M Plan.

Alternative T/MP-2 would include the following specific elements:

- ICs
- Periodic inspections of Mine Pit fencing and access road, the vegetative cover systems, stormwater controls, and tailings dams
- Reseeding and repair of the vegetative cover systems, stormwater controls, fencing, access road, and dam armoring (as necessary)

- Continued dam stability monitoring of the inclinometers located at each tailings dam

Implementing ICs, and maintaining the fencing, vegetative cover systems, stormwater controls, and tailings dams would yield the following benefits:

- Ensure integrity and continued function of the completed source controls actions
- Prevent access to mine pit by trespassers
- Reduce the generation of low pH, metals-enriched runoff from the surface of the tailings and mitigate acid mine drainage emanating from the tailings
- Reduce erosion of the tailings
- Reduce the infiltration of precipitation into the tailings and the consequent generation of acid mine drainage to the overburden and bedrock aquifers and subsequent discharge to surface water

10.0 Comparative Analysis of Alternatives

In selecting a remedy, the EPA considers the factors set out in Section 121 of CERCLA, 42 U.S.C.§ 9621, by conducting a detailed analysis of the viable remedial response actions pursuant to the NCP, 40 CFR §300:430(e)(9), and OSWER Directive 9355.3-01. The detailed analysis consists of an assessment of each of the individual response actions per remedy component against each of NCP nine evaluation criteria and a comparative analysis focusing upon the relative performance of each response measure against the criteria. This section of the ROD describes the relative performance of each alternative against seven of the nine criteria, noting how each compare to the other options under consideration. A detailed analysis of the alternatives can be found in the 2019 FS Report.

Because the EPA has decided that none of the four groundwater remedial alternatives in the FS can be selected as a final remedy at this time, the EPA has selected an interim remedial action that includes: Interim ICs and Monitoring for groundwater and; ICs, Maintenance and Monitoring for source areas (T/MP-2). Thus, only the remedy components selected for this limited scope action are being evaluated below.

Threshold Criteria – The first two criteria are known as "threshold criteria" because they are the minimum requirements that each response action must meet in order to be eligible for selection as a remedy [Reference 40 CFR 300.430(f)(1)(i)(A)].

10.1 Overall Protection of Human Health and the Environment

All alternatives evaluated except for the No Action alternatives would be protective of human health and the environment in the short term. No human health or ecological risks were identified from exposure to tailings at the Site. However, the tailings act as a source for acid mine drainage, which impacts groundwater and surface water onsite and downgradient of the Site. Human health risks associated with the future use of groundwater as a potable water resource were identified in the HHRA. The exposure pathway associated with existing potable uses of groundwater have been eliminated in part by implementing the NTCRA that consisted of wellhead treatment systems at residents adjacent to the Site and within the area of impacted groundwater. The selected remedy in this limited scope interim action for groundwater is comprised of interim IC and the monitoring components of the groundwater alternatives evaluated in the FS. Interim ICs including informational devices or enforcement tools, to mitigate human exposure to untreated, contaminated Site groundwater in the short term will be implemented pursuant to an EPA-approved ICIAP until a final remedy is selected and the need for more

permanent ICs including proprietary controls for affected residential parcels has been evaluated based upon the outcome of groundwater monitoring and background evaluation conducted during the interim remedial action. Alternative T/MP-2 will provide protection to the environment by ensuring the continued integrity and functioning of the completed source control actions, which reduce the infiltration of surface water into tailings and reduces the generation of acid mine drainage. Monitoring and maintenance of the dams would result in long-term stability of the structures. Implementation of ICs, including proprietary controls, pursuant to an EPA-approved ICIAP will ensure the long-term integrity and continued functioning of the completed source control actions in the tailings areas.

10.2 Compliance with ARARs

Only those federal and state requirements that are ARARs for the remedy components considered for this limited scope action (ICs, Maintenance and Monitoring) are addressed for this criterion. All alternatives evaluated except for the No Action alternatives are expected to comply with the action-specific ARARs, including SCDHEC standards for installation, operation and abandonment of monitoring wells. [SCDHEC R. 61-71H]; requirements for managing fugitive dust emissions, erosion and sediment controls, and storm water runoff from land-disturbing activities. [SCDHEC R. 61-62.6 Sect. III(a); R. 61-9.122.41; NPDES Construction General Permit for Stormwater Discharges, Permit No. SCR100000; and SCDHEC R. 72-307 I(3)(d) and (e) – South Carolina Storm Water Management and Sediment Reduction Regulations]. A complete listing of ARARs is provided in Table 14. Groundwater and surface water quality would continue to be monitored as part of the on-going Groundwater Monitoring Program to evaluate the impact of the completed source control actions and natural attenuation processes in achieving cleanup levels over time. This action is an interim solution only and is not expected to attain chemical-specific ARARs for groundwater but will become part of a total final remedial action that will attain groundwater ARARs, unless a TI Waiver is deemed appropriate by the EPA in the final ROD.

Primary Balancing Criteria – The next five criteria, criteria 3 through 7, are known as "primary balancing criteria". These criteria are factors by which tradeoffs between response actions are assessed so that the best options will be chosen, given site-specific data and conditions.

10.3 Long-Term Effectiveness and Permanence

Only those remedy components considered for this limited scope action (ICs, Maintenance and Monitoring) are addressed in this criterion. A complete evaluation of the balancing criteria for all groundwater alternatives is contained in the FS. The No Action alternatives would not provide long-term effectiveness or permanence in protecting human health and the environment through reduction, control, or elimination of contaminant source areas. The IC, maintenance and monitoring components of GW-2 and T/MP-2 would be protective of human health and the environment until a final remedy is selected for Site groundwater. Short-term risks to human health have also been reduced as most residents located within the area impacted by acid mine drainage with drinking water well sampling results above the cleanup levels are either provided bottled water for drinking or have a water treatment system installed on their private wellhead. Interim groundwater ICs in the form of information devices or enforcement tools will be implemented in the short-term until more permanent groundwater ICs including proprietary controls for affected residential parcels will be reevaluated based upon the outcome of groundwater monitoring and background evaluation conducted during the interim remedial action. Proprietary controls may be required as a component of the final remedy for those residential properties with groundwater contamination that presents unacceptable risk to human health.

10.4 Reduce Toxicity, Mobility or Volume through Treatment

As an interim solution only, this limited scope action is not intended to address the statutory mandate to utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. Because the proposed action does not constitute the final remedy for the Site, the statutory preference in CERCLA Section 121(b)(1) for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element will be addressed by the final response action.

10.5 Short-Term Effectiveness

The No Action alternatives would not address short-term risks to community or environment. No actions would be taken to reduce, control, or eliminate existing risks. For purposes of this evaluation, long-term monitoring (for GW-2 and T/MP-2) and maintenance (for T/MP-2) was assumed to continue for 30 years. Activities associated with continued monitoring would be conducted in accordance with the Site-specific Health and Safety Plan, which would minimize potential risk to field monitoring personnel. Installation of the vegetative cover systems, stormwater drainage improvements, and tailings dams have provided short-term effectiveness. Monitoring (and maintenance as necessary) will continue to provide short-term effectiveness. Although a vegetative cover system reduces acid mine drainage generation by reducing the infiltration of surface water into the tailings, it does not prevent all infiltration and does not address the portion of the tailings at AOC 1 that lies below the groundwater table. Improvements to groundwater and surface water quality would be monitored over time until a final remedy is selected.

10.6 Implementability

Under the No Action alternatives there is no action to implement. No action would be taken to protect human health or the environment, attain ARARs, or manage migration of contaminants. Activities in GW-2 and T/MP-2 associated with implementing ICs require the cooperation and assistance of the land owners subject to the use restrictions and thus may be difficult to implement. Continued maintenance and monitoring of groundwater, surface water, and source and access controls are technically easy to implement. Necessary services and equipment are readily available. The long-term monitoring program is already being conducted and would continue under an EPA-approved O&M Plan for the Site.

10.7 Cost

The costs associated with each alternative are compared in Table 15. The costs for each alternative shown in Table 15 are based on the 30-year timeframe as presented in the FS. The costs associated with the selected remedy (GW-2: Interim ICs and monitoring; T/MP-2: ICs, maintenance and monitoring of source areas) are presented in Table 16. The cost for the selected remedy is less than presented in the FS since the monitoring and maintenance is expected to occur for only five years in order to support final remedy selection. The capital cost for implementing the ICs is the same for any of the remedial alternatives, including the EPA's Selected Alternative. All cost estimates assumed a 7% discount rate.

Modifying Criteria – The final two evaluation criteria, criteria 8 and 9, are called "modifying criteria" because new information or comments from the state or the community on the Proposed Plan may modify the preferred response action or cause another response action to be considered.

10.8 State Acceptance

This criterion indicates whether based on its review of the RI/FS reports and the Proposed Plan, the state supports, opposes, and/or has identified any reservations with the selected response action.

The State of South Carolina concurs with all components of the Selected Remedy (see Appendix A).

10.9 Community Acceptance

This criterion summarizes the public's general reaction to the response actions described in the Proposed Plan and the RI/FS reports. This assessment includes determining which of the response actions the community supports, opposes, and/or has reservations about.

The majority of the public comments expressed at the August 29, 2019 public meeting and received during the comment period were supportive of the EPA's Selected Remedy.

11.0 Principal Threat Waste

The NCP establishes an expectation that the EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP Section 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 to groundwater, surface water or air, or acts as a source for direct exposure. Principal threat wastes (PTW) are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur.

The EPA has deferred selection of a final groundwater and surface water remedy for the Site pending further evaluation of the effectiveness of previously implemented source controls actions and natural attenuation processes in reducing contamination in the overburden groundwater zone and further monitoring of the effects of that remediation on contamination within bedrock groundwater and surface water. The selected interim remedial action includes ICs and monitoring for groundwater and ICs, maintenance and monitoring for source areas.

As an interim solution only, this limited scope action is not intended to address the statutory mandate to use treatment to address the principal threats posed by the Site. Because the proposed action does not constitute the final remedy for the Site, the identification of PTW and consideration of the statutory requirement will be addressed by the final response action.

12.0 Selected Remedy

The following sections provide a detailed description, rationale, and cost information for the selected remedy.

12.1 Detailed Description of the Selected Remedy

The Selected Remedy for the interim action includes ICs and monitoring for the groundwater, and ICs, maintenance and monitoring for the source areas.

At this time, the EPA has deferred selection of a final groundwater and surface water remedy to permit further evaluation of the effectiveness of natural attenuation processes on reducing concentrations of contaminants within the overburden groundwater, to monitor the effects of that remediation on contamination within the bedrock groundwater zone as well as impacts on surface water, and to develop Site groundwater and surface water background level data. The monitoring during this interim phase is expected to occur for approximately five years in order to support the selection of a final remedy. The outcome of this evaluation will be documented in an RI Report Addendum and/or an Appendix to the Feasibility Study Report as deemed necessary by the EPA prior to final remedy selection.

The Selected Remedy for groundwater is comprised of the Interim IC and monitoring components of the groundwater alternatives evaluated in the FS. Groundwater will be monitored according to the Final Groundwater Monitoring Plan to permit further evaluation of the effectiveness of natural attenuation processes on reducing concentrations of contaminants within the overburden groundwater and to monitor the effects of that remediation on contamination within the Bedrock groundwater zone as well as impacts on surface water. Groundwater will be monitored according to the Final Groundwater Monitoring Plan, which includes sampling for metals, as well as chloride, sulfate, and alkalinity in groundwater. Groundwater samples will also be analyzed in the field for water quality parameters including pH, temperature, specific conductance, DO, ORP, and turbidity. The current groundwater monitoring program was initiated in June 2015 and includes monitoring of 27 Site monitoring wells, 34 residential wells, and 4 surface water locations. On-going collection of surface water monitoring data will be used to determine whether additional remedial actions are needed to address ecological risk in surface water to ensure long-term protectiveness of ecological receptors. Surface water quality will be assessed by comparing sample concentrations against SCDHEC narrative and numeric AWQC for the associated surface water use classification(s).

For this limited scope action, interim ICs including informational devices or enforcement tools, will be implemented to mitigate human exposure to untreated, contaminated Site groundwater in the short term until a final remedy is selected and the need for more permanent ICs including proprietary controls has been evaluated. Informational devices may include issuance of advisories in coordination with the Town of Clover; and continuation of ABB's educational outreach and written notification efforts, in coordination with EPA, to affected or potentially affected residential landowners of potential health risks associated with consumptive uses (i.e., drinking, cooking use) of contaminated groundwater and the offer to install individual wellhead treatment systems on residential wells. Enforcement tools with IC components include S.C. Reg 61-44 (Individual Residential Well and Irrigation Well Permitting requirements), and requirements in legal agreements, such as Remedial Design/Remedial Action Consent Decrees, that limit certain activities, or require responsible parties to conduct specific activities, such as undertaking best efforts to enter into enforceable written agreements between responsible parties implementing the remedial action and affected landowners regarding access, non-interference, and limitations on uses that the EPA determines will pose an unacceptable risk to human health or interfere with implementation, integrity or protectiveness of the remedial action. Such agreements may be necessary where individual wellhead treatment systems have been or will be installed to ensure their continued effectiveness in mitigating risks to human health.

The Selected Remedy for the source areas includes ICs, including proprietary controls or deed notices, to prevent disturbance of the previously implemented source controls (i.e., vegetative cover systems, stormwater channel controls, and dam stabilization and rip rap armoring) and access controls (i.e., fencing around mine pit), and monitoring and maintenance of the mine pit fencing, tailings areas vegetative cover systems, the engineered drainage channels in AOCs 1, 2, 3, and 5 previously installed as interim actions, and the tailings dams. This remedy will provide protection to the environment by ensuring the continued integrity and functioning of the completed source control actions, which reduce the infiltration of surface water into tailings and reduce the generation of acid mine drainage. Monitoring and maintenance of the dams would result in long-term stability of the structures.

An ICIAP, identifying the specific IC device(s), parties responsible for IC implementation and providing details on how ICs will be implemented, maintained, enforced, modified and terminated (if applicable), will be developed and approved by the EPA during the remedial design phase of IROD implementation.

The Five-Year Review process (5 years of monitoring data) will be used to determine if natural attenuation processes are effective in reducing contamination in groundwater and surface water during the review period. While natural attenuation processes are expected to result in a reduction of contaminant concentrations during the review period, it may not be possible to attain final cleanup levels based upon chemical-specific ARARs (i.e., SDWA MCLs, or risk-based drinking water concentrations) throughout the plume due to elevated background concentrations of certain contaminants, and a TI Waiver Evaluation may be performed as appropriate prior to developing a final ROD. Under CERCLA Section 121(d)(4), compliance with ARARs such as MCLs may be waived when demonstrated that it is not practicable from an engineering perspective due to Site conditions and/or limitations in technologies used to treat the contaminants.

12.2 Summary of the Rationale for the Selected Remedy

The EPA, SCDHEC, and ABB are following a phased approach for remediation of the Site. The phased approach employs a step-wise design, implementation, and evaluation of technically appropriate, and cost-effective remedial actions. Evaluation of these actions will provide site-specific information to support the determination of final cleanup levels for the Site. The phased approach for this Site entails implementing remedial actions for tailings (source control) and stormwater management first and evaluating those remedial actions for improvements to downgradient surface and groundwater quality. This information will be used to determine the final cleanup levels and associated remedial actions for the Site. Interim actions for tailings (source control) and stormwater management have been implemented at several tailings areas and the former mill operations area. A fence was also installed around the Mine Pit as an interim action to restrict access. In addition, a NTCRA was implemented as a remedial measure to prevent the potable use of impacted groundwater from existing residential wells.

Based on completed interim source control actions and the NTCRA, as well as subsequent inspections and monitoring results, these response actions have: (1) partially addressed the concerns of receptor exposure to contamination associated with the tailings areas and the Mine Pit Pond; and (2) are protective of human and ecological receptors in the short term. For these remedial actions to be protective in the long term, ICs are needed to: (1) prevent disturbance of the engineering components of the completed source control actions (i.e., the vegetative cover systems, stormwater channel controls, and dam stabilization and rip rap armoring) so they function as intended to mitigate leaching to groundwater and acid mine drainage-impacted groundwater discharges to surface water; and (2) to prevent uncontrolled access (i.e., Mine Pit fencing) to physical hazards; and (3) to restrict potable uses of untreated Site groundwater exceeding drinking water levels protective of human health. The implementation of these interim actions at Areas of Concern 1, 2, 3, and 5 mitigated impacts of acid mine drainage to surface water. However, on-going collection of surface water monitoring data will be used to determine whether additional remedial actions are needed to address ecological risk in surface water to ensure long-term protectiveness of ecological receptors. Surface water quality will be assessed by comparing surface water concentrations against SCDHEC narrative and numeric AWQC for the associated surface water use classification(s). Monitoring and maintenance of the previously completed response actions will continue pursuant to an EPA-approved O&M Plan, and the results will be used to verify that the response actions continue to be protective and effective. Based on the above information, this IROD focuses on interim remedial actions for groundwater associated with the Site.

After a complete review of the remedial alternatives presented in the FS, the EPA has deferred selection of a final Site groundwater and surface water remedy to permit further evaluation of the effectiveness of the completed source control actions and natural attenuation processes on reducing concentrations of contaminants within the overburden groundwater and further monitoring of the effects of that

remediation on contamination within the bedrock groundwater zone and surface water. This phased approach is being used to further evaluate natural attenuation processes at the Site, develop Site groundwater background level data, and gather additional groundwater and surface water monitoring data.

The interim remedial action and selected remedy for this decision includes ICs and monitoring for the groundwater and surface water, and ICs, maintenance and monitoring for the source areas. ICs to prohibit installation of new groundwater wells and restrict potable use of untreated Site groundwater with COCs above drinking water standards will provide protection of human health until a long-term remedy is selected. Alternative T/MP-2 will provide protection to the environment by ensuring the continued integrity and functioning of the completed source control actions, which reduce the infiltration of surface water into tailings and reduces the generation of acid mine drainage. Monitoring and maintenance of the dams would result in long-term stability of the structures.

The Five-Year Review process (5 years of monitoring data) will be used to determine if natural attenuation processes are effective in reducing contamination in groundwater and surface water during the review period. While natural attenuation processes are expected to result in a reduction of contaminant concentrations during the review period, it may not be possible to attain final cleanup levels based upon chemical-specific ARARs (i.e., SDWA MCLs, or risk-based drinking water concentrations) throughout the plume due to elevated background concentrations of certain contaminants and a TI Waiver Evaluation may be performed as appropriate prior to developing a final ROD. Under CERCLA Section 121(d)(4), compliance with ARARs such as MCLs may be waived when demonstrated that it is not practicable from an engineering perspective due to Site conditions and/or limitations in technologies used to treat the contaminants.

12.3 Cost Estimate for the Selected Remedy

The information in the cost estimate summary table (Table 16) is based on the best available information regarding the anticipated scope of the selected remedy. Changes in the cost elements could occur as a result of new information and data collected during maintenance and monitoring activities. Major changes may be documented in the form of a memorandum, in the AR file, in an Explanation of Significant Differences, or in an amendment to this IROD. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost. The detailed elements of the cost estimate can be found in Appendix B of the FS (Wood 2019).

13.0 Estimated Outcomes of the Selected Remedy

The limited scope of the interim action (ICs and monitoring for the groundwater, and ICs, maintenance and monitoring for the source areas) will support the selection of a final remedy for the Site.

Monitoring data will allow further evaluation of the effectiveness of natural attenuation processes on reducing concentrations of contaminants within the overburden groundwater is needed to support MNA as a final remedy. During this interim remedial action, long-term monitoring of groundwater will continue, and additional data will be collected on naturally-occurring background levels, which may be used to further refine cleanup levels during final remedy selection. Groundwater and surface water quality will be compared against cleanup levels to evaluate concentrations of COCs in groundwater and surface water. Monitoring will assess groundwater plume stability, and further evaluate potential final remedial actions, including the viability of MNA or the need for active remedial measures, prior to selecting a final groundwater remedy or developing a TI Waiver Evaluation, as appropriate. Surface

water monitoring data will be evaluated to determine whether additional actions are needed to address risks to ecological receptors in surface water.

14.0 Statutory Determination

As was previously noted, Section 121(b)(1) of CERCLA, 42 U.S.C. § 9621(b)(1), mandates that remedial actions must be protective of human health and the environment, cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Section 121(b)(1) of CERCLA, 42 U.S.C. § 9621(b)(1), also establishes a preference for RAs which employ treatment to permanently and significantly reduce the volume, toxicity or mobility of the hazardous substances, pollutants, or contaminants at a site. Section 121(d) of CERCLA, 42 U.S.C. § 9621(d), further specifies that a RA must attain a degree of cleanup that satisfies ARARs under federal and state laws, unless a waiver can be justified pursuant to Section 121(d)(4) of CERCLA, 42 U.S.C. § 9621(d)(4).

14.1 Protection of Human Health and the Environment

The selected remedy in this limited scope interim action for groundwater is comprised of the IC and monitoring components of the groundwater alternatives evaluated in the FS. ICs to prohibit installation of new groundwater wells and restrict potable use of untreated Site groundwater with COCs above drinking water standards will provide protection of human health until a long-term remedy is selected. Alternative T/MP-2 will provide protection to the environment by ensuring the continued integrity and functioning of the completed source control actions, which reduce the infiltration of surface water into tailings and reduces the generation of acid mine drainage. Monitoring and maintenance of the dams would result in long-term stability of the structures. Implementation of the Selected Remedy will not pose any unacceptable short-term risks to human health and the environment.

14.2 Compliance with ARARs

Only those federal and state requirements that are ARARs for the remedy components considered for this limited scope action (ICs, Maintenance and Monitoring) are addressed for this criterion.

Section 121(d) of CERCLA, as amended, specifies, in part, that RAs for cleanup of hazardous substances must comply with requirements and standards under federal or more stringent state environmental laws and regulations that are applicable or relevant and appropriate (i.e., ARARs) to the hazardous substances or particular circumstances at a site or justify invoking a waiver under Section 121(d)(4). *See also* 40 C.F.R. §§ 300.430(f)(1)(ii)(B) and (C), and 40 C.F.R. §§ 300.430(f)(5)(ii)(B) and (C). ARARs include only federal and state environmental or facility siting laws/regulations and do not include occupational safety or worker protection requirements. Compliance with Occupational Safety and Health Administration (OSHA) standards is required by 40 C.F.R. § 300.150 and therefore the CERCLA requirement for compliance with or wavier of ARARs does not apply to OSHA standards.

Under CERCLA Section 121(e)(1), federal, state, or local permits are not required for the portion of any removal or RA conducted entirely onsite as defined in 40 C.F.R. § 300.5. *See also* 40 C.F.R. §§ 300.400(e)(1) & (2). Also, CERCLA actions must only comply with the "substantive requirements," not the administrative requirements of a regulation. Administrative requirements include permit applications, reporting, record keeping, and consultation with administrative bodies. Although consultation with state and federal agencies responsible for issuing permits is not required, it is recommended for determining compliance with certain requirements such as those typically identified as Location-Specific ARARs.

Applicable requirements, as defined in 40 C.F.R. § 300.5, means 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, or contaminant, remedial action, location, or other circumstance at a CERCLA site. Only those state standards that are identified by the state in a timely manner and that are more stringent than federal requirements may be applicable.

Relevant and appropriate requirements, as defined in 40 C.F.R. § 300.5, means 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, or contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at a CERCLA site that their use is well suited to the particular site. Only those state standards that are identified by the state in a timely manner and that are more stringent than federal requirements may be relevant and appropriate.

Per 40 C.F.R. § 300.400(g)(5), only those state standards are promulgated, are identified in a timely manner, and that are more stringent than federal requirements may be applicable or relevant and appropriate. For purposes of identification and notification of promulgated state standards, the term promulgated means that the standards are of general applicability and are legally enforceable. State ARARs are considered more stringent where there is no corresponding federal ARAR, where the State ARAR provides a more stringent concentration of a contaminant, or the where a State ARAR is broader in scope than a federal requirement.

In addition to ARARs, the lead and support agencies may, as appropriate, identify other advisories, criteria, or guidance to be considered for a particular release. The "to-be-considered" (TBC) category consists of advisories, criteria, or guidance that were developed by the EPA, other federal agencies, or states that may be useful in developing CERCLA remedies. *See* 40 C.F.R. § 300.400(g)(3). TBCs are not considered legally enforceable and, therefore, are not considered to be applicable for a site but are evaluated along with ARARs as part of the risk assessment to set protective cleanup goals.

For purposes of ease of identification, the EPA has created three categories of ARARs: Chemical-, Location- and Action-Specific. Under 40 C.F.R. § 300.400(g)(5), the lead and support agencies shall identify their specific ARARs for a particular site and notify each other in a timely manner as described in 40 C.F.R. § 300.515(d). Chemical-, and Location-Specific ARARs should be identified as early as scoping phase of the Remedial Investigation, while Action-Specific ARARs are identified as part of the Feasibility Study for each remedial alternative. See 40 C.F.R. §§ 300.430(b)(9) & 300.430(d)(3).

Chemical-Specific - Requirements that establish health- or risk-based numerical concentration limits or assessment methodologies for chemical contaminants in environmental media. As part of limited scope action, groundwater and surface water quality will continue to be monitored as part of the on-going Groundwater Monitoring Program to evaluate the impact of the completed source control actions and natural attenuation processes in achieving cleanup levels over time. This action is an interim solution only and is not expected to attain chemical-specific ARARs for groundwater and surface water but will become part of a total final remedial action that will attain chemical-specific ARARs, unless a TI Waiver is deemed appropriate by the EPA in the final ROD. For purposes of this interim remedial action, groundwater monitoring data will be assessed against the chemical-specific ARAR, i.e., the SDWA MCLs (including more stringent state promulgated MCLs), or human health risk-based

concentrations if ARARs are not available for a particular COCs. Surface water monitoring data will be assessed against the state AWQC, or in the absence of a promulgated AWQC, then assessed against the protective, ecological risk-based concentration.

Location-Specific - Requirements that can restrict, or limit response action based upon specific locations (e.g., wetlands, floodplains, historic places, or sensitive habitats). Location-specific ARARs are triggered by the presence of specific natural or manmade features or potentially affected resources at a disposal or cleanup site.

A Preliminary Protected Species Assessment was prepared for the Site and submitted to the United States Fish and Wildlife Service (USFWS) in April 2014. Based on review of the Preliminary Protected Species Assessment, the USFWS requested further evaluation of the Schweinitz's Sunflower. An additional survey was conducted, and the Schweinitz's Sunflower Survey Results were submitted to the USFWS in October 2014. By letter dated November 17, 2014, the USFWS agreed with the Preliminary Protected Species Assessment and the Schweinitz's Sunflower Survey Results, and concluded that there are no known rare, threatened, or endangered species, nor are there any Critical Habitat areas at the Site where interim actions are planned or have been completed.

A South Carolina State Historical Preservation Office (SHPO) Section 106 Project Review Form Preliminary Cultural Resource Assessment was prepared for the Site and submitted to the EPA in May 2014. The EPA forwarded that submittal to the South Carolina SHPO in July 2014. South Carolina SHPO responded via letter in July 2014 recommending a cultural resource survey investigation prior to conducting any ground-disturbing activities. A cultural resource survey investigation was conducted in April 2015 and a Phase I Cultural Resource Survey of the Site was submitted to South Carolina SHPO in July 2015. An addendum to the Phase I Cultural Resource Survey was submitted in September 2015. In September 2015, the EPA and SCDHEC concurred with the findings of the cultural resource survey and no additional action was required prior to conducting any ground-disturbing activities.

No other specific natural or manmade features or resources have been identified at the Site. Therefore, no location-specific ARARs have been identified specific to this limited scope action.

Action-Specific - Requirements that set controls or restrictions on the design, implementation, and performance levels of activities related to the management of hazardous substances, pollutants, or contaminants. The remedy components considered for this limited scope action (ICs, Maintenance and Monitoring) are expected to comply with the action-specific ARARs, including SCDHEC standards for installation, operation and abandonment of monitoring wells. [SCDHEC R. 61-71H]; requirements for managing fugitive dust emissions, erosion and sediment controls, and storm water runoff from land-disturbing activities. [SCDHEC R. 61-62.6 Sect. III(a); R. 61-9.122.41; NPDES Construction General Permit for Stormwater Discharges, Permit No. SCR100000; and SCDHEC R. 72-307 I(3)(d) and (e) – South Carolina Storm Water Management and Sediment Reduction Regulations]. In accordance with 40 C.F.R. § 300.430(f)(5)(ii)(B) this IROD includes ARARs that the selected remedy is expected to attain that were identified by the EPA and the State of South Carolina. The selected remedy includes ICs, monitoring and maintenance activities. Table 14 lists the Action-Specific ARARs/TBCs for the selected interim remedial action.

Any remediation wastes that are generated and subsequently transferred offsite or transported in commerce along public right-of-ways must meet any applicable requirements such as those for packaging, labeling, marking, manifesting, and placarding requirements for hazardous materials. In addition, CERCLA Section 121(d)(3) provides that the offsite transfer of any hazardous substance,

pollutant, or contaminant generated during CERCLA response actions be sent to a treatment, storage, or disposal facility that is in compliance with applicable federal and state laws and has been approved by the EPA for acceptance of CERCLA waste. *See also* 40 C.F.R. § 300.440 (so called "Off-Site Rule").

14.3 Cost Effectiveness

The EPA has determined that the Selected Remedy is the most cost-effective and that the overall protectiveness of the remedy is proportional to the overall cost. As specified in 40 CFR §300.430(f)(1)(ii)(D), the cost-effectiveness of the Selected Remedy was assessed by comparing the protectiveness of human-health and the environment in relation to three balancing criteria (i.e., long-term effectiveness and permanence; reduction in toxicity, mobility and volume; and short-term effectiveness) with the other alternatives considered.

The basis for the EPA's determination of cost-effectiveness is summarized in the Proposed Plan. While more than one remedial alternative can be considered cost-effective, CERCLA does not mandate that the most cost-effective or least expensive remedy be selected. The timeframe for remediation for Alternatives GW-2, GW-3, and GW-4 is anticipated to be more than 100 years due to ARD associated with the naturally-occurring geology. The EPA has deferred selection of a final remedy pending further evaluation of the effectiveness of previously implemented source control actions and natural attenuation processes in reducing contamination in the overburden groundwater zone and to monitor the effects of that remediation on contamination within the bedrock groundwater and surface water.

The proposed interim action is intended to provide protection of human health and the environment in the short term until a final ROD is signed. The proposed interim action complies with those federal and state requirements that are ARARs for this limited scope action and is cost effective. The costs associated with ICs and groundwater monitoring for the interim action is less than the cost for the remedial alternative presented in the FS since the monitoring is expected to only occur for five years in order to support final remedy selection for groundwater. The capital cost for implementing the ICs is same for any of the remedial alternatives, including the EPA's Preferred Alternative.

14.4 Use of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

This interim action is protective of human health and the environment in the short term and is intended to provide adequate protection until a final ROD is signed, complies with those federal and state requirements that are applicable or relevant and appropriate for this limited-scope action, and is cost-effective. This action is an interim solution only and is not intended to utilize permanent solutions and alternative treatment technologies to the maximum extent practicable for this Site. Subsequent actions are planned to address fully the threats posed by conditions at this Site. Because this remedy will result in hazardous substances remaining onsite 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 RA.

14.5 Preference for Treatment as a Principal Element

This action is an interim solution only and is not intended to utilize treatment as a principal element of the selected remedy. Because this action does not constitute the final remedy for the Site, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element will be addressed by the final response action. Subsequent actions are planned to address fully the threats posed by conditions at this Site. Because this is an interim action IROD, review of this Site and remedy will be ongoing as the EPA continues to develop remedial alternatives for the Site.

14.6 Five-Year Review Requirements

This interim action is protective of human health and the environment in the short term and is intended to provide adequate protection until a final ROD is signed. Subsequent actions are planned to address fully the threats posed by conditions at this Site. Because this remedy will result in hazardous substances remaining onsite above health-based levels, a statutory review will be conducted within five years after the initiation of the remedial action to ensure that the remedy is, or will be, protective of human health and the environment in accordance with CERCLA Section 121(c) and the NCP at 40 CFR 300.430 (f)(4)(ii). Because this is an interim action ROD, review of this Site and remedy will be ongoing as the EPA continues to develop remedial alternatives for the Site.

14.7 Documentation of Significant Changes

Pursuant to CERCLA 117(b) and NCP §300.430(f)(3)(ii), the IROD must document any significant changes made to the Preferred Alternative discussed in the Proposed Plan. The EPA has reviewed all written and verbal comments submitted during the public comment period. There are no significant changes to the remedy, as originally identified in the Proposed Plan.

15.0 References

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AMEC, 2012b. Report of Findings, Limited Geochemical and Geotechnical Studies in Support of Pre-FS Design, Henry's Knob Former Mine Site, York County, South Carolina, EPA ID NO. SCN 000 407 376, AMEC Environment & Infrastructure, Inc., November 2012.

AMEC, 2013a. Revised Vegetative Cover Pilot Study Work Plan, Henry's Knob Former Mine Site, York County, South Carolina, EPA ID NO. SCN 000 407 376, AMEC Environment & Infrastructure, Inc., August 2013.

AMEC, 2013b. Construction Completion Report AOC 1 Vegetative Cover Study Test Plot, Henry's Knob Former Mine Site, York County, South Carolina, EPA ID NO. SCN 000 407 376, AMEC Environment & Infrastructure, Inc., December 2013.

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AMEC, 2014e. Construction Completion Report AOC 1 Vegetative Cover Study Addendum Test Plots, Henry's Knob Former Mine Site, York County, South Carolina, EPA ID NO. SCN 000 407 376, AMEC Environment & Infrastructure, Inc., December 2014.

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AmecFW, 2015b. Construction Completion Report, AOC 3 Vegetative Cover Remedy, Henry's Knob Former Mine Site, York County, South Carolina, EPA ID NO. SCN 000 407 376, Amec Foster Wheeler Environment & Infrastructure, Inc., November 2015.

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AmecFW, 2016a. AOC 1 Rehabilitation Design, Henry's Knob Former Mine Site, York County, South Carolina, EPA ID NO. SCN 000 407 376, AMEC Environment & Infrastructure, Inc. May 2016.

AmecFW, 2016b. AOC 2 Rehabilitation Design, Henry's Knob Former Mine Site, York County, South Carolina, EPA ID NO. SCN 000 407 376, AMEC Environment & Infrastructure, Inc., October 2016.

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PART 3: RESPONSIVENESS SUMMARY

1.0 Public Review Process

1.1 Introduction

This Responsiveness Summary (RS) provides a summary of comments and concerns received during the public comment period related to the Henry's Knob Superfund Site, Proposed Plan, and provides the responses of the US Environmental Protection Agency (EPA) to those comments and concerns.

A RS serves two functions: first, it provides the decision maker with information about the views of the public, government agencies, and potentially responsible parties (PRPs) regarding the proposed RA and other alternatives; and second, it documents the way in which public comments have been considered during the decision-making process and provides answers to significant comments.

Public involvement in the review of Proposed Plans is stipulated in Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, and Sections 300.430(f)(3)(i)(F) and 300.430(f)(5)(iii)(B) of the NCP. These regulations provide for active solicitation of public comment.

All public comments received are addressed in this RS. The RS was prepared following guidance provided by the EPA in *Community Relations in Superfund: A Handbook* (EPA, 1992) and the (*Community Relations during Enforcement Activities and Development of the Administrative Record* (EPA, 1988). The comments presented in this document have been considered in the EPA's decision in the selection of an interim remedy to address contamination at the Henry's Knob Site.

The text of this RS explains the public review process and how comments were responded to. Appendix B provides the Comment and Response, which contains summaries of every comment received during the public comment period and the EPA's response. Appendix C provides documentation of the public meeting.

1.2 Public Review Process

The EPA relies on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. To this end, the Proposed Plan for the Henry's Knob Superfund Site, Clover, South Carolina was made available to the community on August 23, 2019.

The complete AR file, which contains the RI/FS report and risk assessments, upon which the Selected Interim Remedy is based, is available at the locations listed below.

Information Repositories for the Henry's Knob Superfund Site
Administrative Record

Clover Public Library
107 Knox Street
Clover, SC 29710
(803) 222-3474

U.S. EPA - Region 4
Superfund Records Center
61 Forsyth St., SW
Atlanta, GA 30303

1.3 Public Comment Period, Public Meeting and Availability Sessions

The public comment period is intended to gather information about the views of the public regarding both the remedial alternatives and general concerns about the site. A notice of the start of the public comment period, the public meeting date, the preferred remedy, contact information, and the availability of above-referenced documents was provided in a fact sheet distributed to the public on August 23, 2019 and published in the *Rock Hill Herald* on the same day.

The public comment period for the Site Proposed Plan commenced on August 23, 2019 and continued until September 21, 2019 for a total of 30 days. During that period, a public meeting was held on August 29, 2019. The purpose of the meeting was to provide the community with additional information relating to the preferred alternative. A question-and-answer session followed the formal presentation at the public meeting. The meeting was only attended by three citizens and their questions were answered at the meeting. Appendix C provides documentation of the public meeting.

1.4 Receipt and Identification of Comments

Public comments on the Proposed Plan were received as written comments submitted to the EPA Region 4 via USPS, e-mail and oral comments made at the public meeting.

1.5 Locating Responses to Public Comments within the Public Comments and the EPA Responses

The Public Comments and the EPA Responses (Appendix B) contains a complete listing of all public comments and responses from the EPA. The appendix allows readers to find answers to specific questions they have raised and is organized as follows:

Each comment received is presented separately and is immediately followed by the EPA's response.

2.0 References

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EPA, 1992. Community Relations in Superfund: A Handbook. Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9230.0-03C. EPA 540-R-92-009. January 1992

TABLES

Table 1. Occurrence, Distribution, and Selection of Chemicals of Concern in Groundwater

Chemical of Concern	Exposure Unit	Min Conc.[1] (mg/L)	Max Conc.[1] (mg/L)	Mean Conc. (mg/L)	95% UCL of Mean (mg/L)	Exposure Point Conc. (mg/L)	Background Conc. (mg/L)	Screening Value (mg/L)
Aluminum	Overburden Wells	0.0368	1400	146	NC	1400	7.3	3.7
	Bedrock Wells	0.0298	75.6	18.4	NC	75.6	1.9	
Arsenic	Overburden Wells	0.0013 J	0.0026	NA	NC	0.0026	ND	0.000045
	Bedrock Wells	0.000265 J	0.00431 J	NA	NC	0.00431	ND	
Beryllium	Overburden Wells	0.00006 J	0.082	0.01	NC	0.082	ND	0.0073
	Bedrock Wells	0.000064 J	0.0637	0.0086	NC	0.0637	ND	
Cadmium	Overburden Wells	0.000121 J	0.037 J	0.0086	NC	0.037	ND	0.0018
	Bedrock Wells	0.000172 J	0.057	0.004	NC	0.057	ND	
Chromium	Overburden Wells	0.000151 J	0.3	0.026	NC	0.3	0.085	0.000043
Cobalt	Overburden Wells	0.00143 J	13.8	2.5	NC	13.8	0.012	0.0011
	Bedrock Wells	0.000116 J	2	0.2	NC	2	ND	
	Private Wells	0.000676 J	0.211	0.026	NC	0.211	0.007	
Copper	Overburden Wells	0.00021 J	9.2	0.88	NC	9.2	ND	0.15
Lead	Overburden Wells	0.000125 J	0.0244	0.0039	NC	0.0244	0.0078	0.015
Manganese	Overburden Wells	0.00985	651	123	NC	651	0.82	0.088
	Bedrock Wells	0.00944	124	11.3	NC	124	0.45	
	Private Wells	0.0134	10.9	2.4	NC	10.9	0.1	
Nickel	Overburden Wells	0.000553 J	3.29	0.3	NC	3.29	0.044	0.073
Vanadium	Overburden Wells	0.000531 J	0.49	0.06	NC	0.49	0.025	0.018

Notes:

[1] = Minimum/maximum detected concentration in groundwater

J = Estimated concentration

NA = None available

mg/L = milligrams per liter

NC = Not calculated due to small sample size

ND = Not detected

UCL = Upper Confidence Limit

Source: Final Human Health Risk Assessment (MACTEC, 2011)

Table 2. Occurrence, Distribution, and Selection of Chemicals of Concern in Surface Water

Chemical of Concern	Exposure Unit	Min Conc.[1] (mg/L)	Max Conc.[1] (mg/L)	Mean Conc. (mg/L)	Exposure Point Conc. (mg/L)	Screening Value (mg/L)
Aluminum	West Trib.	0.351	15	6.2	10.1	0.087
	SFCC Reach 2	0.0903	2.5	0.82	2.5	
	Allison Creek	0.0632	33.7	4.6	27	
Cadmium	West Trib.	0.000827	0.0044	0.0016	0.0044	0.00009 - 0.00041
	SFCC Reach 2	0.000097	0.000157	0.00035	NA	
	Allison Creek	0.000305	0.00304	0.00079	0.0012	
Cobalt	West Trib.	0.0435	2.2	0.8	2.1	0.023
	SFCC Reach 2	0.0439	0.17	0.096	0.13	
	Allison Creek	0.000877	0.0737	0.024	0.041	
Copper	West Trib.	0.00196	0.11	0.036	0.063	0.0027-0.0146
	SFCC Reach 2	0.00166	0.0075	0.0036	0.0053	
	Allison Creek	0.000868	0.302	0.022	0.23	
Lead	West Trib.	0.000476	0.012	0.0031	0.012	0.0005 - 0.0062
	SFCC Reach 2	0.000175	0.000948	0.00069	NA	
	Allison Creek	0.000203	0.00572	0.0012	0.0018	
Manganese	West Trib.	1.95	47	19.4	32	0.12
	SFCC Reach 2	2.64	6.6	4.9	6.1	
	Allison Creek	0.142	12	2.6	11.6	
Silver	West Trib.	0.005	0.005	0.0023	0.005	0.000012
	SFCC Reach 2	ND	ND	0.00083	NA	
	Allison Creek	ND	ND	0.00077	NA	

Chemical of Concern	Exposure Unit	Min Conc.[1] (mg/L)	Max Conc.[1] (mg/L)	Mean Conc. (mg/L)	Exposure Point Conc. (mg/L)	Screening Value (mg/L)
Thallium	West Trib.	0.00015	0.00015	0.0046	NA	0.004
	SFCC Reach 2	ND	ND	0.0013	NA	
	Allison Creek	0.00012	0.00012	0.0011	NA	
Zinc	West Trib.	0.0207	0.92	0.34	0.91	0.035-0.187
	SFCC Reach 2	0.0172	0.044	0.026	NA	
	Allison Creek	0.00329	0.189	0.059	0.092	
pH (s.u.)	Mine Pit Pond	2	2	NA	NA	6.0-8.0
	East Trib.	4.34	6.6	5.9	NA	
	West Trib.	2.59	5.6	3.5	NA	
	Allison Creek	3.1	5.6	3.66	NA	

Notes:

[1] = Minimum/maximum detected concentration in surface water

J = Estimated concentration

NA = None available

mg/L = milligrams per liter

NC = Not calculated due to small sample size

ND = Not detected

UCL = Upper Confidence Limit

Source: Final Baseline Ecological Risk Assessment (MACTEC, 2011)

Table 3. Occurrence, Distribution, and Selection of Chemicals of Concern in Sediment

Chemical of Concern	Exposure Unit	Min Conc.[1] (mg/kg)	Max Conc.[1] (mg/kg)	Mean Conc. (mg/kg)	Exposure Point Conc. (mg/kg)	Screening Value (mg/kg)
Copper	East Trib.	5.5	42	26	32	31.6
	West Trib.	8.8	250	115	173	
	SFCC Reach 1	3.69	34	15.3	34	
	SFCC Reach 2	3.47	20.9	8	NA	
	Allison Creek	4.36	44.6	17.8	23	
Iron	East Trib.	2700	58000	40740	49528	20,000
	West Trib.	9850	140000	70506	100024	
	SFCC Reach 1	2300	15300	8937	NA	
	SFCC Reach 2	3370	18400	7025	NA	
	Allison Creek	5840	64000	24888	32570	
Manganese	East Trib.	110	9600	2560	5549	460
	West Trib.	56	310	136	NA	
	SFCC Reach 1	59	1820	939	1820	
	SFCC Reach 2	77.7	289	162	NA	
	Allison Creek	11.6	733	255	552	

Notes:

[1] = Minimum/maximum detected concentration in sediment

0NA = None available

NC = Not calculated due to small sample size

ND = Not detected

UCL = Upper Confidence Limit

J = Estimated concentration

mg/kg = milligrams per kilogram

Source: Final Baseline Ecological Risk Assessment (MACTEC, 2011)

Table 4. Summary of Bounding Monitoring Well and Residential Well Groundwater Analytical Results (1Q18 through 4Q18)

Location	Sample Date	Total Cobalt (µg/L)		Total Manganese (µg/L)	
		Result	Qualifier	Result	Qualifier
OM-10-14	11/29/2018	0.12	U	1	U
OM-10-16	11/29/2018	0.72		31	
OM-10-17	11/28/2018	0.12	U	4.8	J
OM-10-19	11/29/2018	0.12	U	3.9	J
OM-10-20	11/29/2018	0.12	U	1.1	J
OM-10-21	11/27/2018	1.1		23	
OM-10-22	11/27/2018	0.48	J	15	
BM-10-14	11/29/2018	0.12	U	2	J
BM-10-17	11/28/2018	0.12	U	3.8	J
BM-10-19	11/29/2018	0.7		36	
BM-10-20	11/29/2018	0.69		13	
BM-10-21	11/27/2018	0.65		9.3	J
\BM-10-22	11/27/2018	0.63		210	
RW-10-01 Pre	11/28/2018	0.12	U	21	
RW-10-04	3/19/2018	0.39	J	65	
RW-10-04	6/20/2018	0.45	J	66	
RW-10-04	8/16/2018	0.36	J	65	
RW-10-04	11/27/2018	0.45	J	72	
RW-10-05 Pre	11/28/2018	0.12	U	10	
RW-10-08 Pre	11/28/2018	0.12	U	34	
RW-10-10	3/19/2018	0.12	U	1	U
RW-10-10	6/20/2018	0.12	U	3.2	J
RW-10-10	8/16/2018	0.17	J	1	U
RW-10-10	11/30/2018	0.12	U	4	J

Location	Sample Date	Total Cobalt (µg/L)		Total Manganese (µg/L)	
		Result	Qualifier	Result	Qualifier
RW-10-11	3/19/2018	0.16	J	14	
RW-10-11	6/20/2018	0.27	J	7.9	J
RW-10-11	8/16/2018	0.12	U	1	U
RW-10-11	11/27/2018	0.15	J	10	
RW-10-12	3/19/2018	0.12	U	1	U
RW-10-12	6/20/2018	0.12	U	1	U
RW-10-12	8/16/2018	0.12	U	1	U
RW-10-12	11/30/2018	0.12	U	1	U
RW-10-16	3/19/2018	0.12	U	52	
RW-10-16	6/20/2018	0.12	U	59	
RW-10-16	8/16/2018	0.13	J	42	
RW-10-16	11/30/2018	0.12	U	45	
RW-10-17 Pre	11/28/2018	0.57		19	
RW-10-18 Pre	11/26/2018	0.69		89	
RW-10-28 Pre	11/28/2018	0.93		28	
RW-10-29 Pre	11/26/2018	0.3	J	19	
RW-10-31	3/19/2018	0.19	J	25	
RW-10-31	6/20/2018	0.32	J	49	
RW-10-31	8/16/2018	0.12	U	17	
RW-10-31	11/30/2018	0.12	U	18	
RW-10-40	3/19/2018	0.12	U	1	U
RW-10-40	6/20/2018	0.12	U	3.2	J
RW-10-40	8/16/2018	0.14	J	1	U
RW-10-40	11/30/2018	0.12	U	3.1	J
RW-10-42 Pre	11/27/2018	0.12	U	95	
RW-10-51 Pre	6/20/2018	0.12	U	570	

Location	Sample Date	Total Cobalt (µg/L)		Total Manganese (µg/L)	
		Result	Qualifier	Result	Qualifier
RW-10-51 Post	6/20/2018	0.12	U	1.8	J
RW-10-51 Pre	11/27/2018	0.12	U	570	
RW-10-51 Post	11/27/2018	0.12	U	2.6	J
RW-10-56	3/19/2018	2.5		26	
RW-10-56	6/20/2018	2.5		21	
RW-10-56	8/16/2018	2.2		21	
RW-10-56	11/28/2018	2.4		24	
RW-10-57 Pre	11/29/2018	0.18	J	110	
RW-10-70 Pre	11/28/2018	0.12	U	260	
RW-10-73 Pre	11/30/2018	0.12	U	170	
RW-10-75 Pre	11/28/2018	0.12	U	1	U
RW-10-92 Pre	11/29/2018	1.4		46	

Notes:

Pre = sample collected before the treatment system

Post = sample collected after the treatment system

µg/L = micrograms per Liter

J = Estimated concentration

U = Not detected

Source: Draft Final Site-Wide FS (Wood, 2019)

Table 5. Summary of Interior Monitoring Well and Residential Well Groundwater Analytical Results (1Q18 through 4Q18)

Location	Sample Date	Total Cobalt (µg/L)		Total Manganese (µg/L)	
		Result	Qualifier	Result	Qualifier
OM-10-01	11/27/2018	4200		68000	
OM-10-02D	11/29/2018	4		1800	
OM-10-03	11/29/2018	3000		140000	
OM-10-04	11/28/2018	8		180000	
OM-10-12	11/28/2018	320		22000	
OM-10-23D	11/29/2018	180		64000	
OM-10-24D	11/27/2018	470		16000	
OM-10-24M	11/27/2018	89		2500	
OM-10-24S	11/27/2018	93		2800	
BM-10-01	11/27/2018	710		22000	
BM-10-02	11/29/2018	1600		130000	
BM-10-03	11/29/2018	33		11000	
BM-10-04	11/28/2018	0.56		180	
BM-10-12	11/28/2018	160		18000	
RW-10-09	6/20/2018	7.0		2200	
RW-10-09	11/26/2018	6.8		2500	
RW-10-15	3/19/2018	0.12	U	1	U
RW-10-15	6/20/2018	0.12	U	1	U
RW-10-15	8/16/2018	0.48	J	36	
RW-10-15	11/30/2018	0.45	J	43	
RW-10-67 Pre	11/27/2018	0.3	J	220	
RW-10-71 Pre	11/26/2018	0.24	J	270	
RW-10-72 Pre	11/26/2018	0.47	J	220	
RW-10-77 Pre	3/19/2018	2500		120000	

Location	Sample Date	Total Cobalt (µg/L)		Total Manganese (µg/L)	
		Result	Qualifier	Result	Qualifier
RW-10-77 Post	3/19/2018	1.2		19	
RW-10-77 Pre	6/19/2018	2600		110000	
RW-10-77 Post	6/19/2018	1.5	J	38	
RW-10-77 Pre	8/16/2018	2800		110000	
RW-10-77 Post	8/16/2018	0.28	J	1	U
RW-10-77 Pre	12/4/2018	2400		150000	
RW-10-77 Post	12/4/2018	420		16000	
RW-10-77 Pre	1/3/2019	2800		120000	
RW-10-77 Post	1/3/2019	0.12	U	3.2	J
RW-10-80 Pre	11/29/2018	0.12	U	180	
RW-10-89	6/19/2018	30		1300	
RW-10-89 Pre	8/16/2018	41		1700	
RW-10-89 Post	8/16/2018	0.31	J	10	
RW-10-89 Pre	12/4/2018	40		2100	
RW-10-89 Post	12/4/2018	0.12	U	1	
RW-10-90	6/19/2018	0.4	J	82	
RW-10-90	8/16/2018	0.18	J	65	
RW-10-90	11/30/2018	0.12	UJ	52	

Notes:

Pre = sample collected before the treatment system

Post = sample collected after the treatment system

µg/L = micrograms per Liter

J = Estimated concentration

U = Not detected

Source: Draft Final Site-Wide FS (Wood, 2019)

Table 6. Summary of Surface Water Analytical Results (4Q18)

Location	Sample Date	pH (Standard Units)		Total Aluminum (µg/L)		Total Cobalt (µg/L)		Total Manganese (µg/L)	
		Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
SW-06-110 (West Tributary)	11/27/2018	4.46		9900		2100		79000	
SW-06-111 (East Tributary)	11/28/2018	NA		NA		230		94000	
SW-06-112 (Allison Creek)	11/30/2018	4.08		16000		49		4100	J
SW-06-113 (Mine Pit Pond)	11/30/2018	3.13		32000		68		800	J

Notes:
J = Estimated concentration
U = Not detected
µg/L = micrograms per Liter
Source: Draft Final Site-Wide FS (Wood, 2019)

Table 7. Summary of Cancer Toxicity Data

Pathway: Ingestion, Dermal						
Chemical of Concern	Oral Cancer Slope Factor	Dermal Cancer Slope Factor	Slope Factor Units	Weight of Evidence/Cancer Guideline Description	Source	Date
Arsenic	1.5E+00	1.5E+00	$(mg/kg/day)^{-1}$	A	IRIS	Oct 2010

Notes:
A - Known human carcinogen
IRIS - Integrated Risk Information System
$(mg/kg/day)^{-1}$ - risk per milligram per kilogram per day
Source: Final Human Health Risk Assessment (MACTEC, 2011)

Table 8. Summary of Non-Cancer Toxicity Data

Pathway: Ingestion, Dermal								
Chemical of Concern	Chronic/ Subchronic	Oral RfD	Dermal RfD	RfD Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Source	Date
Aluminum	Chronic	1E+00	2.0E-01	mg/kg-day	CNS	100	PPRTV	Nov 2010
Arsenic	Chronic	3.0E-04	3.0E-04	mg/kg-day	Skin	3	IRIS	Oct 2010
Beryllium	Chronic	2.0E-03	1.4E-05	mg/kg-day	GI Tract	300	IRIS	Oct 2010
Cadmium (water)	Chronic	5.0E-04	2.5E-05	mg/kg-day	Kidney	10	IRIS	Oct 2010
Chromium (as Cr^{+6})	Chronic	3.0E-03	7.5E-05	mg/kg-day	NOAEL	300	IRIS	Oct 2010
Cobalt	Chronic	3.0E-04	6.0E-05	mg/kg-day	Blood	3000	PPRTV	Aug 2008
Copper	Chronic	4.0E-02	8.0E-03	mg/kg-day	GI Tract	NA	HEAST	Nov 2010
Lead	Chronic	NA	NA	mg/kg-day	NA	NA	NA	NA
Manganese	Chronic	2.4E-02	9.6E-04	mg/kg-day	CNS	3	IRIS	Oct 2010
Nickel	Chronic	2.0E-02	8.0E-04	mg/kg-day	General Toxicity	300	IRIS	Oct 2010
Vanadium	Chronic	9.0E-03	2.3E-04	mg/kg-day	Liver	100	IRIS	Oct 2010

Notes:
CNS - Central Nervous System
GI Tract - Gastrointestinal Tract
PPRTV - Provisional Peer Reviewed Toxicity Value
HEAST - Health Effects Assessment Summary Tables
IRIS - Integrated Risk Information System
mg/kg-day - milligrams per kilogram per day
NA – Not available

Source: Final Human Health Risk Assessment (MACTEC, 2011)

Table 9. Risk Characterization Summary – Carcinogens in Groundwater (Future Resident)

Scenario Timeframe: Future Receptor Population: Resident Receptor Age: Lifetime							
Medium	**Exposure Medium**	**Exposure Point**	**Chemical of Concern**	**Carcinogenic Risks**			
				Ingestion	**Inhalation**	**Dermal**	**Exposure Routes Total**
Groundwater	Groundwater	Overburden Wells	Arsenic	6E-05	NA	4E-07	6E-05
						Groundwater Risk Total =	6E-05
		Bedrock Wells	Arsenic	1E-04	NA	7E-07	1E-04
						Groundwater Risk Total =	1E-04

Notes:
NA = Not Applicable

Source: Final Human Health Risk Assessment (MACTEC, 2011)

Table 10. Risk Characterization Summary – Non-Carcinogens in Groundwater (Future Resident)

Scenario Timeframe: Future Receptor Population: Resident Receptor Age: Child							
Medium	**Exposure Medium**	**Exposure Point**	**Chemical of Concern**	**Non-cancer Hazard Index**			
				Ingestion	**Inhalation**	**Dermal**	**Exposure Routes Total**
Groundwater	Groundwater	Overburden Wells	Aluminum	89	NA	NC	89
			Arsenic	0.55	NA	0.0037	0.56
			Beryllium	2.6	NA	2.5	5.1
			Cadmium	4.7	NA	0.62	5.4
			Chromium	6.4	NA	3.4	9.8
			Cobalt	2900	NA	97	3000
			Copper	15	NA	0.49	15
			Lead	NC	NA	NC	NC
			Manganese	1700	NA	290	2000
			Nickel	11	NA	0.35	11
			Vanadium	6.3	NA	1.6	7.9
						Total HI =	5000
						Total CNS HI =	2000
						Total Skin HI =	0.56
						Total GI Tract HI =	20
						Total Kidney HI =	5.4
						Total Blood HI =	3000
						Total General Toxicity HI =	11
						Total Liver HI =	7.9

		Bedrock Wells	Aluminum	4.8	NA	NC	4.8
			Arsenic	0.92	NA	0.0061	0.92
			Beryllium	2	NA	1.9	4
			Cadmium	7.3	NA	0.96	8.2
			Cobalt	430	NA	14	440
			Manganese	330	NA	54	380
						Total HI =	840
						Total CNS HI =	385
						Total Skin HI =	0.92
						Total GI Tract HI =	4
						Total Kidney HI =	8.2
						Total Blood HI =	440
		Private Wells	Cobalt	45	NA	1.5	46
			Manganese	29	NA	4.8	34
						Total HI =	80
						Total Blood HI =	46
						Total CNS HI =	34

Notes:
CNS = Central Nervous System
GI Tract = Gastrointestinal Tract
NA = Not applicable
NC = Not calculated
HI = Hazard Index

Source: Final Human Health Risk Assessment (MACTEC, 2011)

Table 11. Remedial Goals for Groundwater

Analyte	Highest Measured Value (µg/L)	HHRA Risk-Based (µg/L)	Primary MCL (µg/L)	Selected Cleanup Level (µg/L)
Aluminum	1,400,000	15,600	NA	15,600
Arsenic	4.31	4	10	10
Beryllium	82	NA	4	4
Cadmium	57	NA	5	5
Chromium	300	31	100	100
Cobalt	13,800	4.7	NA	4.7
Copper	9,200	610	1,300	1300
Lead	24.4	NA	15	15
Manganese	651,000	320	NA	320
Nickel	3,290	300	NA	300
Vanadium	490	62	NA	62

Notes:
HHRA = Human Health Risk Assessment
MCL = Maximum Contaminant Level
µg/L = microgram per liter

Table 12. Remedial Goals for Surface Water

Analyte	Highest Measured Value (µg/L)	BERA Risk-Based [1] (µg/L)	South Carolina WQS (µg/L)	Selected Cleanup Level [2] (µg/L)
Aluminum**	33700	87	NA	87
Cadmium*	4.4	0.09 - 0.41	0.13 - 0.23	0.13 - 0.23
Cobalt	2200	23	NA	23
Copper*	302	2.7 - 14.6	4.1 - 7.8	4.1 - 7.8
Lead*	12	0.5 - 6.2	0.9 - 2.4	0.9 - 2.4
Manganese	94000	120	NA	120
Silver*	5	0.012	0.7 - 2.6	0.7 - 2.6
Thallium	0.15	4	NA	4
Zinc*	920	35 - 187	53 - 100	53 - 100
pH	2	6.0 - 8.0	6.0 - 8.5	6.0 - 8.5

Notes:

(1) Risk-Based values based on 2011 BERA

(2) Cleanup Level is the South Carolina Water Quality Standard for protection of freshwater aquatic life (SC. R 61-68.E.14, and Appendix: Water Quality Numeric Criteria), or in the absence of an WQS, the ecological risk-based level

* = South Carolina WQS is based on hardness. Range of values presented are based on available hardness data presented in BERA for the West Tributary, SFCC Reach 2 and Allison Creek

** = Cleanup Level is from 2011 BERA based on the EPA Ambient Water Quality Criteria at that time (prior to EPA issuing 2018 Ambient Water Quality Criteria for Aluminum, which is calculated based on site-specific pH, hardness and dissolved organic carbon; Cleanup Level for aluminum may be adjusted in the EPA-approved sampling plan based on collection of these site-specific field parameters)

BERA = Baseline Ecological Risk Assessment

WQS = Water Quality Standard

µg/L = microgram per liter

Table 13. Remedial Goals for Sediment

Analyte	Highest Measured Value (mg/kg)	Selected Cleanup Level (mg/kg)		Source
		TEC	PEC	
Copper	250	31.6	149	EPA Region 4
Iron	140,000	20,000	40,000	EPA Region 4
Manganese	9,600	460	1,100	EPA Region 4

Notes:
PEC = Probable Effect Concentration
PRG = Preliminary Remediation Goal
TEC = Threshold Effect Concentration
mg/kg = milligrams per kilogram
Source: Region 4 Ecological Risk Assessment Supplemental Guidance (EPA 2018)

Table 14. Action-Specific ARARs

Action	Requirements	Prerequisite	Citation
Action-specific ARARs Monitoring Well Installation, Operation, and Abandonment			
Installation of Permanent and Temporary Monitoring Wells	All monitoring wells shall be drilled, constructed, maintained, operated, and/or abandoned to ensure that underground sources of drinking water are not contaminated.	Construction of permanent and temporary monitoring wells, as defined in R. 61-71B – **applicable**	SCDHEC R. 61-71H.1(b)
Installation of Permanent Conventionally Installed or Direct Push Monitoring Wells	Wells shall be grouted from the top of the bentonite seal to the land surface. Grout is to be composed of neat cement, a bentonite cement mixture, or high solids sodium bentonite grout.	Construction of permanent conventionally installed or direct push monitoring wells, as defined in R. 61-71B – **applicable**	SCDHEC R. 61-71H.2.a.(1),(2) [conventionally installed wells] SCDHEC R. 61-71H.3.b.(1),(2) [direct push wells]
Additional Requirements for Installation of Direct Push Monitoring Wells	Direct push wells cannot be installed below a confining layer unless it can be demonstrated to the satisfaction of the Department that cross-contamination of the aquifer systems can be prevented.	Construction of direct push monitoring wells, as defined in R. 61-71B – **applicable**	SCDHEC R. 61-71H.3.a.
Installation of Temporary Monitoring Wells	Construction and Materials – (1) Casing shall be of sufficient strength to withstand normal forces encountered during and after well installation and be 20 composed of material so as to minimally affect water quality analyses. (2) Casing shall have a sufficient diameter to provide access for sampling equipment. (3) The monitoring well intake or screen design	Construction of temporary monitoring wells, as defined in R. 61-71B – **applicable**	SCDHEC R. 61-71H.4.a.

Action	Requirements	Prerequisite	Citation
	shall minimize formational materials from entering the well. The filter pack or intake shall be utilized opposite the well screen as appropriate so that parameter analyses will be minimally affected.		
Abandonment of Permanent Conventionally Installed Monitoring Wells	Abandonment of permanent conventionally installed monitoring wells shall be by forced injection of grout or pouring through a tremie pipe starting at the bottom of the well and proceeding to the surface in one continuous operation. The well shall be filled with either with neat cement, bentonite-cement, or 20% high solids sodium bentonite grout, from the bottom of the well to the land surface.	Abandonment of permanent conventionally installed monitoring wells– **applicable**	SCDHEC R. 61-71H.2.e.
Abandonment of Permanent Direct Push Monitoring Wells	(1) Permanent direct push wells that do not penetrate a confining layer shall be abandoned by removing all casing from the subsurface and be grouted by forced injection through a tremie pipe from the total depth to the land surface, or by forced injection or pouring of neat cement, bentonite-cement, or 20% high solids sodium bentonite grout through a tremie pipe starting at the bottom of the well and proceeding to the surface. (2) Direct push wells that penetrate a confining layer shall be abandoned by forced injection or pouring of neat cement, bentonite-cement, or 20% high solids sodium bentonite grout through a tremie pipe starting at the bottom of the well and proceeding to the surface in one continuous operation.	Abandonment of permanent direct push monitoring wells, as defined in R.61-71B – **applicable**	SCDHEC R. 61-71H.2.f.

Action	Requirements	Prerequisite	Citation
Abandonment of Temporary Conventionally Installed or Direct Push Monitoring Wells	(1) All temporary monitoring wells shall be abandoned within 5 days of borehole completion. (2) A conventionally drilled temporary well shall be abandoned by forced injection of neat cement, bentonite-cement, or 20% high solids sodium bentonite grout through a tremie pipe starting at the bottom of the well and proceeding to the surface in one continuous operation. (3) A temporary direct push well that does not penetrate a confining layer shall be abandoned by forced injection of neat cement, bentonite-cement, or 20% high solids sodium bentonite grout through a tremie pipe after the sampling device has been removed. (4) A temporary direct push well that penetrates a confining layer shall be abandoned by forced injection of neat cement, bentonite-cement, or 20% high solids sodium bentonite grout through the sampling device as the sampling device is removed from the sub-surface. Abandonment shall occur during the initial withdrawal from the original push borehole and not by a separate tremie tool after the sampling device has been removed to ensure the breech in the confining layer is permanently sealed.	Abandonment of temporary conventionally installed or direct push monitoring wells, as defined in R.61-71B – **Applicable**	SCDHEC R. 61-71H.4.c.

Action	Requirements	Prerequisite	Citation
Action-specific ARARs			
General Construction Standards — All Land-disturbing Activities (i.e., excavation, clearing, grading, etc.)			
Managing Storm Water Runoff from Land-Disturbing Activities	Must comply with the substantive requirements for stormwater management and sediment control of NPDES Construction General (CG) Permit for Stormwater Discharges No. SCR100000, issued under R.122.8 and developed consistent with the conditions in R.61-9.122.41 applicable to all permits.	Large and small construction activities (as defined in R. 61-9 and SCR100000) of more than 1 acre of land – applicable	SCDHEC R. 61-9.122.41 and 122.28(a)(2)(i)
	Coverage under the CG Permit requires development of a stormwater management and sediment control plan which is to be consistent, at a minimum, to the substantive standards listed in SC Regulation 72-300, unless specifically exempted by SC Regulation 72-302.A	Large and small construction activities (as defined in R. 61-9 and SCR100000) of more than 1 acre of land – TBC	NPDES Construction General (CG) Permit for Stormwater Discharges, Permit No. SCR100000
	The stormwater management and sediment control plan shall contain at a minimum the information provided in the following subsections: • A plan for temporary and permanent vegetative and structural erosion and sediment control measures which specify the erosion and sediment control measures to be used during all phases of the land disturbing activity and a description of their proposed operation; • Provisions for stormwater runoff control during the land disturbing activity and during the life of the facility meeting the peak discharge rate and velocities requirements in	Activities involving more than two (2) acres and less than five (5) acres of actual land disturbance which are not part of a larger common plan of development or sale – applicable	SCDHEC R. 72-307 I(3)(d) and (e) – South Carolina Storm Water Management and Sediment Reduction Regulations

Action	Requirements	Prerequisite	Citation
	subsections (e)1. and (e)2. of this section.		
Managing Fugitive Dust Emissions from Land Disturbing Activities	Emissions of fugitive particulate matter shall be controlled in such a manner and to the degree that it does not create an undesirable level of air pollution. Volatile organic compounds shall not be used for dust control purposes. Oil treatment is also prohibited.	Activities that will generate fugitive particulate matter (Statewide) – applicable	SCDHEC R. 61-62.6 Section III(a)-Control of Fugitive Particulate Matter Statewide SCDHEC R. 61-62.6 Section III(d)
Closure/post-closure care of tailings piles	Establishes reclamation plan objectives to include, on a continuing basis, a vegetative cover, soil stability, and water and safety conditions appropriate to the area. The alternatives will meet the substantive portions of these regulations for reclamation, closure and post-closure activities for covered tailings piles.	Mine Reclamation Closure - TBC	South Carolina Mining Act, Reg. 89-80, Reclamation Plan
	Regulates mining impacts on the environment and sets forth standards for mine reclamation and closure. The alternatives will meet the substantive portions of these regulations for reclamation, closure and post-closure activities for covered tailings piles.		South Carolina Mining Act, Reg. 89-140, Minimum Standards for Environmental Protection and Land Reclamation

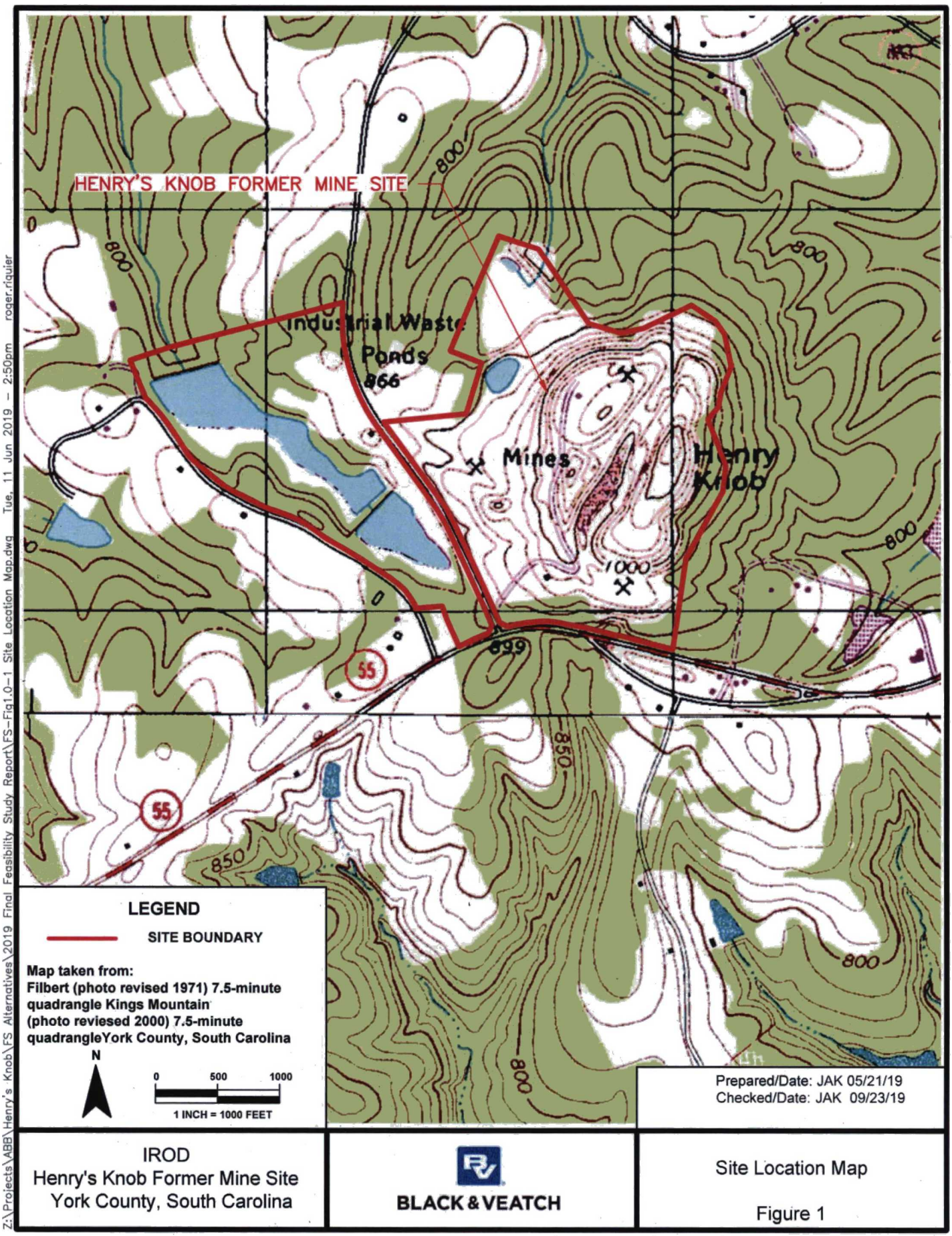
Table 15. Summary of Remedial Alternative Costs

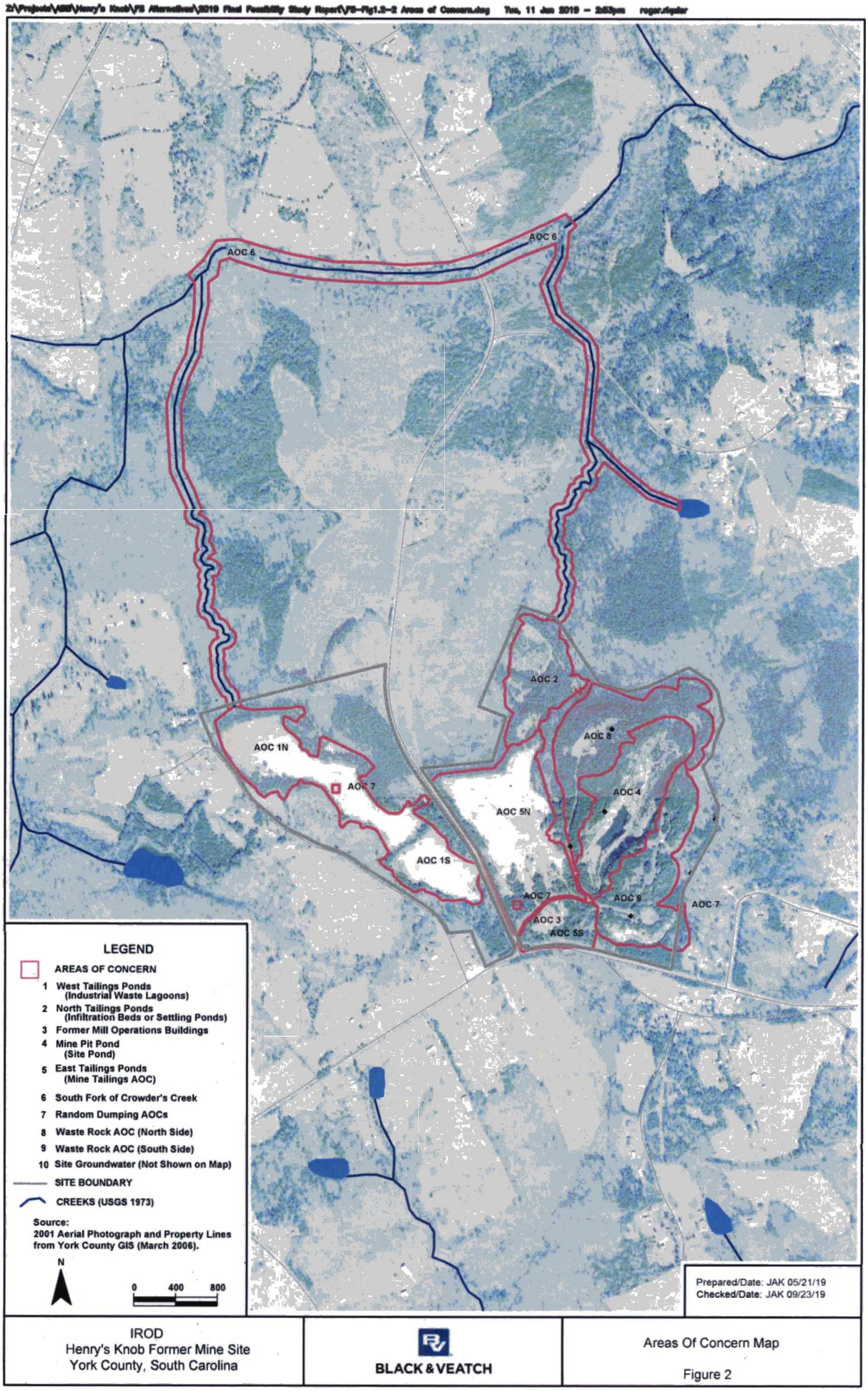
ESTIMATED COSTS FOR REMEDIAL ALTERNATIVES					
Activity	GW-1, T/MP-1 (No Action)	GW-2 (MNA)	GW-3 (PRB)	GW-4 (Extract & Treat)	T/MP-2 (ICs, Maintenance & Monitoring)
Estimated Capital Cost	$0	$5,000	$5,743,000	$3,791,000	$5,000
Total Periodic Cost 30 years	$0	$2,668,000	$5,384,000	$2,668,000	$2,003,000
Total O&M Cost 30 years	$0	$660,000	$1,110,000	$30,510,000	$1,470,000
Total Cost	$0	$3,333,000	$12,237,000	$36,969,000	$3,478,000
Net Present Value	$0	$1,406,000	$8,632,000	$17,539,000	$1,534,000
Estimated Time to Achieve RAOs	NA	greater than 100 years	greater than 100 years	greater than 100 years	IC implementation 5 years; monitoring period ~30 years

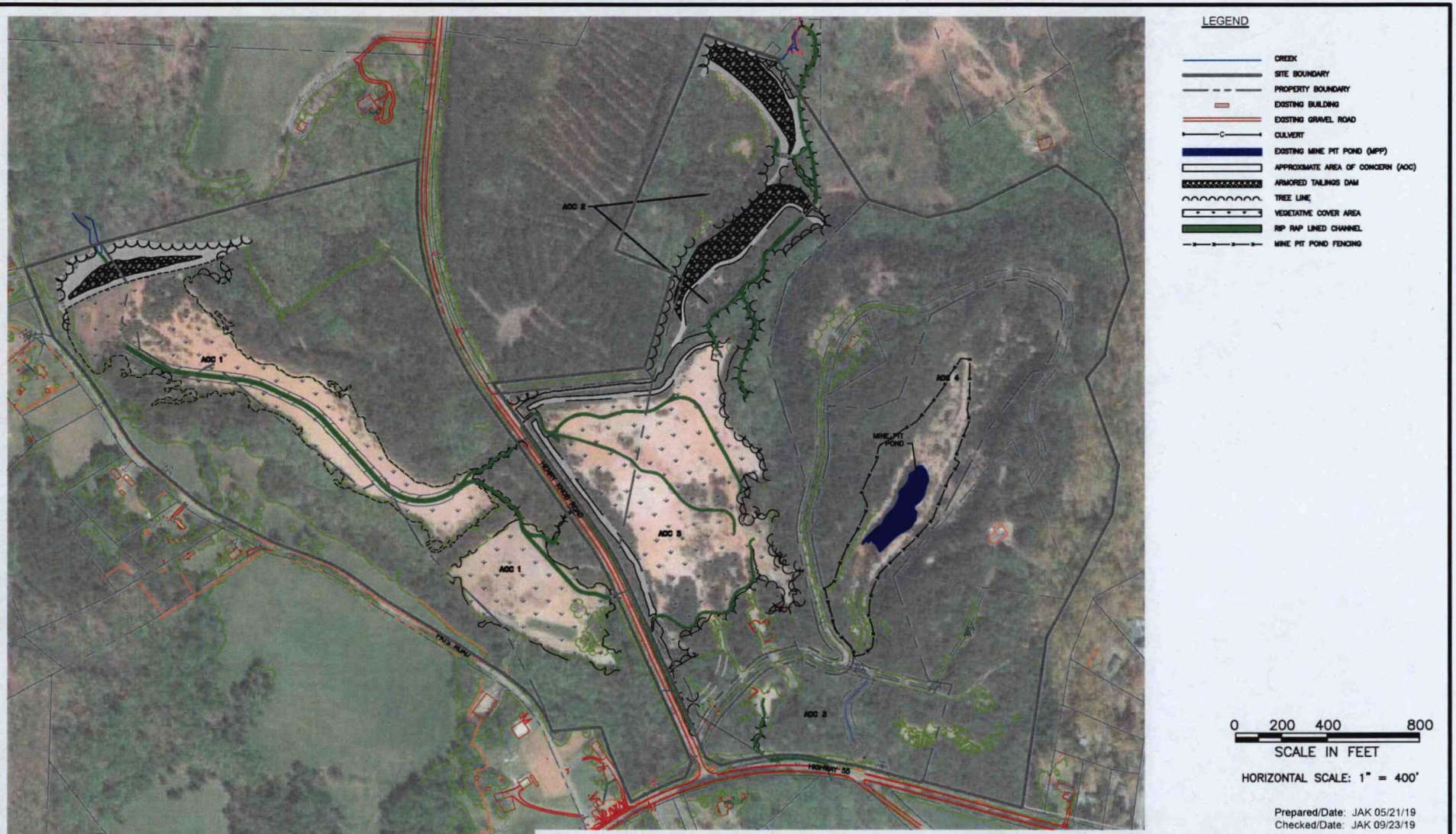
Table 16. Selected Remedy Cost Estimate Summary

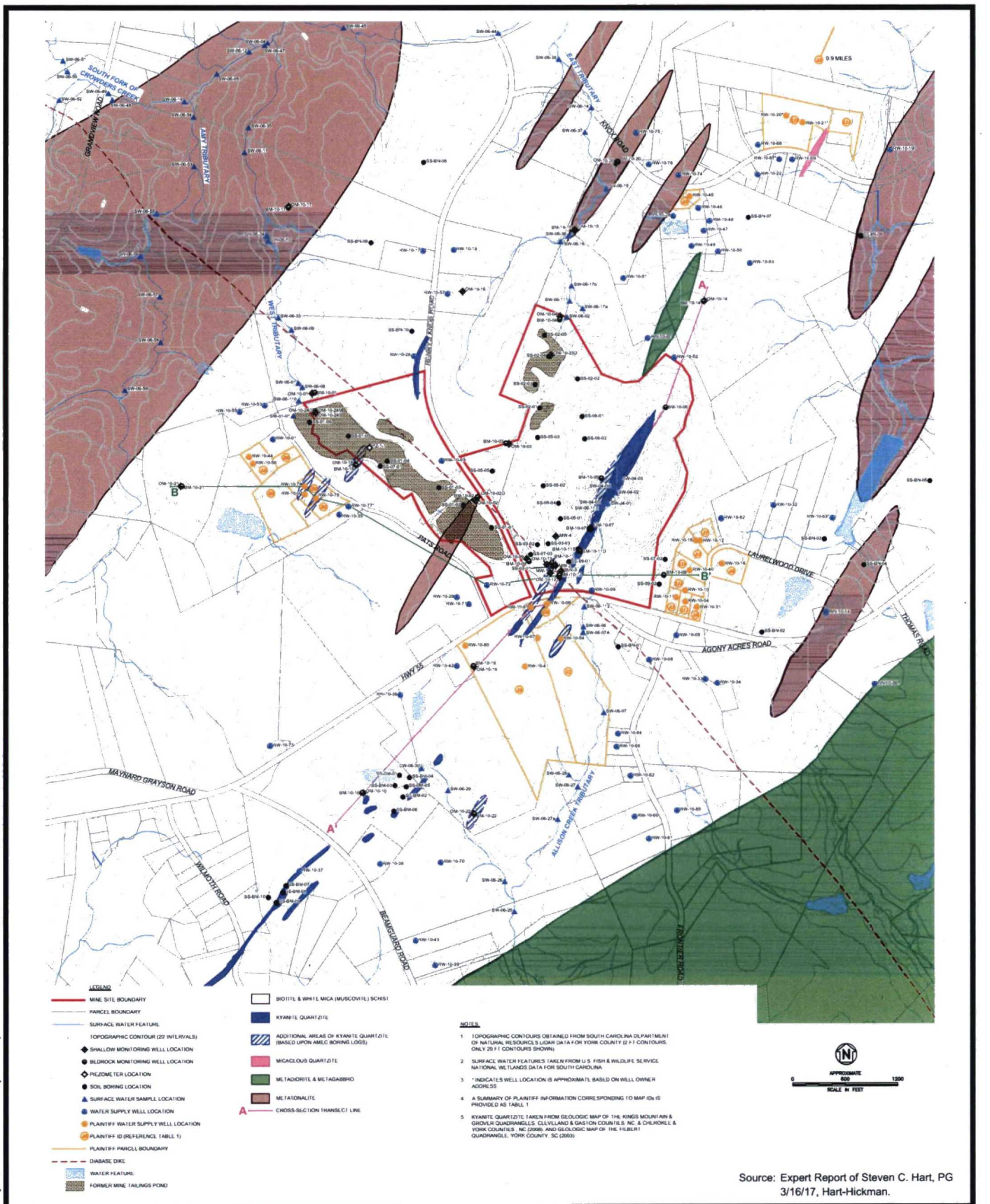
ESTIMATED COSTS FOR SELECTED REMEDY			
Activity	GW-2 (ICs, & Monitoring)	T/MP-2 (ICs, Maintenance & Monitoring)	Total Cost
Estimated Capital Cost	$5,000	$5,000	$10,000
Total Periodic Cost 5 years	$488,000	$524,000	$1,012,000
Total O&M Cost 5 years	$110,000	$245,000	$355,000
Total Cost	$603,000	$774,000	$1,377,000
Net Present Value	$499,776	$634,942	$1,134,718
Note: All estimates derived from Draft Final Site-Wide FS (Wood, 2019)			

FIGURES


HENRY'S KNOB FORMER MINE SITE
Industrial Waste Ponds
866
Mines
Henry Knob
800
850
899
1000
55
LEGEND
SITE BOUNDARY
Map taken from:
Filbert (photo revised 1971) 7.5-minute quadrangle Kings Mountain
(photo reviesed 2000) 7.5-minute quadrangleYork County, South Carolina
N
0 500 1000
1 INCH = 1000 FEET
Prepared/Date: JAK 05/21/19
Checked/Date: JAK 09/23/19
IROD
Henry's Knob Former Mine Site
York County, South Carolina
BLACK & VEATCH
Site Location Map
Figure 1
Z:\Projects\ABB\Henry's Knob\FS Alternatives\2019 Final Feasibility Study Report\FS-Fig1.0-1 Site Location Map.dwg Tue, 11 Jun 2019 - 2:50pm roger.riquier


AOC 6
AOC 6
AOC 2
AOC 8
AOC 1N
AOC 7
AOC 4
AOC 5N
AOC 1S
AOC 7
AOC 9
AOC 7
AOC 3
AOC 5S
LEGEND
AREAS OF CONCERN
1 West Tailings Ponds (Industrial Waste Lagoons)
2 North Tailings Ponds (Infiltration Beds or Settling Ponds)
3 Former Mill Operations Buildings
4 Mine Pit Pond (Site Pond)
5 East Tailings Ponds (Mine Tailings AOC)
6 South Fork of Crowder's Creek
7 Random Dumping AOCs
8 Waste Rock AOC (North Side)
9 Waste Rock AOC (South Side)
10 Site Groundwater (Not Shown on Map)
SITE BOUNDARY
CREEKS (USGS 1973)
Source:
2001 Aerial Photograph and Property Lines from York County GIS (March 2006).
N
0
400
800
Prepared/Date: JAK 05/21/19
Checked/Date: JAK 09/23/19
IROD
Henry's Knob Former Mine Site
York County, South Carolina
BLACK & VEATCH
Areas Of Concern Map
Figure 2

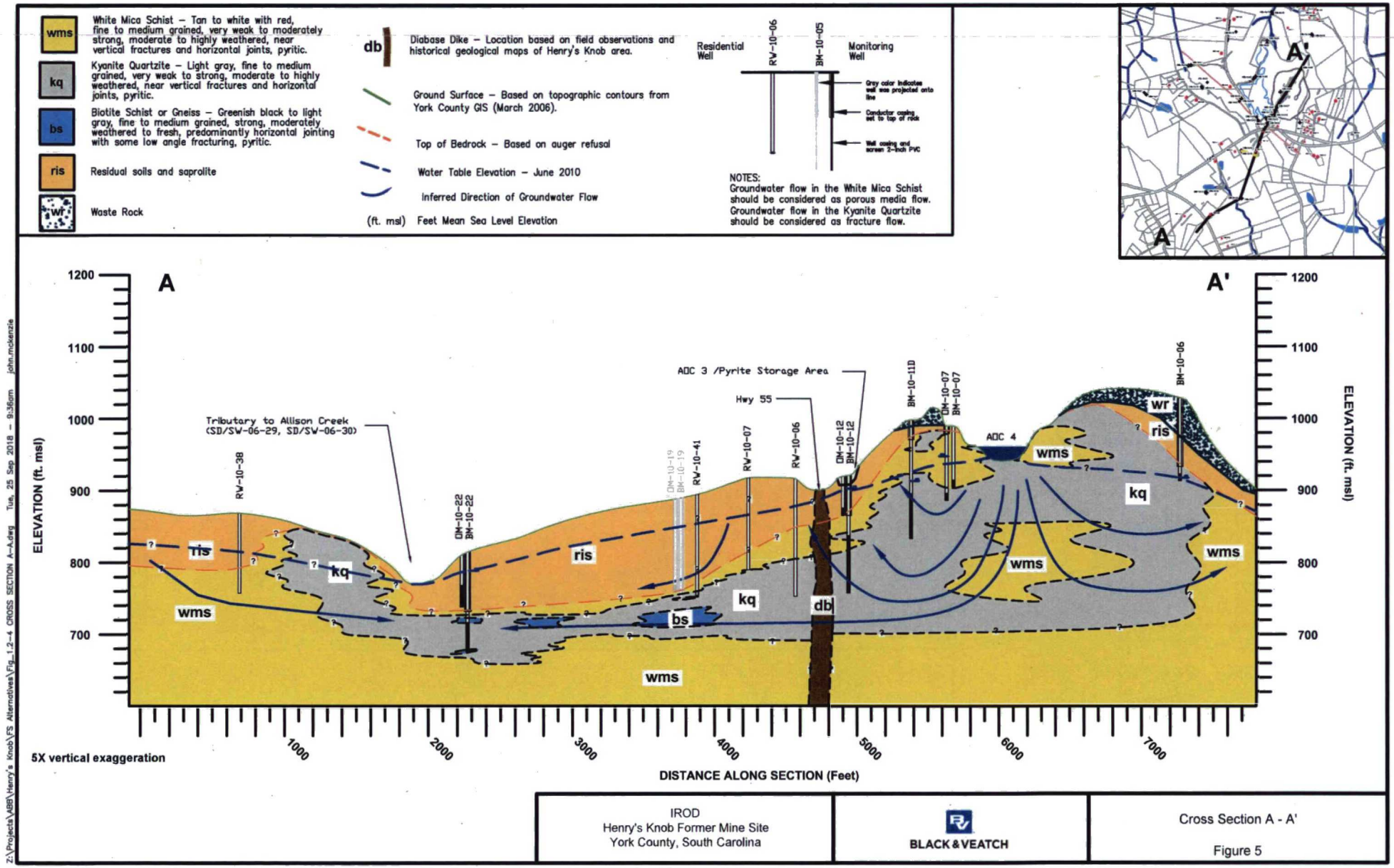

LEGEND
CREEK
SITE BOUNDARY
PROPERTY BOUNDARY
EXISTING BUILDING
EXISTING GRAVEL ROAD
CULVERT
EXISTING MINE PIT POND (MPP)
APPROXIMATE AREA OF CONCERN (AOC)
ARMORED TAILINGS DAM
TREE LINE
VEGETATIVE COVER AREA
RIP RAP LINED CHANNEL
MINE PIT POND FENCING
AOC 1
AOC 2
AOC 3
AOC 4
AOC 5
MINE PIT POND
HENRY KNOB ROAD
HIGHWAY 55
0 200 400 800
SCALE IN FEET
HORIZONTAL SCALE: 1" = 400'
Prepared/Date: JAK 05/21/19
Checked/Date: JAK 09/23/19
IROD
Henry's Knob Former Mine Site
York County, South Carolina
BLACK & VEATCH
HENRY KNOB REHABILITATION
SITE OVERVIEW
Figure 3
Z:\Projects\ABB\Henry's Knob\FS Alternatives\2019 Final Feasibility Study Report\FS-Fig1.3-1 Site Overview.dwg Tue, 23 Jul 2019 - 2:52pm roger.riquier



Source: Expert Report of Steven C. Hart, PG 3/16/17, Hart-Hickman.

\\PLD2-FS1\Project\Projects\CADD-PORT\Projects\Graphics\MISC\ABB

IROD Henry's Knob Former Mine Site York County, South Carolina	BLACK & VEATCH	Geologic Map Figure 4



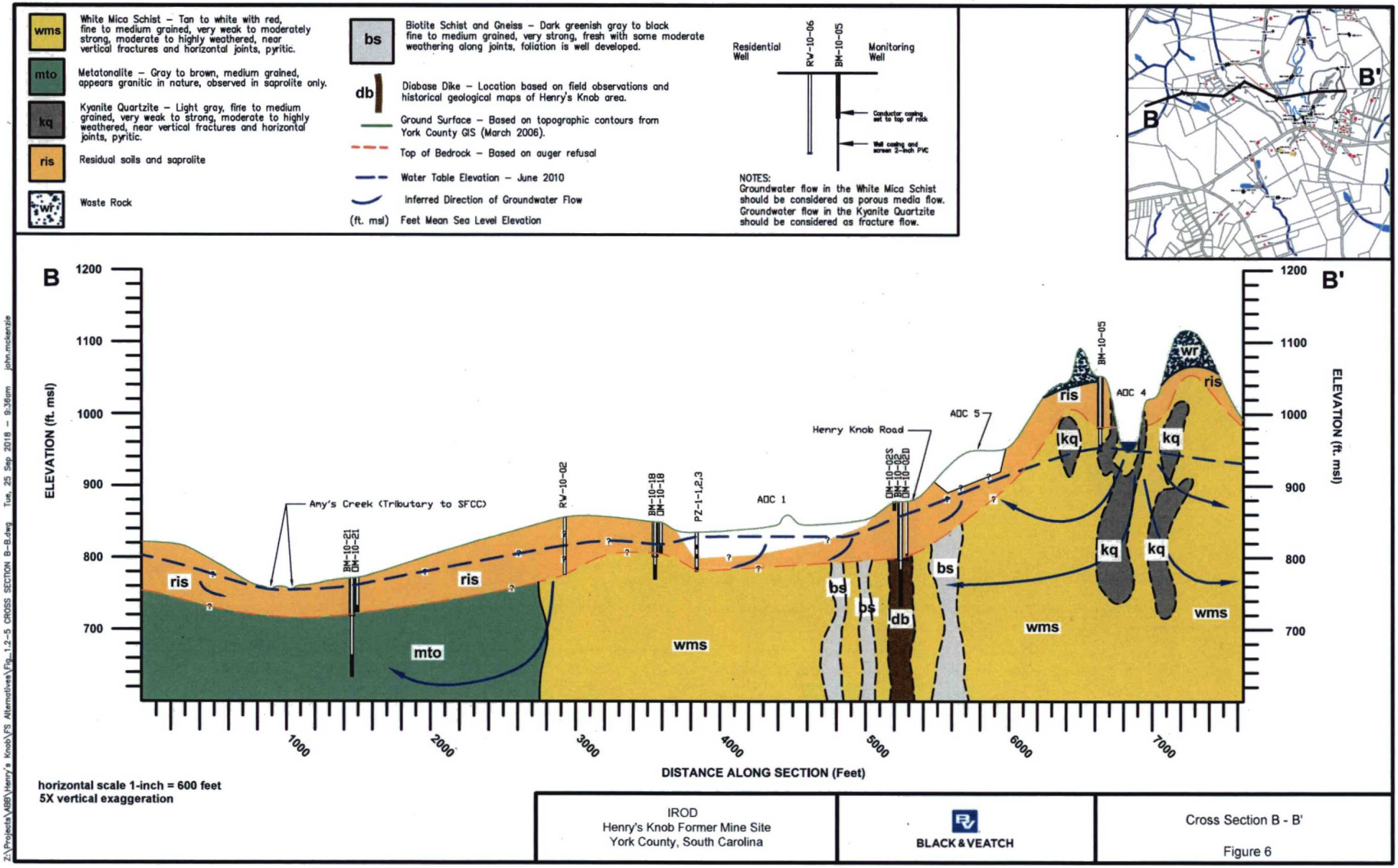
IROD
Henry's Knob Former Mine Site
York County, South Carolina

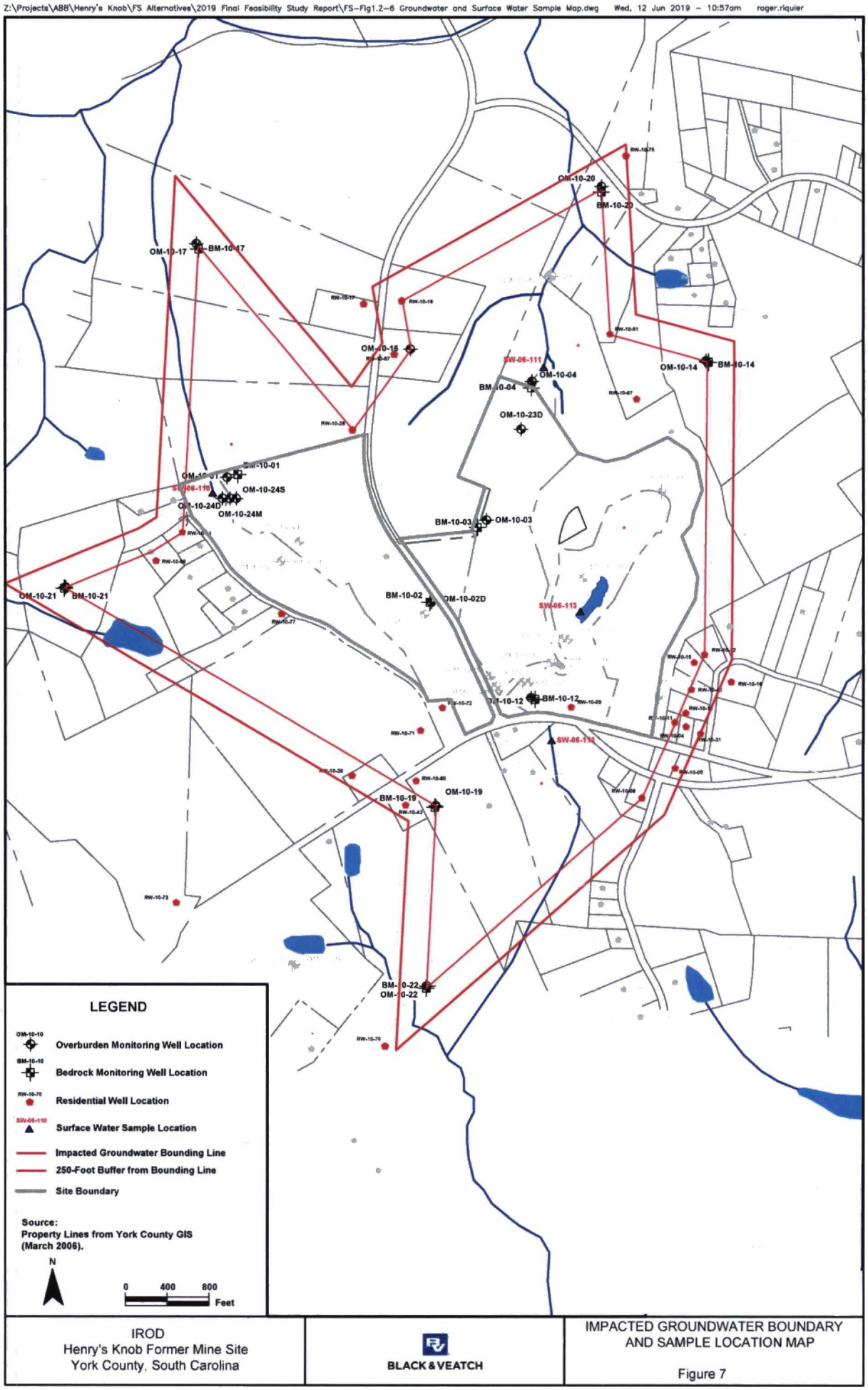
BLACK & VEATCH

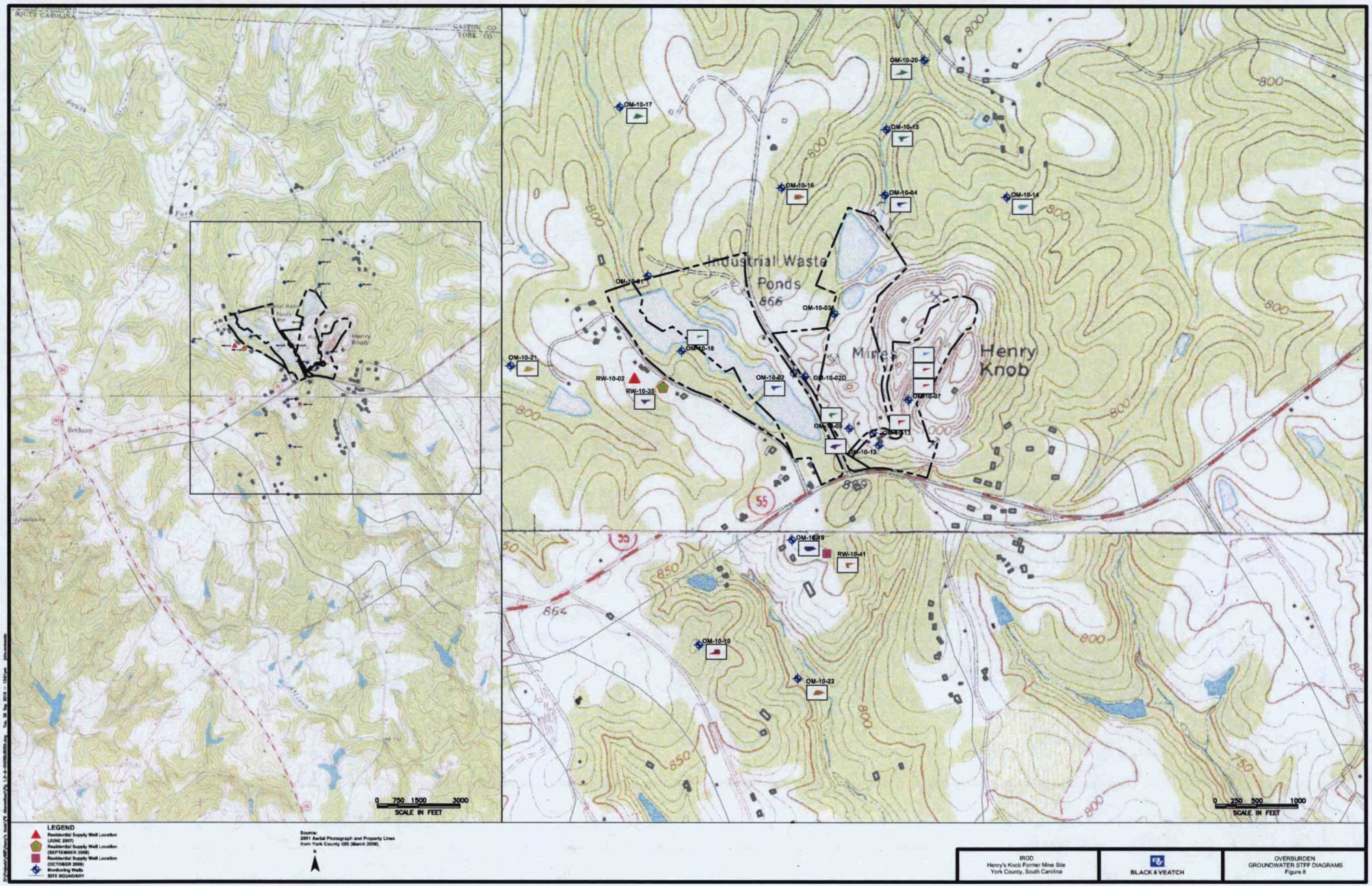
Cross Section A - A'

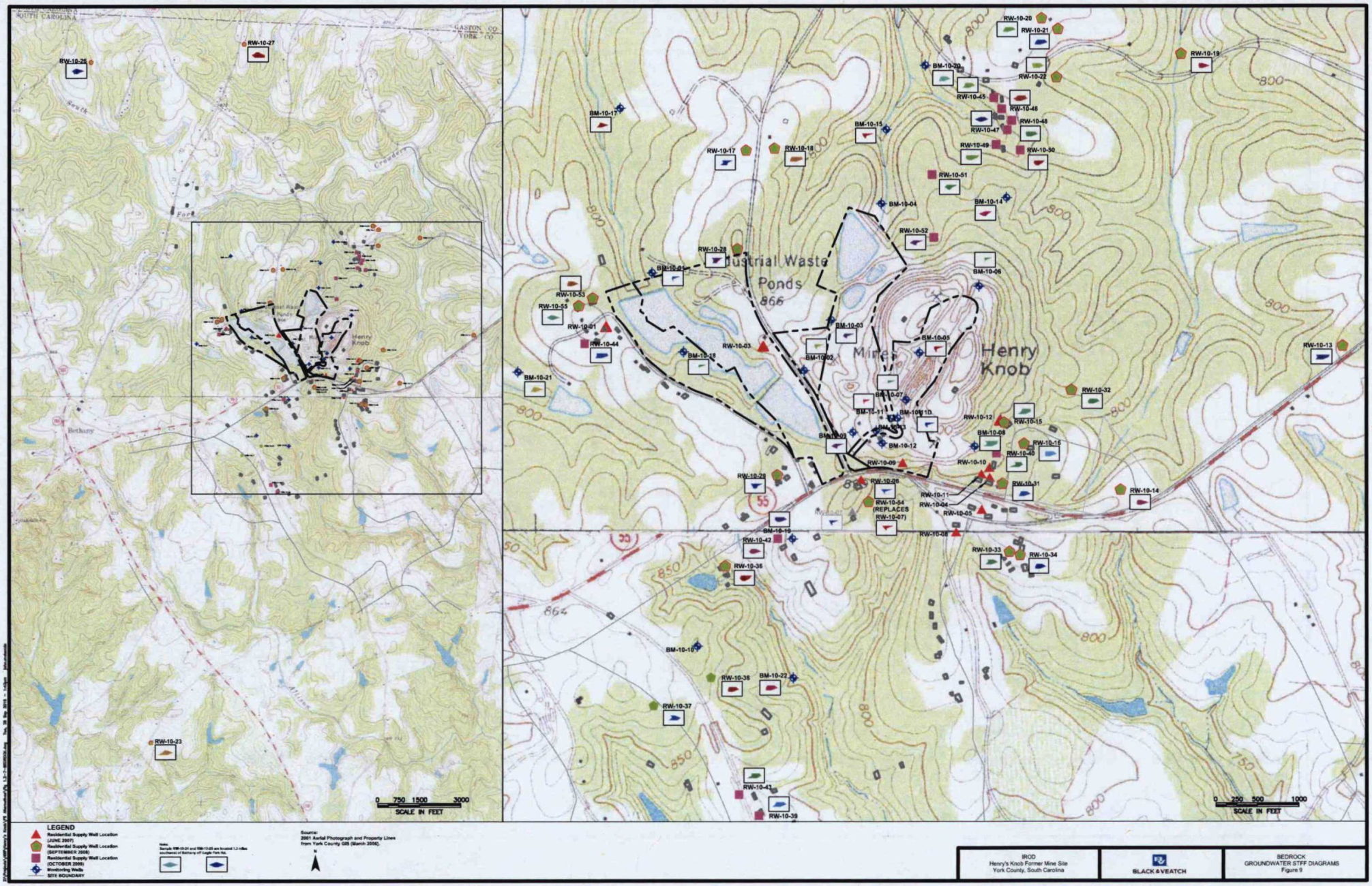
Figure 5

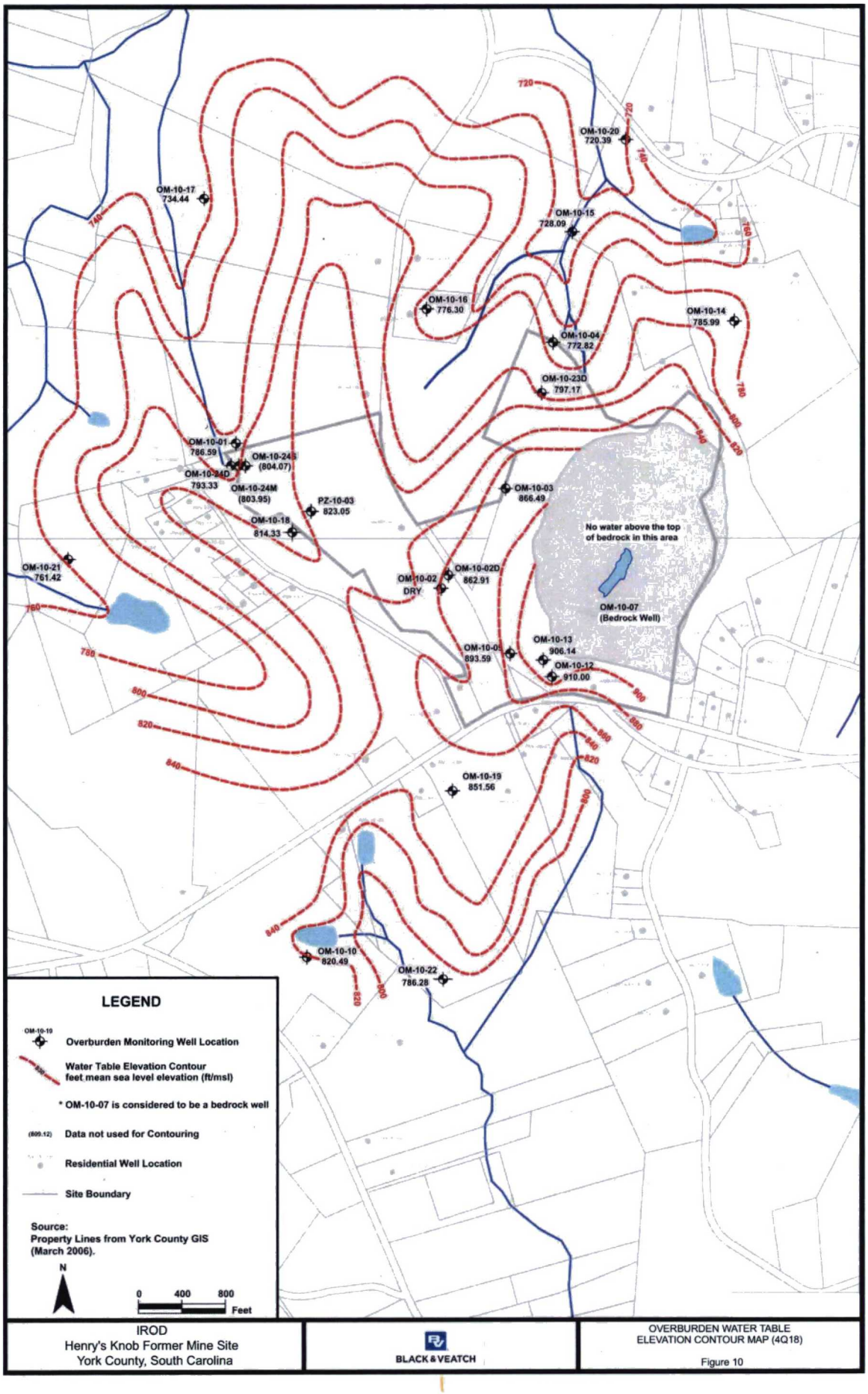
Z:\Projects\489\Henry's Knob\FS Alternatives\Fig_1.2-4 CROSS SECTION A-A.dwg Tue, 25 Sep 2018 - 9:36am john.mckenzie

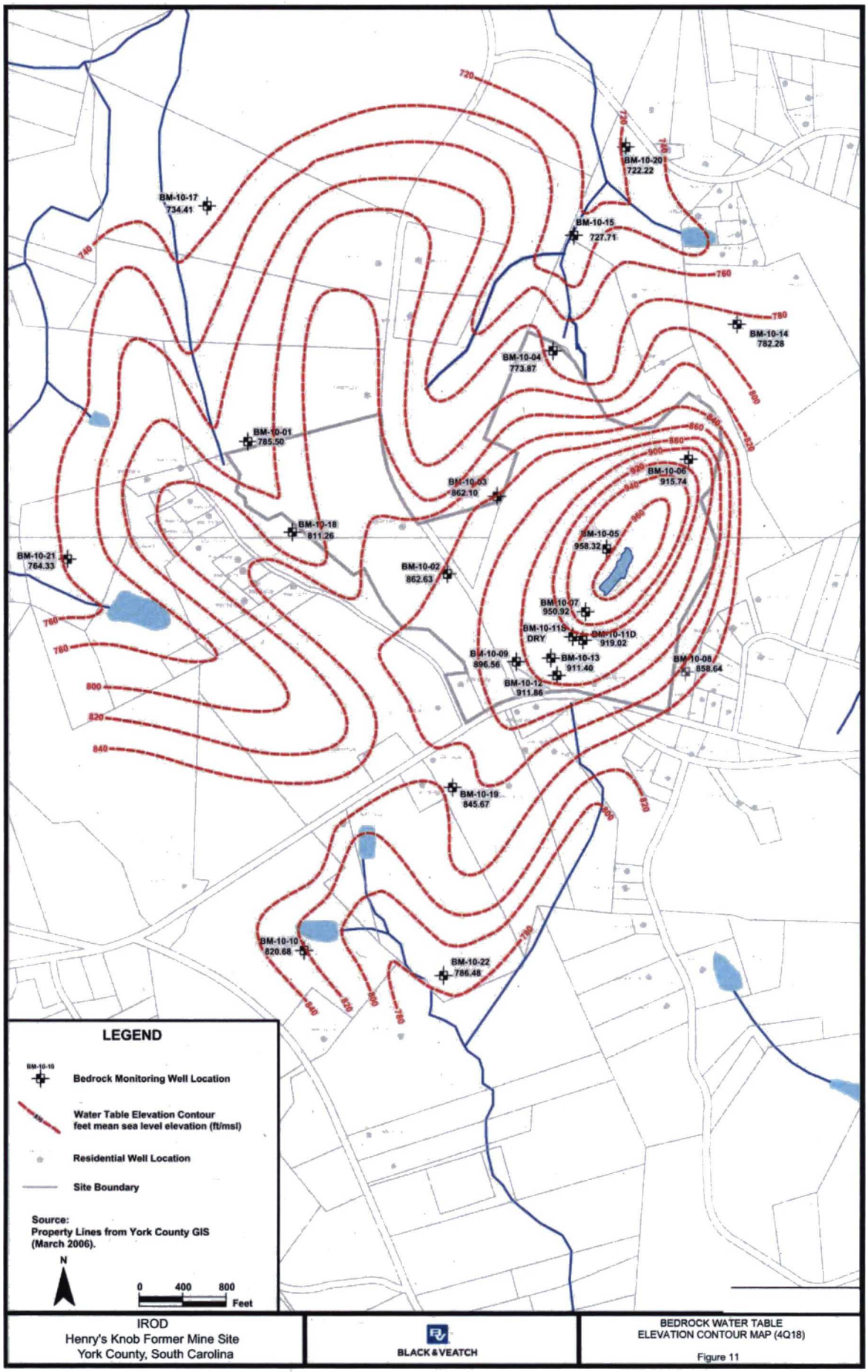

wms
White Mica Schist – Tan to white with red, fine to medium grained, very weak to moderately strong, moderate to highly weathered, near vertical fractures and horizontal joints, pyritic.
mto
Metatonalite – Gray to brown, medium grained, appears granitic in nature, observed in saprolite only.
kq
Kyanite Quartzite – Light gray, fine to medium grained, very weak to strong, moderate to highly weathered, near vertical fractures and horizontal joints, pyritic.
ris
Residual soils and saprolite
wr
Waste Rock
bs
Biotite Schist and Gneiss – Dark greenish gray to black fine to medium grained, very strong, fresh with some moderate weathering along joints, foliation is well developed.
db
Diabase Dike – Location based on field observations and historical geological maps of Henry's Knob area.
Ground Surface – Based on topographic contours from York County GIS (March 2006).
Top of Bedrock – Based on auger refusal
Water Table Elevation – June 2010
Inferred Direction of Groundwater Flow
(ft. msl) Feet Mean Sea Level Elevation
Residential Well
RW-10-06
BM-10-05
Monitoring Well
Conductor casing set to top of rock
Well casing and screen 2-inch PVC
NOTES:
Groundwater flow in the White Mica Schist should be considered as porous media flow.
Groundwater flow in the Kyanite Quartzite should be considered as fracture flow.
B
B'
ELEVATION (ft. msl)
1200
1100
1000
900
800
700
Amy's Creek (Tributary to SFCC)
BM-10-21
DM-10-21
RW-10-02
BM-10-18
DM-10-18
PZ-1,2,3
ADC 1
DM-10-02S
BM-10-02D
DM-10-02D
Henry Knob Road
ADC 5
ADC 4
BM-10-05
ris
mto
wms
bs
db
kq
wr
1000
2000
3000
4000
5000
6000
7000
DISTANCE ALONG SECTION (Feet)
horizontal scale 1-inch = 600 feet
5X vertical exaggeration
IROD
Henry's Knob Former Mine Site
York County, South Carolina
BLACK & VEATCH
Cross Section B - B'
Figure 6
Z:\Projects\488\Henry's Knob\FS Alternatives\Fig_1-2-5 CROSS SECTION B-B.dwg Tue, 25 Sep 2018 – 8:36am john.mckenzie

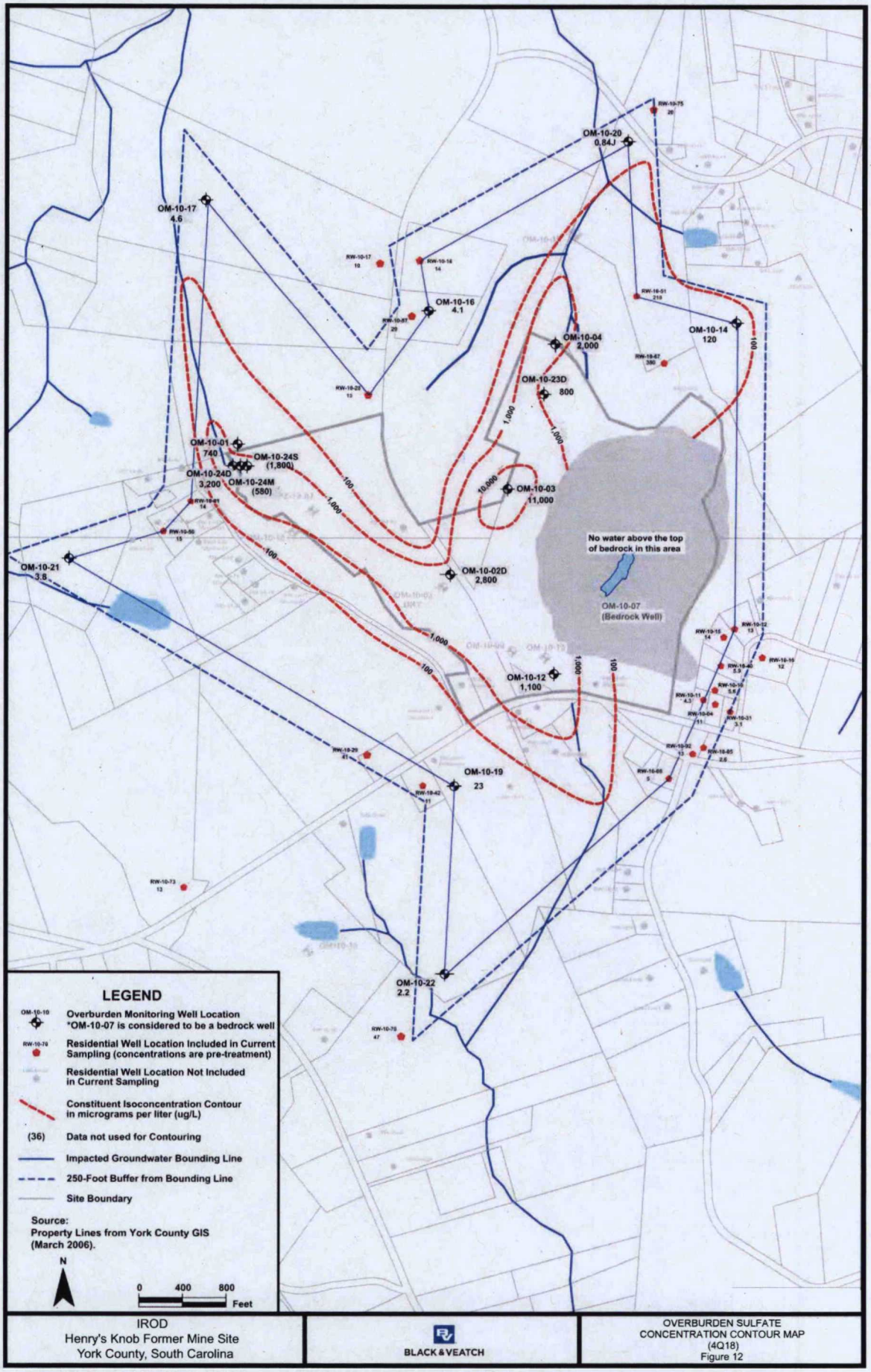

Z:\Projects\ABB\Henry's Knob\FS Alternatives\2019 Final Feasibility Study Report\FS-Fig1.2-6 Groundwater and Surface Water Sample Map.dwg Wed, 12 Jun 2019 - 10:57am roger.riquier
OM-10-20
BM-10-20
OM-10-17
BM-10-17
OM-10-16
SW-06-111
OM-10-04
BM-10-04
BM-10-14
OM-10-14
OM-10-23D
OM-10-01
OM-10-24S
OM-10-24D
OM-10-24M
BM-10-03
OM-10-03
OM-10-21
BM-10-21
BM-10-02
OM-10-02D
SW-06-113
BM-10-12
OM-10-12
SW-06-112
OM-10-19
BM-10-19
BM-10-22
OM-10-22
LEGEND
Overburden Monitoring Well Location
Bedrock Monitoring Well Location
Residential Well Location
Surface Water Sample Location
Impacted Groundwater Bounding Line
250-Foot Buffer from Bounding Line
Site Boundary
Source:
Property Lines from York County GIS
(March 2006).
N
0
400
800
Feet
IROD
Henry's Knob Former Mine Site
York County, South Carolina
BLACK & VEATCH
IMPACTED GROUNDWATER BOUNDARY
AND SAMPLE LOCATION MAP
Figure 7

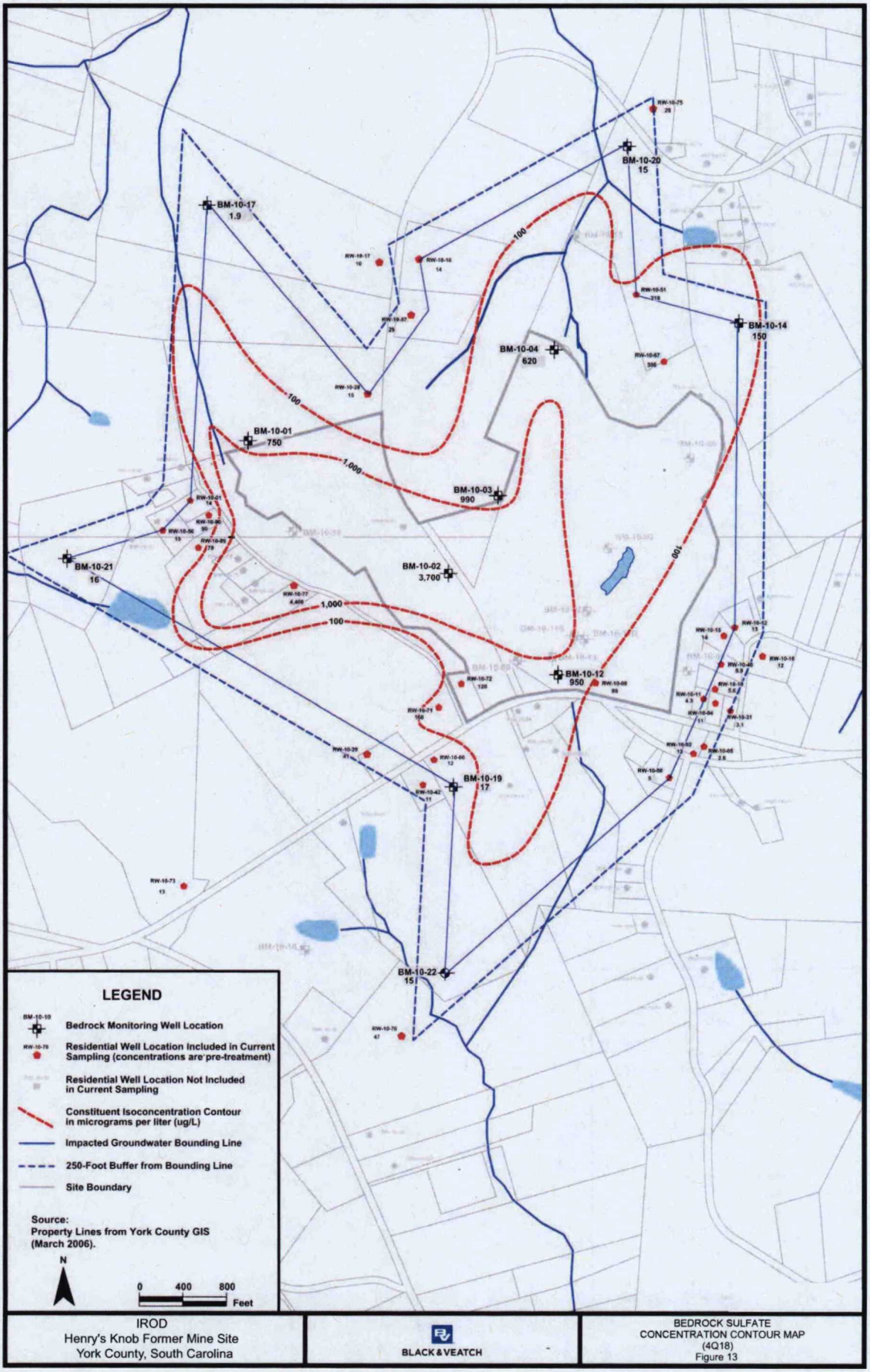

Industrial Waste Ponds
866
Mine
Henry Knob
OM-10-17
OM-10-20
OM-10-15
OM-10-16
OM-10-04
OM-10-14
OM-10-01
OM-10-03A
OM-10-18
OM-10-21
RW-10-02
RW-10-35
OM-10-02
OM-10-02D
OM-10-07
OM-10-03
OM-10-13
OM-10-12
OM-10-19
RW-10-41
OM-10-10
OM-10-22
800
850
864
0 750 1500 3000
SCALE IN FEET
0 250 500 1000
SCALE IN FEET
LEGEND
Residential Supply Well Location (JUNE 2007)
Residential Supply Well Location (SEPTEMBER 2008)
Residential Supply Well Location (OCTOBER 2008)
Monitoring Wells
SITE BOUNDARY
Source:
2001 Aerial Photograph and Property Lines from York County GIS (March 2006)
IROD
Henry's Knob Former Mine Site
York County, South Carolina
BLACK & VEATCH
OVERBURDEN
GROUNDWATER STFF DIAGRAMS
Figure 8

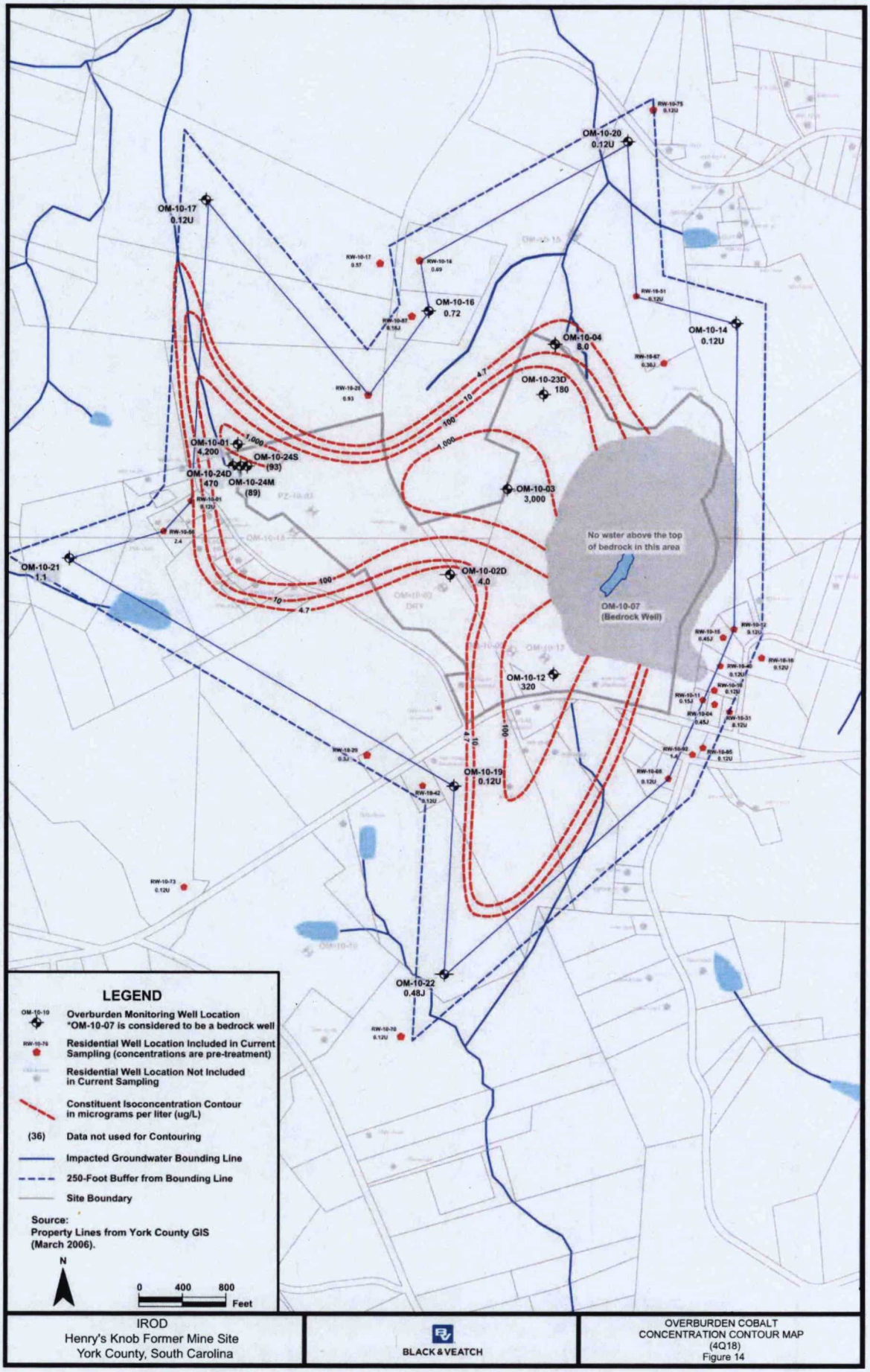

Industrial Waste Ponds
Henry Knob
Mine
SCALE IN FEET
LEGEND
Residential Supply Well Location (JUNE 2007)
Residential Supply Well Location (SEPTEMBER 2008)
Residential Supply Well Location (OCTOBER 2008)
Monitoring Wells
SITE BOUNDARY
Source:
2001 Aerial Photograph and Property Lines from York County GIS (March 2008).
IROD
Henry's Knob Former Mine Site
York County, South Carolina
BLACK & VEATCH
BEDROCK GROUNDWATER STFF DIAGRAMS
Figure 9

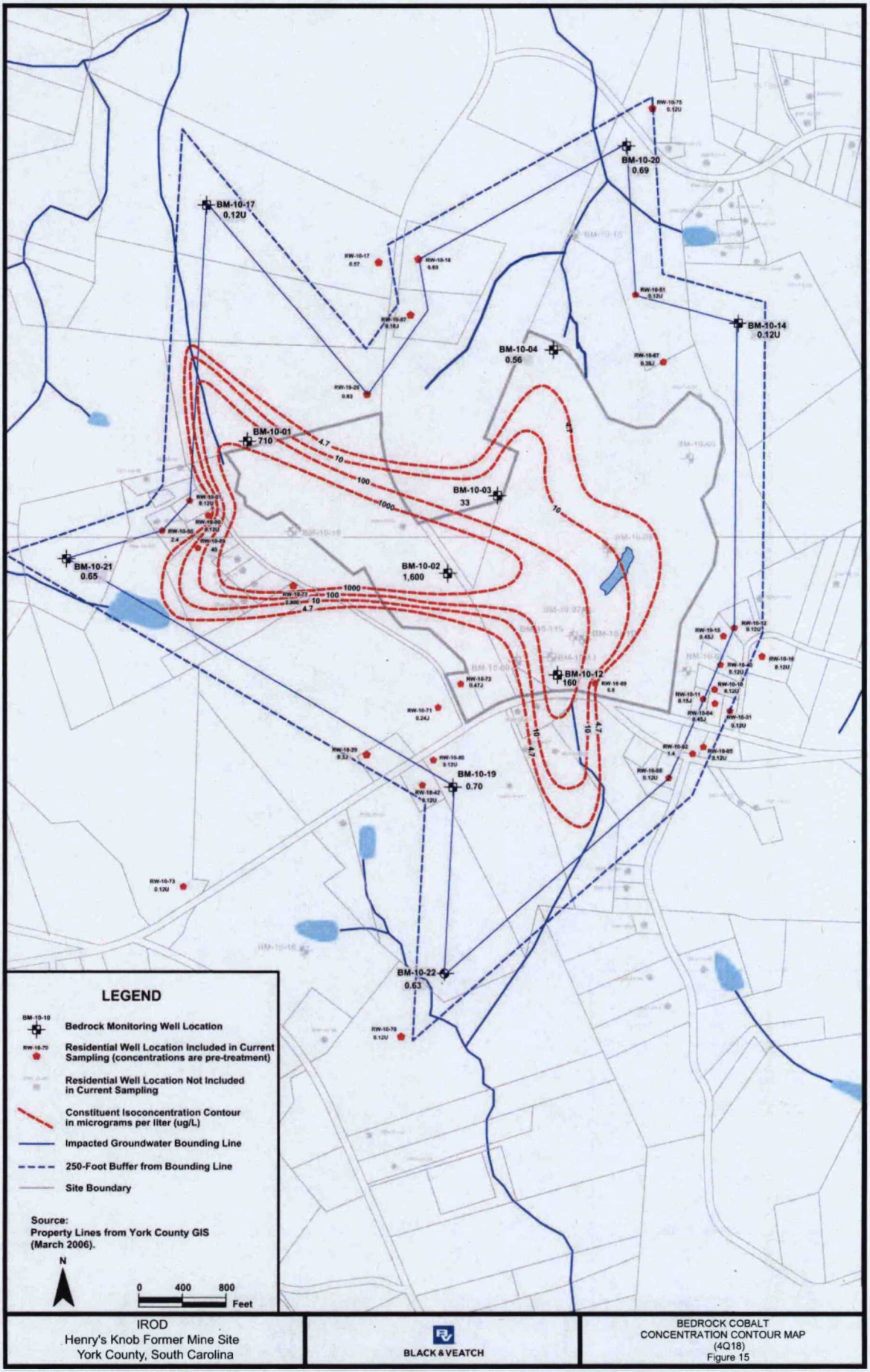

OM-10-17
734.44
OM-10-20
720.39
OM-10-15
728.09
OM-10-16
776.30
OM-10-14
785.99
OM-10-04
772.82
OM-10-23D
797.17
OM-10-01
786.59
OM-10-24S
(804.07)
OM-10-24D
793.33
OM-10-24M
(803.95)
PZ-10-03
823.05
OM-10-18
814.33
OM-10-03
866.49
No water above the top of bedrock in this area
OM-10-21
761.42
OM-10-02
DRY
OM-10-02D
862.91
OM-10-07
(Bedrock Well)
OM-10-05
893.59
OM-10-13
906.14
OM-10-12
910.00
OM-10-19
851.56
OM-10-10
820.49
OM-10-22
786.28
720
740
760
780
800
820
840
860
LEGEND
Overburden Monitoring Well Location
Water Table Elevation Contour
feet mean sea level elevation (ft/msl)
* OM-10-07 is considered to be a bedrock well
(809.12) Data not used for Contouring
Residential Well Location
Site Boundary
Source:
Property Lines from York County GIS
(March 2006).
N
0 400 800
Feet
IROD
Henry's Knob Former Mine Site
York County, South Carolina
BLACK & VEATCH
OVERBURDEN WATER TABLE
ELEVATION CONTOUR MAP (4Q18)
Figure 10

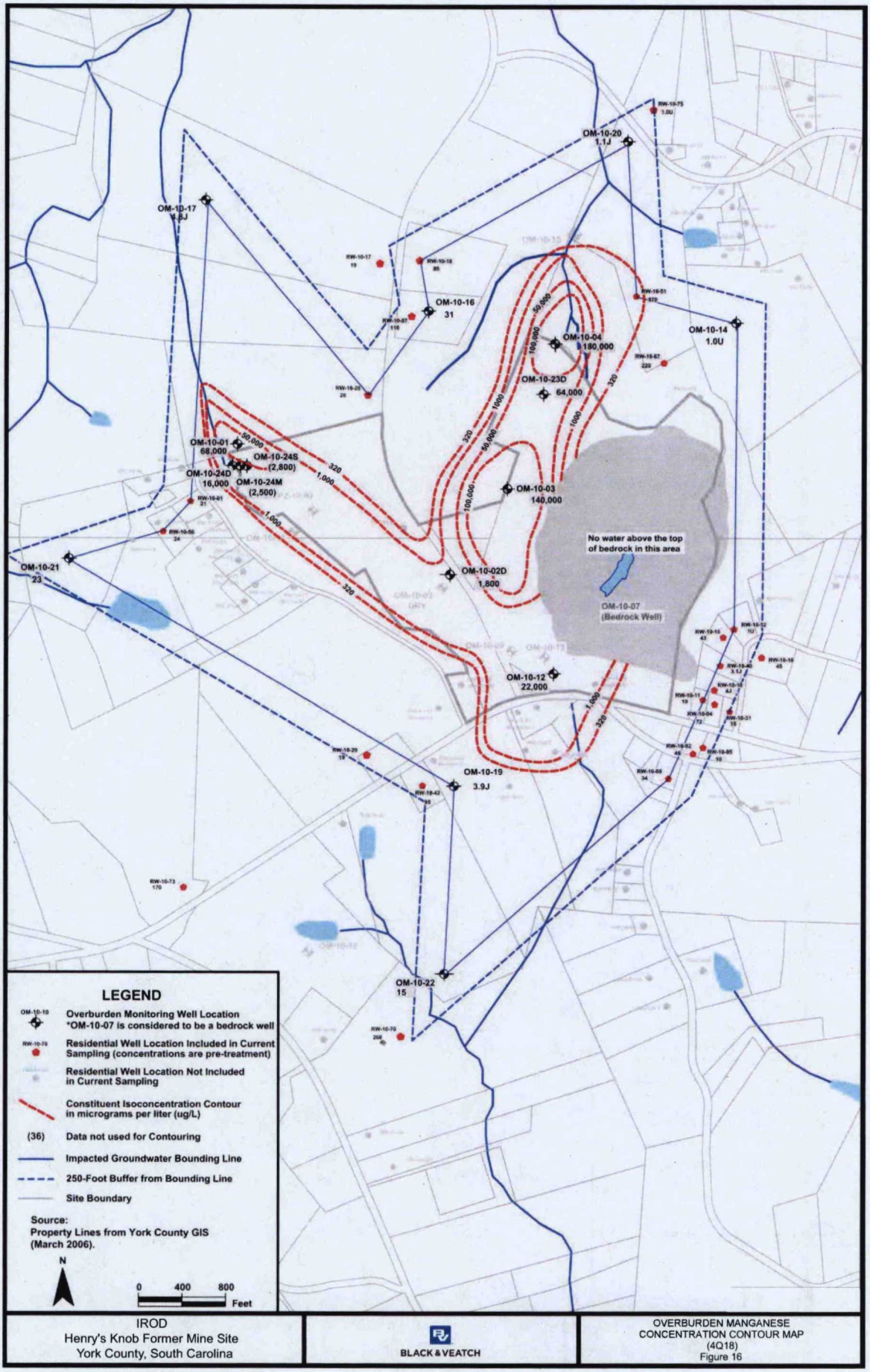

BM-10-17
734.41
BM-10-20
722.22
BM-10-15
727.71
BM-10-14
782.28
BM-10-04
773.87
BM-10-01
785.50
BM-10-03
862.10
BM-10-06
915.74
BM-10-18
811.26
BM-10-21
764.33
BM-10-02
862.63
BM-10-05
958.32
BM-10-07
950.92
BM-10-11S
DRY
BM-10-11D
919.02
BM-10-09
896.56
BM-10-13
911.40
BM-10-08
858.64
BM-10-12
911.86
BM-10-19
845.67
BM-10-10
820.68
BM-10-22
786.48
720
740
760
780
800
820
840
860
880
900
920
940
960
LEGEND
BM-10-10
Bedrock Monitoring Well Location
Water Table Elevation Contour
feet mean sea level elevation (ft/msl)
Residential Well Location
Site Boundary
Source:
Property Lines from York County GIS
(March 2006).
N
0
400
800
Feet
IROD
Henry's Knob Former Mine Site
York County, South Carolina
BLACK & VEATCH
BEDROCK WATER TABLE
ELEVATION CONTOUR MAP (4Q18)
Figure 11

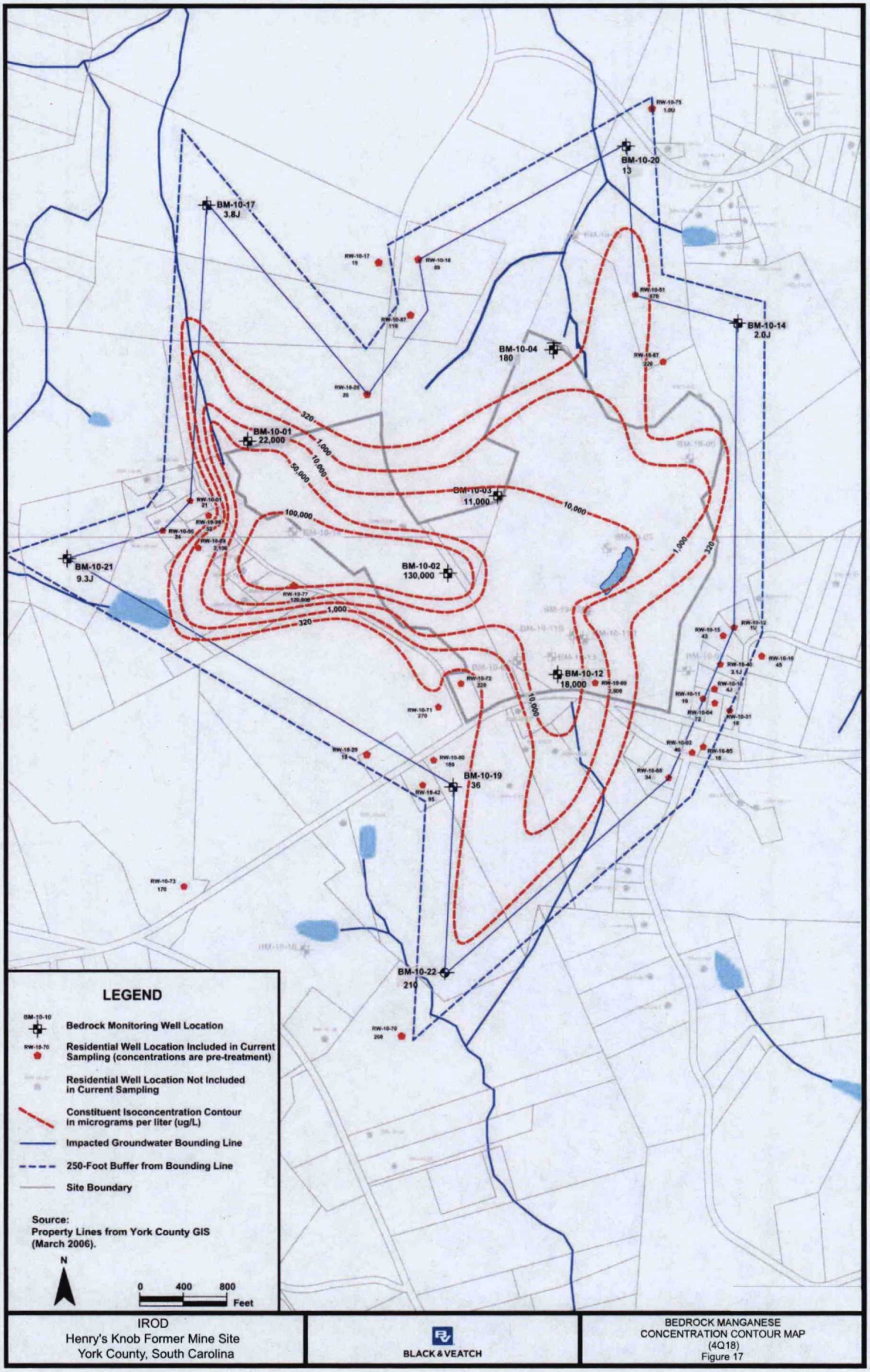

OM-10-20
0.84J
OM-10-17
4.6
OM-10-16
4.1
OM-10-04
2,000
OM-10-14
120
OM-10-23D
800
OM-10-01
740
OM-10-24S
(1,800)
OM-10-24D
3,200
OM-10-24M
(580)
OM-10-03
11,000
No water above the top of bedrock in this area
OM-10-07
(Bedrock Well)
OM-10-21
3.8
OM-10-02D
2,800
OM-10-12
1,100
OM-10-19
23
OM-10-22
2.2
1,000
100
10,000
LEGEND
Overburden Monitoring Well Location
*OM-10-07 is considered to be a bedrock well
Residential Well Location Included in Current Sampling (concentrations are pre-treatment)
Residential Well Location Not Included in Current Sampling
Constituent Isoconcentration Contour in micrograms per liter (ug/L)
(36) Data not used for Contouring
Impacted Groundwater Bounding Line
250-Foot Buffer from Bounding Line
Site Boundary
Source:
Property Lines from York County GIS (March 2006).
N
0 400 800
Feet
IROD
Henry's Knob Former Mine Site
York County, South Carolina
BLACK & VEATCH
OVERBURDEN SULFATE CONCENTRATION CONTOUR MAP
(4Q18)
Figure 12

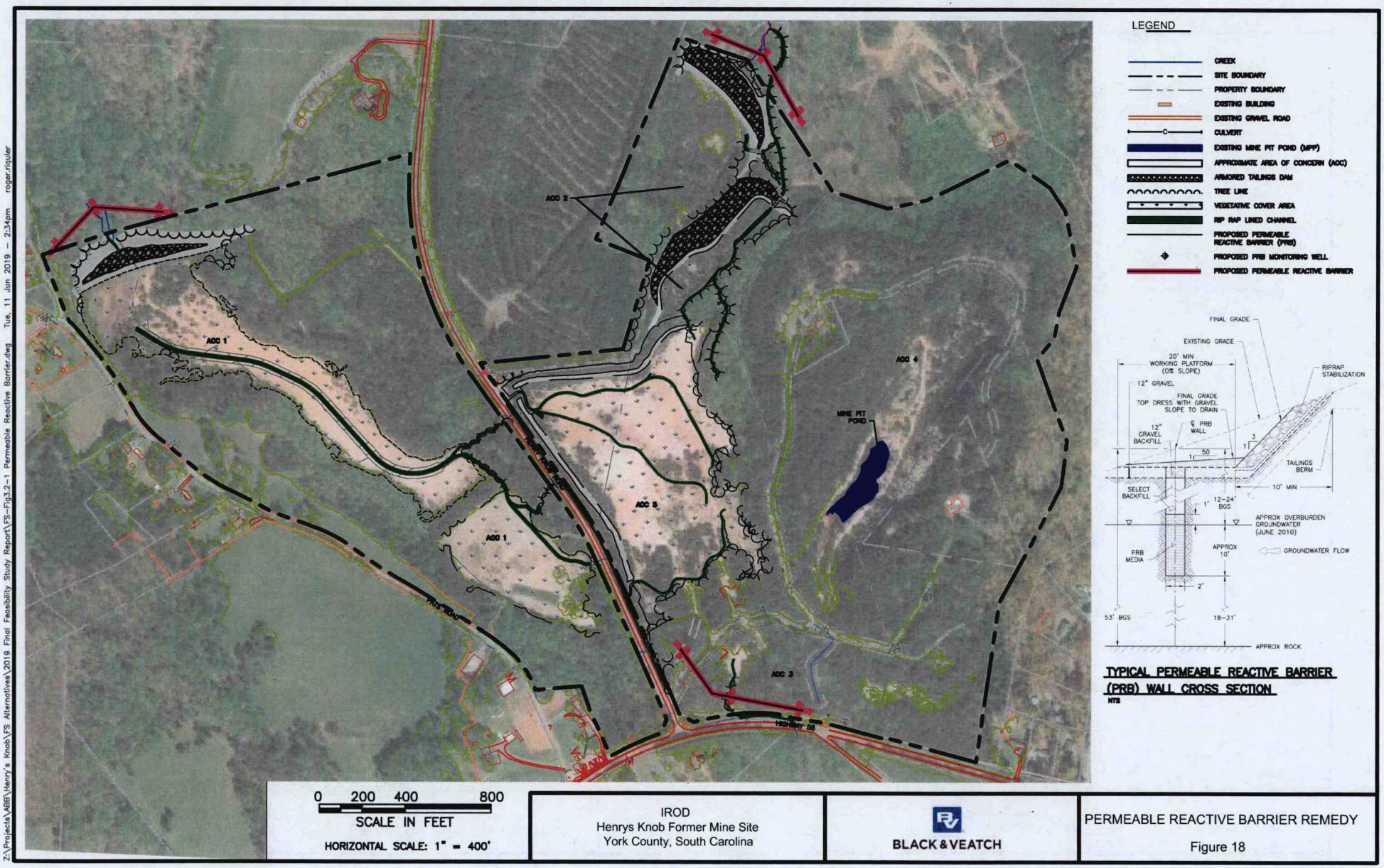

BM-10-17
1.9
BM-10-20
15
BM-10-14
150
BM-10-04
620
BM-10-01
750
BM-10-03
990
BM-10-21
16
BM-10-02
3,700
BM-10-12
950
BM-10-19
17
BM-10-22
15
100
1,000
LEGEND
Bedrock Monitoring Well Location
Residential Well Location Included in Current Sampling (concentrations are pre-treatment)
Residential Well Location Not Included in Current Sampling
Constituent Isoconcentration Contour in micrograms per liter (ug/L)
Impacted Groundwater Bounding Line
250-Foot Buffer from Bounding Line
Site Boundary
Source:
Property Lines from York County GIS (March 2006).
N
0
400
800
Feet
IROD
Henry's Knob Former Mine Site
York County, South Carolina
BLACK & VEATCH
BEDROCK SULFATE
CONCENTRATION CONTOUR MAP
(4Q18)
Figure 13

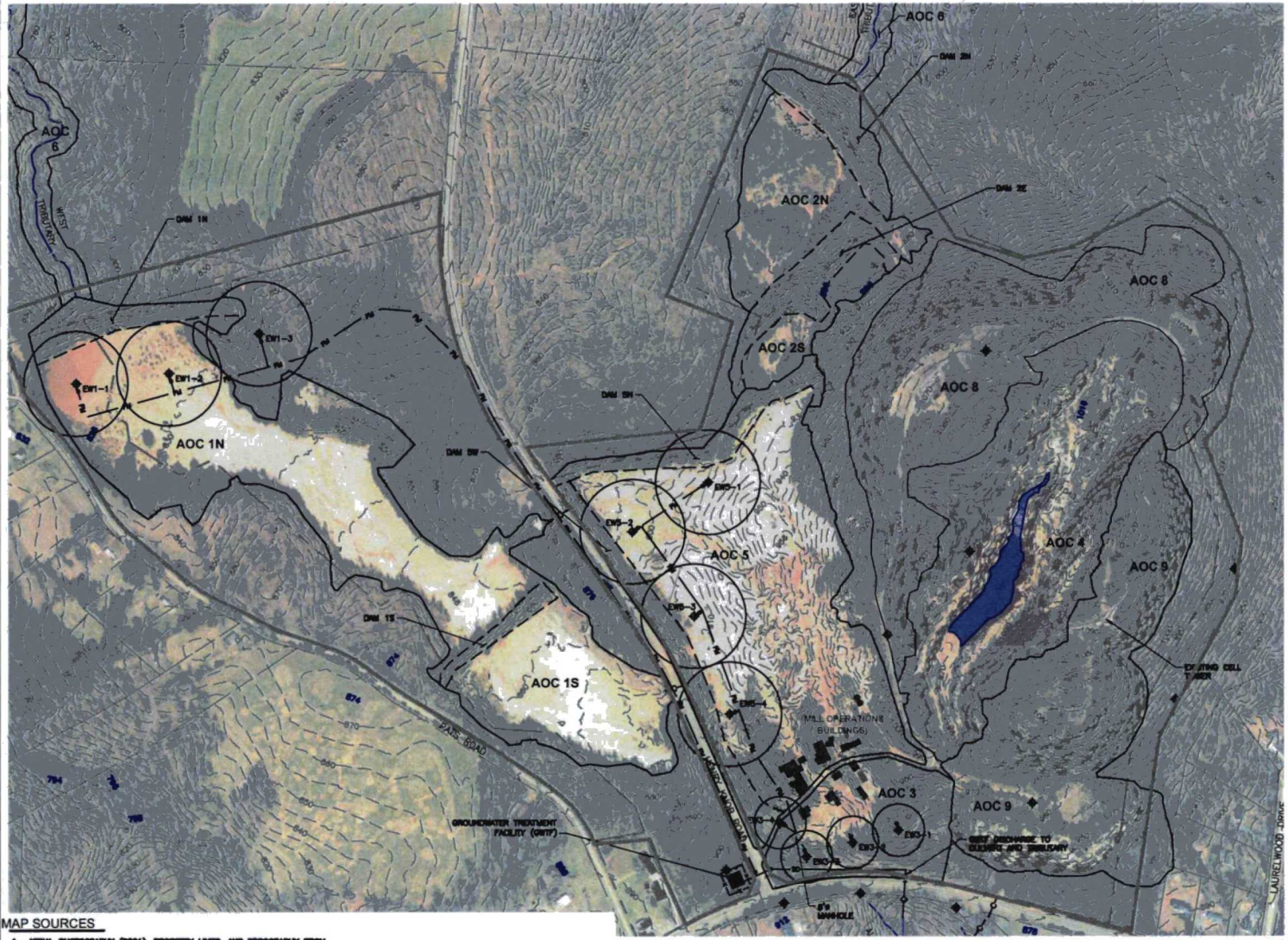

OM-10-20
0.12U
OM-10-17
0.12U
OM-10-16
0.72
OM-10-04
8.0
OM-10-14
0.12U
OM-10-23D
180
OM-10-01
4,200
OM-10-24S
(93)
OM-10-24D
470
OM-10-24M
(89)
OM-10-03
3,000
No water above the top of bedrock in this area
OM-10-07
(Bedrock Well)
OM-10-21
1.1
OM-10-02D
4.0
OM-10-12
320
OM-10-19
0.12U
OM-10-22
0.48J
4.7
10
100
1,000
LEGEND
Overburden Monitoring Well Location
*OM-10-07 is considered to be a bedrock well
Residential Well Location Included in Current Sampling (concentrations are pre-treatment)
Residential Well Location Not Included in Current Sampling
Constituent Isoconcentration Contour in micrograms per liter (ug/L)
(36) Data not used for Contouring
Impacted Groundwater Bounding Line
250-Foot Buffer from Bounding Line
Site Boundary
Source:
Property Lines from York County GIS (March 2006).
N
0 400 800
Feet
IROD
Henry's Knob Former Mine Site
York County, South Carolina
BLACK & VEATCH
OVERBURDEN COBALT CONCENTRATION CONTOUR MAP
(4Q18)
Figure 14

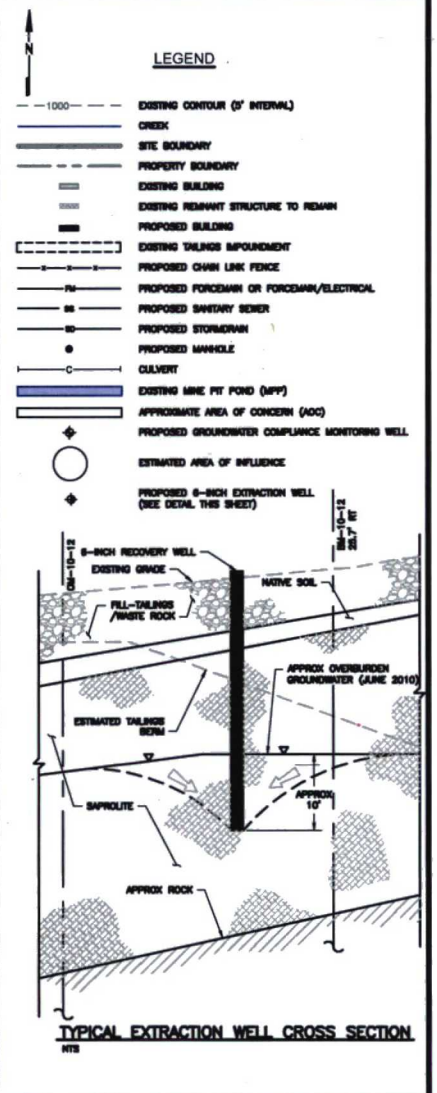

BM-10-17
0.12U
BM-10-20
0.69
BM-10-14
0.12U
BM-10-04
0.56
BM-10-01
710
BM-10-03
33
BM-10-21
0.65
BM-10-02
1,600
BM-10-12
160
BM-10-19
0.70
BM-10-22
0.63
4.7
10
100
1000
LEGEND
Bedrock Monitoring Well Location
Residential Well Location Included in Current Sampling (concentrations are pre-treatment)
Residential Well Location Not Included in Current Sampling
Constituent Isoconcentration Contour in micrograms per liter (ug/L)
Impacted Groundwater Bounding Line
250-Foot Buffer from Bounding Line
Site Boundary
Source:
Property Lines from York County GIS (March 2006).
N
0
400
800
Feet
IROD
Henry's Knob Former Mine Site
York County, South Carolina
BLACK & VEATCH
BEDROCK COBALT
CONCENTRATION CONTOUR MAP
(4Q18)
Figure 15


OM-10-20
1.1J
OM-10-17
4.8J
OM-10-16
31
OM-10-04
180,000
OM-10-14
1.0U
OM-10-23D
64,000
OM-10-01
68,000
OM-10-24S
(2,800)
OM-10-24D
16,000
OM-10-24M
(2,500)
OM-10-03
140,000
No water above the top of bedrock in this area
OM-10-07
(Bedrock Well)
OM-10-21
23
OM-10-02D
1,800
OM-10-12
22,000
OM-10-19
3.9J
OM-10-22
15
LEGEND
Overburden Monitoring Well Location
*OM-10-07 is considered to be a bedrock well
Residential Well Location Included in Current Sampling (concentrations are pre-treatment)
Residential Well Location Not Included in Current Sampling
Constituent Isoconcentration Contour in micrograms per liter (ug/L)
(36) Data not used for Contouring
Impacted Groundwater Bounding Line
250-Foot Buffer from Bounding Line
Site Boundary
Source:
Property Lines from York County GIS (March 2006).
N
0 400 800
Feet
IROD
Henry's Knob Former Mine Site
York County, South Carolina
BLACK & VEATCH
OVERBURDEN MANGANESE CONCENTRATION CONTOUR MAP
(4Q18)
Figure 16


BM-10-17
3.8J
BM-10-20
13
BM-10-14
2.0J
BM-10-04
180
BM-10-01
22,000
BM-10-03
11,000
BM-10-21
9.3J
BM-10-02
130,000
BM-10-12
18,000
BM-10-19
36
BM-10-22
210
320
1,000
10,000
50,000
100,000
LEGEND
Bedrock Monitoring Well Location
Residential Well Location Included in Current Sampling (concentrations are pre-treatment)
Residential Well Location Not Included in Current Sampling
Constituent Isoconcentration Contour in micrograms per liter (ug/L)
Impacted Groundwater Bounding Line
250-Foot Buffer from Bounding Line
Site Boundary
Source:
Property Lines from York County GIS (March 2006).
N
0
400
800
Feet
IROD
Henry's Knob Former Mine Site
York County, South Carolina
BLACK & VEATCH
BEDROCK MANGANESE
CONCENTRATION CONTOUR MAP
(4Q18)
Figure 17


LEGEND
CREEK
SITE BOUNDARY
PROPERTY BOUNDARY
EXISTING BUILDING
EXISTING GRAVEL ROAD
CULVERT
EXISTING MINE PIT POND (MPP)
APPROXIMATE AREA OF CONCERN (AOC)
ARMORED TAILINGS DAM
TREE LINE
VEGETATIVE COVER AREA
RIP RAP LINED CHANNEL
PROPOSED PERMEABLE REACTIVE BARRIER (PRB)
PROPOSED PRB MONITORING WELL
PROPOSED PERMEABLE REACTIVE BARRIER
AOC 1
AOC 2
AOC 3
AOC 4
AOC 5
MINE PIT POND
HIGHWAY 55
FINAL GRADE
EXISTING GRADE
20' MIN WORKING PLATFORM (0% SLOPE)
12" GRAVEL
FINAL GRADE TOP DRESS WITH GRAVEL SLOPE TO DRAIN
12" GRAVEL BACKFILL
℄ PRB WALL
RIPRAP STABILIZATION
TAILINGS BERM
10' MIN
SELECT BACKFILL
12-24' BGS
APPROX OVERBURDEN GROUNDWATER (JUNE 2010)
GROUNDWATER FLOW
PRB MEDIA
APPROX 10'
53' BGS
18-31'
APPROX ROCK
TYPICAL PERMEABLE REACTIVE BARRIER (PRB) WALL CROSS SECTION
NTS
0 200 400 800
SCALE IN FEET
HORIZONTAL SCALE: 1" = 400'
IROD
Henrys Knob Former Mine Site
York County, South Carolina
BLACK & VEATCH
PERMEABLE REACTIVE BARRIER REMEDY
Figure 18
Z:\Projects\A68\Henry's Knob\FS Alternatives\2019 Final Feasibility Study Report\FS-Fig3.2-1 Permeable Reactive Barrier.dwg Tue, 11 Jun 2019 - 2:34pm roger.riquier





MAP SOURCES

1. AERIAL PHOTOGRAPHY (2001), PROPERTY LINES, AND TOPOGRAPHY FROM YORK COUNTY GIS (2006).
2. CREEKS ADAPTED FROM UNITED STATES GEOLOGIC SERVICE (USGS) MAPPING (1973).
3. AOC BOUNDARIES ADAPTED FROM RI REPORT BY AMEC. BOUNDARIES ADJUSTED TO COORDINATE WITH AERIAL PHOTOGRAPHY AND TOPOGRAPHY.

0 200 400 800
SCALE IN FEET

IROD
Henrys Knob Former Mine Site
York County, South Carolina

BLACK & VEATCH

GROUNDWATER EXTRACTION AND TREATMENT REMEDY

Figure 19

Z:\Projects\ABB\Henry's Knob\FS Alternatives\2019 Final Feasibility Study Report\FS-Fig3.2-2 Groundwater Extraction and Treatment.dwg Wed, 12 Jun 2019 - 1:06pm roger.riguier

IROD APPENDIX A
STATE OF SOUTH CAROLINA CONCURRENCE

dhec
Healthy People. Healthy Communities.

September 27, 2019

Franklin Hill, Director
Superfund Division
US EPA, Region IV
Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, Georgia 30303

Re: Henry's Knob Superfund Site
SCN000407376
Interim Record of Decision Concurrence Letter

Dear Mr. Hill:

The South Carolina Department of Health and Environmental Control (SCDHEC or Department) has reviewed and concurs with all parts of the Interim Record of Decision (IROD) dated September 2019 for the Henry's Knob Superfund Site located in Clover, South Carolina. In concurring with this IROD, the Department agrees that the Interim Remedy was selected in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 42 United States Code (USC) §9601 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300, as amended.

This Interim Remedy consists of establishing Institutional Controls (ICs) for groundwater and source area controls, monitoring and maintenance of source area controls, and groundwater monitoring. The response action selected in this IROD is necessary to protect the public health and the environment from actual or threatened releases of hazardous substances.

The Interim Remedy is expected to be implemented for a period of five years. At the end of five years, groundwater monitoring data collected will be evaluated to determine the effectiveness of the previous interim actions on groundwater and surface water contamination. The data will also be used to determine groundwater and surface water background levels. Conclusions from the data evaluation will inform selection of a final remedy. The final remedy will address all contaminated media at the site and will meet the statutory requirements of CERCLA including Section 121.

Previously, Non-Time Critical Removal Actions and Interim Actions to install source area controls were conducted at the Site. These Actions included installation of wellhead treatment systems to improve water quality within the area of groundwater impact, installation of a fence around the mine pit for access control, repair of the tailings dams, repair of stormwater drainage pathways and controls, and treatment of tailings to establish vegetative covers that reduce acid mine drainage to groundwater and surface water at the Site.

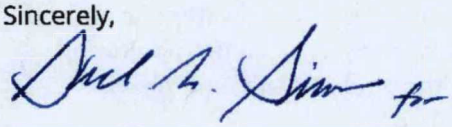
The Interim Remedy for the Henry's Knob Superfund Site is estimated to cost $4,671,000 over 30 years. However, as previously noted, the Interim Remedy is expected to be implemented for five years in order to support the selection of a final remedy; therefore, costs are anticipated to be less than the 30 year estimate. The major components of the Interim Remedy are:

- ICs to prohibit the installation of new groundwater wells and to restrict potable use of untreated Site groundwater with chemicals of concern above drinking water standards;
- Groundwater monitoring in accordance with the Groundwater Monitoring Plan to permit further evaluation of the effectiveness of natural attenuation processes on reducing concentrations of contaminants within the overburden groundwater, and to monitor the effects of that remediation on contamination in bedrock groundwater and surface water;
- ICs to prevent disturbance of the previously implemented source controls (vegetative cover systems, stormwater channel controls, and dam stabilization and rip rap armoring);
- Access controls (fencing around the mine pit);
- Monitoring and maintenance of the mine pit fencing, tailings areas vegetative covers, and engineered drainage channels in Areas of Concern 1, 2, 3, and 5 that were previously installed as interim actions, and of the tailings dams.

SCDHEC agrees that the Interim Remedy presented in the IROD is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action, and is cost-effective.

If you should have any questions regarding the Department's concurrence with the IROD, please contact Joel Padgett at (803) 898-0832.

Sincerely,



Henry J. Porter, Chief
Bureau of Land and Waste Management

Cc: Jeff Crowley, EPA Region 4
Don Siron, BLWM
Ken Taylor, BLWM
Susan Fulmer, BLWM
Joel Padgett, BLWM
Sara MacDonald, BLWM
Veronica Barringer, EA Midlands Region
File # 20799

IROD APPENDIX B
PUBLIC COMMENTS AND EPA RESPONSES

Responses to Public Comments

Following is the compilation of all public comments received on the Proposed Plan for an Interim Record of Decision for the Henry's Knob Superfund Site (Site). Each comment received is presented separately and is immediately followed by EPA's response.

Letter from Keith Knauerhase, Chief Counsel, ABB, Inc., regarding "Legal Comments on the Superfund Proposed Plan for an Interim Record of Decision," Henry's Knob Superfund Site, York County, SC, submitted 9/19/19. In summary counsel for ABB, Inc. (ABB) stated that the proposed Institutional Controls (ICs), to the extent that the Proposed Plan contemplates proprietary controls restricting groundwater use, are premature and should be deferred until the EPA's selection of a final groundwater remedy for the Site. The EPA agrees in part with the commenter that ICs in the form of proprietary controls, specifically restrictive covenants recorded in the public land records, may be deferred pending the EPA's evaluation of groundwater and background sampling data obtained during the proposed interim remedial action. The EPA disagrees with the commenter, however, to the extent that the comments suggest the selected interim remedy not require any form of ICs for groundwater. ABB's comments are provided below and the EPA's responses follow:

ABB Legal Comment #1:

Proprietary control ICs that limit or prohibit the use of groundwater within the impacted area may be deemed unnecessary based on the monitoring and Five-Year Review Process. In accord with the [Feasibility Study] (FS), ABB will conduct an annual receptor survey to evaluate whether new potable drinking water wells have been installed within the impacted groundwater area (including the 250-foot buffer zone). Any newly identified wells are added to the monitoring program and sampled. Consistent with the NTCRA, if sampling results are below the Remedial Goal [RG] for cobalt and manganese, the resident is offered a wellhead treatment system installed by ABB and operated and maintained by the resident. If the results are above the RG for cobalt and/or manganese, the resident is offered a wellhead treatment system installed, operated and maintained by ABB. The annual receptor survey also includes an annual review of deed records to track property ownership changes within the impacted groundwater area.

Further, the Proposed Plan emphasizes the benefit of utilizing the Five-Year Review Process to make fully informed long-term decisions regarding a final remedy: "Five-Year Reviews will be performed to evaluate the effectiveness of the completed source controls actions and natural attenuation processes in reducing contaminant concentrations in the overburden groundwater and to determine the impact on the bedrock groundwater zone. Five-Year reviews under CERCLA 121(c) will be conducted accordingly." (Proposed Plan p. 17). And: "[t]he Five-Year Review process (5 years of monitoring data) will also be used to determine if natural attenuation processes are effective in reducing contamination in groundwater and surface water during the review period." (Proposed Plan p. 3).

Likewise, any requirement for proprietary control ICs for residential parcels within the impacted area should be deferred until after the Five-Year Review process. Deferring requirements for ICs until after completion of the Five-Year Review process will allow for a more accurate determination of the necessity and benefits of any such controls. Requiring proprietary control ICs before completion of the Five-Year Review process will burden EPA, SCDHEC, local government, and ABB with the implementation

of potentially unnecessary proprietary controls resulting in unnecessary financial and resource expenses for all parties and unnecessarily burdening residential owners.

EPA Response to ABB Legal Comment #1:

The EPA agrees that ICs in the form of proprietary controls, specifically restrictive covenants recorded in the public land records, may be deferred pending the EPA's evaluation of groundwater and background sampling data obtained during the estimated five-year monitoring period in the proposed interim remedial action. The EPA will revise the proposed interim action for inclusion in the Interim Record of Decision (IROD) to utilize other forms of ICs including informational devices or enforcement tools, to mitigate human exposure to untreated, contaminated Site groundwater in the short term until a final remedy is selected and the need for more permanent ICs in the form of proprietary controls has been reevaluated.

These "informational devices" may include issuance of advisories in coordination with the Town of Clover; continuation of ABB's educational outreach and written notification efforts, in coordination with the EPA, to affected or potentially affected residential landowners of potential health risks associated with consumptive uses (i.e., drinking, cooking) of contaminated groundwater and the offer to install individual wellhead treatment systems on residential wells; or inclusion in state registries of contaminated sites, when available. "Enforcement tools" with IC components include requirements under state/local permits, administrative orders, unilateral orders, or Consent Decrees that limit certain activities, or require responsible parties to conduct specific activities. Available permit enforcement tools include SC Reg 61-44 (Individual Residential Well and Irrigation Well Permitting requirements) which provides that SCDHEC may deny coverage under the general permit when a proposed well would violate SC Reg 61-71; Well Standards, the Pollution Control Act, Sect. 48-1-10 et seq., the Safe Drinking Water Act, Sect. 44-55-10 et seq., or 1976 S.C. Code of Laws; and provides that SCDHEC will, upon receipt of information that a constructed individual residential well or irrigation well may present an unacceptable risk to health of the persons using the well or to the groundwaters of the State, or is in violation of any other applicable statutes or regulations, initiate enforcement action against the well driller. In addition, enforcement tools include requirements in Consent Decrees pursuant to which responsible parties are conducting the remedial action. Consent Decrees may require enforceable written agreements between responsible parties implementing the remedial action and affected landowners regarding access, non-interference, and limitations on uses that the EPA determines will pose an unacceptable risk to human health or interfere with implementation, integrity or protectiveness of the remedial action.) See EPA "Model Remedial Design/Remedial Action Consent Decree," issued 2014, revised 8/15/19, available at: https://cfpub.epa.gov/compliance/models/view.cfm?model_ID=81.

The specific IC instrument(s) for the Site and the affected or potentially affected residential properties must be detailed in an EPA-approved Institutional Control Implementation and Assurance Plan (ICIAP) to be implemented by ABB. The EPA acknowledges that ABB's "annual receptor survey" may be included as a component of the ICIAP to be developed and approved by the EPA during the remedial design phase of IROD implementation. An ICIAP should detail parties responsible for IC implementation and provide details on how ICs will be implemented, maintained, enforced, modified and terminated (if applicable). See "Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites," EPA OSWER 9355.0-89, EPA-540-R-09-001, Dec. 2012. Monitoring of affected residential wells should include sampling for all groundwater COCs to ensure exposures above

Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs), or human health risk-based levels in the absence of an MCL, does not occur.

ABB Legal Comment #2:

Proprietary control ICs that limit or prohibit the use of groundwater within the impacted area may deemed unnecessary and/or inappropriate after completion of a background review. Because metals naturally occur in groundwater in the Site area, and are present in monitoring wells as well as residential water supply wells located in the vicinity of the Site, the Proposed Plan calls for a further review of background conditions for naturally occurring metals: "Upon further review by EPA of background conditions for naturally occurring metals, site-specific background levels may be identified as cleanup levels in a final groundwater remedy provided they are deemed protective of human health." (Proposed Plan p. 9). It is practical and consistent with EPA guidance to defer any requirement for proprietary control ICs until after the completion of this additional background review. Otherwise, proprietary control ICs may limit the use of untreated groundwater for parcels with concentrations of metals at or below background levels. As the EPA has recognized, "ICs should be carefully evaluated, selected, and narrowly tailored to meet the cleanup objectives for the site in a manner that does not unnecessarily restrict the reasonably anticipated future land use or resources."[1] Restricting the use of groundwater when metal concentrations are at or below background levels would be unreasonable and inconsistent with EPA guidance and would result in unnecessary financial and resource burdens on EPA, SCDHEC, local government, and ABB. Further such proprietary ICs may unreasonably burden residential property owners prior to completion of the background review and selection of a final remedy.

EPA Response to ABB Legal Comment #2:

The EPA is currently evaluating site-specific background values provided in ABB's background evaluation submitted in support of ABB's draft Final Feasibility Study, which the EPA conditionally approved on August 16, 2019, to determine whether additional background sampling locations are needed to further refine the groundwater RGs prior to selecting a final groundwater remedy. Additional sampling data collected during the interim remedial action will aid in this evaluation. ABB's previously proposed background values relied in part on literature and/or regional background values that are not accepted by the EPA. Site-specific background values taken at EPA-approved background sampling locations are required to determine whether residential wells are impacted by metals from naturally occurring conditions or from Site impacts (e.g., acid mine drainage resulting from mining activities and/or leaching from sources remaining on Site). Upon further review by the EPA, acceptable background levels may be identified as RGs in a final groundwater remedy provided the levels are deemed protective of human health. In the interim, groundwater monitoring for all COCs should be assessed against MCLs, or human health risk-based levels in the absence of an MCL.

As previously stated, the EPA agrees that ICs in the form of proprietary controls, specifically restrictive covenants recorded in the public land records, may be deferred pending the EPA's evaluation of groundwater and background sampling data obtained during the estimated five-year monitoring period in the proposed interim remedial action. The EPA will revise the proposed interim action for inclusion in the IROD to require implementation of other forms of ICs including informational devices or enforcement

[1] *Institutional Controls: A Guide to Planning, Implementing, Maintaining and Enforcing Institutional Controls at Contaminated Sites*, EPA, December 2012

tools, to mitigate human exposure to untreated, contaminated Site groundwater in the short term until a final remedy is selected and the need for more permanent ICs in the form of proprietary controls has been reevaluated at that time. Note, however, that background levels that continue to exceed human health risk-based levels at the time of final remedy selection may still warrant additional, more permanent, IC measures to effectively limit human exposure.

ABB Legal Comment #3

Current data demonstrates that many residential parcels within the impacted area will not require proprietary control ICs. Not all parcels within the impacted area contain residential wells with concentrations of metals above the remedial goal options (RGOs) (EE/CA pp. 3-5). "Figure 4 presents the area of groundwater that has the potential to be affected by AMD." (Proposed Plan, p. 17). Therefore, each parcel must be evaluated independently based on the data for that parcel to determine the extents of impacts, if any, of AMD to that parcel and, thus, to determine whether ICs are necessary for that parcel. It would be inefficient to require proprietary control ICs for groundwater use and any such requirement would result in unnecessary expenses and resource expenditures for EPA, SCDHEC, local government, and ABB. Moreover, requiring ICs for parcels within the impacted area, but which are later found not to be impacted by AMD would be unfair and burdensome to residential property owners. There is no benefit or additional protection for human health to prohibiting the installation of a new well on residential property where metal concentrations are below the RGOs or are the result of ARD.

EPA Response to ABB Legal Comment #3

In ABB's technical comments, ABB indicated it had offered systems to 32 homes. Offers were accepted and individual wellhead treatment systems have been installed at 19 homes. Two additional homes have been constructed or are planned for construction since the initial implementation of the NTCRA. Thirteen residential owners have declined wellhead treatment systems. The EPA reiterates, as discussed in response to comment #1 above, that ABB continue its educational outreach and written notification efforts, in coordination with the EPA, to affected or potentially affected residential landowners who have declined individual wellhead treatment system installation (or new residents not yet offered) of potential health risks associated with drinking contaminated groundwater and the offer to install individual wellhead treatment systems at residences where untreated groundwater levels exceed MCLs or HH risk-based levels in the absence of an MCL for a particular COC.

Monitoring well data in the vicinity of or located on a particular residential parcel may be utilized to determine whether groundwater use on a residential parcel may present an unacceptable risk. The EPA is not required to wait for a landowner to install a new drinking water well and exposure has already occurred before the Agency makes a risk-management decision under CERCLA regarding potential unacceptable exposure to contaminated groundwater. If a residential parcel lies within the area of Site-impacted groundwater ICs may be required to help ensure protection of human health.

ABB Legal Comment #4

ABB does not have authority under South Carolina law to unilaterally implement proprietary control ICs on parcels that it does not own. South Carolina has not adopted the Uniform Environmental Covenant Act, therefore South Carolina common law governs the implementation of proprietary controls ICs such

as restrictive covenants and deed restrictions. Under South Carolina common law, ABB has no authority to place enforceable deed restrictions prohibiting the installation of wells or limiting the use of groundwater on any parcels it does not own. ABB is also precluded from recording a deed notice on a parcel it does not own due to the legal risks associated with recording an unwanted notice (e.g., potential for slander suits). Cooperation form current property owners is necessary for the implementation of proprietary controls ICs on parcels that ABB does not own.

As the EPA has recognized, "...when many separately-owned parcels are to be covered by ICs, proprietary controls can become difficult to negotiate and execute. Because proprietary controls typically are parcel specific, disparate implementation and compliance could occur among a group of parcels where proprietary controls are selected." EPA guidance also considers that "...legal implementation issues, jurisdictional questions ... and enforcement concerns" should be taken into account when considering requirements for ICs."[2] Given these concerns, proprietary control ICs, such as well prohibitions and groundwater use limits, should not be required in the Proposed Plan at this time. These ICs may not ultimately be necessary for many residential parcels.

EPA Response to Legal Comment #4

The EPA acknowledges that ABB does not have unilateral authority to implement proprietary controls in the form of restrictive covenants on land it does not own. However, enforcement tools may be utilized to aid in IC implementation. These tools include the RD/RA Consent Decree (RD/RA CD) for implementing the selected remedial action. An RD/RA CD may require responsible parties to undertake "best efforts" to secure the affected property owner's cooperation in executing and recording proprietary controls that grant a right of access to conduct any activity regarding the CD and grant the right to enforce the land, water, or other resource use restrictions set forth in the ROD and CD. Alternatively, a responsible party may be required to undertake "best efforts" to enter into enforceable written agreements between the responsible party implementing the remedial action and affected landowners regarding access, non-interference, and limitations on uses that the EPA determines will pose an unacceptable risk to human health or interfere with implementation, integrity or protectiveness of the remedial action. Such agreements may be necessary where individual wellhead treatment systems have been or will be installed to ensure their continued effectiveness in mitigating risks to human health. See EPA "Model Remedial Design/Remedial Action Consent Decree," issued 2014, revised 8/15/19, available at: https://cfpub.epa.gov/compliance/models/view.cfm?model_ID=81.

ABB Legal Comment #5

Property owners are required by South Carolina law to disclose environmental hazards. Section 27-50-40 of the South Carolina Code requires owners of real property to furnish purchasers with a written disclosure statement that includes information regarding environmental contamination. The South Carolina Residential Property Disclosure Statement, updated in November 2108 (sic), requires residential property owners to "[d]escribe any known property environmental contamination problems from construction, repair, cleaning, furnishing, intrusion, operating, toxic mold, methamphetamine production, lead based paint, lead hazards, asbestos, radon gas, methane gas, formaldehyde, corrosion-causing sheetrock, storage tanks, hazardous materials, toxic materials, environmental contamination, or other." This requirement applies to all residential property owners within the impacted area and will

[2] *Id* at p.3

ensure that any future owner of a residential property within the impacted area is informed of potential health concerns.

EPA Response to Legal Comment #5

Disclosures provided in private real estate transactions are not a recognized or recommended form of IC in EPA guidance and are not enforceable by the EPA or SCDHEC. Real estate disclosures rely on the knowledge of the resident who may or may not be fully informed as to environmental conditions on or under their property from sources outside of their own property. As indicated in the commenter's previous statement that each residential parcel "must be evaluated independently based on the data for that parcel to determine the extent of impacts," a particular resident may be unaware as to the existence or extent of groundwater contamination or the extent of human health risks posed by that contamination, and thus may fail to disclose the environmental condition to a prospective purhaser. The EPA maintains that an environmental restrictive covenant (that "runs with the land") should be pursued by ABB with landowners for those residential properties with groundwater contamination that presents risk to human health.

Letter from Robin Staszak, Project Manager, ABB, Inc., regarding "Technical Comments on the Superfund Proposed Plan for an Interim Record of Decision," Henry's Knob Superfund Site, York County, SC, submitted 9/19/19. The general and specific comments are summarized below, and the EPA's responses follow:

ABB General Comment

Attached are the ABB, Inc. (ABB) comments on the United States Environmental Protection Agency (USEPA) Superfund Proposed Plan for an Interim Record of Decision at the Henry's Knob Superfund Site (the Proposed Plan). In addition to the attached technical comments, ABB would like to take the opportunity to recognize the work completed to date on the Henry's Knob Former Mine Site (the Site) by ABB in collaboration with USEPA and South Carolina Department of Health and Environmental Control (SCDHEC). ABB has worked proactively with USEPA to implement an innovative "adaptive management" approach that allowed for expedient progress to be made in reclaiming and stabilizing the Site. Several notable milestone achievements are highlighted and described below.

Potable Water Supply - USEPA, SCDHEC, and ABB, with input from the Town of Clover and the local community, worked collaboratively to identify and implement a Non-Time Critical Removal Action (NTCRA) to address the use of groundwater as potable water within the area of potentially impacted groundwater. The NTCRA not only addressed the limited number of homes (three) within the potentially impacted groundwater boundary where groundwater exceeded remedial goals but offered wellhead treatment systems to all homes (32 homes to date with 19 accepting the offer) within the boundary.

Vegetation of Tailings Impoundments - ABB worked with Dr. Gwen Guidel, academic mine reclamation expert, the York County Cooperative Extension, University of Clemson Agricultural Service, and other local agricultural resources to design, pilot-test, and implement at full-scale an innovative approach to establish vegetation on over 77 acres of tailings impoundments at the Site. The approach prioritized the

use of locally-sourced, plant-based (food and leaf waste) compost and locally-sourced mulch hay to establish a growing media that was incorporated into the tailings and seeded. To support USEPA's "Pollinator Protection" initiative, ABB also included a mix of pollinator and wildflower seed in the seed mixture. Vegetation of the tailings impoundments mitigated erosion and transport of the tailings, reduced infiltration of precipitation through the tailings (mitigated acid mine drainage) and restored a visual eyesore in the community.

Rehabilitation of Tailings Impoundment Dams and Stormwater Controls - As part of the interim measures conducted at the Site, ABB completed rehabilitation of five impoundment dams as well as establishment of over 6,000 linear feet of rip-rap lined stormwater drainage channels. These interim measures helped mitigate erosion at the Site and stabilized the impoundment dams, thereby protecting property and resources downgradient of the dams, including Highway 55.

On-going Monitoring and Maintenance - ABB has been conducting the long-term groundwater monitoring program outlined in the 2015 Final Groundwater Monitoring Plan since June 2015, to support the Remedial Investigation/ Feasibility Study (RI/FS) process and gather data to support an evaluation of the effects of interim measures on groundwater quality. Groundwater monitoring results are presented and evaluated in the annual groundwater monitoring reports submitted to USEPA. In addition to groundwater monitoring, ABB conducts periodic inspections of the vegetative covers (including sampling for agricultural parameters), dams, stormwater controls, and site access controls, and monitors dam stability. Issues identified during the inspections are repaired and documented in quarterly progress reports submitted to USEPA.

In addition to the work completed and the on-going monitoring and maintenance, ABB would also like to note that the Site was awarded the USEPA Region 4 Excellence in Site Reuse Award in 2017, was featured in USEPA's Mining Site Webinar Series in 2018, and was published by USEPA as a Case Study for Ecological Revitalization of Contaminated Sites in 2018.

ABB looks forward to continuing to work with USEPA to implement the adaptive management approach developed for the Site to reach a final Record of Decision.

EPA Response to ABB General Comment

The EPA acknowledges the comment, and appreciates the progress made to date regarding potable water supply for residential households, vegetation of the tailings impoundments, rehabilitation of tailings impoundment dams and stormwater controls, and ongoing monitoring and maintenance activities in reclaiming and stabilizing the Henry's Knob Site.

ABB Technical Comment #1:

The first sentence on page 1 states, "This Proposed Plan presents the Preferred Remedial Alternative for the Interim Record of Decision (IROD) which addresses the overburden groundwater zone (emphasis added) at the Henry's Knob Superfund Site in Clover, South Carolina. Why does USEPA specify that the Preferred Remedial Alternative is specific to overburden groundwater since it is a single aquifer and the overburden portion and bedrock portion of the aquifer are in direct contact? Other sections of the Proposed Plan (e.g., page 2 first sentence of "Scope and Role" and page 3 last sentence of first paragraph) do not make the distinction to overburden groundwater.

EPA Response to ABB Technical Comment #1:

As stated in the FS, source control actions that have already been taken (i.e. interim actions at AOCs 1,2, 3, and 5) have focused on reducing acid mine drainage to the shallow groundwater. The remedial alternatives presented in the FS to address groundwater are all similarly focused on actions to address contamination in the shallow (overburden groundwater). None of the alternatives presented in the FS directly address the bedrock zone. The EPA recognizes that the Overburden zone is in direct contact with the bedrock zone. The preferred alternative (selected remedy) includes continued monitoring of both overburden and bedrock zones.

ABB Technical Comment #2:

The next to last paragraph on page 4 states treatment systems were offered to 30 homes. ABB has offered systems to 32 homes (2 additional homes have been constructed or are planned for construction since the initial implementation of the NTCRA). Offers were accepted and individual wellhead treatment systems have been installed at 19 homes.

EPA Response to ABB Technical Comment #2:

The IROD will incorporate the updated information regarding the number of homes offered treatment systems (32 homes) and the number that have accepted a wellhead treatment system (19 homes).

ABB Technical Comment #3

The last paragraph on page 4 references the Construction Completion Report and Post Completion Monitoring Report/Inspection Schedule (AmecFW; February 2017), which documented the interim action associated with AOC 1. However, there is no reference in the Proposed Plan relative to similar documents prepared for AOC 2, AOC 3, and AOC 5.

EPA Response to ABB Technical Comment #3

The IROD will include references to the documentation of interim actions for AOCs 2, 3, and 5.

ABB Technical Comment #4

The first paragraph on page 3, the second paragraph on page 8, and footnote 2 on Table 7 all reference the South Carolina Water Quality Criteria (WQC); however, the WQC provided in Table 7 appear to be the USEPA Ambient Water Quality Criteria (AWQC) and not the more stringent South Carolina WQC. For example, the USEPA AWQC of 6.5 to 9 for pH is listed, rather than the South Carolina WQC of 6.0 to 8.5 for pH for freshwaters.

EPA Response to ABB Technical Comment #4

The selected cleanup level for surface water will be the South Carolina Water Quality Criteria (SCWQC) when available. When a SCWQC is not available, the ecological risk-based level will be selected as the cleanup level. There is no SCWQC for aluminum. The ecological risk-based level used in the BERA was 87 ug/L. This value was based on the USEPA AWQC for aluminum at the time the BERA was conducted and prior to EPA issuing the 2018 NRWQC for aluminum, which is calculated based on site-specific pH, hardness and dissolved organic carbon. As indicated in the footnote on Table 7 of the Proposed Plan, the

cleanup level for aluminum may be adjusted in the EPA-approved sampling plan based on collection of these site-specific field parameters. Also, the SCWQC of 6.0 to 8.5 for pH will be presented in the IROD.

ABB Technical Comment #5

The discussion of chemicals of concern (COCs) and the summary of site risks (pages 6-8), especially is misleading and inaccurate. While Table 2 lists the groundwater COCs identified in the Human Health Risk Assessment (HHRA), it is not clear how USEPA generated Tables 3 and 4 COCs for surface water and sediment. Tables 3 and 4 include a subset of chemicals of potential ecological concern (COPECs) that were identified and evaluated in the Baseline Ecological Risk Assessment (BERA) for these media. The BERA listed these (and other metals) as COPECs for surface water and sediment, however the evaluation processes in the BERA reduced the list of COPECs to COCs that included: aluminum and pH in Allison Creek Tributary, pH in West Tributary of SFCC, and pH in the Mine Pit Pond. No COCs were identified for sediment.

a) The BERA was conducted following the eight-step approach in accordance with various USEPA ecological risk assessment guidance documents. The process starts with identification of COPECs. These COPECs are then carried through the exposure assessment and risk characterization steps in the process and conclude with a list of COCs that may pose risks to ecological receptors.

b) The Proposed Plan starts out by listing the surface water COCs (Table 3), but these are actually a subset of the COPECs identified in the BERA. COPECs identified in the BERA were carried through the exposure assessment and risk characterization steps in the BERA and concluded that the ecological surface water COCs are limited to aluminum in Allison Creek Tributary and pH in Allison Creek Tributary, West Tributary of SFCC, and Mine Pit Pond. Therefore, the BERA concluded that the overall list of COCs for surface water consists of aluminum and pH, and not the long list of COCs listed in Table 3 of the Proposed Plan. Additionally, the BERA did not identify any unacceptable risks to ecological receptors related to sediment. Therefore, there are no COCs for sediment. Rather the COCs for sediment listed in Table 4 of the Proposed Plan are actually the COPECs identified in the BERA which were carried through the exposure assessment and risk characterization steps in the process.

c) As stated in the Draft Final FS in Section 1.2.5.2 Baseline Ecological Risk Assessment, the BERA identified only aluminum (surface water at Allison Creek Tributary) and pH (surface water at Allison Creek Tributary, West Tributary to SFCC, and Mine Pit Pond) as the COCs posing potential risk to ecological receptors. Note that the BERA did identify and evaluate other COPECs (metals and inorganics) as well as other media in addition to surface water (sediment, fish tissue, and soil) as part of the ecological risk assessment, but the BERA only identified potential risk to ecological receptors from aluminum (surface water at Allison Creek Tributary) and pH (surface water at Allison Creek Tributary, West Tributary to SFCC, and Mine Pit Pond). COPECs represent chemicals that are present in Site media at concentrations that could pose more than a negligible risk to ecological receptors and, therefore, are carried through the risk assessment for quantitative evaluation of potential risks. The identification of COPECs was done in accordance with USEPA guidance. Section 2.4 and Tables 2-5 through 2-25 of the BERA present the identification and screening of COPECs for surface water, sediment, fish tissue, and soil. COPECs retained through the screening process were evaluated in Sections 3 (Baseline Ecological Exposure and Effects Assessment) and Section 4 (Risk Characterization) of the BERA. Based on the conclusions of the BERA, the surface water COCs are limited to aluminum (surface water at Allison Creek Tributary) and pH (surface water at Allison Creek Tributary, West Tributary to SFCC, and Mine Pit Pond).

The BERA did not identify any unacceptable risks to ecological receptors related to sediment, soil, or fish tissue.

EPA Response to ABB Technical Comment #5

As stated in the FS conditional approval letter the EPA issued to ABB on August 16, 2019:

"The EPA has identified outstanding issues and unresolved comments in the Feasibility Study Report and supporting BERA/HHRA which require a more detailed re-evaluation of the risk assessment, contaminants of concern (COCs), and preliminary remedial goals (PRGs) for groundwater, surface water and sediments. This re-evaluation will be performed as part of the on-going monitoring under the proposed interim remedy. The EPA has determined that more information on the effects of the previously implemented source controls actions on groundwater contamination, and groundwater discharge to surface water, as well as a site-specific background study on naturally occurring metals is necessary in order to refine COCs/PRGs and select a final remedy for the Site. The outcome of this re-evaluation may be documented in an RI Report Addendum and/or Appendix to the Feasibility Study Report as deemed necessary by the EPA prior to final remedy selection."

Note that in the EPA's letter to ABB dated Sept. 8, 2011, the Agency conditionally approved the RI Report, Baseline HHRA, and Ecological Risk Assessment Reports submitted by ABB in June 2011; however, the EPA stated that the Agency had identified issues in the reports regarding current and expected behavior of seeps in Allison Creek and West Tributary, and concerns regarding background data for screening purposes remained an issue. The EPA directed ABB to modify the reports to cure the deficiencies through the EE/CA or in the Feasibility Study. Black & Veatch comments dated 8/8/11 on the RI, HHRA, and BERA discussed these concerns in more depth. These deficiencies were noted in 8/31/11 meeting minutes produced by Amec on behalf of ABB, which reiterate that in the FS, ABB would further evaluate stream concentration influxes and with findings incorporated into the FS alternative development; and media specific PRGs would be developed in the FS for all media, including surface water and sediments, that are protective of ecological receptors. These issues appear to remain unaddressed or unresolved and thus it is not clear that, as ABB proposes in its Comment #5(c) on the Proposed Plan, that the "BERA only identified potential risk to ecological receptors from aluminum and pH" and that "based on conclusion of the BERA, the surface water COCs are limited to aluminum and pH." The EPA has not formally approved the BERA or FS. Only conditionally approvals were issued pending resolution of outstanding issues.

Specifically, the list of COCs for ecological concern presented in the Proposed Plan was developed from Table 5-1 (Ecological Risk Summary Matrix - Aquatic Exposure Areas) of the 2011 BERA, which summarizes the COCs for surface water and sediment. The chemicals listed on Tables 3 and 4 of the Proposed Plan appear in Table 5-1 as chemicals of concern based on exceedances of effects benchmarks or South Carolina Water Quality Standards (SCWQS). For sediment, Table 5-1 indicates that copper, iron and manganese at exposure areas exceeded effects benchmarks for sediment. For surface water, Table 5-1 indicates that aluminum, cadmium, cobalt, copper, lead, manganese, silver, thallium and zinc exceeded effects benchmarks for surface water. In addition, the pH of the surface water in the Mine Pit Pond, East Tributary, West Tributary, and Allison Creek Tributary do not meet SCWQS.

Evaluation processes in the BERA that reduced the list of COCs down to just aluminum and pH in surface water did not consider discharge of overburden groundwater to surface water and relied on comparisons

with reference or background levels. The BERA did not evaluate ecological risk from groundwater discharging to surface water (groundwater data from monitoring wells and private wells was not used in the BERA). The three COCs for sediment (copper, iron and manganese) were elevated in reference area sediment. Several metals (aluminum, cadmium, copper, manganese, and zinc) were also elevated in reference area surface water.

ABB Technical Comment #6

The fourth paragraph on page 8 references current ecological screening values for cobalt (0.019 milligrams per liter [mg/L]) and manganese (0.093 mg/L), but do not identify the source of these values. Please explain why these screening values are different from the screening values presented in the BERA. Please also explain why these current screening values are less than the risk-based values presented in the BERA (0.023 mg/L for cobalt and 0,12 mg/L for manganese) that have been identified as the selected surface water PRGs in Table 7 of the Proposed Plan.

EPA Response to ABB Technical Comment #6

The BERA was prepared in 2011. Many of the values used in the BERA have been updated. The current screening values for cobalt and manganese referenced in the comment are from the Region 4 Ecological Risk Assessment Supplemental Guidance (EPA, 2018). Table 7 of the Proposed Plan presents risk-based values based on the 2011 BERA.

ABB Technical Comment #7

The second paragraph of the Remedial Action Objectives (RAO) discussion on page 8 states, "The HHRA demonstrated that the COCs at the Henry's Knob Site (cobalt, manganese, and other metals) pose a non-cancer hazard to human health through ingestion of and dermal contact with groundwater in overburden wells, bedrock wells and private wells." The HHRA did not identify risks to human health through dermal contract with groundwater.

EPA Response to ABB Technical Comment #7

Disagree. Unacceptable non-cancer hazards (Hazard Indices exceeding 1) were identified in the 2011 HHRA due to both ingestion and dermal routes of exposure. The IROD will present detailed tables of the non-cancer hazards for the COCs as presented in the HHRA that demonstrate unacceptable hazards due to ingestion and dermal contact with the COCs.

ABB Technical Comment #8

Why do the RAOs listed in the Proposed Plan on page 9 differ from the RAOs provided by USEPA ORC via email to ABB on July 17, 2019 which read:

"Revise the RAOs for this FS to state as follows:

RAOs for this FS, include:

• Restore groundwater to its beneficial use as a drinking water source wherever practicable and within a reasonable timeframe given the particular circumstances at the Site.

• Prevent potable use of groundwater that contains concentrations of metals that pose potential non-cancer risks to human health. [The NTCRA supplied water treatment systems to impacted residents in

the vicinity of the Site; however, use restrictions are needed for Site groundwater to prevent exposure and ensure long-term protectiveness.]

• Ensure integrity of previously implemented engineering controls (i.e., vegetative cover systems, stormwater channel controls, dam stabilization and rip rap armoring) and access controls (i.e., fencing around mine pit/pond) to ensure the source control actions function as intended and that the remedy remains protective in the long-term."

EPA Response to ABB Technical Comment #8

The FS report includes RAOs for a final groundwater remedy. The RAOs included in the Proposed Plan for this interim remedial action were developed (or retained from the FS) based on the current and potential future residential land use at the Site and the limited scope of the interim action.

The preferred remedy presented in the Proposed Plan is an interim remedy and thus does not have the groundwater restoration RAO because groundwater is not being cleaned up under the interim action. The scope of the IROD is ICs, maintenance and monitoring. MNA is not being selected at this time (if MNA was selected, an EPA-approved Technical Impracticability Evaluation and ARAR waiver would be required now because chemical-specific ARARs would not be met). Rather, the EPA is using additional monitoring data and background level data gathered during this interim phase to evaluate efficacy of MNA as potential final remedy.

The Proposed Plan added a surface water RAO to clarify that reductions in contaminant concentrations in overburden groundwater (e.g., as a result of the completed source control actions) are expected to mitigate contaminated groundwater discharge to surface water at levels protective of aquatic life.

The final groundwater and surface water remedy for the Site will be addressed in the final ROD at a later date.

ABB Technical Comment #9

ABB does not agree with the first RAO listed on page 9. The RAO should be reworded to "Prevent potable use of untreated groundwater that contains concentrations of metals that pose potential non-cancer risks to human health" to allow for the elements of the NTCRA to continue to be implemented.

EPA Response to ABB Technical Comment #9

See the response to ABB Technical Comment #8 above.

ABB Technical Comment #10

ABB does not agree with the last RAO listed on page 9, "Protect downgradient surface water resources by reducing contaminant concentrations in overburden groundwater so that discharges to surface water are protective of aquatic life." Since surface water in the vicinity of the Site is impacted by both acid mine drainage (AMD) and acid rock drainage (ARD), the RAO should be reworded to "Protect downgradient surface water resources by reducing contaminant concentrations in overburden groundwater so that discharges to surface water are protective of aquatic life wherever practicable given the particular circumstances at the Site."

EPA Response to ABB Technical Comment #10

Groundwater discharges to surface water must be protective of aquatic life. Groundwater discharges to surface water must comply with applicable or relevant and appropriate federal, or more stringent state, water quality criteria considering the designated or potential use of the surface water (CERCLA Sect. 121 (d)), or risk-based levels protective of ecological receptors in the absence of a promulgated standard. A remedial action that does not attain a level or standard of control at least equivalent to an ARAR requires an ARAR waiver under CERCLA Sect. 121(d)(4). On-going collection of surface water monitoring data over the next five years will be used to determine whether additional remedial actions are needed to address ecological risk in surface water as part of a final ROD for the Site. The data gathered will be used to further assess validity of MNA for Site groundwater; gather appropriate background level data; develop Technical Impracticability evaluation; and determine whether additional measures are needed to address surface water due to groundwater discharge to surface water.

ABB Technical Comment #11

Tables 7 and 8 list PRGs for COCs for surface water and sediment (respectively), however it is unclear how the list of COCs was generated as the BERA only identified aluminum (in Allison Creek Tributary) and pH (in Allison Creek Tributary, West Tributary of SFCC, and the Mine Pit Pond) as surface water COCs, and no COCs were identified for sediment.

EPA Response to ABB Technical Comment #11

See response to ABB Technical Comment #5 above.

ABB Technical Comment #12

Page 11, second column, five-year reviews should be added as a key component to Alternative GW-2.

EPA Response to ABB Technical Comment #12

It is agreed that Five-Year Reviews is a key component to Alternative GW-2. The IROD will include Five-Year Reviews as a key component of Alternative GW-2.

ABB Technical Comment #13

Page 11, second column, second paragraph does not mention that a long-term O&M Plan to address groundwater and surface water monitoring for site specific COCs, as well as other requirements necessary to verify that the previously completed NTCRA and interim measures continue to be protective would be prepared and submitted to the USEPA for approval as part of the alternative.

EPA Response to ABB Technical Comment #13

It is agreed that Long-term groundwater monitoring is as a key component of Alternative GW-2. The IROD will include long-term monitoring as a key component of the alternative. Since the EPA's preferred remedy is an interim action, it is not necessary to present the full details of this alternative. However, the details of the monitoring requirements for the EPA's preferred alternative are presented in the IROD.

ABB Technical Comment #14

Text on pages 11-13 and Table 9 (Summary of Remedial Alternative Costs) includes costs for Alternatives GW-2, GW-3 and GW-4 from the June 17, 2019 (Revision 2) version of the FS provided by ABB. Based on USEPA review comments on Revision 2 of the FS, the cost estimates were revised by ABB and included in the Draft Final version of the FS dated August 2, 2019 (Revision 3). Many of the cost values included in Revision 3 were higher than the cost values included in Revision 2 and are not reflected in Table 9 of the Proposed Plan.

EPA Response to ABB Technical Comment #14

The text and tables of the IROD will present the cost estimates included in the August version of the FS.

ABB Technical Comment #15

Figures 1,2a, and 3 through 6 of the Proposed Plan do not reflect the most recent version of the Draft Final FS dated August 2, 2019 (Revision 3).

• Figures 1 and 2a of the Proposed Plan are from the FS dated May 1,2019 (Revision 1). These figures were revised for the June 17, 2019 (Revision 2) version of the FS to address review comments provided by SCDHEC dated May 30, 2019.

• Figure 3 of the Proposed Plan is from the FS dated June 17, 2019 (Revision 2). This figure was revised for the August 2, 2019 (Revision 3) version of the FS due to the inclusion of Alternative T/MP-2 based on USEPA review comments.

• Figures 4, 5, and 6 of the Proposed Plan are from the FS dated May 1, 2019 (Revision 1). These figures were revised for the June 17, 2019 (Revision 2) version of the FS to address review comments provided by SCDHEC dated May 30, 2019.

EPA Response to ABB Technical Comment #15

The figures referenced in the comment from the August 2019 version of the FS will be included in the IROD.

ABB Technical Comment #16

The process to the Final ROD is not identified clearly in the Proposed Plan. During a July 23, 2019 conference call between ABB and USEPA the following process was identified, and the following notes were made (and circulated with meeting attendees):

• Pathway to move from an Interim ROD to a Final ROD include the following steps:

i. Consent Decree

ii. Remedial Design (RD)/Remedial Action (RA)

iii. Technical Impracticability (TI) Waiver evaluation (if needed) for groundwater and surface water

iv. Final ROD

• Design components of the RD included in the Interim ROD would outline the specifics of background evaluations. The development of the RD would be a collaborative effort between ABB and USEPA.

• The RA would implement the RD.

• The RD/RA period is typically on the order of 5 years.

• TI Waiver evaluation (if needed) would be drafted by either USEPA or ABB. USEPA would finalize and publish the TI waiver, if granted.

EPA Response to Technical Comment #16

General details of the process to the Final ROD will be included in the IROD. Specific enforcement processes pertaining to negotiated legal agreements such as Consent Decrees are not typically included in a ROD.

Public Comment Summary

Two public comments were submitted expressing concern that additional measures be taken to address the mine pit pond. The two comments are provided below, followed by the EPA's response:

Public Comment #1

Why not put lime in the big hole on top of Knob. It would stop so much acid in ground water. This is too simple for Government!?

Public Comment #2

I'm sorry that this comment is past the deadline, but I have dealt with health issues recently. My only comment is that there is a belief among many that the pond on top of the knob needs to be drained and filled in as to eliminate that part of the problem going forward in the future. The other parts of this bad problem is something that will require time and deep thought. Thanks

EPA Response to Public Comments #1 and #2

The proposed interim action is a limited scope action that requiring additional groundwater, surface water and background samples be collected to determine the appropriate final remedial action for groundwater and surface water. Pending the outcome of the approximate five-year monitoring period in the proposed interim action, the EPA may determine that additional measures to address surface water in the mine pit pond are necessary.

IROD APPENDIX C
PUBLIC MEETING DOCUMENTATION

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

R4-RSEB

DATE: September 27, 2019

SUBJ: Henry's Knob Proposed Plan Public Meeting Transcription Error

FROM: Jeff Crowley, Remedial Project Manager

TO: Site File

EPA held the public meeting for the Henry's Knob Proposed Plan on August 29, 2019 at the Larne Building in Clover, SC. Representatives from the South Carolina Department of Health and Environmental Control (SCDHEC) were also present.

The EPA Remedial Project Manager (RPM) gave a brief presentation on the history of the site, the cleanup alternatives evaluated, and to begin the solicitation of comments on the proposed remedy. The questions from the public were minimal and focused mainly on a request to resample a private drinking water well. One resident had a question pertaining to possibly sampling his groundwater prior to construction of his home. EPA received additional comments during the public comment period and are being addressed in the Responsiveness Summary of the Interim Record of Decision.

A court reporter from Huseby Global Litigation was hired to produce a transcript of the meeting to act as the record that the meeting was held and to capture any questions or concerns posed by the public. On September 10, 2019 the court reporter alerted EPA (via email) that they were unable to transcribe the meeting due to poor acoustics in the room. It should be noted that the EPA Remedial Project Manager (RPM) asked the court reporter prior to beginning the presentation if he was ready and if he needed to move closer. The reporter stated that everything was ready to go and to proceed.

Attached to this memo are the slides from the meeting that the RPM used to brief the public, the fact sheet that was used to announce the meeting, and a copy of the public notice that was published in the Herald newspaper on August 22,2019 announcing the public meeting and comment period.

Attachments:

1. Henry's Knob Proposed Plan presentation slides
2. Henry's Knob Proposed Plan Public Meeting Announcement
3. Herald Newspaper Announcement of Meeting, August 22, 2019
4. Email Correspondence from Huseby to EPA CIC regarding transcription error, September 10, 2019

HENRY'S KNOB PROPOSED PLAN

August 29, 2019
The Larne Building
Clover, South Carolina
Jeff Crowley, USEPA

MEETING AGENDA

- Brief Site History
- Summary of Remedial Investigation Activities and Feasibility Study
- Groundwater Discussion
- Presentation of the Proposed Remedy
- Next Steps and Timeline
- Question and Answer

SITE BACKGROUND

- Former open-pit mine that operated from 1947 – 1970 for the extraction of kyanite which is used in high-alumina brick and other high-temperature refractory materials.
- The site is approximately 185-acres in size and contains the remnants of the open pit mine, the infiltration beds (tailings ponds) and spoils piles.
- Current Owner and Responsible Party is ABB, Inc.
- In 2004 ABB and EPA entered into an Administrative Order to conduct a Remedial Investigation (RI) / Feasibility Study (FS).
- In 2011 ABB completed and EPA/SCDHEC conditionally approved the RI.
- In 2013, a NTCRA was approved to install individual wellhead treatment systems at impacted residences
- In August 2019, ABB completed and EPA/SCDHEC conditionally approved the FS.

AREAS OF CONCERN

AOC 1 – West Tailings Ponds

AOC 2 – North Tailings Ponds

AOC 3 – Former Mill Operations Buildings

AOC 4 – Mine Pit Pond

AOC 5 – East Tailings Ponds

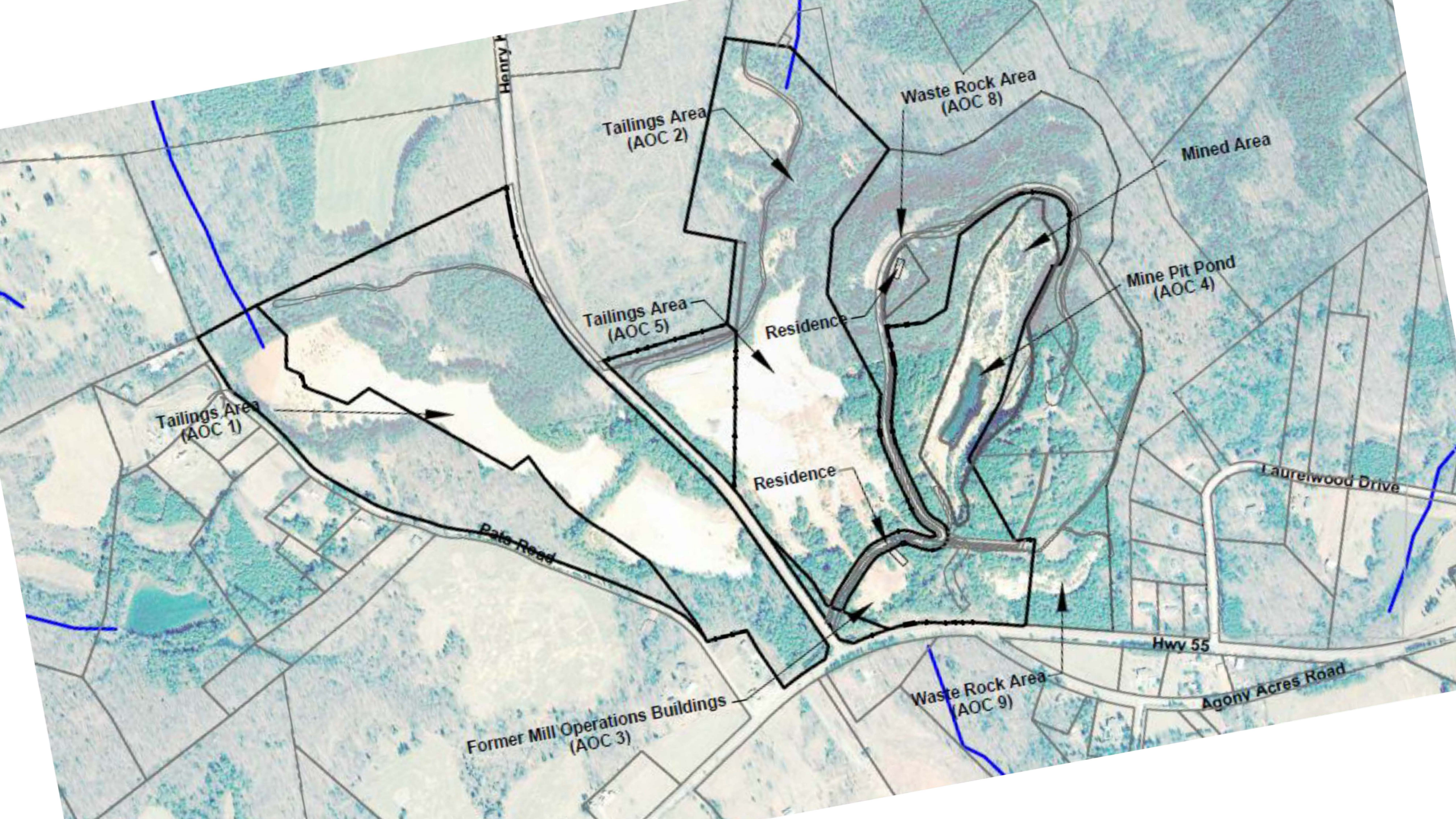
AOC 6 – South Fork of Crowders Creek

AOC 7 – Random Dumping Areas

AOC 8 – Waste Rock Area (North Side)

AOC 9 – Waste Rock Area (South Side)

AOC 10 – Site Groundwater


Tailings Area
(AOC 2)
Waste Rock Area
(AOC 8)
Mined Area
Mine Pit Pond
(AOC 4)
Tailings Area
(AOC 5)
Residence
Tailings Area
(AOC 1)
Residence
Laurelwood Drive
Pate Road
Hwy 55
Waste Rock Area
(AOC 9)
Agony Acres Road
Former Mill Operations Buildings
(AOC 3)

NATURE AND EXTENT OF CONTAMINATION

- Acid Mine Drainage (AMD) is the primary environmental impact at the Site.
  - Acid Mine Drainage (AMD) is created by the weathering of naturally occurring iron sulfide minerals in the waste rock and tailings areas.
  - AMD has created an acidic condition (pH 2.5-4.5) that has caused naturally occurring inorganic constituents to leach from soil to groundwater, and to migrate with the groundwater flow.
  - AMD also impacts the surface water bodies by overland flow and subsequent discharge of AMD impacted groundwater to surface water.
- Acid Rock Drainage (ARD) resulting from natural oxidation of pyrite from in-place bedrock is also impacting the groundwater and surface water.

NON TIME CRITICAL REMOVAL ACTION

- Under the NTCRA, landowners with dwellings located within the mine impacted GW area were offered a wellhead treatment system (WTS).
- To date, 18 residences have an operating WTS, specifically designed based on sampling results.
- ABB maintains those WTS where contamination is above Remedial Goals (currently 3 systems) and the residences maintain those systems below Remedial Goals.
  - Two residences accept bottled water in lieu of the system.

ABB and DHEC continue to sample wells at homes near the Site:

- Within 1 mi, ABB will sample
- Greater than 1 mi, DHEC will sample

ABB continues to conduct quarterly groundwater sampling at both residential and monitoring well locations

INTERIM MEASURES

These were actions that occurred beginning in 2015 and ended in 2018.

These were taken to remediate the tailings impact on AMD and to prevent further migration of the tailings at the Site.

Activities involved revegetation of tailings ponds, repairing tailings pond dams and surface water flow management through the former ponds.

Actions took place at AOC 1, 2, 3 and 5.

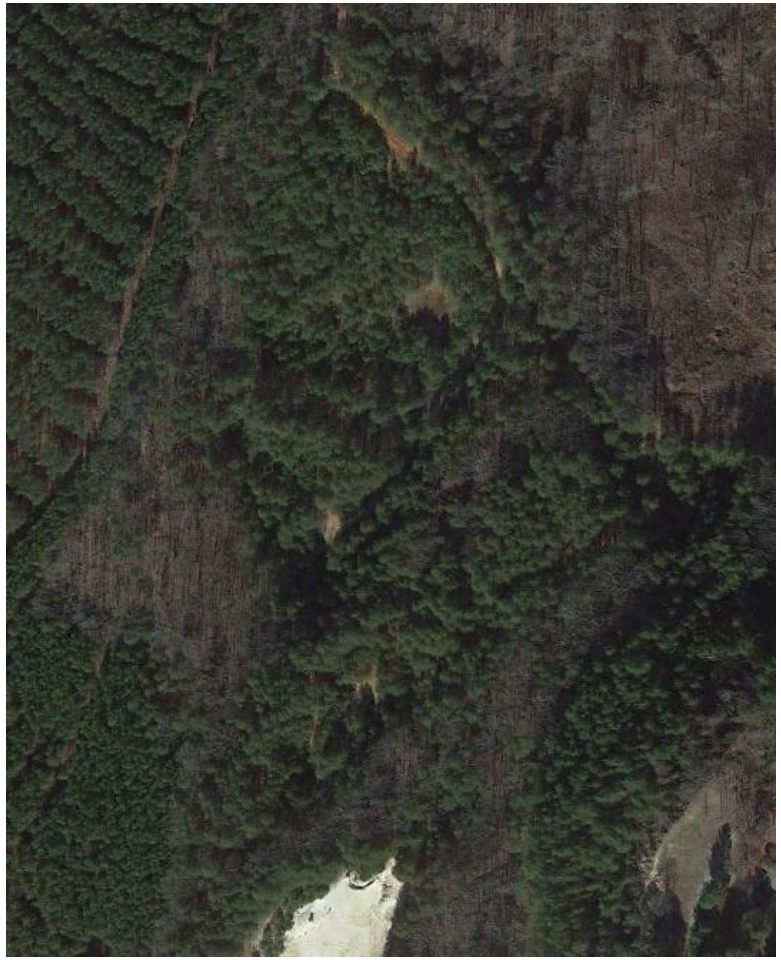
AOC 3 BEFORE

AOC 3 AFTER

AOC 1 BEFORE

AOC 1 AFTER

AOC 2 BEFORE AND AFTER



AOC 5 BEFORE AND AFTER

REMEDIAL ACTION OBJECTIVES

- Prevent potable use of groundwater that contains concentrations of metals that pose potential non-cancer risk to human health.
- Ensure the integrity of previously implemented interim actions so the engineering controls function as intended to mitigate leaching to groundwater and to prevent uncontrolled access.
- Protect downgradient surface water resources by reducing contaminant concentrations in overburden groundwater so that discharges to surface water are protective of aquatic life.

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REMEDIAL ALTERNATIVES CONSIDERED

Groundwater (GW)

GW-1: No Action

GW-2: MNA, Institutional Controls and Monitoring

GW-3: Permeable Reactive Barrier (PRB) Installation

GW-4: Groundwater Extraction and Treatment

Tailings/Mine Pit (T/MP)

T/MP-1: No Action

T/MP-2: Institutional Controls, Maintenance and Monitoring

MORE ON THE GROUNDWATER

EPA has determined that more information is needed on the effects of the interim source control measures in the groundwater contamination in the bedrock groundwater zone as well as naturally occuring metals in the groundwater in order to select a final remedy at the Site.

Additionally, further evaluation of the effectiveness of natural attenuation processes on reducing contaminant concentrations in the overburden groundwater zone is needed before it can select MNA as a final remedy.

Thus, EPA has selected none of the groundwater alternatives in the FS can be selected at this time.

EPA'S PROPOSED PLAN

Groundwater - Institutional Controls, Maintenance and Monitoring

- Will address the RAO to prevent exposure to, and potable use of GW that contains concentrations of metals by implementing ICs until a final GW remedy is selected.
- Allows for continued evaluation of the GW quality and evaluation of potential final remedial actions.

Source Areas - T/MP-2 Institutional Controls, Maintenance and Monitoring

- This was retained from the FS.
- Takes into consideration the substantial remediation work that was done at the Site.

WRAPPING IT ALL UP

The substantial amount of Interim actions that were taken at the 4 listed AOCs and the mine pit will be protected through Institutional Controls.

The Preferred Alternative will be documented in the Interim Record of Decision and will protective in the short-term while EPA continues to develop a final remedy.

Once Comments are received, EPA gives consideration to the comments and then selects the remedy that will be documented in the Record of Decision

This alternative will then be implemented through an EPA approved Remedial Design and Remedial Action.

WHAT'S NEXT?

30-Day Public Comment Period on the Proposed Plan

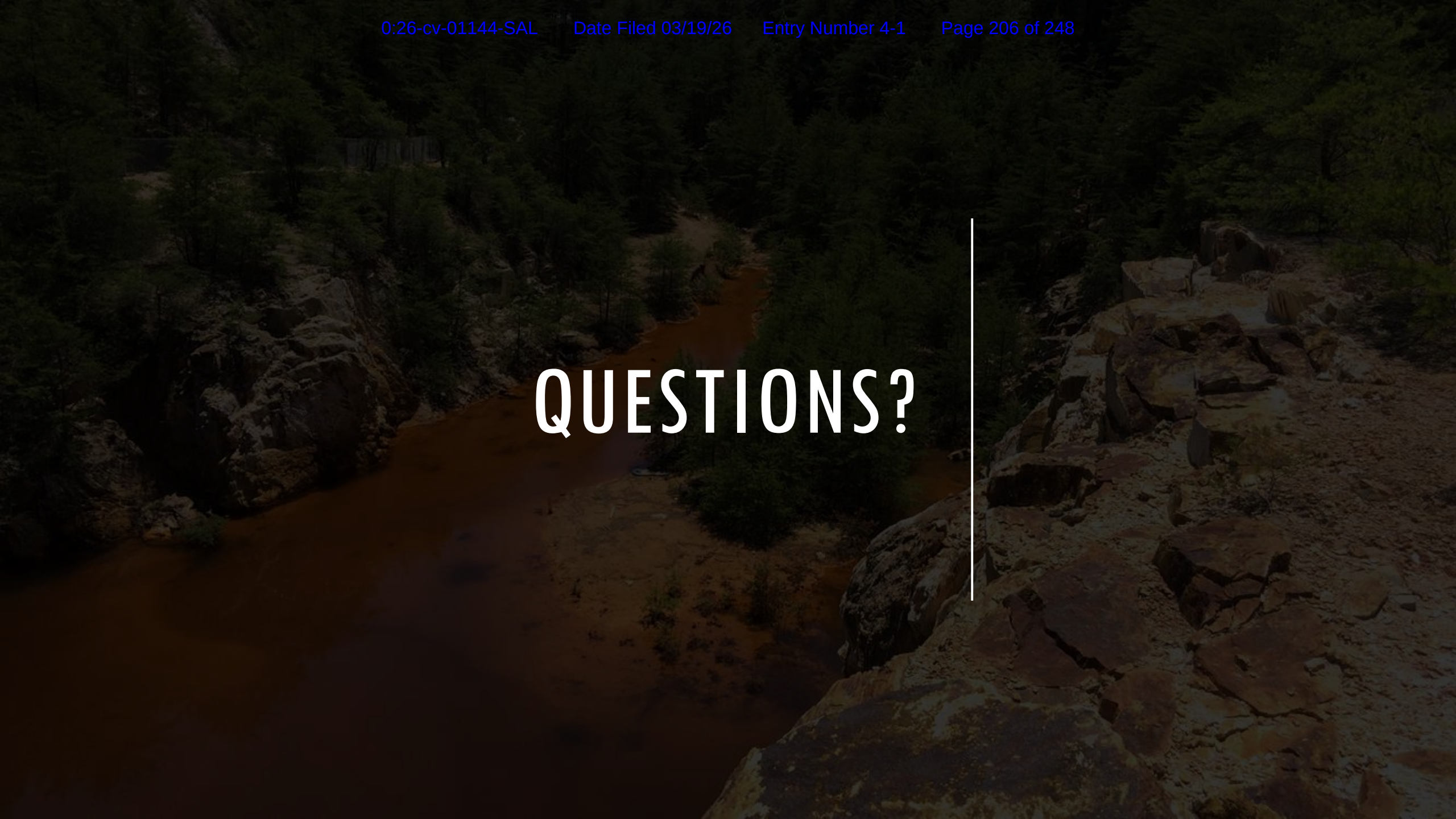
- Comment Period ends September 21, 2019
- Email: Crowley.Jeffery@epa.gov
- By Mail: Jeff Crowley
  RSEB, 11th Floor
  USEPA Region 4
  Atlanta, GA 30303

WHAT'S NEXT (CONT.)?

IROD Signature – September 2019

Remedial Design - 1Q of 2020

Remedial Action – 1Q of 2021


QUESTIONS?

The U.S. Environmental Protection Agency, Region 4 Announces a Proposed Plan Public Meeting for the Henry's Knob Former Mine Site, Clover, York County, South Carolina

The United States Environmental Protection Agency will hold a public meeting on the Proposed Plan and preferred alternative for addressing contaminated groundwater at the Henry's Knob Former Mine Superfund Site located in Clover, South Carolina. **A formal presentation and public meeting will begin at 6:00 p.m. on Thursday, August 29, 2019. The meeting will be held at the Larne Building located at 103 Main Street, Clover, South Carolina.**

EPA is conducting a 30-day public comment period from August 23, 2019 to September 21, 2019, to seek public input on the proposed actions. During the comment period, the public is encouraged to review and offer comments related to the proposed plan. Comments will also be received during the public meeting scheduled for **August 29, 2019**.

Written comments should be submitted by **September 21, 2019** to Jeffery Crowley, EPA Remedial Project Manager, US-EPA Region 4, Superfund Division, 61 Forsyth Street, SW, Atlanta, Georgia 30303, or via email crowley.jeffery@epa.gov

For further information please contact Kerisa Coleman, EPA Community Involvement Coordinator toll free (877) 718-3752, directly (404) 562-8831 or via email coleman.kerisa@epa.gov

PGA chief glad to play match with Trump

BY DOUG FERGUSON
Associated Press

ATLANTA

PGA Tour Commissioner Jay Monahan didn't think twice when President Donald Trump invited him to play golf last Saturday.

It was the second time they played since Trump has been in office.

"I'm concerned about criticism for everything that I do," Monahan said Tuesday. "But in this instance ... listen, like I said, he has been a great supporter of the Presidents Cup. He loves our game. He's got a relationship with a lot of our players. And to me, I'm not there for political reasons. I'm there to support him. He's asked me to be there and be there along with other peers in our industry. It's a chance for us to spend some time together and have a wonderful time."

They played a match at Trump National in Bedminster, New Jersey, where the 2022 PGA Championship will be held.

Monahan said his team of Trump and Augusta National Chairman Fred Ridley beat NBC Sports President Pete Bevacqua, Jay Clayton, chairman of the Securities and Exchange Commission, and Andrew Giuliani, son of former New York Mayor Rudy Giuliani.

"We have great respect for the office of the presidency, and it's an awesome opportunity," Monahan said.

Monahan said Trump wanted to play the championship tee on the 17th hole, which would be used for the PGA Championship. He said it measured 502 yards for a par 4 and Trump reached the front of the green with a driver and a 3-wood.

"He loves the game of golf, and that's very apparent," Monahan said. "As his teammates, that's a little bit of extra pressure. But it was a nice day."

Sabbo the Slovakian: Rory Sabbatini played for South Africa six times, teaming with Trevor Immelman in 2003 to win at Kiawah Island. He also played in the Presidents Cup in 2007, earning a half-point in his four matches at Royal Montreal.

His goal now is to become the first non-American to play in both the Presidents Cup and the Ryder Cup.

SPORTS IN BRIEF

Figure skating coach Callaghan banned by SafeSport

Richard Callaghan, who coached Tara Lipinski to Olympic gold, has been banned from figure skating by the U.S. Center for SafeSport for sexual misconduct.

Callaghan, who also coached six-time U.S. champion Todd Eldredge, was ruled "permanently ineligible" on Wednesday for actions involving a minor. Callaghan was accused by a former student, Adam Schmidt, in a lawsuit. Schmidt alleged Callaghan sexually abused him from 1999 to 2001. Schmidt was 14 in 1999.

Callaghan, 73, was suspended in March 2018 by SafeSport and by the federation. He sued SafeSport, but the lawsuit was dismissed.

Tennis

Osaka, Djokovic No. 1 seeds for US Open: Defending champions Naomi Osaka and Novak Djokovic are the No. 1 singles seeds at the U.S. Open. The draw will be held Thursday and play will begin Monday in New Yor. Serena Williams, who lost to Osaka in last year's final, was given the No. 8 seed by the U.S. Tennis Association. Djokovic is followed by fellow past U.S. Open champions Rafael Nadal and Roger Federer.

● The United States will face Latvia for a place in next year's Fed Cup finals, the first time the "World Cup of Tennis" tournament system will be used. Four nations, including 2019 Fed Cup finalists Australia and France and host nation Hungary, have qualified for the inaugural 12-team final tournament in April 2020.

● Goran Ivanisevic, Sergi Bruguera, Conchita Martinez and Jonas Bjorkman are candidates for International Tennis Hall of Fame's Class of 2020. The former Grand Slam tournament champions are in their second year of a three-year possible candidacy in the player category. The class will be announced during January.

Basketball

Larry Bird mural will be changed: Artist Jules Muck said she'll remove most tattoos from a large painting of former NBA star Larry Bird on an Indianapolis multifamily residence. The tattoos include two rabbits mating on his right arm and a spider web on a shoulder. Muck said she was just trying to be funny. The mural is a replica of Bird's appearance on a 1977 Sports Illustrated cover when he played for Indiana State.

— WIRE SERVICES

NFL IN BRIEF

Mayfield contacts Giants QB after biting remarks

Saying he was taken out of context in an interview four months ago, Browns quarterback Baker Mayfield said Wednesday he reached out to New York Giants rookie QB Daniel Jones after making biting comments about the first-round draft pick from Duke.

On Tuesday, a GQ article on Mayfield was published, quoting Mayfield as saying he was shocked the Giants drafted Jones with the No. 6 pick this year and questioned why the team would take a player without a proven track record of winning.

Mayfield acknowledged he told GQ he was stunned by the choice of Jones but that he didn't mean any disrespect toward Jones.

Notable

Jets: The NFL announced linebacker Brandon Copeland will be suspended for the first four games of the regular season for violating the league's policy on performance-enhancing substances. In a post on Instagram, Copeland said he used a supplement that he believed adhered to NFL rules.

Browns: Cleveland signed WR Braxton Miller, a former star QB at Ohio State. He joins a deep receiving corps, but could separate himself because of his experience – he played 21 games for Houston – and as a potential kick returner.

— WIRE SERVICES

COLLEGE FOOTBALL

SCHEDULE

AP Top 25

Yesterday's Game
No. 8 Florida vs. Miami at Orlando, Fla., 7 p.m.

Thursday, Aug. 29
No. 1 Clemson vs. Georgia Tech, 8 p.m.
No. 12 Texas A&M vs. Texas State, 8:30 p.m.

Friday, Aug. 30
No. 14 Utah at BYU, 10:15 p.m.
No. 17 UCF vs. Florida A&M, 7:30 p.m.

Friday, Aug. 30
No. 18 Michigan State vs. Tulsa, 7 p.m.
No. 19 Wisconsin at South Florida, 7 p.m.

Saturday, Aug. 31
No. 2 Alabama vs. Duke at Atlanta, 3:12 p.m.
No. 3 Georgia at Vanderbilt, 7:30 p.m.
No. 5 Ohio State vs. TAU, Noon
No. 6 LSU vs. Ga. Southern, 7:32 p.m.
No. 7 Michigan vs. Middle Tennessee, 7:30 p.m.
No. 10 Texas vs. Louisiana Tech, 8 p.m.
No. 11 Oregon vs. No. 16 Auburn at Arlington, Texas, 7:30 p.m.
No. 13 Washington vs. Eastern Washington, 3 p.m.
No. 15 Penn State vs. Idaho, 3:30 p.m.
No. 20 Iowa vs. Miami (Ohio), 7:30 p.m.
No. 21 Iowa State vs. Northern Iowa, Noon
No. 23 Syracuse at Liberty, 8 p.m.
No. 23 Washington State vs. New Mexico State, 10 p.m.
No. 24 Nebraska vs. South Alabama, Noon
No. 25 Stanford vs. Northwestern, 4 p.m.

Monday, Sept. 2
No. 4 Oklahoma vs. Houston, 7:30 p.m.

Monday, Sept. 2
No. 9 Notre Dame at Louisville, 8 p.m.

NFL PRESEASON

AMERICAN CONFERENCE

East	W	L	T	Pct	PF	PA
New England	3	0	0	1.000	53	22
Buffalo	2	1	0	1.000	51	32
Miami	1	1	0	.500	48	43
N.Y. Jets	1	1	0	.500	44	41
South	W	L	T	Pct	PF	PA
Tennessee	1	1	0	.500	44	32
Houston	1	1	0	.500	54	51
Jacksonville	0	2	0	.000	18	53
Indianapolis	0	2	0	.000	34	45
North	W	L	T	Pct	PF	PA
Pittsburgh	2	1	0	1.000	67	35
Baltimore	2	1	0	1.000	55	13
Cleveland	2	0	0	1.000	51	29
Cincinnati	1	1	0	.500	40	51
West	W	L	T	Pct	PF	PA
Oakland	3	0	0	1.000	47	29
Kansas City	1	1	0	.500	45	34
Denver	1	2	0	.333	43	58
L.A. Chargers	0	2	0	.000	38	38

NATIONAL CONFERENCE

East	W	L	T	Pct	PF	PA
N.Y. Giants	2	0	0	1.000	63	35
Dallas	1	1	0	.500	33	37
Philadelphia	1	1	0	.500	34	57
Washington	0	2	0	.000	33	43
South	W	L	T	Pct	PF	PA
Carolina	1	1	0	.500	37	42
Tampa Bay	1	1	0	.500	44	44
New Orleans	1	1	0	.500	44	51
Atlanta	0	3	0	.000	67	72
North	W	L	T	Pct	PF	PA
Minnesota	3	0	0	1.000	59	44
Green Bay	1	1	0	.500	41	52
Chicago	0	2	0	.000	26	55
Detroit	0	2	0	.000	26	41
West	W	L	T	Pct	PF	PA
San Francisco	3	0	0	1.000	41	24
Seattle	1	1	0	.500	41	33
Arizona	1	1	0	.500	43	46
L.A. Rams	0	2	0	.000	13	71

Thursday's games
N.Y. Giants at Cincinnati, 7 p.m.
Carolina at New England, 7:30 p.m.
Washington at Atlanta, 7:30 p.m.
Baltimore at Philadelphia, 7:30 p.m.
G. Bay at Oakland at Winnipeg, 8 p.m.
Jacksonville at Miami, 8 p.m.
Friday's games
Cleveland at Tampa Bay, 7:30 p.m.
Buffalo at Detroit, 8 p.m.
Saturday's games
Arizona at Minnesota, 1 p.m.
Houston at Dallas, 7 p.m.
Chicago at Indianapolis, 7 p.m.
New Orleans at N.Y. Jets, 7:30 p.m.
San Francisco at Kansas City, 8 p.m.
Denver at L.A. Rams, 9 p.m.
Tennessee at L.A. Chargers, 10 p.m.
Sunday's game
Pittsburgh at Tennessee, 8 p.m.

FROM PAGE 1B

MOMENTUM

from them in everything they do."

Pittman said he expects the offensive line to be solid. Carson Murray, Tanner Galbreath, and Tyreek Banks are expected to be the leaders up front. Anthony Arnette and Robbie Ouzts are working to fill the voids left in the backfield. Cam Walker and Elliel Cuesta are leading the young receiving corp.

The defensive line used an eight man rotation last year, and four are back. Riley Hindman, Thomas Rainey, Hakeem Jackson, and D'Reece McMullen are very capable on the defensive front. The linebackers are experienced with Alex English and Jeffrey Patterson leading the group. The secondary is especially strong. Pittman said he is counting on Anthony Jackson and Tylik Edwards to have solid seasons.

Robbie Ouzts and Ethan Dutton will handle all of the kicking duties.

Pittman said he is pleased with what he has seen thus far.

"If we continue to make progress, then we will enjoy a good season," Pittman said. "If not, then we will not achieve our goals.

"Our non-region schedule is challenging. We need that challenge to get ready for the tough region schedule."

Pittman said he knows people want the football program to continue improving. For that reason he puts a lot of pressure on himself.

"I am a Rock Hill High School graduate," said Pittman, who was the quarterback for the 'Cats in his playing days. "I want the football program to be good. I also want every program in academics and athletics at Rock Hill High School to be excellent."

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Commercial Real Estate for Rent/Lease

From: Coleman, Kerisa
To: Crowley, Jeffery
Cc: Moore, Abena; McCullough, Rachel; Sheesley, John
Subject: FW: Job 257799 8/29 Public Meeting
Date: Wednesday, September 25, 2019 9:37:01 AM
Attachments: ATT00001.txt
image002.png
image003.png
image004.png
image005.png
image006.png
image007.png
image008.png
image009.png

Hi Jeff-

The email below provides Huseby's reasons for their inability to transcribe the Henry's Knob Proposed Plan Public Meeting. I will forward correspondence detailing scheduling shortly.

Thanks,

Kerisa Coleman
Community Involvement Coordinator
Region 4, U.S. EPA
61 Forsyth St, SW
Atlanta, GA 30303
(404) 562-8831 (office)
(404) 991-0476 (mobile)
coleman.kerisa@epa.gov

From: support <support@huseby.com>
Sent: Tuesday, September 10, 2019 11:48 AM
To: Coleman, Kerisa <Coleman.Kerisa@epa.gov>
Subject: Job 257799 8/29 Public Meeting

Hi Kerisa,
The court reporter brought it to our attention that the meeting we covered on 8/29 in Clover, SC is not going to be able to be transcribed. Due to the poor acoustics in the room, the reporter was unable to get a recording that can be understood and he depends on the recording in order to complete the transcription. He has several back-up recordings, none of which are intelligible. We tried applying filters to try to help clean it up to no avail. I apologize for this situation. You will not be billed for anything.

Thank you,

Jeff Sanders
Client/Reporter Support Manager
Huseby Global Litigation
(800) 333-2082, ext. 6001

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APPENDIX B

Explanation of Significant Differences
Henry's Knob Superfund Site
Clover, York County, South Carolina

Site Name:	Henry's Knob Superfund Site
CERCLA ID#:	SCN000407376
Site Location:	Clover, York County, South Carolina
Lead Agency:	EPA, Region 4
Support Agency:	South Carolina Department of Health and Environmental Control (SCDHEC)

I. Introduction

This decision document presents an Explanation of Significant Differences (ESD) for the selected remedy at the Henry's Knob Superfund Site (the "Site"). The Site is located near the intersection of Henry Knob Road and State Highway 55, in Clover, York County, South Carolina. The EPA, with the concurrence of the South Carolina Department of Health and Environmental Control (SCDHEC), signed the Interim Record of Decision (IROD) on September 30, 2019.

This ESD is issued in accordance with Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. § 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR § 300.435(c)(2)(i). The Director of the Superfund & Emergency Management Division has delegated authority to sign this ESD pursuant to the EPA Delegation of Authority 14-2.

This ESD will become part of the Administrative Record for the Site as required by the National Contingency Plan (NCP), 40 CFR § 300.825(a)(2), which has been developed in accordance with Section 113 (k) of CERCLA, 42 U.S.C. § 9613 (k).

The Administrative Record is available for review at the Clover Public Library, located at 107 Knox Street, Clover, South Carolina 29710 and on the U.S. EPA Region 4 Henry's Knob Superfund website at https://www.epa.gov/superfund/henrys-knob.

II. Statement of Purpose

The purpose of this ESD is to expand the groundwater monitoring well system portion of the remedy for the Site by providing for the construction of additional groundwater monitoring wells. The other portions of the remedy in the IROD — the Institutional Controls, maintenance, and monitoring for the source areas — are not changed by this ESD. The EPA prepares an ESD when the Agency determines that changes to the originally selected remedy in the IROD are significant but do not fundamentally alter the remedy selected in the IROD with respect to scope, performance, or cost.

III. Site History and Contamination

The Site is located on Henry's Knob, a mountain in Clover, York County, South Carolina, and consists of approximately 185 acres of land north of Highway 55 and on either side of Henry's Knob Road. East of Henry's Knob Road, the Site contains the remnants of an open pit mine, infiltration beds or settling ponds (tailings impoundments) and spoil piles. Tailings impoundments are located on the west side of Henry's Knob Road.

From 1947 to 1970, the on-site open pit mine was operated by Commercialores, Inc. to extract kyanite, an aluminum silicon oxide, used to the manufacture high-alumina brick and other high-temperature, refractory materials. Mine tailings from the mining operation are present at several large areas and consist of fine-grained mineral sediment located downslope of the former mineral processing facilities. When the kyanite mining operations ceased in 1970, the seven-acre open pit mine collected precipitation, creating a one-acre acidic pond. The remnants of ore processing facilities, such as building and storage foundations, remain at the Site.

Asea Brown Boveri, Inc. (ABB) is the current owner of most of the Site and is successor-in-interest to Commercialores. ABB purchased Site property from private landowners over a five-year period from 2010 to 2015. A private landowner still owns the top of Henry's Knob, the access road extending down toward Henry Knob Road, and land extending down toward Highway 55.

The Site is currently being managed under the Superfund Alternative Approach (SAA) and is not on the National Priorities List. On September 24, 2004, EPA Region 4 and ABB executed an Administrative Order on Consent (Consent Order) that required ABB to conduct a Remedial Investigation/Feasibility Study (RI/FS) at the Site. The primary environmental impacts attributed to the Site have been identified to be from acid mine drainage (AMD), resulting from the interaction of mine waste materials with precipitation and the subsequent leaching of metals and inorganic constituents to groundwater and stormwater run-off. AMD also impacts surface water via overland flow and the infiltration of precipitation through mine wastes and the subsequent migration and discharge of AMD-impacted groundwater to surface water. AMD-impacts to groundwater and surface water were delineated in the RI. In addition to AMD, the groundwater and surface water in the vicinity of the Site are impacted by naturally occurring acid rock drainage resulting from the pyrite's natural oxidation from in-place bedrock.

In 2012, ABB conducted an Engineering Evaluation/Cost Analysis (EE/CA) to evaluate removal action alternatives to mitigate potential human health risks associated with the potable use of groundwater in the vicinity of the Site. Based on the recommendations of the EE/CA, the EPA issued an Action

Memorandum in September 2012. The EPA selected a Non-Time Critical Removal Action (NTCRA), proposing that the Town of Clover extend the public water supply line to the Henry's Knob area. In April 2013, the Town of Clover notified the EPA that they did not support the water line extension option due to economics and the low number of homes to service. Public response, similarly, was not favorable.

In October 2013, the EPA issued a revised plan (Action Memorandum - Change in Scope) to the NTCRA to install wellhead treatment systems on individual drinking water wells. The treatment systems neutralize and softens the water pumped from residential wells. Treatment systems were offered to 30 homes located up to 250 feet beyond the area of potentially impacted groundwater. To date, ABB has installed 19 treatment systems on residential wells as part of the NTCRA. There are two other systems installed by residents, bringing the total to 21 wells being treated. ABB has extended offers to other residents within the affected area to install wellhead treatment systems. As required in the Action Memorandum, ABB performs ongoing operation and maintenance at the residences where untreated groundwater exceeds protective, human health risk-based drinking water levels for cobalt and manganese, the primary contaminants of concern at the Site.

In March 2015, ABB prepared a Final Groundwater Monitoring Plan (Final Groundwater Monitoring Plan) as part of the NTCRA. Under this plan, samples were collected from a series of monitoring wells, residential wells, and surface water locations and will continue to be collected under the IROD, as described below in Section IV (Selected Remedy). The objective of the Final Groundwater Monitoring Plan is to monitor groundwater plume stability, monitor surface water for constituents of concern, and monitor the effectiveness of the wellhead treatment systems installed in the impacted area. The Final Groundwater Monitoring Plan includes a list of the proposed sampling locations.

In 2015, ABB began remediation stabilization work in the tailings areas with EPA oversight pursuant to the September 2004 Consent Order. Four major portions of the Site that are the primary sources of contamination have been stabilized to date. These include Areas of Concern (AOCs) 1) West Tailings Ponds, 2) North Tailings Ponds, 3) Former Mill Operations Buildings, and 5) East Tailings Ponds. The designs for the interim actions completed at AOCs 1, 2, 3, and 5 are shown on Figure 3 of the IROD. These interim source control actions were designed and constructed to:

(1) increase pH of the shallow tailings to foster revegetation;

(2) reduce the amount of water infiltration and percolation through tailings;

(3) mitigate tailings erosion; and

(4) mitigate the tailings as an AMD source to groundwater and surface water.

The interim actions included the installation of stormwater drainage controls, rehabilitation of tailings dams, consolidation of tailings, and construction of vegetative covers. Fencing was also installed to restrict access to the Mine Pit Pond. The completed interim actions were documented in the Construction Completion Report and Post Completion Monitoring/Inspection Schedule.

IV. Selected Remedy

The selected remedy in the September 2019 IROD for groundwater includes Institutional Controls (ICs) and monitoring components from the alternatives evaluated in the FS. The selected remedy for the source areas includes ICs, maintenance, and monitoring. Interim groundwater ICs, including informational devices or enforcement tools, will be implemented to mitigate human exposure to untreated, contaminated Site groundwater in the short term until a final remedy is selected. The need for more permanent ICs such as restrictive covenants for affected residential parcels will also be evaluated as part of the final remedial action at this Site.

Groundwater will be monitored according to the Final Groundwater Monitoring Plan to evaluate the effectiveness of natural attenuation processes on reducing concentrations of contaminants within the overburden groundwater and to monitor contamination within the bedrock groundwater zone and surface water. Groundwater will be monitored for metals, chloride, sulfate, and alkalinity. Groundwater will also be analyzed in the field for water quality parameters including hydrogen ion concentration (pH), temperature, specific conductance, dissolved oxygen (DO), oxidation reduction potential (ORP) and turbidity.

ICs for the source areas include: proprietary controls to prevent disturbance of the previously implemented source controls (i.e., vegetative cover systems, stormwater channel controls, and dam stabilization and rip rap armoring); access controls (i.e., fencing around mine pit/pond); and monitoring and maintenance of the mine pit fencing, tailings areas vegetative cover systems, the engineered drainage channels in AOCs 1, 2, 3, and 5 previously installed as interim actions, and the tailings dams. This remedy will provide protection to the environment by ensuring the continued integrity and functioning of the completed source control actions, which reduce the infiltration of surface water into tailings and reduces the generation of acid mine drainage. Monitoring and maintenance of the dams would result in long-term stability of the structures.

Remedy Cost Estimate Summary

	ESTIMATED COSTS FOR SELECTED REMEDY			
Activity	**GW-2 (ICs, & Monitoring)**	**T/MP-2 (ICs, Maintenance & Monitoring)**	**ESD Costs (Additional Wells GW-2)**	**Total Cost**
Estimated Capital Cost	$5,000	$5,000	$10,000	$20,000
Total Periodic Cost 5 years	$488,000	$524,000	$5,000	$1,017,000
Total O&M Cost 5 years	$110,000	$245,000	$5,000	$360,000
Total Cost	$603,000	$774,000	$20,000	$1,397,000
Net Present Value	$499,776	$634,942	$18,200	$1,152,918
	Costs from 2019 IROD			

V. Description of Significant Differences and Basis for the ESD

The purpose of this ESD is to expand the groundwater monitoring well system portion of the remedy for the Site by providing for the construction of additional off-site groundwater monitoring wells. The September 2019 IROD includes continued monitoring of the groundwater in accordance with the Final Groundwater Monitoring Plan. That plan is limited in scope and identifies a network of specific groundwater monitoring wells and surface water sampling locations to be sampled both on and off the Site. Neither the IROD nor the Final Groundwater Monitoring Plan calls for the construction of additional wells. The EPA believes that expanding the groundwater monitoring network with additional permanent monitoring wells constructed off-site will provide additional data necessary to properly implement and evaluate the effectiveness of the selected remedy for the Site.

The contaminants of concern to be tested for using the expanded well network remain unchanged from those identified in the IROD, namely aluminum, manganese, cobalt, copper, and other metals. Groundwater will also be monitored for chloride, sulfate, alkalinity, and water quality parameters set forth in the IROD.

An expansion of the current groundwater monitoring network system is needed because implementing and evaluating the selected remedy's effectiveness requires additional data from locations not served by existing monitoring wells. Historically at the Site, background sampling was performed using existing private drinking water wells located off-site and in the general vicinity of the Site. However, collecting groundwater samples from additional locations is needed to identify what unimpacted groundwater conditions (parameters) are, determine whether an upgradient source is impacting the Site, and confirm the Site remedy is performing as intended by preventing off-site migration.

Although the Site's underlying groundwater conditions were exacerbated by the historical mining activities and disposal practices, the same geologic material that produced AMD on-site also exists off-site. As the geology changes with distance from the Site, the groundwater contamination would be expected to decrease. Therefore, the construction of additional monitoring wells off-site would benefit data evaluation at the Site when comparing on-site to off-site groundwater conditions.

The EPA also needs additional data to determine the effectiveness of natural attenuation processes at the Site and to further evaluate the impacts of the mine pit to groundwater surrounding the mine. The expanded monitoring well network system will allow the EPA to better evaluate these criteria by comparing on-Site and off-Site natural attenuation processes and determining if the contamination plume has migrated.

The EPA anticipates that a minimum of four additional wells need to be constructed. While the precise number and location of the additional wells will be determined during the Remedial Design phase, the EPA expects the wells to be located upgradient and downgradient of the Site. The costs for the installation of the groundwater monitoring well is expected to be approximately $10,000 for each well, plus $2,000 per well each year for annual data collection, also known as "monitoring" and operation and maintenance. The time needed to the construct each additional well and conduct the groundwater monitoring is de minimis and will not delay the performance of the remedy because the installation can occur simultaneously as other remedy performance tasks are conducted. The construction, operation, and abandonment of the monitoring wells will be performed in accordance with regulatory requirements

that were identified in the 2019 IROD as "applicable or relevant and appropriate requirements" (ARARs) per CERCLA Section 121(d)(2). No other selected remedies at this Site are being modified by this ESD.

VI. Support Agency Comments

The EPA consulted with SCDHEC and provided the opportunity to comment on this ESD in accordance with NCP, 40 CFR §300.435 (c)(2) and § 300.435 (c)(2)(i) and CERCLA §121(f). SCDHEC concurred with the modified selected remedy described in this ESD in a concurrence letter dated March 12, 2021.

VII. Statutory Determinations

The EPA has determined that the modifications to the 2019 IROD selected remedy described in this ESD will continue to satisfy the statutory requirements of CERCLA § 121, 42 U.S.C. § 9621. These modifications are protective of human health and the environment, will comply with identified ARARs to the remedial actions, are cost-effective, and utilize permanent solutions and alternative treatment technologies to the maximum extent practicable.

Because this modified remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, 40 C.F.R. Section 300.430(f)(4)(ii) requires a review of the remedy(ies) no less often than each five years after the initiation of the remedial action(s) to ensure that the remedies are, or will be, protective of human health and the environment.

VIII. Public Participation

The public participation requirements set out in the NCP, 40 CFR § 300.435(c)(2), have been met by making this ESD and supporting information available to the public in the Administrative Record and by publishing a notice summarizing the ESD in a major local newspaper.

For further information about this ESD, contact:

Jeff Crowley
Remedial Project Manager
U.S. Environmental Protection Agency
61 Forsyth Street, SW
Atlanta, Georgia 30303
Telephone: 404-562-9587
E-mail: Crowley.Jeffery@EPA.gov

Authorizing Signature

I have determined the remedies for the Site, as modified by this ESD, are protective of human health and the environment, and will remain so provided the actions presented in this ESD are implemented as described above.

This ESD documents the significant changes related to the remedy at the Site. The EPA selected these changes with the concurrence of SCDHEC.

By: RANDALL CHAFFINS Digitally signed by RANDALL CHAFFINS Date: 2021.03.30 06:23:32 -04'00'

Randall Chaffins, Acting Director
Superfund & Emergency Management Division

Date: 3/30/21

APPENDIX C

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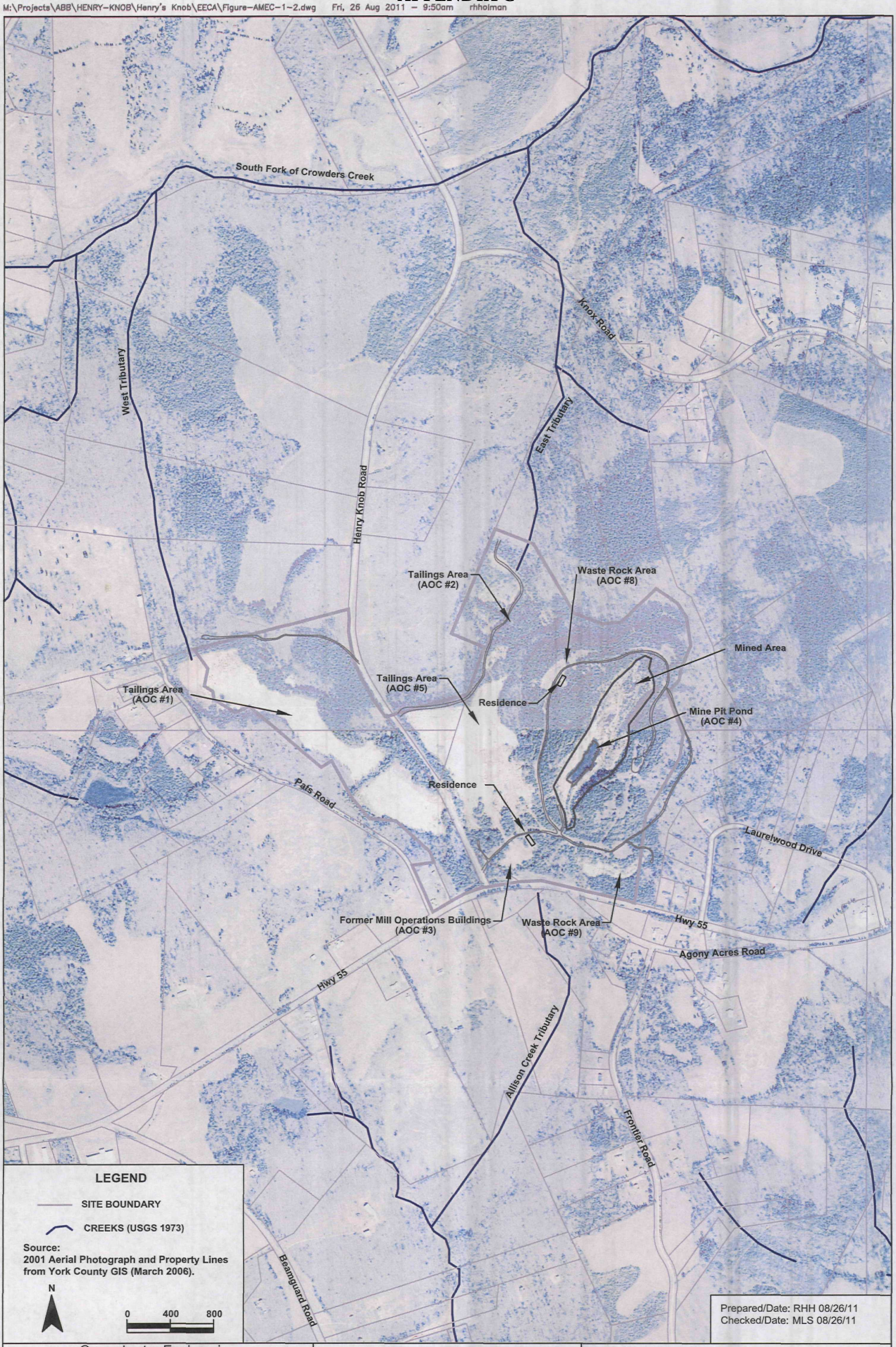

Groundwater Engineering
Evaluation/Cost Analysis
Henry's Knob Former Mine Site
York County, South Carolina

amec

Site and Property Boundary Map
Project 3617-09-7188
Figure 1-2

APPENDIX D

REMEDIAL DESIGN/REMEDIAL ACTION

STATEMENT OF WORK

HENRY'S KNOB SUPERFUND SITE

Clover, York County, State of South Carolina

EPA Region 4

March 2026

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Purpose of SOW. This 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 Defendant's 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 Defendant's reporting obligations.
- Section 7 (Deliverables) describes the contents of the supporting deliverables and the general requirements regarding Settling Defendant's 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 Part 1 of the Interim Record of Decision (IROD) (including Institutional Controls (ICs) and monitoring for the groundwater, and ICs, maintenance and monitoring for the source areas) and Section V of the Explanation of Significant Differences (ESD), as follows:

Groundwater: The selected remedial action is comprised of IC and monitoring components from the groundwater alternatives evaluated in the FS. Interim ICs, including informational devices or enforcement tools to mitigate human exposure to untreated, contaminated Site groundwater in the short term, will be implemented until a final remedy is selected and the need for more permanent ICs including proprietary controls (such as restrictive covenants) for affected residential parcels has been further evaluated. Groundwater will be monitored according to the Final Groundwater Monitoring Plan (prepared by Amec Foster Wheeler Environment & Infrastructure, Inc. for ABB, Inc. and submitted to the EPA on March 27, 2015) to permit further evaluation of the effectiveness of natural attenuation processes on reducing concentrations of contaminants within the overburden groundwater and to monitor the effects of that remediation on contamination within the bedrock groundwater zone as well as impacts on surface water. Groundwater will be monitored for metals, as well as chloride, sulfate, and alkalinity.

Groundwater will also be analyzed in the field for water quality parameters including hydrogen ion concentration (pH), temperature, specific conductance, dissolved oxygen (DO), oxidation reduction potential (ORP), and turbidity. The groundwater well monitoring system will be expanded, as necessary, through construction of additional off-site groundwater monitoring wells.

Source Areas: The selected remedial action for the source areas includes ICs, including proprietary controls, to prevent disturbance of the previously implemented source controls (i.e., vegetative cover systems, stormwater channel controls, and dam stabilization and rip rap armoring), access controls (i.e., fencing around mine pit/pond), and monitoring and maintenance of the mine pit fencing, tailings areas vegetative cover systems, the engineered drainage channels in Areas of Concern (AOCs) 1, 2, 3, and 5 previously installed as interim actions, and the tailings dams. This remedial action will provide protection to the environment by ensuring the continued integrity and functioning of the completed source control actions, which reduce the infiltration of surface water into tailings and reduces the generation of acid mine drainage. Monitoring and maintenance of the dams would result in long-term stability of the structures.

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" 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 Defendant 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")

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. Pursuant to 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, including, if applicable, any Technical Assistance Grant (TAG), any use of the Technical Assistance Services for Communities (TASC) contract, and/or any Technical Assistance Plan (TAP).

(b) **Settling Defendant's CI Coordinator**. At EPA's request, Settling Defendant shall, within 15 days, designate and notify EPA of Settling Defendant's Community Involvement Coordinator (Settling Defendant's CI Coordinator).

Settling Defendant may hire a contractor for this purpose. Settling Defendant's notice must include the name, title, and qualifications of the Settling Defendant's CI Coordinator. Settling Defendant's 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 Defendant's CI Coordinator has the responsibility to ensure that when they communicate with the public, the Settling Defendant protects any "Personally Identifiable Information" ("PII") (*e.g.,* sample results from residential properties) in accordance with "EPA Policy 2151.0: Privacy Policy."

(c) At EPA's request, Settling Defendant shall participate in community involvement activities, including participation in (1) the preparation of information regarding the Work for dissemination to the public, with consideration given to including mass media and/or Internet notification, and (2) public meetings that may be held or sponsored by EPA to explain activities at or relating to the Site. Settling Defendant's 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 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 Defendant's responsibilities for community involvement activities. All community involvement activities conducted by Settling Defendant at EPA's request are subject to EPA's oversight. Upon EPA's request, Settling Defendant shall establish a community information repository at or near the Site to house one copy of the administrative record.

(d) **Information for the Community**. At EPA's request, Settling Defendant 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 Impacts Mitigation Plan under ¶ 7.7(e); (2) a copy of the Community Impacts Mitigation Plan required under ¶ 7.7(e); (3) schedules prepared under Section 8; (4) dates that Settling Defendant completed each task listed in the schedules; and (5) 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.

2.3 Settling Defendant's Responsibilities for Technical Assistance

(a) At EPA's request, Settling Defendant 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 Defendant. Settling Defendant's 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 ¶ 5.8. Settling Defendant shall implement this requirement under a Technical Assistance Plan ("TAP").

(b) At EPA's request, Settling Defendant 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 Defendant shall cooperate with EPA in encouraging the groups to submit a single, joint application for a TAP.

(c) At EPA's request, Settling Defendant shall, within 30 days, submit a proposed TAP for EPA approval. The TAP must describe the Settling Defendant's plans for the qualified community group to receive independent technical assistance. The TAP must include the following elements:

(1) For Settling Defendant to arrange for publication of a notice in local media that it has 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 Defendant 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 or businesses 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 Defendant to notify EPA of 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 Defendant 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 Defendant to document its evaluation of, and its selection of, a qualified community group, and to brief EPA regarding its evaluation process and choice. EPA may review Settling Defendant's 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 Defendant to notify all applicant(s) about Settling Defendant's decision;

(7) For Settling Defendant to designate a person (TAP Coordinator) to be its primary contact with the selected community group;

(8) A description of Settling Defendant's plans to implement the requirements of ¶ 2.3(d) (Agreement with Selected Community Group); and

(9) For Settling Defendant to submit quarterly progress reports regarding the implementation of the TAP.

(d) Agreement with Selected Community Group

(1) Settling Defendant shall negotiate an agreement with the selected community group that specifies the duties of Settling Defendant 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 Defendant's 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, 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 Interim Record of Decision;

(iv) EPA issues another Interim Record of Decision or Final Record of Decision;

(v) The public health assessment (or related activities) for the Site indicates the need for further health investigations and/or health-related activities;

(vi) After Settling Defendant's selection of the Community Group for the TAP, EPA designates additional operable units at the Site;

(vii) EPA issues an Explanation of Significant Differences for the Interim Record of Decision;

(viii) After Settling Defendant's selection of the Community Group, a legislative or regulatory change results in significant new Site information;

(ix) 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.;

(x) Any other factor that, in EPA's judgment, indicates that the Site is unusually complex; or

(xi) A RI/FS costing at least $2 million was performed at the Site.

(4) Settling Defendant is entitled to retain any unobligated TAP funds upon EPA's Certification of Work Completion under ¶ 5.8.

(5) Settling Defendant shall submit a draft of the proposed agreement to EPA for its comments.

3. COORDINATION AND SUPERVISION

3.1 Project Coordinators

(a) Settling Defendant's Project Coordinator must have sufficient technical expertise to coordinate the Work. Settling Defendant's Project Coordinator may not be an attorney representing Settling Defendant in this matter and may not act as the Supervising Contractor. Settling Defendant's Project Coordinator may assign other representatives, including other contractors, to assist in coordinating the Work.

(b) EPA shall designate and notify the Settling Defendant of EPA's Project Coordinator and Alternate Project Coordinator. 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 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) Settling Defendant's Project Coordinator shall communicate with EPA's Project Coordinator at least quarterly.

3.2 Supervising Contractor. Settling Defendant's 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 Defendant shall designate, and notify EPA, within 10 days after the Effective Date, of the name, title, contact information, and qualifications of the Settling Defendant's 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 who shall 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 Defendant 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 Defendant may select any coordinator/contractor covered by an authorization to proceed and shall, within 21 days, notify EPA of Settling Defendant's 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 Defendant may change its 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") and Pre-Design Investigation ("PDI"). Given the completed interim actions (vegetating tailings ponds, improving tailings dams, re-designing stormwater flows across the Site, and installation of fencing around the mine pit pond) and current Site conditions, separate documents for the RDWP and PDI are not needed for the Remedial Design. The RDWP and PDI shall be combined into a single document and shall be based on existing data acquired during the RI/FS. In connection with performance of the Remedial Design, Settling Defendant shall:

(a) Meet with EPA on-site to discuss locations of new and existing monitoring wells;

(b) Submit a RDWP/PDI for EPA approval that includes:

(1) Documentation of the on-site meeting with EPA;

(2) An evaluation and summary of existing data and description of data gaps;

(3) A summary of potential well locations including photographs; and

(4) Conclusions and recommendations for Remedial Design, including design parameters and criteria;

(5) Descriptions of any applicable permitting requirements and other regulatory requirements; and

(6) Description of plans for obtaining access in connection with the Work, such as property acquisition, property leases, and/or easements.

(c) Supplement the RDWP/PDI and/or perform additional pre-design studies, as directed by EPA.

4.2 Institutional Controls Implementation and Assurance Plan ("ICIAP"). Settling Defendant shall submit a proposed ICIAP for EPA approval. The ICIAP should describe plans to implement, maintain, monitor, and enforce the 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 ¶ 4.5. 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 Defendant 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 Defendant 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 Defendant shall communicate regularly with EPA to discuss design issues as necessary, as directed or determined by EPA.

4.4 Pre-final (90%) Remedial Design. Settling Defendant shall submit the Pre-final (90%) Remedial Design for EPA's comment. 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 or a later edition;

(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 following deliverables:

(1) Operation and Maintenance ("O&M") Plan and O&M Manual; and

(2) 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);

(d) All supporting deliverables described in ¶ 7.7 (Supporting Deliverables): Health and Safety Plan; Emergency Response Plan; Quality Assurance Project Plan; Site Wide Monitoring Plan; Community Impacts Mitigation Plan; Transportation and Off-Site Disposal Plan; O&M Plan; and O&M Manual; and

(e) A specification for photographic documentation of the Remedial Action.

4.5 Final (100%) Remedial Design. If EPA does not approve the Pre-final (90%) Remedial Design without comments, Settling Defendant 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 Defendant shall submit a RAWP for EPA approval that includes:

(a) A proposed Remedial Action Construction Schedule;

(b) An updated Health and Safety Plan that covers activities during the Remedial Action; and

(c) Plans for satisfying permitting requirements, including obtaining permits for off-site activity and for satisfying substantive requirements of permits for on-site activity; and

5.2 Meetings and Inspections

(a) **Preconstruction Conference**. Settling Defendant shall hold a preconstruction conference with EPA and others as directed or approved by EPA. Settling Defendant 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 Defendant shall communicate regularly with EPA, and others as directed or determined by EPA, to discuss construction issues. Settling Defendant shall distribute an agenda and list of attendees to all Parties prior to each meeting or telephone call. Settling Defendant 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 the Work. At EPA's request, the Supervising Contractor or other designee shall accompany EPA or its representative during inspections.

(2) Upon notification by EPA of any deficiencies in the Remedial Action Construction, Settling Defendant 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 Defendant shall comply with any schedule provided by EPA in its notice of deficiency.

5.3 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 Defendant shall submit timely and complete applications and take all other actions necessary to obtain all such permits or approvals.

(b) Settling Defendant 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 ¶ 5.3(a) and required for the Work, provided that it has 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.

5.4 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 Defendant 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 ¶ 5.4(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 Defendant is required to report under CERCLA § 103 or Section 304 of the Emergency Planning and Community Right-to-Know Act ("EPCRA"), Settling Defendant shall immediately notify the authorized EPA officer orally.

(c) The "authorized EPA officer" for purposes of immediate oral notifications and consultations under ¶ 5.4(a) and ¶ 5.4(b) is the EPA Project Coordinator, the EPA Alternate Project Coordinator (if the EPA Project Coordinator is unavailable), or the Manager of the EPA Emergency Response, Removal and Prevention Branch, Region 4 (if neither EPA Project Coordinator is available).

(d) For any event covered by ¶ 5.4(a) and ¶ 5.4(b), Settling Defendant 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 ¶ 5.4 are in addition to the reporting required by CERCLA § 103 or EPCRA § 304.

5.5 Off-Site Shipments

(a) Settling Defendant may ship hazardous substances, pollutants, and contaminants from the Site to an off-Site facility only if it complies with CERCLA § 121(d)(3), and 40 C.F.R. § 300.440. Settling Defendant will be deemed to be in compliance with CERCLA § 121(d)(3) and 40 C.F.R. § 300.440 regarding a shipment if Settling Defendant obtains 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 Defendant may ship Waste Material from the Site to an out-of-state waste management facility only if, prior to any shipment, it provides 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 Defendant 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 Defendant shall provide the notice after the award of the contract for Remedial Action construction and before the Waste Material is shipped.

(c) Settling Defendant may ship Investigation Derived Waste (IDW) from the Site to an off-Site facility only if it complies 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 Interim 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 CFR § 261.4(e) shipped off-site for treatability studies, are not subject to 40 C.F.R. § 300.440.

5.6 Remedial Action Construction Completion

(a) For purposes of this ¶ 5.6, "Remedial Action Construction" comprises, for any Remedial Action that involves the construction and operation of systems to conduct groundwater monitoring or source area maintenance and monitoring, or 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 systems to function properly and as designed.

(b) **Inspection of Constructed Remedial Action**. Settling Defendant shall schedule an inspection to review the construction and operation of the system and to review whether the systems are functioning properly and as designed. The inspection must be attended by Settling Defendant and EPA and/or their representatives. A reinspection must be conducted if requested by EPA.

(c) **Remedial Action Report**. Following the inspection, Settling Defendant 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 Defendant's Project Coordinator that the construction of the system is complete and that the systems are functioning properly and as designed; (2) include a demonstration, and supporting documentation, that construction of the system is complete and that the systems are 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 (June 2022), 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).

(d) If EPA determines that Remedial Action Construction is not complete, EPA shall so notify Settling Defendant. EPA's notice must include a description of, and schedule for, the activities that Settling Defendant must perform to complete Remedial Action Construction. EPA's notice may include a schedule for completion of such activities or may require Settling Defendant to submit a proposed schedule for EPA approval. Settling Defendant shall perform all activities described in the EPA notice in accordance with the schedule.

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

5.7 Certification of Remedial Action Completion

(a) **Remedial Action Completion Inspection**. The Remedial Action is "Complete" for purposes of this ¶ 5.7 when it has been fully performed and Performance Standards have been achieved, and EPA has received sufficient monitoring data to support selection of a final remedy for surface water and groundwater. Settling Defendant shall schedule an inspection for the purpose of obtaining EPA's Certification of Remedial Action Completion. The inspection must be attended by Settling Defendant and EPA and/or their representatives.

(b) **Remedial Action Report**. Following the inspection, Settling Defendant shall submit a Remedial Action 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 Defendant's Project Coordinator that the Remedial Action is complete; (2) include as-built drawings signed and stamped by a registered professional engineer; (3) 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); (4) contain monitoring data that EPA deems sufficient to support the selection of a final remedy for surface water and groundwater, and to demonstrate that Performance Standards have been achieved; and (5) be certified in accordance with ¶ 7.5 (Certification).

(c) If EPA concludes that the Remedial Action is not Complete, EPA shall so notify Settling Defendant. 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 Defendant to submit a schedule for EPA

approval. Settling Defendant shall perform all activities described in the notice in accordance with the schedule.

(d) If EPA concludes, based on the initial or any subsequent Remedial Action Report requesting Certification of Remedial Action Completion, that the Remedial Action is Complete, EPA shall so certify to Settling Defendant. This certification will constitute the Certification of Remedial Action Completion for purposes of the Decree, including Section XIV of the Decree (Covenants by Plaintiff). Certification of Remedial Action Completion will not affect Settling Defendant's remaining obligations under the Decree.

5.8 Certification of Work Completion

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

(b) **Work Completion Report**. Following the inspection, Settling Defendant 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 Defendant's Project Coordinator that the Work, including all O&M activities, is complete; and (2) be certified in accordance with ¶ 7.5 (Certification). If the Remedial Action Report submitted under ¶ 5.7(b) includes all elements required under this ¶ 5.8(b), then the Remedial Action Report suffices to satisfy all requirements under this ¶ 5.8(b).

(c) If EPA concludes that the Work is not complete, EPA shall so notify Settling Defendant. EPA's notice must include a description of the activities that Settling Defendant must perform to complete the Work. EPA's notice must include specifications and a schedule for such activities or must require Settling Defendant to submit specifications and a schedule for EPA approval. Settling Defendant 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 Defendant. 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 VII (Property Requirements), and XVII (Records) of the Decree; (3) Institutional Controls obligations as provided in the ICIAP; and (4) reimbursement of EPA's Future Response Costs under Section X (Payments for Response Costs) of the Decree.

5.9 **Periodic Review Support Plan ("PRSP")**. Settling Defendant shall submit the PRSP for EPA approval. The PRSP addresses the studies and investigations that Settling Defendant 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 Defendant 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.

6. REPORTING

6.1 **Progress Reports**. Commencing with the first month following entry of the Decree and until EPA approves the Remedial Action Construction Completion, Settling Defendant shall submit progress reports to EPA on a quarterly 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 Defendant;

(c) A description of all deliverables that Settling Defendant 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 Defendant has 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 Defendant shall notify EPA of such change at least seven days before performance of the activity.

7. DELIVERABLES

7.1 **Applicability**. Settling Defendant 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 ¶ 76 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 Defendant 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 Defendant shall also provide EPA with paper copies of such exhibits.

7.4 **Technical Specifications**

(a) Sampling, monitoring and environmental data should be submitted in accordance with EPA Region 4 Superfund Environmental Data Submission Procedure. The standard Region 4 Electronic Data Deliverable (EDD) format is available at: https://www.epa.gov/superfund/region-4-superfund-electronic-data-submission. Other delivery methods may be allowed if electronic direct submission technology changes.

(b) Spatial data, including spatially-referenced data and geospatial data, should be submitted: (1) in accordance with EPA Region 4 Superfund Environmental Data Submission Procedure (the standard Region 4 spatial format is available at https://www.epa.gov/superfund/region-4-superfund-electronic-data-submission); 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://www.epa.gov/geospatial/epa-metadata-editor.

(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 Defendant 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 Defendant's Project Coordinator, or other responsible official of Settling Defendant, 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.

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 Defendant 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 Defendant 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 Defendant 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 Defendant 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 Defendant shall submit each of the following supporting deliverables for EPA approval, except as specifically provided. Settling Defendant shall develop the deliverables in accordance with all applicable regulations, guidances, and policies (see Section 10 (References)). Settling Defendant 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 Defendant 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) Notification activities in accordance with ¶ 5.4(b) (Release Reporting) in the event of a release of hazardous substances requiring reporting under CERCLA § 103 or EPCRA § 304; and

(4) A description of all necessary actions to ensure compliance with ¶ 5.4 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) **Quality Assurance Project Plan ("QAPP")**. The QAPP must include a detailed explanation of Settling Defendant's quality assurance, quality control, and chain of custody procedures for all treatability, design, compliance, and monitoring samples. Settling Defendant 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 Defendant shall collect, produce, and evaluate all environmental information at the Site in accordance with the approved QAPP.

(d) **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 periodic reports to EPA and State agencies; and

(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 immediately provide to EPA any unvalidated sampling data from Community Areas as defined in ¶ 7.7(e) 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(e) 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.

(e) **Community Impacts Mitigation Plan ("CIMP")**. The CIMP describes all activities 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. 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

(f) **Transportation and Off-Site Disposal Plan ("TODP")**. The TODP describes plans to ensure compliance with ¶ 5.5 (Off-Site Shipments). The TODP must include:

(1) Proposed times and routes for off-site shipment of Waste Material;

(2) Identification of communities affected by shipment of Waste Material; and

(3) Description of plans to minimize impacts (*e.g.*, noise, traffic, dust, odors) on affected communities.

(g) **O&M Plan**. The O&M Plan describes the requirements for inspecting, operating, and maintaining the Remedial Action. Settling Defendant 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 groundwater monitoring, source area maintenance and monitoring, and Performance Standards required to be met to implement the Interim Record of Decision;

(2) Description of activities to be performed: (i) to provide confidence that Performance Standards will be met, and that required groundwater monitoring and source area maintenance and monitoring will be completed; and (ii) to determine whether Performance Standards have been met, and whether required groundwater monitoring and source area maintenance and monitoring have been completed;

(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 or to complete groundwater monitoring or source area maintenance and monitoring; (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, or groundwater monitoring or source area maintenance and monitoring are not completed; and a schedule for implementing these corrective actions.

(h) **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 remedial action. Settling Defendant shall develop the O&M Manual in accordance with *Guidance for Management of Superfund Remedies in Post Construction*, OLEM 9200.3-105 (Feb. 2017).

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 Defendant 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

	Description of Deliverable, Task	**¶ Ref.**	**Deadline**
1	CI Coordinator	2.2(b)	15 days after EPA request
2	TAP	2.3(c)	30 days after EPA request
3	TAP Coordinator	2.3(c)(7)	30 days after EPA request
4	Project Coordinator and Supervising Contractor	3.3(a)	10 days after Effective Date
5	RDWP/PDI	4.1	60 days after EPA's Authorization to Proceed regarding Supervising Contractor (¶ 3.3(b)) or 60 days after the on-site meeting with EPA(¶ 4.1(b)) whichever occurs last.
6	ICIAP	4.2	60 days after EPA Authorization to Proceed regarding Supervising Contractor (¶ 3.3(b)).
7	Pre-final (90%) Remedial Design	4.4	90 days after EPA approval of the RDWP/PDI
8	Final (100%) Remedial Design	4.5	30 days after EPA comments on the Pre-final Remedial Design

8.3 Remedial Action Schedule

	Description of Deliverable / Task	¶ Ref.	Deadline
1	Commence to Implement ICIAP	4.2	30 days after EPA Notice of Authorization to Proceed with ICIAP
2	Award Remedial Action contract		60 days after EPA Notice of Authorization to Proceed with Remedial Action
3	RAWP	5.1	60 days after EPA Notice of Authorization to Proceed with Remedial Action
4	Pre-Construction Conference	5.2(a)	30 days after Approval of RAWP
5	Start of Construction		60 days after the Pre-Construction Conference
6	Completion of Construction		
7	Inspection of Remedial Action Construction	5.6(b)	30 days after Completion of Construction
8	Remedial Action Report	5.6(c)	60 days after Inspection of Remedial Action Construction
9	Work Completion Report	5.8(b)	60 days after Work Completion Inspection (¶ 5.9(a))
10	Periodic Review Support Plan	5.9	Five years after Start of Remedial Action Construction

9. STATE PARTICIPATION

9.1 **Copies**. Settling Defendant 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 Defendant, 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 ¶ 5.6 (Remedial Action Construction Completion), any disapproval of, or Certification of Remedial Action Completion under ¶ 5.7 (Certification of Remedial Action Completion), and any disapproval of, or Certification of Work Completion under ¶ 5.8 (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).

(e) Guidance on EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties, OSWER 9355.5-01, EPA/540/G90/001 (Apr.1990).

(f) Guidance on Expediting Remedial Design and Remedial Actions, OSWER 9355.5-02, EPA/540/G-90/006 (Aug. 1990).

(g) Guide to Management of Investigation-Derived Wastes, OSWER 9345.3-03FS (Jan. 1992).

(h) Permits and Permit Equivalency Processes for CERCLA On-Site Response Actions, OSWER 9355.7-03 (Feb. 1992).

(i) Guidance for Conducting Treatability Studies under CERCLA, OSWER 9380.3-10, EPA/540/R-92/071A (Nov. 1992).

(j) National Oil and Hazardous Substances Pollution Contingency Plan; Final Rule, 40 C.F.R. part 300 (Oct. 1994).

(k) Guidance for Scoping the Remedial Design, OSWER 9355.0-43, EPA/540/R-95/025 (Mar. 1995).

(l) Remedial Design/Remedial Action Handbook, OSWER 9355.0-04B, EPA/540/R-95/059 (June 1995).

(m) EPA Guidance for Data Quality Assessment, Practical Methods for Data Analysis, QA/G-9, EPA/600/R-96/084 (July 2000).

(n) Comprehensive Five-year Review Guidance, OSWER 9355.7-03B-P, EPA/540-R-01-007 (June 2001).

(o) Guidance for Quality Assurance Project Plans, EPA QA/G-5, EPA Office of Environmental Information (Dec. 2002) https://www.epa.gov/quality/guidance-quality-assurance-project-plans-epa-qag-5.

(p) Institutional Controls: Third-Party Beneficiary Rights in Proprietary Controls, OECA (Apr. 2004).

(q) EPA Guidance on Systematic Planning Using the Data Quality Objectives Process, QA/G-4, EPA/240/B-06/001 (Feb. 2006).

(r) EPA Requirements for Quality Management Plans, QA/R-2, EPA/240/B-01/002 (Mar. 2001, reissued May 2006).

(s) EPA National Geospatial Data Policy, CIO Policy Transmittal 05-002 (Aug. 2005), https://www.epa.gov/geospatial/epa-national-geospatial-data-policy.

(t) Summary of Key Existing EPA CERCLA Policies for Groundwater Restoration, OSWER 9283.1-33 (June 2009).

(u) Principles for Greener Cleanups (Aug. 2009), https://www.epa.gov/greenercleanups/epa-principles-greener-cleanups.

(v) Providing Communities with Opportunities for Independent Technical Assistance in Superfund Settlements, Interim (Sep. 2009).

(w) Close Out Procedures for National Priorities List Sites, OSWER 9320.2-22 (June 2022).

(x) Groundwater Road Map: Recommended Process for Restoring Contaminated Groundwater at Superfund Sites, OSWER 9283.1-34 (July 2011).

(y) Recommended Evaluation of Institutional Controls: Supplement to the "Comprehensive Five-Year Review Guidance," OSWER 9355.7-18 (Sep. 2011).

(z) Construction Specifications Institute's MasterFormat available from the Construction Specifications Institute, http://www.csinet.org/masterformat.

(aa) Updated Superfund Response and Settlement Approach for Sites Using the Superfund Alternative Approach, OSWER 9200.2-125 (Sep. 2012)

(bb) 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.

(cc) 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), https://semspub.epa.gov/work/HQ/175449.pdf.

(dd) EPA's Emergency Responder Health and Safety Manual, OSWER 9285.3-12 (July 2005 and updates), https://www.epaosc.org/_HealthSafetyManual/manual-index.htm.

(ee) Broader Application of Remedial Design and Remedial Action Pilot Project Lessons Learned, OSWER 9200.2-129 (Feb. 2013).

(ff) Guidance for Evaluating Completion of Groundwater Restoration Remedial Actions, OSWER 9355.0-129 (Nov. 2013).

(gg) Groundwater Remedy Completion Strategy: Moving Forward with the End in Mind, OSWER 9200.2-144 (May 2014).

(hh) 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/.

(ii) Guidance for Management of Superfund Remedies in Post Construction, OLEM 9200.3-105 (Feb. 2017), https://www.epa.gov/superfund/superfund-post-construction-completion.

(jj) 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.

(kk) Superfund Community Involvement Handbook, OLEM 9230.0-51 (March 2020). More information on Superfund community involvement is available on the Agency's Superfund Community Involvement Tools and Resources web page at https://www.epa.gov/superfund/superfund-community-involvement-tools-and-resources.

(ll) EPA directive CIO 2105.1 (Environmental Information Quality Policy, 2021), https://www.epa.gov/sites/production/files/2021-04/documents/environmental_information_quality_policy.pdf.

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/collection-methods.

10.3 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 Defendant receive notification from EPA of the modification, amendment, or replacement.