

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF OHIO

UNITED STATES OF AMERICA,

Plaintiff,

Civil Action No. _____

v.

Dover Chemical Corporation,

Defendant.

REMEDIAL DESIGN/REMEDIAL ACTION

CONSENT DECREE

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I. BACKGROUND

A. 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 pursuant to Sections 106 and 107 of the Comprehensive Environmental Response, Compensation, and Liability Act (“CERCLA”), 42 U.S.C. §§ 9606 and 9607 (the “Complaint”).

B. The United States in the Complaint seeks, *inter alia*: (1) reimbursement of costs incurred by EPA and the Department of Justice (“DOJ”) for response actions at Operable Unit 2 (“Site”), as defined herein, of the Dover Chemical Corporation Superfund Site in Dover, Ohio, together with accrued interest; and (2) performance of response actions by the defendant at the Site consistent with the National Contingency Plan, 40 C.F.R. Part 300 (“NCP”).

C. In accordance with the NCP and Section 121(f)(1)(F) of CERCLA, 42 U.S.C. § 9621(f)(1)(F), EPA notified the State of Ohio (“the State”) on December 14, 2015, of negotiations with Dover Chemical Corporation (“Dover Chemical”) as a potentially responsible party 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 be a party to this Consent Decree (“CD”).

D. In accordance with Section 122(j)(1) of CERCLA, 42 U.S.C. § 9622(j)(1), EPA notified the State of Ohio and the U.S. Fish and Wildlife Service on December 14, 2015, of negotiations with Dover Chemical regarding the alleged release of hazardous substances that may have resulted in injury to natural resources under federal trusteeship and encouraged the trustee(s) to participate in the negotiation of this CD.

E. The defendant that has entered into this CD, Dover Chemical, does not admit any liability to Plaintiff or any other person arising out of the transactions or occurrences alleged in the Complaint, nor does it acknowledge that the alleged 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. The findings and conclusions stated in this CD are those of the United States. Nothing stated in this CD is, or shall be construed as, an admission by Dover Chemical.

F. In response to a release or a substantial threat of a release of a hazardous substance(s) at or from the Dover Chemical Corporation Superfund Site Operable Unit 1, EPA, the Ohio Environmental Protection Agency and Dover Chemical entered into an Administrative Order on Consent on August 24, 1988, according to which Dover Chemical would perform a Remedial Investigation and Feasibility Study (RI/FS) for the Site pursuant to 40 C.F.R. § 300.430.

G. Dover Chemical completed a Remedial Investigation (RI) Report on June 1, 1994, a Feasibility Study (FS) Report on December 1, 1996, and the Final Addendum to the FS Report on May 1, 2013.

H. Pursuant to Section 117 of CERCLA, 42 U.S.C. § 9617, EPA published notice of the completion of the FS and of the proposed plan for remedial action on June 14, 2015, in a major local newspaper of general circulation. EPA provided an opportunity for written and oral comments from the public on the proposed plan for remedial action. A copy of the transcript of the public meeting is available to the public as part of the administrative record upon which the Director of the Superfund Division, EPA Region 5, based the selection of the response action.

I. The decision by EPA on the remedial action to be implemented at the Site is embodied in a final Record of Decision (“ROD”), executed on September 18, 2015, on which the State has given its concurrence. The ROD includes EPA’s responsiveness summary to the public comments. Notice of the final plan was published in accordance with Section 117(b) of CERCLA, 42 U.S.C. § 9617(b).

J. Based on the information presently available to EPA, EPA believes that the Work will be properly and promptly conducted by Dover Chemical if conducted in accordance with this CD and its appendices.

K. Solely for the purposes of Section 113(j) of CERCLA, 42 U.S.C. § 9613(j), the remedy set forth in the ROD and the Work to be performed by Dover Chemical shall constitute a response action taken or ordered by the President for which judicial review shall be limited to the administrative record.

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

NOW, THEREFORE, it is hereby Ordered, Adjudged, and Decreed:

II. JURISDICTION

1. This Court has jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §§ 1331 and 1345, and 42 U.S.C. §§ 9606, 9607, and 9613(b). This Court also has personal jurisdiction over Dover Chemical. Solely for the purposes of this CD and the Complaint, Dover Chemical waives all objections and defenses that it may have to jurisdiction of the Court or to venue in this District. Dover Chemical shall not challenge the terms of this CD or this Court’s jurisdiction to enter and enforce this CD.

III. PARTIES BOUND

2. This CD is binding upon the United States and upon Dover Chemical and its successors and assigns. Any change in ownership or corporate or other legal status of Dover Chemical including, but not limited to, any transfer of assets or real or personal property, shall in no way alter such Dover Chemical’s responsibilities under this CD.

3. Dover Chemical shall provide a copy of this CD to each contractor hired to perform the Work and to each person representing Dover Chemical with respect to the Site or the

Work, and shall condition all contracts entered into hereunder upon performance of the Work in conformity with the terms of this CD. Dover Chemical or its contractors shall provide written notice of the CD to all subcontractors hired to perform any portion of the Work. Dover Chemical shall nonetheless be responsible for ensuring that its contractors and subcontractors perform the Work in accordance with the terms of this CD. With regard to the activities undertaken pursuant to this CD, each contractor and subcontractor shall be deemed to be in a contractual relationship with Dover Chemical within the meaning of Section 107(b)(3) of CERCLA, 42 U.S.C. § 9607(b)(3).

IV. DEFINITIONS

4. Unless otherwise expressly provided in this CD, terms used in this CD that are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this CD or its appendices, the following definitions shall apply solely for purposes of this CD:

“2000 Administrative Order on Consent” shall mean the document controlling the removal action at Operable Unit 1, a portion of the Dover Chemical Corporation Superfund Site that is not the subject of this CD.

“Affected Property” shall mean all real property at the Site and any other real property where EPA determines, at any time, that access, land, water, or other resource use restrictions, and/or Institutional Controls are needed to implement the Remedial Action.

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

“Consent Decree” or “CD” shall mean this consent decree and all appendices attached hereto (listed in Section XXII). In the event of conflict between this CD and any appendix, this CD shall control.

“Day” or “day” shall mean a calendar day, unless expressly stated to be a working day. The term “working day” shall mean a day other than a Saturday, Sunday, or federal or state holiday. In computing any period of time under this CD, where the last day would fall on a Saturday, Sunday, or federal or state holiday, the period shall run until the close of business of the next working day.

“DOJ” shall mean the United States Department of Justice and its successor departments, agencies, or instrumentalities.

“Dover Chemical” shall mean Dover Chemical Corporation, the settling defendant which owns or controls a portion of the Affected Property.

“Dover Chemical Corporation Superfund Site” shall mean the combined areas of Operable Unit 1 and Operable Unit 2, as defined herein.

“Dover Chemical Corporation Superfund Site Operable Unit 1” or “Operable Unit 1” shall mean the area of the Dover Chemical Corporation Superfund Site that is undergoing a

separate removal action controlled by the 2000 Administrative Order on Consent. Operable Unit 1 is not the subject of this CD.

“Dover Chemical Corporation Superfund Site Operable Unit 2” or “Operable Unit 2” or “Site” shall mean the geographic area that is the subject of this CD, located within the corporate limits of the City of Dover, Ohio and depicted generally on the map attached hereto as Appendix 1. The Site, which is described in the ROD as the “Off-Site Groundwater Plume,” extends from the southern boundary of Operable Unit 1, at 3676 Davis Road N.W., Dover, Ohio, and had, as of the issuance of the ROD, migrated southeast to approximately 5th Street within the City of Dover, Ohio.

“Dover Chemical Corporation Superfund Site Operable Unit 2 Special Account” shall mean the special account, within the EPA Hazardous Substance Superfund, established for the Site by EPA pursuant to Section 122(b)(3) of CERCLA, 42 U.S.C. § 9622(b)(3).

“Effective Date” shall mean the date upon which the approval of this CD is recorded on the Court’s docket.

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

“EPA Hazardous Substance Superfund” shall mean the Hazardous Substance Superfund established by the Internal Revenue Code, 26 U.S.C. § 9507.

“Future Response Costs” shall mean all costs, including, but not limited to, direct and indirect costs, that the United States incurs and pays in reviewing or developing deliverables submitted pursuant to this CD, in overseeing implementation of the Work, or otherwise implementing, overseeing, or enforcing this CD, including, but not limited to, payroll costs, contractor costs, travel costs, laboratory costs, the costs incurred pursuant to ¶ 11 (Emergencies and Releases), ¶ 12 (Community Involvement) (including the costs of any technical assistance grant under Section 117(e) of CERCLA, 42 U.S.C. § 9617(e)), ¶ 25 (Access to Financial Assurance), Section VII (Remedy Review), Section VIII (Property Requirements) (including the cost of attorney time and any monies paid to secure or enforce access or land, water, or other resource use restrictions and/or to secure, implement, monitor, maintain, or enforce Institutional Controls including the amount of just compensation), and Section XIII (Dispute Resolution), and all litigation costs. Future Response Costs shall also include all Interim Response Costs.

“Institutional Controls” shall mean Proprietary Controls 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 non-interference with, or ensure the protectiveness of the RA; and/or (c) provide information intended to modify or guide human behavior at or in connection with the Site.

“Institutional Controls Implementation and Assurance Plan” shall mean the plan described in Section 6.7.i of the SOW.

“Interest” shall mean interest at the rate specified for interest on investments of the EPA Hazardous Substance Superfund, compounded annually on October 1 of each year, in accordance with 42 U.S.C. § 9607(a). The applicable rate of interest shall 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. Rates are available online at http://www.epa.gov/ocfopage/finstatement/superfund/int_rate.htm.

“Interim Response Costs” shall mean all costs, including, but not limited to, direct and indirect costs, (a) paid by the United States in connection with the Site between August 31, 2015 and the Effective Date, or (b) incurred prior to the Effective Date but paid after that date.

“National Contingency Plan” or “NCP” shall mean the National Oil and Hazardous Substances Pollution Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300, and any amendments thereto.

“Non-Settling Owner” shall mean any person, other than Dover Chemical, that owns or controls any Affected Property.

“Operation and Maintenance” or “O&M” shall mean all activities required to operate, maintain, and monitor the effectiveness of the RA as specified in the SOW or any EPA-approved O&M Plan.

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

“Parties” shall mean the United States and Dover Chemical.

“Past Response Costs” shall mean all costs, including, but not limited to, direct and indirect costs, that the United States paid at or in connection with the Site through August 31, 2015, plus Interest on all such costs that has accrued pursuant to 42 U.S.C. § 9607(a) through such date.

“Performance Standards” or “PS” shall mean the cleanup levels and other measures of achievement of the remedial action objectives, as set forth in the ROD.

“Plaintiff” shall mean the United States.

“Proprietary Controls” shall mean easements or covenants running with the land that (a) limit land, water, or other resource use and/or provide access rights and (b) are created pursuant to common law or statutory law by an instrument that is recorded in the appropriate land records office.

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

“Record of Decision” or “ROD” shall mean the EPA Record of Decision relating to the Site signed on September 18, 2015, by the Director of the Superfund Division, EPA Region 5, and all attachments thereto. The ROD is attached as Appendix 2.

“Remedial Action” or “RA” shall mean the remedial action selected in the ROD.

“Remedial Design” or “RD” shall mean those activities to be undertaken by Dover Chemical to develop final plans and specifications for the RA as stated in the SOW.

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

“Site” is defined above at “Dover Chemical Corporation Superfund Site Operable Unit 2.”

“State” shall mean the State of Ohio.

“Statement of Work” or “SOW” shall mean the document describing the activities Dover Chemical must perform to implement the RD, the RA, and O&M regarding the Site, which is attached as Appendix 3.

“Supervising Contractor” shall mean the principal contractor retained by Dover Chemical to supervise and direct the implementation of the Work under this CD.

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

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

“Waste Material” shall mean (1) any “hazardous substance” under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); (2) any pollutant or contaminant under Section 101(33) of CERCLA, 42 U.S.C. § 9601(33); and (3) any “solid waste” under Section 1004(27) of RCRA, 42 U.S.C. § 6903(27).

“Work” shall mean all activities and obligations Dover Chemical is required to perform under this CD, except the activities required under Section XIX (Retention of Records).

V. GENERAL PROVISIONS

5. **Objectives of the Parties.** The objectives of the Parties in entering into this CD are to protect public health or welfare or the environment by the design and implementation of response actions at the Site by Dover Chemical, to pay response costs of Plaintiff, and to resolve the claims of Plaintiff against Dover Chemical.

6. **Commitments by Dover Chemical.** Dover Chemical shall finance and perform the Work in accordance with this CD and all deliverables developed by Dover Chemical and approved or modified by EPA pursuant to this CD. Dover Chemical shall pay the United States for its response costs as provided in this CD.

7. **Compliance with Applicable Law.** Nothing in this CD limits Dover Chemical’s obligations to comply with the requirements of all applicable federal and state laws and regulations. Dover Chemical must also comply with all applicable or relevant and appropriate requirements of all federal and state environmental laws as set forth in the ROD and the SOW.

The activities conducted pursuant to this CD, if approved by EPA, shall be deemed to be consistent with the NCP as provided in Section 300.700(c)(3)(ii) of the NCP.

8. Permits.

a. As provided in Section 121(e) of CERCLA, 42 U.S.C. § 9621(e), and Section 300.400(e) of the NCP, no permit shall be 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, Dover Chemical shall submit timely and complete applications and take all other actions necessary to obtain all such permits or approvals.

b. Dover Chemical may seek relief under the provisions of Section XII (Force Majeure) 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 ¶ 8.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. This CD is not, and shall not be construed to be, a permit issued pursuant to any federal or state statute or regulation.

VI. PERFORMANCE OF THE WORK

9. Coordination and Supervision.

a. Project Coordinators.

(1) Dover Chemical's Project Coordinator must have sufficient technical expertise to coordinate the Work. Dover Chemical's Project Coordinator may not be an attorney representing Dover Chemical in this matter and may not act as the Supervising Contractor. Dover Chemical's Project Coordinator may assign other representatives, including other contractors, to assist in coordinating the Work.

(2) EPA's Project Coordinator for the Site shall be Colleen Moynihan and EPA shall notify Dover Chemical of any change to that assigned role. 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 NCP. This includes the authority to halt the Work and/or to conduct or direct any necessary response action when he or she determines 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.

(3) Dover Chemical's Project Coordinator shall confer (by in-person meeting, or by telephone) with EPA's Project Coordinator at least monthly.

b. **Supervising Contractor.** Dover Chemical's proposed Supervising Contractor must have sufficient technical expertise to supervise the Work and a quality assurance system that complies with ANSI/ASQC E4-2014, Quality Systems for Environmental Data and Technology Programs: Requirements with Guidance for Use (American National Standard).

c. **Procedures for Disapproval/Notice to Proceed.**

(1) Dover Chemical shall designate, and notify EPA, within 10 days after the Effective Date, of the names, contact information, and qualifications of Dover Chemical's proposed Project Coordinator and Supervising Contractor.

(2) EPA shall issue notices of disapproval and/or authorizations to proceed regarding the proposed Project Coordinator and Supervising Contractor, as applicable. If EPA issues a notice of disapproval, Dover Chemical 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. EPA shall issue a notice of disapproval or authorization to proceed regarding each supplemental proposed coordinator and/or contractor. Dover Chemical may select any coordinator/contractor covered by an authorization to proceed and shall, within 21 days, notify EPA of Dover Chemical's selection.

(3) Dover Chemical may change its Project Coordinator and/or Supervising Contractor, as applicable, by following the procedures of ¶¶ 9.c(1) and 9.c(2).

10. **Performance of Work in Accordance with SOW.** Dover Chemical shall: (a) develop the RD; (b) perform the RA; and (c) operate, maintain, and monitor the effectiveness of the RA; all in accordance with the SOW and all EPA-approved, conditionally-approved, or modified deliverables as required by the SOW. All deliverables required to be submitted for approval under the CD or SOW shall be subject to approval by EPA in accordance with Section 6 (Deliverables) of the SOW.

11. **Emergencies and Releases.** Dover Chemical shall comply with the emergency and release response and reporting requirements under ¶ 4.3 (Emergency Response and Reporting) of the SOW. Subject to Section XV (Covenants by Plaintiff), nothing in this CD, including ¶ 4.3 of the SOW, limits any authority of Plaintiff: (a) to take 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 (b) to direct or order such action, or seek an order from the Court, 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. If, due to Dover Chemical's failure to take appropriate response action under ¶ 4.3 of the SOW, EPA takes such action instead, Dover Chemical shall reimburse EPA under Section X (Payments for Response Costs) for all costs of the response action.

12. **Community Involvement.** If requested by EPA, Dover Chemical shall conduct community involvement activities under EPA's oversight as provided for in, and in accordance

with, Section 2 (Community Involvement) of the SOW. Such activities may include, but are not limited to, designation of a Community Involvement Coordinator and implementation of a technical assistance plan. Costs incurred by the United States under this Section constitute Future Response Costs to be reimbursed under Section X (Payments for Response Costs).

13. Modification of SOW or Related Deliverables.

a. If EPA determines that it is necessary to modify the work specified in the SOW and/or in deliverables developed under the SOW in order to achieve and/or maintain the Performance Standards or to carry out and maintain the effectiveness of the RA, and such modification is consistent with the scope of the remedy set forth in ¶ 1.3 of the SOW, then EPA may notify Dover Chemical in writing of such modification. If Dover Chemical objects to the modification it may, within 30 days after EPA's notification, seek dispute resolution under Section XIII.

b. If the SOW and/or deliverables developed under the SOW are the subject of a modification notification issued pursuant to ¶ 13.a, they shall be modified: (1) in accordance with such modification notification; or (2) if Dover Chemical invokes dispute resolution, in accordance with the final resolution of the dispute. The modification shall be incorporated into and enforceable under this CD, and Dover Chemical shall implement all work required by such modification. Dover Chemical shall incorporate the modification into the deliverable required under the SOW, as appropriate.

c. Nothing in this Paragraph shall be construed to limit EPA's authority to require performance of further response actions as may be otherwise provided in this CD.

14. Nothing in this CD, the SOW, or any deliverable required under the SOW constitutes a warranty or representation of any kind by Plaintiff that compliance with the work requirements set forth in the SOW or related deliverable will achieve the Performance Standards.

VII. REMEDY REVIEW

15. **Periodic Review.** Dover Chemical shall conduct, in accordance with ¶ 4.7 (Periodic Review Support Plan) of the SOW, studies and investigations to support EPA's reviews under Section 121(c) of CERCLA, 42 U.S.C. § 9621(c), and applicable regulations, of whether the RA is protective of human health and the environment.

VIII. PROPERTY REQUIREMENTS

16. Agreements Regarding Access and Non-Interference.

a. Dover Chemical shall, with respect to any Affected Property owned by a Non-Settling Owner where EPA has determined that any activity regarding the CD, including one or more activities listed in subparagraphs (1) - (7) and (9) - (11) of ¶ 16.c (Access Requirements) are needed to implement the remedial action, use best efforts to secure from such Non-Settling Owner an agreement, enforceable by Dover Chemical and by Plaintiff, providing

that such Non-Settling Owner shall, with respect to such Non-Settling Owner's Affected Property:

(1) Provide Plaintiff and Dover Chemical, and their representatives, contractors, and subcontractors, with access at all reasonable times to such Affected Property to conduct the activities that EPA has determined are needed to implement the Remedial Action; and

(2) Refrain from using such Affected Property in any manner that EPA determines will: (i) pose an unacceptable risk to human health or to the environment due to exposure to Waste Material, or (ii) interfere with or adversely affect the implementation, integrity, or protectiveness of the Remedial Action, including the restrictions listed in 16.e (Land, Water, or Other Resource Use Restrictions).

b. Dover Chemical shall, with respect to any Affected Property owned by Dover Chemical:

(1) Provide Plaintiff, and its representatives, contractors, and subcontractors, with access at all reasonable times to such Affected Property to conduct any activity needed to implement the Remedial Action, including one or more of those listed in ¶ 16.c (Access Requirements); and

(2) Refrain from using such Affected Property in any manner that EPA determines will: (i) pose an unacceptable risk to human health or to the environment due to exposure to Waste Material, or (ii) interfere with or adversely affect the implementation, integrity, or protectiveness of the Remedial Action, including the restrictions listed in ¶ 16.d (Land, Water, or Other Resource Use Restrictions).

c. **Access Requirements.** The following is a list of activities for which access is required regarding the Affected Property:

- (1) Monitoring the Work;
- (2) Verifying any data or information submitted to the United States;
- (3) Conducting investigations regarding contamination at or near the Site;
- (4) Obtaining samples;
- (5) Assessing the need for, planning, or implementing additional response actions at or near the Site;
- (6) Assessing implementation of quality assurance and quality control practices as defined in the approved construction quality assurance quality control plan as provided in the SOW;
- (7) Implementing the Work pursuant to the conditions set forth in ¶ 61 (Work Takeover);

- (8) Inspecting and copying records, operating logs, contracts, or other documents maintained or generated by Dover Chemical or its agents, consistent with Section XVIII (Access to Information);
- (9) Assessing Dover Chemical's compliance with the CD;
- (10) Determining whether the Affected Property is being used in a manner that is prohibited or restricted, or that may need to be prohibited or restricted under the CD; and
- (11) Implementing, monitoring, maintaining, reporting on, and enforcing any Institutional Controls.

d. **Land, Water, or Other Resource Use Restrictions.** The land, water, or other resource use restrictions established under the Institutional Controls Implementation and Assurance Plan shall be enforceable under this Consent Decree.

e. Dover Chemical shall not Transfer its Affected Property without first securing EPA's approval of, and transferee's consent to, an agreement that: (i) is enforceable by Dover Chemical and Plaintiff; and (ii) requires the transferee to provide access to and to refrain from using the Affected Property to the same extent as is provided under ¶ 16.c and 16.d.

17. **Best Efforts.** As used in this Section, "best efforts" means the efforts that a reasonable person in the position of Dover Chemical would use so as 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, Proprietary Controls, agreements, releases, subordinations, modifications, or relocations of prior encumbrances that affect the title to the Affected Property, as applicable. If Dover Chemical is unable to accomplish what is required through "best efforts" in a timely manner, it shall notify the United States, and include a description of the steps taken to comply with the requirements. If the United States deems it appropriate, it may assist Dover Chemical, or take independent action, in obtaining such access and/or use restriction agreements, Proprietary Controls, agreements, releases, subordinations, modifications, or relocations of prior encumbrances that affect the title to the Affected Property, as applicable. All costs incurred by the United States in providing such assistance or taking such action, including the cost of attorney time and the amount of monetary consideration or just compensation paid, constitute Future Response Costs to be reimbursed under Section X (Payments for Response Costs).

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

a. Dover Chemical shall, within 15 days after the Effective Date, submit for EPA approval a notice to be filed regarding Dover Chemical's Affected Property in the appropriate land records. The notice must: (1) include a proper legal description of the Affected Property; (2) provide notice to all successors-in-title: (i) that the Affected Property is part of, or related to, the Site; (ii) that EPA has selected a remedy for the Site; and (iii) that potentially responsible parties have entered into a CD requiring implementation of such remedy; (3) identify the U.S. District Court in which the CD was filed, the name and civil action number of this case,

and the date the CD was entered by the Court. Dover Chemical 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. Dover Chemical shall, prior to entering into a contract to Transfer Dover Chemical's Affected Property, or 60 days prior to Transferring Dover Chemical's Affected Property, whichever is earlier:

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

19. In the event of any Transfer of the Affected Property, unless the United States otherwise consents in writing, Dover Chemical shall continue to comply with its obligations under the CD, including its obligation to provide and/or secure access, to implement, maintain, monitor, and report on Institutional Controls, and to abide by such Institutional Controls.

20. Notwithstanding any provision of the CD, Plaintiff retains all of its access authorities and rights, as well as all of its rights to require Institutional Controls, including enforcement authorities related thereto, under CERCLA, RCRA, and any other applicable statute or regulations.

IX. FINANCIAL ASSURANCE

21. In order to ensure completion of the Work, Dover Chemical shall secure financial assurance, initially in the amount of \$7.4 million (Estimated Cost of the Work), for the benefit of EPA. The financial assurance must be one or more of the mechanisms listed below, in a form substantially identical to the relevant sample documents available from the "Financial Assurance" category on the Cleanup Enforcement Model Language and Sample Documents Database at <http://cfpub.epa.gov/compliance/models/>, and satisfactory to EPA. Dover Chemical may use multiple mechanisms provided that at least \$3.5 million of the \$7.4 million must consist of one or more of the mechanisms described in ¶ 21 (a)-(d).

a. A surety bond guaranteeing payment and/or performance of the Work 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 or at the direction of EPA, that is issued by an entity that has the authority to issue letters of credit and whose letter-of-credit operations are regulated and examined by a federal or state agency;

c. A trust fund established for the benefit of EPA that is administered by a trustee that has the authority to act as a trustee and whose trust operations are regulated and examined by a federal or state agency;

d. A 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;

e. A demonstration that Dover Chemical meets the relevant financial test criteria of 40 C.F.R. § 264.143(f) and reporting requirements of this Section for the sum of the Estimated Cost of the Work and the amounts, if any, of other federal or state environmental obligations financially assured through the use of a financial test or guarantee, accompanied by a standby funding commitment, which obligates Dover Chemical to pay funds to or at the direction of EPA, up to the amount financially assured through the use of this demonstration in the event of a Work Takeover; or

f. A guarantee to fund or perform the Work executed in favor of EPA by one of the following: (1) a direct or indirect parent company of Dover Chemical; or (2) a company that has a “substantial business relationship” (as defined in 40 C.F.R. § 264.141(h)) with Dover Chemical; provided, however, that any company providing such a guarantee must demonstrate to EPA’s satisfaction that it meets the relevant financial test criteria of 40 C.F.R. § 264.143(f) and reporting requirements of this Section for the sum of the Estimated Cost of the Work and the amounts, if any, of other federal or state environmental obligations financially assured through the use of a financial test or guarantee.

22. Dover Chemical has selected, and EPA has found satisfactory as an initial financial assurance, an irrevocable letter of credit, prepared in accordance with ¶ 21(b), for \$3.5 million in liquid financial assurance and a demonstration, prepared in accordance with ¶ 21(e), for the balance. Within 30 days after the Effective Date, or 30 days after EPA’s approval of the form and substance of Dover Chemical’s financial assurance, whichever is later, Dover Chemical shall secure all executed and/or otherwise finalized mechanisms or other documents consistent with the EPA-approved form of financial assurance and shall submit copies of such mechanisms and documents to the Regional financial assurance specialist, to the United States, and to EPA as specified in Section XX (Notices and Submissions).

23. If Dover Chemical provides financial assurance by means of a demonstration or guarantee under ¶ 21.e or 21.f, Dover Chemical shall also comply and shall ensure that its guarantors comply with the other relevant criteria and requirements of 40 C.F.R. § 264.143(f) and this Section, including, but not limited to: (a) the initial submission to EPA of required documents from the affected entity’s chief financial officer and independent certified public accountant no later than 30 days after the Effective Date; (b) the annual resubmission of such documents within 90 days after the close of each such entity’s fiscal year; and (c) the notification of EPA no later than 30 days, in accordance with ¶ 24, after any such entity determines that it no longer satisfies the relevant financial test criteria and requirements set forth at 40 C.F.R. § 264.143(f)(1). Dover Chemical agrees that EPA may also, based on a belief that an affected

entity may no longer meet the financial test requirements of ¶ 21.e or 21.f, require reports of financial condition at any time from such entity in addition to those specified in this Paragraph. For purposes of this Section, references in 40 C.F.R. Part 264, Subpart H, to: (1) the terms “current closure cost estimate,” “current post-closure cost estimate,” and “current plugging and abandonment cost estimate” include the Estimated Cost of the Work; (2) the phrase “the sum of the current closure and post-closure cost estimates and the current plugging and abandonment cost estimates” includes the sum of all environmental obligations (including obligations under CERCLA, RCRA, and any other federal or state environmental obligation) guaranteed by such company or for which such company is otherwise financially obligated in addition to the Estimated Cost of the Work under this CD; (3) the terms “owner” and “operator” include Dover Chemical making a demonstration or obtaining a guarantee under ¶ 21.e or 21.f, and (4) the terms “facility” and “hazardous waste management facility” include the Site.

24. Dover Chemical shall diligently monitor the adequacy of the financial assurance. If Dover Chemical 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, Dover Chemical shall notify EPA of such information within 14 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 Dover Chemical of such determination. Dover Chemical 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 Dover Chemical, in the exercise of due diligence, to secure and submit a proposal for a revised or alternative financial assurance mechanism, not to exceed 60 days. Dover Chemical shall follow the procedures of ¶ 26 (Modification of Financial Assurance) in seeking approval of, and submitting documentation for, the revised or alternative financial assurance mechanism. Dover Chemical’s inability to secure and submit to EPA financial assurance in accordance with this Section shall in no way excuse performance of any other requirements of this CD, including, without limitation, the obligation of Dover Chemical to complete the Work in accordance with the terms of this CD.

25. Access to Financial Assurance.

a. If EPA issues a notice of implementation of a Work Takeover under ¶ 61.b, then, in accordance with any applicable financial assurance mechanism and/or related standby funding commitment, EPA is entitled to: (1) the performance of the Work; and/or (2) require that any funds guaranteed be paid in accordance with ¶ 25.d.

b. If EPA is notified by the issuer of a financial assurance mechanism that it intends to cancel such mechanism, and Dover Chemical 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 (“Guaranteed Funds”) must be paid prior to cancellation in accordance with ¶ 25.d.

c. If, upon issuance of a notice of implementation of a Work Takeover under ¶ 61.b, either: (1) EPA is unable for any reason to promptly secure the Guaranteed Funds,

whether in cash or in kind, to continue and complete the Work; or (2) the financial assurance is provided under ¶ 21.e or 21.f, then EPA may demand an amount, as determined by EPA, sufficient to cover the cost of the remaining Work to be performed (the “Takeover Funds”). Dover Chemical shall, within 20 days of such demand, pay the Takeover Funds demanded as directed by EPA.

d. Any Guaranteed Funds or Takeover Funds required to be paid under this paragraph shall 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 EPA Hazardous Substance Superfund or into the Dover Chemical Corporation Superfund Site Operable Unit 2 Special Account within the EPA Hazardous Substance Superfund 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 EPA Hazardous Substance Superfund.

e. All EPA Work Takeover costs not paid under this ¶ 25 must be reimbursed as Future Response Costs under Section X (Payments for Response Costs).

26. Modification of Amount, Form, or Terms of Financial Assurance. Dover Chemical may submit, on any anniversary of the Effective Date or at any other time agreed to by the Parties, a request to reduce the amount, or change the form or terms, of the financial assurance mechanism. Any such request 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 Dover Chemical of its decision to approve or disapprove a requested reduction or change pursuant to this Paragraph. In the event that, upon any anniversary of the Effective Date, Dover’s estimate of the cost of the remaining Work is less than \$7.4 million, Dover Chemical may request that the amount of financial assurance provided by one or more of the mechanisms described in ¶ 21 (a)-(d) be reduced to an amount that is equal to 51% of the estimate of the cost of the remaining work. If EPA determines that Dover’s estimate of the cost of the remaining work is accurate, then EPA shall approve such request. Dover Chemical may reduce the amount of the financial assurance mechanism only in accordance with: (a) EPA’s approval; or (b) if there is a dispute, the agreement, final administrative decision, or final judicial decision resolving such dispute under Section XIII (Dispute Resolution). Any decision made by EPA on a request submitted under this Paragraph to change the form or terms of a financial assurance mechanism shall be made in EPA’s sole and unreviewable discretion, and such decision shall not be subject to challenge by Dover Chemical pursuant to the dispute resolution provisions of this CD or in any other forum. Within 30 days after receipt of EPA’s approval of, or the agreement or decision resolving a dispute relating to, the requested modifications pursuant to this Paragraph, Dover Chemical shall submit to EPA documentation of the reduced, revised, or alternative financial assurance mechanism in accordance with ¶ 22.

27. Release, Cancellation, or Discontinuation of Financial Assurance. Dover Chemical may release, cancel, or discontinue any financial assurance provided under this Section

only: (a) if EPA issues a Certification of Work Completion under ¶ 4.8 (Certification of Work Completion) 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 XIII (Dispute Resolution).

X. PAYMENTS FOR RESPONSE COSTS

28. Payment by Dover Chemical for United States Past Response Costs.

a. Within 30 days after the Effective Date, Dover Chemical shall pay to EPA \$41,336 in payment for Past Response Costs. Payment shall be made in accordance with ¶ 30.a.

b. **Deposit of Past Response Costs Payment.** The total amount to be paid by Setting Defendants pursuant to this Paragraph shall be deposited by EPA in the Dover Chemical Corporation Superfund Site Operable Unit 2 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 EPA Hazardous Substance Superfund.

29. **Payments by Dover Chemical for Future Response Costs.** Dover Chemical shall pay to EPA all Future Response Costs not inconsistent with the NCP.

a. **Periodic Bills.** On an annual basis, EPA will send to Dover Chemical a bill requiring payment that includes an itemized cost summary, which includes direct and indirect costs incurred and paid by EPA, its contractors, subcontractors, and DOJ. Dover Chemical shall make all payments within 45 days after Dover Chemical's receipt of each bill requiring payment, except as otherwise provided in ¶ 31, in accordance with ¶ 30.b (instructions for future response cost payments).

b. **Deposit of Future Response Costs Payments.** The amounts to be periodically paid by Dover Chemical pursuant to ¶ 29.a (Periodic Bills) shall be deposited by EPA in the Dover Chemical Corporation Superfund Site Operable Unit 2 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 EPA Hazardous Substance Superfund, provided, however, that EPA may deposit a Future Response Costs payment directly into the EPA Hazardous Substance Superfund if, at the time the payment is received, EPA estimates that the Dover Chemical Corporation Superfund Site Operable Unit 2 Special Account balance is sufficient to address currently anticipated future response actions to be conducted or financed by EPA at or in connection with the Site. Any decision by EPA to deposit a Future Response Costs payment directly into the EPA Hazardous Substance Superfund for this reason shall not be subject to challenge by Dover Chemical pursuant to the dispute resolution provisions of this CD or in any other forum.

30. Payment Instructions for Dover Chemical.

a. Past Response Costs Payments

(1) The Financial Litigation Unit (FLU) of the United States Attorney's Office for the Northern District of Ohio shall provide Dover Chemical, in accordance with ¶ 82, with instructions regarding making the Past Response Costs payment of \$41,336 to DOJ on behalf of EPA. The instructions must include a Consolidated Debt Collection System (CDCS) number to identify this payment.

(2) For the payment subject to this ¶ 30.a, Dover Chemical shall make such payment by Fedwire Electronic Funds Transfer (EFT) [at <https://www.pay.gov>] to the U.S. DOJ account, in accordance with the instructions provided under ¶ 30.a(1), and including references to the CDCS number, Site/Spill ID Number (OHD004210563/05B5), and DJ number 90-11-3-11517.

(3) For the payment made under this ¶ 30.a, Dover Chemical shall send notices, including references to the CDCS, Site/Spill ID, and DJ numbers, to the United States, EPA, and the EPA Cincinnati Finance Center, all in accordance with ¶ 82.

b. Future Response Costs Payments and Stipulated Penalties.

(1) For all payments subject to this ¶ 30.b, Dover Chemical shall make such payment by Automated Clearinghouse (ACH) payment as follows:

PNC Bank
808 17th Street, NW
Washington, DC 20074
Contact: Jesse White 301-887-6548
ABA = 051036706
Transaction Code 22 - checking
Environmental Protection Agency
Account 310006
CTX Format

(2) For all payments made under this paragraph, Dover Chemical must include references to the CDCS, Site/Spill ID, and DJ numbers. At the time of any payment required to be made in accordance with ¶ 30.b, Dover Chemical shall send notices that payment has been made to the United States, EPA, and the EPA Cincinnati Finance Center, all in accordance with ¶ 82.

31. Contesting Future Response Costs. Dover Chemical may submit a Notice of Dispute, initiating the procedures of Section XIII (Dispute Resolution), regarding any Future Response Costs billed under ¶ 29 (Payments by Dover Chemical for Future Response Costs) if it determines that EPA has made a mathematical error or included a cost item that is not within the definition of Future Response Costs or if it believes that EPA incurred excess costs as a direct result of an EPA action that was inconsistent with a specific provision or provisions of the NCP. Such Notice of Dispute shall be submitted in writing within 45 days after receipt of the bill and must be sent to the United States pursuant to Section XX (Notices and Submissions). Such Notice of Dispute shall specifically identify the contested Future Response Costs and the basis

for objection. If Dover Chemical submits a Notice of Dispute, Dover Chemical shall within the 30-day period, also as a requirement for initiating the dispute, (a) pay all uncontested Future Response Costs to the United States, and (b) establish, in a duly chartered bank or trust company, an interest-bearing escrow account that is insured by the Federal Deposit Insurance Corporation (FDIC), and remit to that escrow account funds equivalent to the amount of the contested Future Response Costs. Dover Chemical shall send to the United States, as provided in Section XX (Notices and Submissions), a copy of the transmittal letter and check paying the uncontested Future Response Costs, and a copy of the correspondence that establishes and funds the escrow account, including, but not limited to, information containing the identity of the bank and bank account under which the escrow account is established as well as a bank statement showing the initial balance of the escrow account. If the United States prevails in the dispute, Dover Chemical shall pay the sums due (with accrued interest) to the United States within seven days after the resolution of the dispute. If Dover Chemical prevails concerning any aspect of the contested costs, Dover Chemical shall pay that portion of the costs (plus associated accrued interest) for which it did not prevail to the United States within seven days after the resolution of the dispute. Dover Chemical shall be disbursed any balance of the escrow account. All payments to the United States under this Paragraph shall be made in accordance with ¶ 30.b (instructions for future response cost payments). The dispute resolution procedures set forth in this Paragraph in conjunction with the procedures set forth in Section XIII (Dispute Resolution) shall be the exclusive mechanisms for resolving disputes regarding Dover Chemical's obligation to reimburse the United States for its Future Response Costs.

32. **Interest.** In the event that any payment for Future Response Costs required under this Section is not made by the date required, Dover Chemical shall pay Interest on the unpaid balance. The Interest on Future Response Costs shall begin to accrue on the date of the bill. The Interest shall accrue through the date of Dover Chemical's payment. Payments of Interest made under this Paragraph shall be in addition to such other remedies or sanctions available to Plaintiff by virtue of Dover Chemical's failure to make timely payments under this Section including, but not limited to, payment of stipulated penalties pursuant to ¶ 48 (Stipulated Penalty Amounts – Work (Including Payments and Excluding Deliverables)).

XI. INDEMNIFICATION AND INSURANCE

33. Dover Chemical's Indemnification of the United States.

a. The United States does not assume any liability by entering into this CD or by virtue of any designation of Dover Chemical as EPA's authorized representative under Section 104(e) of CERCLA, 42 U.S.C. § 9604(e). Dover Chemical shall indemnify, save, and hold harmless the United States and its officials, agents, employees, contractors, subcontractors, and representatives for or from any and all claims or causes of action arising from, or on account of, negligent or other wrongful acts or omissions of Dover Chemical, its officers, directors, employees, agents, contractors, subcontractors, and any persons acting on Dover Chemical's behalf or under its control, in carrying out activities pursuant to this CD, including, but not limited to, any claims arising from any designation of Dover Chemical as EPA's authorized representative under Section 104(e) of CERCLA. Further, Dover Chemical agrees to pay the

United States all costs it incurs including, but not limited to, attorneys' fees and other expenses of litigation and settlement arising from, or on account of, claims made against the United States based on negligent or other wrongful acts or omissions of Dover Chemical, its officers, directors, employees, agents, contractors, subcontractors, and any persons acting on their behalf or under their control, in carrying out activities pursuant to this CD. The United States shall not be held out as a party to any contract entered into by or on behalf of Dover Chemical in carrying out activities pursuant to this CD. Neither Dover Chemical nor any such contractor shall be considered an agent of the United States.

b. The United States shall give Dover Chemical notice of any claim for which the United States plans to seek indemnification pursuant to this ¶ 33, and shall consult with Dover Chemical prior to settling such claim.

34. Dover Chemical covenants not to sue and agrees not to assert any claims or causes of action against the United States for damages or reimbursement or for set-off of any payments made or to be made to the United States, arising from or on account of any contract, agreement, or arrangement between Dover Chemical and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays. In addition, Dover Chemical shall indemnify, save and hold harmless the United States with respect to any and all claims for damages or reimbursement arising from or on account of any contract, agreement, or arrangement between Dover Chemical and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays.

35. **Insurance.** No later than 15 days before commencing any on-Site Work, Dover Chemical shall secure, and shall maintain until the first anniversary after issuance of EPA's Certification of RA Completion pursuant to ¶ 4.6 (Certification of RA Completion) of the SOW, commercial general liability insurance with limits of \$1.5 million, for any one occurrence, and automobile liability insurance with limits of \$1 million, combined single limit, naming the United States as an additional insured with respect to all liability covered by such policies and arising out of the activities performed by or on behalf of Dover Chemical pursuant to this CD. In addition, for the duration of this CD, Dover Chemical 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 Dover Chemical in furtherance of this CD. Prior to commencement of the Work, Dover Chemical shall provide to EPA certificates of such insurance and a copy of each insurance policy. Dover Chemical shall resubmit such certificates and copies of policies each year on the anniversary of the Effective Date. If Dover Chemical 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, Dover Chemical need provide only that portion of the insurance described above that is not maintained by the contractor or subcontractor.

XII. FORCE MAJEURE

36. “Force majeure,” for purposes of this CD, is defined as any event arising from causes beyond the control of Dover Chemical, of any entity controlled by Dover Chemical, or of Dover Chemical’s contractors that delays or prevents the performance of any obligation under this CD despite Dover Chemical’s best efforts to fulfill the obligation. The requirement that Dover Chemical exercise “best efforts to fulfill the obligation” includes using best efforts to anticipate any potential force majeure and best efforts to address the effects of any potential force majeure (a) as it is occurring and (b) following the potential force majeure such that the delay and any adverse effects of the delay are minimized to the greatest extent possible. “Force majeure” does not include financial inability to complete the Work or a failure to achieve the Performance Standards.

37. If any event occurs or has occurred that may delay the performance of any obligation under this CD for which Dover Chemical intends or may intend to assert a claim of force majeure, Dover Chemical shall notify EPA’s Project Coordinator orally or, in the event EPA’s designated representative is unavailable, the Director of the Superfund Division, EPA Region 5, within 3 working days of when Dover Chemical first knew that the event might cause a delay. Within 10 days thereafter, Dover Chemical shall provide in writing to EPA an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; Dover Chemical’s rationale for attributing such delay to a force majeure; and a statement as to whether, in the opinion of Dover Chemical, such event may cause or contribute to an endangerment to public health or welfare, or the environment. Dover Chemical shall include with any notice all available documentation supporting its claim that the delay was attributable to a force majeure. Dover Chemical shall be deemed to know of any circumstance of which Dover Chemical, any entity controlled by Dover Chemical, or Dover Chemical’s contractors or subcontractors knew or should have known. Failure to comply with the above requirements regarding an event shall preclude Dover Chemical from asserting any claim of force majeure regarding that event, provided, however, that if EPA, despite the late or incomplete notice, is able to assess to its satisfaction whether the event is a force majeure under ¶ 36 and whether Dover Chemical has exercised its best efforts under ¶ 36, EPA may, in its unreviewable discretion, excuse in writing Dover Chemical’s failure to submit timely or complete notices under this Paragraph.

38. If EPA agrees that the delay or anticipated delay is attributable to a force majeure, the time for performance of the obligations under this CD that are affected by the force majeure will be extended by EPA for such time as is necessary to complete those obligations. 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. If EPA does not agree that the delay or anticipated delay has been or will be caused by a force majeure, EPA will notify Dover Chemical in writing of its decision. If EPA agrees that the delay is attributable to a force majeure, EPA will notify Dover Chemical in writing of the length of the extension, if any, for performance of the obligations affected by the force majeure.

39. If Dover Chemical elects to invoke the dispute resolution procedures set forth in Section XIII (Dispute Resolution) regarding EPA's decision, it shall do so no later than 15 days after receipt of EPA's notice. In any such proceeding, Dover Chemical shall have the burden of demonstrating by a preponderance of the evidence that the delay or anticipated delay has been or will be caused by a force majeure, that the duration of the delay or the extension sought was or will be warranted under the circumstances, that best efforts were exercised to avoid and mitigate the effects of the delay, and that Dover Chemical complied with the requirements of ¶¶ 36 and 37. If Dover Chemical carries this burden, the delay at issue shall be deemed not to be a violation by Dover Chemical of the affected obligation under this CD identified to EPA and the Court.

40. The failure by EPA to timely complete any obligation under the CD or under the SOW is not a violation of the CD, provided, however, that if such failure prevents Dover Chemical from meeting one or more deadlines in the SOW, Dover Chemical may seek relief under this Section.

XIII. DISPUTE RESOLUTION

41. Unless otherwise expressly provided for in this CD, the dispute resolution procedures of this Section shall be the exclusive mechanism to resolve disputes regarding this CD. However, the procedures set forth in this Section shall not apply to actions by the United States to enforce obligations of Dover Chemical that have not been disputed in accordance with this Section.

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

43. Statements of Position.

a. In the event that the Parties cannot resolve a dispute by informal negotiations under the preceding Paragraph, then the position advanced by EPA shall be considered binding unless, within 30 days after the conclusion of the informal negotiation period, Dover Chemical invokes the formal dispute resolution procedures of this Section by serving on the United States a written Statement of Position on the matter in dispute, including, but not limited to, any factual data, analysis, or opinion supporting that position and any supporting documentation relied upon by Dover Chemical. The Statement of Position shall specify Dover Chemical's position as to whether formal dispute resolution should proceed under ¶ 44 (Record Review) or ¶ 45.

b. Within 45 days after receipt of Dover Chemical's Statement of Position, EPA shall serve on Dover Chemical its Statement of Position, including, but not limited to, any factual data, analysis, or opinion supporting that position and all supporting documentation relied upon by EPA. EPA's Statement of Position shall include a statement as to whether formal

dispute resolution should proceed under ¶ 44 (Record Review) or ¶ 45. Within 21 days after receipt of EPA's Statement of Position, Dover Chemical may submit a reply.

c. If there is disagreement between EPA and Dover Chemical as to whether dispute resolution should proceed under ¶ 44 (Record Review) or ¶ 45 the Parties shall follow the procedures set forth in the Paragraph determined by EPA to be applicable. However, if Dover Chemical ultimately appeals to the Court to resolve the dispute, the Court shall determine which Paragraph is applicable in accordance with the standards of applicability set forth in ¶¶ 44 and 45.

44. **Record Review.** Formal dispute resolution for disputes pertaining to the selection or adequacy of any response action and all other disputes that are accorded review on the administrative record under applicable principles of administrative law shall be conducted pursuant to the procedures set forth in this Paragraph. For purposes of this Paragraph, the adequacy of any response action includes, without limitation, the adequacy or appropriateness of plans, procedures to implement plans, or any other items requiring approval by EPA under this CD, and the adequacy of the performance of response actions taken pursuant to this CD. Nothing in this CD shall be construed to allow any dispute by Dover Chemical regarding the validity of the ROD's provisions.

a. An administrative record of the dispute shall be maintained by EPA and shall contain the Parties' Statements of Position, including supporting documentation, and any reply by Dover Chemical, including supporting documentation, submitted pursuant to this Section. Where appropriate, EPA may allow submission of supplemental statements of position by the Parties.

b. The Director of the Superfund Division, EPA Region 5, will issue a final administrative decision resolving the dispute based on the administrative record described in ¶ 44.a. This decision shall be binding upon Dover Chemical, subject only to the right to seek judicial review pursuant to ¶¶ 44.c and 44.d.

c. Any administrative decision made by EPA pursuant to ¶ 44.b shall be reviewable by this Court, provided that a motion for judicial review of the decision is filed by Dover Chemical with the Court and served on the United States within 20 days after receipt of EPA's decision. The motion shall include a description of the matter in dispute, the efforts made by the parties to resolve it, the relief requested, and the schedule, if any, within which the dispute must be resolved to ensure orderly implementation of this CD. The United States may file a response to Dover Chemical's motion.

d. In proceedings on any dispute governed by this Paragraph, Dover Chemical shall have the burden of demonstrating that the decision of the Superfund Division Director is arbitrary and capricious or otherwise not in accordance with law. Judicial review of EPA's decision shall be on the administrative record compiled pursuant to ¶ 44.a.

45. Formal dispute resolution for disputes that neither pertain to the selection or adequacy of any response action nor are otherwise accorded review on the administrative record under applicable principles of administrative law, shall be governed by this Paragraph.

a. The Director of the Superfund Division, EPA Region 5, will issue a final decision resolving the dispute based on the statements of position and reply, if any, served under ¶ 43. The Superfund Division Director's decision shall be binding on Dover Chemical unless, within 20 days after receipt of the decision, Dover Chemical files with the Court and serves on the United States a motion for judicial review of the decision setting forth the matter in dispute, the efforts made by the Parties to resolve it, the relief requested, and the schedule, if any, within which the dispute must be resolved to ensure orderly implementation of the CD. The United States may file a response to Dover Chemical's motion.

b. Notwithstanding ¶ K (CERCLA § 113(j) record review of ROD and Work) of Section I (Background) of this CD, judicial review of any dispute governed by this Paragraph shall be governed by applicable principles of law.

46. The invocation of formal dispute resolution procedures under this Section does not extend, postpone, or affect in any way any obligation of Dover Chemical under this CD, except as provided in ¶ 31 (Contesting Future Response Costs), as agreed by EPA, or as determined by the Court. Stipulated penalties with respect to the disputed matter shall continue to accrue, but payment shall be stayed pending resolution of the dispute, as provided in ¶ 54. Notwithstanding the stay of payment, stipulated penalties shall accrue from the first day of noncompliance with any applicable provision of this CD. In the event that Dover Chemical does not prevail on the disputed issue, stipulated penalties shall be assessed and paid as provided in Section XIV (Stipulated Penalties).

XIV. STIPULATED PENALTIES

47. Dover Chemical shall be liable for stipulated penalties in the amounts set forth in ¶¶ 48 and 49 to the United States for failure to comply with the requirements of this CD specified below, unless excused under Section XII (Force Majeure). "Compliance" by Dover Chemical shall include completion of all activities and obligations, including payments, required under this CD, or any deliverable approved under this CD, in accordance with all applicable requirements of law, this CD, the SOW, and any deliverables approved under this CD and within the specified time schedules established by and approved under this CD.

48. Stipulated Penalty Amounts- Work (Including Payments and Excluding Deliverables).

a. The following stipulated penalties shall accrue per violation per day for any noncompliance identified in ¶ 48.b:

Period of Noncompliance	Penalty Per Violation Per Day
1st through 14th day	\$750
15th through 30th day	\$1,500
31st day and beyond	\$2,500

b. Compliance Milestones.

(1) Failure to timely pay Past Response Costs within 30 days after the Effective Date, as required under ¶ 28.a;

(2) Failure to timely pay Future Response Costs within 45 days after Dover Chemical's receipt of each bill as required under ¶29.a, except as otherwise provided in ¶ 31.

(3) Failure to timely initiate Remedial Action Construction or to complete the Remedial Action;

(4) Failure to implement the Operation and Maintenance Plan;

(5) Failure to conduct performance monitoring;

(6) Failure to initiate or complete any further response actions EPA selects for the Site (consistent with the scope of the remedy set forth in ¶ 1.3 of the SOW) pursuant to this CD; or

(7) Failure to establish and maintain financial assurance in compliance with the timelines and other substantive and procedural requirements of Section IX (Financial Assurance).

49. Stipulated Penalty Amounts - Deliverables.

a. **Material Defects.** If (1)(i) an initially submitted deliverable contains a material defect, and the material defect indicates a bad faith lack of effort to submit an acceptable deliverable; or (ii) a resubmitted deliverable contains a material defect; and (2) the initially submitted or resubmitted deliverable is disapproved or modified by EPA under ¶ 6.6(a) (Initial Submissions) or 6.6(b) (Resubmissions) of the SOW due to such material defect, then the material defect shall constitute a lack of compliance for purposes of ¶ 47. The provisions of Section XIII (Dispute Resolution) and Section XIV (Stipulated Penalties) shall govern the accrual and payment of any stipulated penalties regarding Dover Chemical's submissions under this CD.

b. The following stipulated penalties shall accrue per violation per day for failure to submit (1) timely deliverables; (2) Initial Submissions devoid of material defects indicating a bad faith lack of effort to submit an acceptable deliverable; or (3) Resubmissions devoid of material defects, pursuant to the CD:

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

50. In the event that EPA assumes performance of a portion or all of the Work pursuant to ¶ 61 (Work Takeover), Dover Chemical shall be liable for a stipulated penalty in the amount of \$500,000. Stipulated penalties under this Paragraph are in addition to the remedies available under ¶¶ 25 (Access to Financial Assurance) and 61 (Work Takeover).

51. All penalties shall begin to accrue on the day after the complete performance is due or the day a violation occurs and shall continue to accrue through the final day of the correction of the noncompliance or completion of the activity. However, stipulated penalties shall not accrue: (a) with respect to a deficient submission under ¶ 49.a of Section XIV (Stipulated Penalties) of this CD and ¶ 6.6 (Approval of Deliverables) 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 Dover Chemical of any deficiency; (b) with respect to a decision by the Director of the Superfund Division, EPA Region 5, under ¶¶ 44.b or 45.a of Section XIII (Dispute Resolution), during the period, if any, beginning on the 21st day after the date that Dover Chemical's reply to EPA's Statement of Position is received until the date that the Director issues a final decision regarding such dispute; or (c) with respect to judicial review by this Court of any dispute under Section XIII (Dispute Resolution), 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. Nothing in this CD shall prevent the simultaneous accrual of separate penalties for separate violations of this CD.

52. Following EPA's determination that Dover Chemical has failed to comply with a requirement of this CD, EPA may give Dover Chemical written notification of the same and describe the noncompliance. EPA may send Dover Chemical written demand for payment of the penalties. However, penalties shall accrue as provided in the preceding Paragraph regardless of whether EPA has notified Dover Chemical of a violation.

53. All penalties accruing under this Section shall be due and payable to the United States within 30 days after Dover Chemical's receipt from EPA of a demand for payment of the penalties, unless Dover Chemical invokes the Dispute Resolution procedures under Section XIII (Dispute Resolution) within the 30-day period. All payments to the United States under this Section shall indicate that the payment is for stipulated penalties and shall be made in accordance with ¶ 30.b.

54. Penalties shall continue to accrue as provided in ¶ 51 during any dispute resolution period, but need not be paid until the following:

a. If the dispute is resolved by agreement of the parties or by a decision of EPA that is not appealed to this Court, accrued penalties determined to be owed shall be paid to EPA within 30 days after the agreement or the receipt of EPA's decision or order.

b. If the dispute is appealed to this Court and the United States prevails in whole or in part, Dover Chemical shall pay all accrued penalties determined by the Court to be owed to EPA within 60 days after receipt of the Court's decision or order, except as provided in ¶ 54.c.

c. If the District Court's decision is appealed by Dover Chemical, Dover Chemical shall pay all accrued penalties determined by the District Court to be owed to the United States into an interest-bearing escrow account, established at a duly chartered bank or trust company that is insured by the FDIC, within 60 days after receipt of the Court's decision or order. Penalties shall be paid into this account as they continue to accrue, at least every 60 days. Within 15 days after receipt of the final appellate court decision, the escrow agent shall pay the balance of the account to EPA or to Dover Chemical to the extent that they prevail.

55. If Dover Chemical fails to pay stipulated penalties when due, Dover Chemical shall pay Interest on the unpaid stipulated penalties as follows: (a) if Dover Chemical has timely invoked dispute resolution such that the obligation to pay stipulated penalties has been stayed pending the outcome of dispute resolution, Interest shall accrue from the date stipulated penalties are due pursuant to ¶ 54 until the date of payment; and (b) if Dover Chemical fails to timely invoke dispute resolution, Interest shall accrue from the date of demand under ¶ 53 until the date of payment. If Dover Chemical fails to pay stipulated penalties and Interest when due, the United States may institute proceedings to collect the penalties and Interest.

56. The payment of stipulated penalties and Interest, if any, shall not alter in any way Dover Chemical's obligation to complete the performance of the Work required under this CD.

57. Nothing in this CD shall be construed as prohibiting, altering, or in any way limiting the ability of the United States to seek any other remedies or sanctions available by virtue of Dover Chemical's violation of this CD or of the statutes and regulations upon which it is based, including, but not limited to, penalties pursuant to Section 122(l) of CERCLA, 42 U.S.C. § 9622(l), provided, however, that the United States shall not seek civil penalties pursuant to Section 122(l) of CERCLA for any violation for which a stipulated penalty is provided in this CD, except in the case of a willful violation of this CD.

58. Notwithstanding any other provision of this Section, the United States may, in its unreviewable discretion, waive any portion of stipulated penalties that have accrued pursuant to this CD.

XV. COVENANTS BY PLAINTIFF

59. **Covenants for Dover Chemical by United States.** Except as provided in ¶ 60 (General Reservations of Rights), the United States covenants not to sue or to take administrative action against Dover Chemical pursuant to Sections 106 and 107(a) of CERCLA and Section 7003 of RCRA, 42 U.S.C. § 6973, for the Work, Past Response Costs, and recovery of Future

Response Costs. These covenants shall take effect upon the Effective Date. These covenants are conditioned upon the satisfactory performance by Dover Chemical of its obligations under this CD. These covenants extend only to Dover Chemical and do not extend to any other person.

60. **General Reservations of Rights.** The United States reserves, and this CD is without prejudice to, all rights against Dover Chemical with respect to all matters not expressly included within Plaintiff's covenants. Notwithstanding any other provision of this CD, the United States reserves all rights against Dover Chemical with respect to:

- a. liability for failure by Dover Chemical to meet a requirement of this CD;
- 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 the ownership of the Site by Dover Chemical when such ownership commences after signature of this CD by Dover Chemical;
- d. liability based on the operation of the Site by Dover Chemical when such operation commences after signature of this CD by Dover Chemical and does not arise solely from Dover Chemical's performance of the Work;
- e. liability based on Dover Chemical's transportation, treatment, storage, or disposal, or arrangement for transportation, treatment, storage, or disposal of Waste Material at or in connection with the Site, other than as provided in the ROD, the Work, or otherwise ordered by EPA, after signature of this CD by Dover Chemical;
- f. liability for damages for injury to, destruction of, or loss of natural resources, and for the costs of any natural resource damage assessments;
- g. criminal liability;
- h. liability for violations of federal or state law that occur during or after implementation of the Work;
- i. 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 remedy set forth in the ROD, but that cannot be required pursuant to ¶ 13 (Modification of SOW or Related Deliverables); and
- j. liability for costs that the United States incurs at Operable Unit 1 of the Dover Chemical Corporation Superfund Site, which is currently undergoing a separate removal action controlled by the 2000 Administrative Order on Consent.

61. **Work Takeover.**

a. In the event EPA determines that Dover Chemical (1) has ceased implementation of any portion of the Work; (2) is seriously or repeatedly deficient or late in its performance of the Work; or (3) is implementing the Work in a manner that may cause an endangerment to human health or the environment, EPA may issue a written notice ("Work

Takeover Notice”) to Dover Chemical. Any Work Takeover Notice issued by EPA will specify the grounds upon which such notice was issued and will provide Dover Chemical a period of 10 days within which to remedy the circumstances giving rise to EPA’s issuance of such notice.

b. If, after expiration of the 10-day notice period specified in ¶ 61.a, Dover Chemical has not remedied to EPA’s satisfaction the circumstances giving rise to EPA’s issuance of the relevant Work Takeover Notice, EPA may at any time thereafter assume the performance of all or any portion(s) of the Work as EPA deems necessary (Work Takeover). EPA will notify Dover Chemical in writing (which writing may be electronic) if EPA determines that implementation of a Work Takeover is warranted under this ¶ 61.b Funding of Work Takeover costs is addressed under ¶ 25 (Access to Financial Assurance).

c. Dover Chemical may invoke the procedures set forth in ¶ 44 (Record Review) to dispute EPA’s implementation of a Work Takeover under ¶ 61.b. However, notwithstanding Dover Chemical’s invocation of such dispute resolution procedures, and during the pendency of any such dispute, EPA may in its sole discretion commence and continue a Work Takeover under ¶ 61.b until the earlier of (1) the date that Dover Chemical remedies, to EPA’s satisfaction, the circumstances giving rise to EPA’s issuance of the relevant Work Takeover Notice, or (2) the date that a final decision is rendered in accordance with ¶ 44 (Record Review) requiring EPA to terminate such Work Takeover.

62. Notwithstanding any other provision of this CD, the United States retains all authority and reserves all rights to take any and all response actions authorized by law.

XVI. COVENANTS BY DOVER CHEMICAL

63. **Covenants by Dover Chemical.** Subject to the reservations in ¶ 65, Dover Chemical covenants not to sue and agrees not to assert any claims or causes of action against the United States with respect to the Work, past response actions regarding the Site, Past Response Costs, Future Response Costs, and this CD, including, but not limited to:

a. any direct or indirect claim for reimbursement from the EPA Hazardous Substance Superfund through CERCLA §§ 106(b)(2), 107, 111, 112 or 113, or any other provision of law;

b. any claims under CERCLA §§ 107 or 113, RCRA Section 7002(a), 42 U.S.C. § 6972(a), or state law regarding the Work, Past Response Costs regarding the Site, Future Response Costs, and this CD; or

c. any claims arising out of response actions at or in connection with the Site, including any claim under the United States Constitution, the Ohio Constitution, the Tucker Act, 28 U.S.C. § 1491, the Equal Access to Justice Act, 28 U.S.C. § 2412, or at common law.

64. Except as provided in ¶ 73 (Res Judicata and Other Defenses), the covenants in this Section shall not apply if the United States brings a cause of action or issues an order pursuant to any of the reservations in Section XV (Covenants by Plaintiff), other than in ¶¶ 60.a (claims for failure to meet a requirement of the CD), 60.g (criminal liability), and 60.h

(violations of federal/state law during or after implementation of the Work), but only to the extent that Dover Chemical's claims arise from the same response action, response costs, or damages that the United States is seeking pursuant to the applicable reservation.

65. Dover Chemical reserves, and this CD is without prejudice to, claims against the United States, subject to the provisions of Chapter 171 of Title 28 of the United States Code, and brought pursuant to any statute other than CERCLA or RCRA and for which the waiver of sovereign immunity is found in a statute other than CERCLA or RCRA, for money damages for injury or loss of property or personal injury or death caused by the negligent or wrongful act or omission of any employee of the United States, as that term is defined in 28 U.S.C. § 2671, while acting within the scope of his or her office or employment under circumstances where the United States, if a private person, would be liable to the claimant in accordance with the law of the place where the act or omission occurred. However, the foregoing shall not include any claim based on EPA's selection of response actions, or the oversight or approval of Dover Chemical's deliverables or activities.

66. Nothing in this CD shall be deemed to constitute approval or preauthorization of a claim within the meaning of Section 111 of CERCLA, 42 U.S.C. § 9611, or 40 C.F.R. § 300.700(d).

67. Dover Chemical 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.

XVII. EFFECT OF SETTLEMENT; CONTRIBUTION

68. Nothing in this CD shall be construed to create any rights in, or grant any cause of action to, any person not a Party to this CD. Except as provided in Section XVI (Covenants by Dover Chemical), each of the Parties expressly reserves any and all rights (including, but not limited to, pursuant to Section 113 of CERCLA, 42 U.S.C. § 9613), defenses, claims, demands, and causes of action that each Party may have with respect to any matter, transaction, or occurrence relating in any way to the Site against any person not a Party hereto. Nothing in this CD diminishes the right of the United States, pursuant to Section 113(f)(2) and (3) of CERCLA, 42 U.S.C. § 9613(f)(2)-(3), to pursue any such persons 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).

69. The Parties agree, and by entering this CD this Court finds, that this CD constitutes a judicially-approved settlement pursuant to which Dover Chemical has, as of the Effective Date, resolved liability to the United States within the meaning of Section 113(f)(2) of CERCLA, 42 U.S.C. § 9613(f)(2), and 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 CD. The "matters addressed" in this CD are the Work, Past Response Costs, and Future Response Costs.

70. The Parties further agree, and by entering this CD this Court finds, that the complaint filed by the United States commences a civil action within the meaning of Section 113(f)(1) of CERCLA, 42 U.S.C. § 9613(f)(1), and that this CD constitutes a judicially-approved settlement pursuant to which Dover Chemical has, as of the Effective Date, resolved liability to the United States within the meaning of Section 113(f)(3)(B) of CERCLA, 42 U.S.C. § 9613(f)(3)(B).

71. Dover Chemical shall, with respect to any suit or claim brought by it for matters related to this CD, notify the United States in writing no later than 60 days prior to the initiation of such suit or claim.

72. Dover Chemical shall, with respect to any suit or claim brought against it for matters related to this CD, notify in writing the United States within 10 days after service of the complaint on Dover Chemical. In addition, Dover Chemical shall notify the United States 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.

73. **Res Judicata and Other Defenses.** In any subsequent administrative or judicial proceeding initiated by the United States for injunctive relief, recovery of response costs, or other appropriate relief relating to the Site, Dover Chemical shall not assert, and may not maintain, any defense or claim based upon the principles of waiver, res judicata, collateral estoppel, issue preclusion, 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; provided, however, that nothing in this Paragraph affects the enforceability of the covenants not to sue set forth in Section XV (Covenants by Plaintiff).

XVIII. ACCESS TO INFORMATION

74. Except with respect to privileged or protected Records that are identified by Dover Chemical pursuant to ¶ 75.b, Dover Chemical shall provide to EPA, upon request, copies of all records, reports, documents, and other information (including records, reports, documents, and other information in electronic form) (hereinafter referred to as “Records”) within Dover Chemical’s possession or control or that of its contractors or agents relating to activities at the Site or to the implementation of this CD, including, but not limited to, sampling, analysis, chain of custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information regarding the Work. Dover Chemical 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.

75. Privileged and Protected Claims.

a. Dover Chemical 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 Dover Chemical complies with ¶ 75.b and except as provided in ¶ 75.c.

b. If Dover Chemical 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, Dover Chemical shall provide the Record to Plaintiff in redacted form to mask the privileged or protected portion only. Dover Chemical 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 Dover Chemical's favor.

c. Dover Chemical may make no claim of privilege or protection regarding: (1) any data regarding the Site, including, but not limited to, 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 Dover Chemical is required to create or generate pursuant to this CD.

76. **Business Confidential Claims.** Dover Chemical may assert that all or part of a Record provided to Plaintiff under this Section or Section XIX (Retention of Records) is business confidential to the extent permitted by and in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), and 40 C.F.R. § 2.203(b). Dover Chemical shall segregate and clearly identify all Records or parts thereof submitted under this CD for which Dover Chemical asserts business confidentiality claims. Records submitted to EPA and determined to be confidential by EPA will be afforded the protection specified in 40 C.F.R. Part 2, Subpart B. If no claim of confidentiality accompanies Records when they are submitted to EPA, or if EPA has notified Dover Chemical, in writing, that EPA has determined that the Records are not confidential 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 Dover Chemical.

77. If relevant to the proceeding, the Parties agree that validated sampling or monitoring data generated in accordance with the SOW and reviewed and approved by EPA shall be admissible as evidence, without objection, in any proceeding under this CD.

78. Notwithstanding any provision of this CD, 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.

XIX. RETENTION OF RECORDS

79. Until 10 years after EPA's Notice of Work Completion under ¶ 4.8 (Certification of Work Completion) of the SOW, Dover Chemical shall preserve and retain all non-identical copies of Records (including Records in electronic form) now in its possession or control or that come into its possession or control that relate in any manner to its liability under CERCLA with respect to the Site, provided, however, that Dover Chemical must retain, in addition, all Records that relate to the liability of any other person under CERCLA with respect to the Site. Dover Chemical must also retain, and instruct its contractors and agents to preserve, for the same period

of time specified above, all non-identical copies of the last draft or final version of any Records (including Records in electronic form) now in its possession or control or that come into its possession or control that relate in any manner to the performance of the Work, provided, however, that Dover Chemical (and its contractors and agents) must retain, in addition, copies of all data generated during the performance of the Work and not contained in the aforementioned Records required to be retained. Each of the above record retention requirements shall apply regardless of any corporate retention policy to the contrary.

80. At the conclusion of this record retention period, Dover Chemical shall notify the United States, at least 90 days prior to the destruction of any such Records, and, upon request by the United States, and except as provided in ¶ 75 (Privileged and Protected Claims), Dover Chemical shall deliver any such Records to EPA.

81. Dover Chemical certifies that, to the best of its knowledge and belief, after thorough inquiry, it has not altered, mutilated, discarded, destroyed, or otherwise disposed of any Records (other than identical copies) relating to its potential liability regarding the Site since notification of potential liability by the United States and that it has fully complied with any and all EPA and State requests for information regarding the Site pursuant to Sections 104(e) and 122(e)(3)(B) of CERCLA, 42 U.S.C. §§ 9604(e) and 9622(e)(3)(B).

XX. NOTICES AND SUBMISSIONS

82. All approvals, consents, deliverables, modifications, notices, notifications, objections, proposals, reports, and requests specified in this CD must be in writing unless otherwise specified. Whenever, under this CD, notice is required to be given, or a report or other document is required to be sent, by one Party to another, it must be directed to the person(s) specified below at the address(es) specified below. Any Party may change the person and/or address applicable to it by providing notice of such change to the other Party. All notices under this Section are effective upon receipt, unless otherwise specified. Notices required to be sent to EPA, and not to the United States, should not be sent to the DOJ. Except as otherwise provided, notice to a Party by email (if that option is provided below) or by regular mail in accordance with this Section satisfies any notice requirement of the CD regarding such Party.

As to the United States:

EES Case Management Unit
U.S. Department of Justice
Environment and Natural Resources Division
P.O. Box 7611
Washington, D.C. 20044-7611
eescdcopy.enrd@usdoj.gov
Re: DJ # 90-11-3-11517

As to EPA: Margaret Guerriero
Acting Director, Superfund Division
U.S. Environmental Protection Agency
Region 5
77 W. Jackson Blvd
Chicago, IL 60604

and: Colleen Moynihan
EPA Project Coordinator
U.S. Environmental Protection Agency
Region 5
Cleveland Office
25063 Center Ridge Road
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Moynihan.colleen@epa.gov

As to the Regional Financial Management Officer: Richard Hackley
U.S. Environmental Protection Agency
Region 5
77 W. Jackson Blvd. (MF-10J)
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Hackley.richard@epa.gov

At to EPA Cincinnati Finance Center: EPA Cincinnati Finance Center
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cinwd_acctsreceivable@epa.gov

As to Dover Chemical: James Moore
Director, Health, Safety and Environment
Dover Chemical Corporation
3676 Davis Road, N.W.
Dover, Ohio 44622
Jim.moore@doverchem.com

XXI. RETENTION OF JURISDICTION

83. This Court retains jurisdiction over both the subject matter of this CD and Dover Chemical for the duration of the performance of the terms and provisions of this CD for the purpose of enabling either Party to apply to the Court at any time for such further order, direction, and relief as may be necessary or appropriate for the construction or modification of

this CD, or to effectuate or enforce compliance with its terms, or to resolve disputes in accordance with Section XIII (Dispute Resolution).

XXII. APPENDICES

84. The following appendices are attached to and incorporated into this CD:

“Appendix 1” is the map of the Dover Chemical Corporation Superfund Site, including Operable Unit 1 and Operable Unit 2, the latter of which is the subject of this CD.

“Appendix 2” is the ROD.

“Appendix 3” is the SOW.

XXIII. MODIFICATION

85. Except as provided in ¶ 13 (Modification of SOW or Related Deliverables), material modifications to this CD, including the SOW, shall be in writing, signed by the United States and Dover Chemical, and shall be effective upon approval by the Court. Except as provided in ¶ 13, non-material modifications to this CD, including the SOW, shall be in writing and shall be effective when signed by duly authorized representatives of the United States and Dover Chemical. A modification to the SOW shall be considered material if it implements a ROD amendment that fundamentally alters the basic features of the selected remedy within the meaning of 40 C.F.R. § 300.435(c)(2)(ii). Before providing its approval to any material modification to the SOW, the United States will provide the State with a reasonable opportunity to review and comment on the proposed modification.

86. Nothing in this CD shall be deemed to alter the Court’s power to enforce, supervise, or approve modifications to this CD.

XXIV. LODGING AND OPPORTUNITY FOR PUBLIC COMMENT

87. This CD shall be lodged with the Court for at least 30 days for public notice and comment in accordance with Section 122(d)(2) of CERCLA, 42 U.S.C. § 9622(d)(2), and 28 C.F.R. § 50.7. The United States reserves the right to withdraw or withhold its consent if the comments regarding the CD disclose facts or considerations that indicate that the CD is inappropriate, improper, or inadequate. Dover Chemical consents to the entry of this CD without further notice.

88. If for any reason the Court should decline to approve this CD in the form presented, this agreement is voidable at the sole discretion of any Party and the terms of the agreement may not be used as evidence in any litigation between the Parties.

XXV. SIGNATORIES/SERVICE

89. The undersigned representatives of Dover Chemical and the Assistant Attorney General for the Environment and Natural Resources Division of the Department of Justice each

certify that he or she is fully authorized to enter into the terms and conditions of this CD and to execute and legally bind such Party to this document.

90. Dover Chemical agrees not to oppose entry of this CD by this Court or to challenge any provision of this CD unless the United States has notified Dover Chemical in writing that it no longer supports entry of the CD.

91. Dover Chemical shall identify, on the attached signature page, the name, address, and telephone number of an agent who is authorized to accept service of process by mail on Dover Chemical's behalf with respect to all matters arising under or relating to this CD. Dover Chemical agrees to accept service in that manner and to waive the formal service requirements set forth in Rule 4 of the Federal Rules of Civil Procedure and any applicable local rules of this Court, including, but not limited to, service of a summons. Dover Chemical need not file a response to the complaint in this action unless or until the Court expressly declines to enter this CD.

XXVI. FINAL JUDGMENT

92. This CD and its appendices constitute the final, complete, and exclusive agreement and understanding among the Parties regarding the settlement embodied in the CD. The Parties acknowledge that there are no representations, agreements, or understandings relating to the settlement other than those expressly contained in this CD.

93. Upon entry of this CD by the Court, this CD shall constitute a final judgment between and among the United States and Dover Chemical. The Court enters this judgment as a final judgment under Fed. R. Civ. P. 54 and 58.

SO ORDERED THIS __ DAY OF _____, 20__.

United States District Judge
for the Northern District of Ohio


Signature Page for Consent Decree Regarding Operable Unit 2 of the Dover Chemical Corporation Superfund Site

FOR THE UNITED STATES OF AMERICA:

Nov. 7, 2017
Dated



KAREN DWORKIN
Deputy Section Chief
Environmental Enforcement Section
Environment and Natural Resources Division
U.S. Department of Justice
P.O. Box 7611
Washington, D.C. 20044-7611



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Signature Page for Consent Decree Regarding Operable Unit 2 of the Dover Chemical Corporation Superfund Site



MARGARET M. GUERRIERO
Acting Division Director
U.S. Environmental Protection Agency
Region 5
77 W. Jackson Blvd.
Chicago, IL 60604

SUSAN TENNENBAUM
Associate Regional Counsel
U.S. Environmental Protection Agency
Region 5
77 W. Jackson Blvd.
Chicago, IL 60604

Signature Page for Consent Decree Regarding Operable Unit 2 of the Dover Chemical Corporation Superfund Site

FOR DOVER CHEMICAL CORPORATION:

JACK L. TEAT JR.

Jack L. Teat Jr

AUG. 28, 2017

Dated

Name (print):

Title: PRESIDENT

Address: DOVER CHEMICAL CORP
3676 DAVIS RD
DOVER, OH 44622

Agent Authorized to Accept Service
on Behalf of Above-signed Party:

Name (print): JAMES MOORE

Title: DIRECTOR, HEALTH, SAFETY & ENVIRONMENT

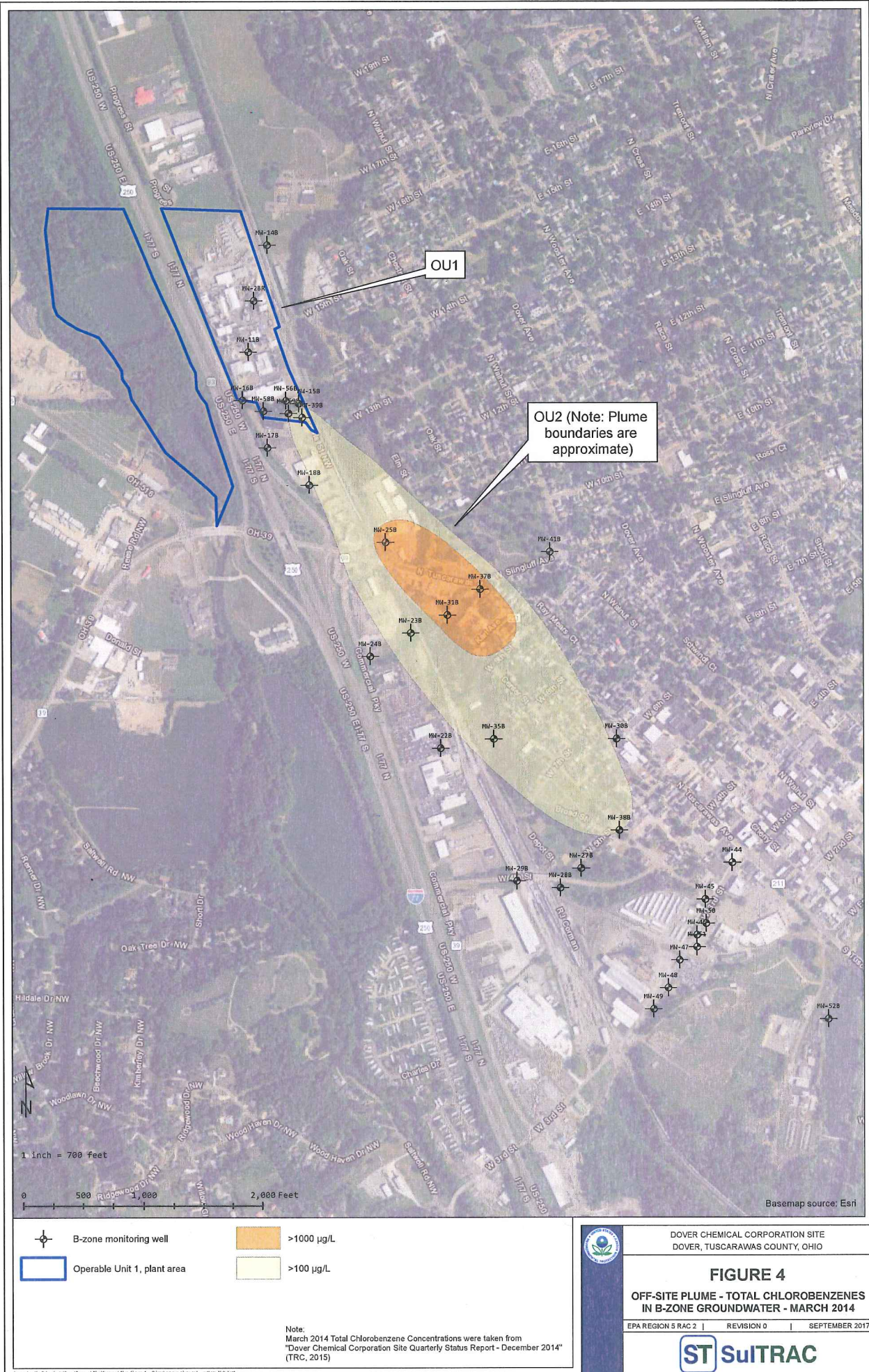
Company: DOVER CHEMICAL CORPORATION

Address: 3676 DAVIS RD.
DOVER OH 44622

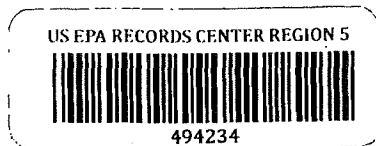
Phone: 330-365-3734

Email: jim.moore@doverchem.com

APPENDIX 1



APPENDIX 2



United States Environmental Protection Agency – Region 5

Record of Decision

Dover Chemical Corporation

Dover, Ohio

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Abbreviation and Acronyms

1,2-DCB	1,2 Dichlorobenzene
1,3-DCB	1,3 Dichlorobenzene
1,4-DCB	1,4 Dichlorobenzene
AOC	Administrative Order by Consent
CCL4	Carbon tetrachloride
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CO2	Carbon dioxide
COCs	Contaminants of Concern
COPC	Contaminants of Potential Concern
CSIA	Compound Specific Isotope Analysis
CSM	Conceptual Site Model
DO	Dissolved oxygen
EPA	Environmental Protection Agency
EPC	Exposure point concentrations
FSA	Feasibility Study Addendum
FSA-II	Feasibility Study Addendum II
HCB	Hexachlorobenzene
HHRA	Human Health Risk Assessment
ISCO	In-Situ Chemical Oxidation
MCB	Monochlorobenzene
MCL	Maximum contaminant limit
mg/l	Milligram per liter
MNA	Monitored Natural Attenuation
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NTCRA	Non-time Critical Removal Action
O&M	Operation and Maintenance
OEPA	Ohio Environmental Protection Agency
PCDDs/PCDFs	Polychlorinated dibenzodioxins and polychlorinated dichlorofurans
ppb	Parts per billion
RAGs	Risk Assessment Guidance for Superfund
RAOs	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation and Feasibility Study
ROD	Record of Decision
RSLs	Regional Screening Levels
SARA	Superfund Amendments and Reauthorization Act of 1986
SVE	Soil Vapor Extraction
TCE	Trichloroethene
TMV	Toxicity, mobility and volume

ug/l	Micrograms per liter
VI	Vapor Intrusion
VISL	Vapor Intrusion Screening Levels
VOCs	Volatile organic compounds
yd ³	Cubic yards

PART 1: THE DECLARATION

I. Site Name and Location

The Dover Chemical Corporation Superfund Site (Site), National Superfund Database identification number OHD 004210563, is located in Dover, Ohio. The Site includes an on-site cleanup component that was addressed as part of a Non-Time Critical Removal Action and Administrative Order by Consent issued by EPA in October 2000, and an off-site groundwater plume. This Record of Decision (ROD) addresses the off-site groundwater contamination plume associated with the Site.

II. Statement of Basis and Purpose

This decision document presents the selected remedy for the off-site groundwater plume. The selected remedy 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), and, to the extent practicable, the National Contingency Plan (NCP). The decision is based on the Administrative Record (AR) file for the Site.

EPA anticipates that the selected remedy will be conducted by the potentially responsible parties pursuant to a Consent Decree. The State of Ohio has indicated concurrence with the selected remedy. Their concurrence letter will be added to the record upon receipt.

III. Assessment of the Site

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

IV. Description of Selected Remedy

Pursuant to an October 2000 Administrative Order by Consent (AOC), Dover Chemical Corporation (Dover Chemical) is addressing the contaminated on-site groundwater via a pump and treat system. This system captures contaminated groundwater on-site so that it does not continue to migrate off-site, and treats the contaminated water via air stripping before discharging to a nearby surface water body under a National Pollutant Discharge Elimination System (NPDES) permit. Dover Chemical has also installed soil vapor extraction systems at two locations on-site to address contaminant source areas. These systems reduce contaminant mass within these sources in the subsurface vadose zone and prevent further groundwater contaminant migration off-site.

The selected remedy includes In-Situ Chemical Oxidation (ISCO) injections in a grid near the origin of the off-site plume, plus injections of an aerobic amendment along the center line of the plume that extends from the origin, followed by monitored natural attenuation (MNA).

V. Statutory Determinations

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate for the remedial action, and is cost effective. The remedy satisfies the statutory preference for treatment as a principal element of the remedy (that is, the reduction of toxicity, mobility or volume of hazardous substances, pollutants or contaminants through treatment).

Because hazardous substances, pollutants, or contaminants will remain on-site above health based levels after completion of remedy implementation, statutory Five-Year Reviews will be conducted every 5 years after initiation of the remedial action to ensure that the remedy is, or will be, protective of human health and the environment. Five-Year Reviews will no longer be needed for this off-site groundwater plume remedial action once remedial action objectives have been achieved.

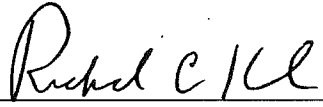
VI. ROD Data Certification Checklist

The following information is included in the Decision Summary Section of the ROD. Additional information for the Site can be found in the Administrative Record located at the Dover Public Library, 525 N. Walnut Street, Dover, Ohio or at the EPA Record Center, 7th Floor, 77 West Jackson, Chicago, IL:

- COCs and their respective concentrations are located in Section V and Section VII.
- An updated Human Health Risk Assessment (HHRA) represented by the COCs is located in Section VII.
- Cleanup levels established for the COCs and the basis for the levels are located in Section V and VII.
- Descriptions of the current and reasonably anticipated future land use assumptions and current and potential future beneficial use of groundwater are located in Section VI.
- A description of the potential land and groundwater use that will be available at the Site as a result of the implementation of the selected remedy is located in Section VI.
- Estimated capital and annual operation and maintenance (O&M) costs, and the number of years over which the remedy cost estimates are projected, are located in Section IX.
- A description of the key factors that led to selecting the remedy is located in Section X and Section XII.

A. Authorizing Signatures and Support Agency Acceptance of Remedy

EPA is the lead agency for developing and preparing this ROD. The State of Ohio is expected to submit a letter of concurrence for the implementation of this selected remedy.



Richard C. Karl, Director
Superfund Division

9-18-15
Date

PART 2: THE DECISION SUMMARY

I. Site Name, Location, and Brief Description

The Dover Chemical Corporation Site is approximately 60 acres in size and consists of a main plant area east of Interstate 77 along with an abandoned canal/lagoon area and a wooded low lying area west of I-77. Land use surrounding the facility is varied and includes industrial, commercial and residential areas. This facility is located in Dover, Ohio. Industrial facilities are located to the north and south. Several blocks of residences are located east of the Site and extend to the north and south. Figure 1 presents a site map.

The Site was began operation in 1951 and was acquired by ICC Industries in 1975. This active facility currently produces alkyl phenols, chlorinated paraffin and organophosphites. The chlorinated paraffin are used for metal working lubricants, flame retardants and plasticizers for vinyl products and the organophosphites are additives used in the polyolefin, rubber and vinyl industries. The first facilities at the Site were constructed before World War II, and the plant has continuously manufactured chemicals from the 1940s to the present.

Operations at the plant have resulted in releases of organic compounds to the ground surface and ultimately to the groundwater at the Site. The compounds released on-site included chlorobenzenes; carbon tetrachloride (CCl₄); polychlorinated dibenzodioxins and polychlorinated dibenzofurans ([PCDDs/PCDFs], a group of compounds referred to collectively as "dioxins"); and other chemicals. Activities that caused the releases of compounds to the environment include the disposal of still bottoms from a chlorobenzene distillation process in a low lying area in the southwest part of the plant area known as Area H; temporary storage of hexachlorocyclohexane (commonly known as benzene hexachloride or BHC) near building 21 in the area known as Area G, in the center of the plant; and various spills, tank and piping leaks, and other unintentional discharges during the 1950s, 1960s, and 1970s. Raw materials from the phenol process used to manufacture chlorobenzenes are believed to have contained dioxins that were concentrated in the still bottoms deposited in Area H (see Figure 2).

II. Site History and Enforcement Activities

Since 1981, multiple environmental investigations were conducted at the Site to assess the impact of contamination to the environment. These investigations identified high concentrations of hazardous substances in soil on-site and in groundwater both on-site and off-site. Substances identified on-site include: CCL₄, chloroform, monochlorobenzene (MCB), 1,2-dichlorobenzene (1,2-DCB), 1,3- dichlorobenzene (1,3-DCB), 1,4-dichlorobenzene (1,4-DCB), 1,2,4-trichlorobenzene, dioxins, hexachlorobenzene (HCB), and trichloroethene (TCE). Off-site groundwater sampling at the time found that similar chlorobenzene compounds had migrated off-site and created an off-site groundwater plume of contamination.

On October 23, 1981, EPA issued a Resource Conservation and Recovery Act (RCRA) Order to Dover Chemical Corporation (Dover Chemical) to study and address soil and groundwater contamination at the Site. After completing the study, Dover Chemical removed approximately

6,800 cubic yards (yd³) of contaminated soil and waste from the Site. In 1982, organic compounds were detected in a water supply well located on the Dover Chemical plant property. As a result of this finding, Dover Chemical initiated additional investigations in 1983 to better define the nature and extent of soil and groundwater contamination associated with the Site.

Between 1983 and 1986, Dover Chemical conducted several additional voluntary investigations at the Site. As part of these investigations, Dover Chemical installed groundwater monitoring wells around the Site. These investigations revealed additional locations of groundwater and soil contamination. The investigations also indicated that contaminated groundwater had migrated southward beyond the boundary of the plant property.

In 1986, Dover Chemical submitted a draft Feasibility Study to EPA and OEPA. After review of this document, EPA determined that additional investigation would be required to determine the nature and extent of the contamination associated with releases at the property.

Based on information gathered from all the years of investigative work conducted at this Site, four areas of concern were identified. These areas are identified as follows:

- Plant area soils
- Lagoon and canal area soils
- Plant area groundwater
- Off-site groundwater plume

Dover Chemical entered into a three party AOC with EPA and OEPA on August 24, 1988. Under this Order, Dover Chemical agreed to complete a Remedial Investigation and Feasibility Study (RI/FS).

During the RI investigation additional chemicals of concern (dioxins and BHC) were discovered in soils on-site. The scope of the 1988 RI investigation was expanded to include the characterization of the environmental media at the Site for these additional constituents.

Based on the concentrations of the additional chemicals found, the EPA requested that Dover Chemical conduct an interim removal action on-site to reduce the mobility and potential for contact with plant area soils containing dioxins. On July 12, 1991, Dover Chemical and EPA entered into an AOC to conduct interim soil cleanup on-site and at adjacent off-site roadways used by Dover Chemical truck traffic. The interim soil cleanup was taken to mitigate direct human exposure and included the following:

- Excavation and removal of off-site soils above the EPA residential area soil cleanup standards for dioxin (1 part per billion (ppb)) and securing on-site soils;
- Capping active plant areas;
- Securing inactive areas with contaminant levels above the soil cleanup standards by installing snow fencing to prevent access;
- Fencing the entire plant area to maintain security and prevent unauthorized access;

- Reducing the average dioxin soil concentration on the Armory property adjacent to the Site to below the soil cleanup standard by removing the soil in area M and adding 6 inches of clean fill and paving to area AC; and
- Removing soil above the soil cleanup standard for dioxin and installing a parking lot and top soil to the east of Building 31 (Area P and part of Area K).

The Armory property and Areas M, AC, P, and K are depicted in Figure 2. The interim action was completed in late 1994.

In 1993, EPA proposed the Site to the National Priorities List (NPL). The Site has not been finalized on the list.

In 1994, Dover Chemical submitted an expanded RI/FS. EPA did not approve the risk assessment portion of the 1994 RI/FS and conducted an independent Site risk assessment.

In August 1999, EPA determined that a non-time critical removal action would be appropriate to address the plant area soils, lagoon and canal area soils, and the plant area groundwater to prevent and mitigate further releases of hazardous substances to the environment. On October 20, 2000, Dover Chemical and EPA entered into an Administrative Order on Consent requiring Dover Chemical to conduct a non-time critical removal action on identified on-site areas. Between 2000 and 2008 Dover Chemical conducted an investigation of the off-site groundwater plume south of the facility was evaluated consistent with the 1988 RI/FS AOC.

Dover Chemical completed soil removal work in the plant area, lagoon area and canal area. Major areas excavated on-site are identified in Figure 3.

A. Off-Site Groundwater Monitoring

The groundwater investigations identified three primary zones within the aquifer. Those zones are identified as follows:

Monitoring well zone designation	Screening location below the water table
A-Zone	0-9 feet
B-Zone	35-50 feet
C-Zone	80-90 feet

Early investigations identified contamination migrating off-site below the A-zone. Off-site B-zone wells were found to have contaminants associated with on-site contamination above drinking water standards. Groundwater in the C-zone was below cleanup standards set for on-site contamination.

Dover Chemical has conducted quarterly groundwater monitoring since 2005. Based on the risk associated with contaminants in the off-site B-zone groundwater plume, nine contaminants of concern (COC) were identified. Concentrations of these contaminants have shown a general decrease over time. Recent maximum concentrations of each contaminant (detected during quarterly sampling in 2013 and 2014) for each contaminant are shown in the following table:

Off-Site Groundwater – Maximum Recent Contaminant Concentrations (B-Zone) September 2013 – June 2014			
	Maximum Concentration Off-Site Wells (ug/l)	Well #	MCL (ug/l)
benzene	0.36J	MW-25B	5
monochlorobenzene	360	MW23B	100
chloroform	0.28	MW25B	100
1,2, dichlorobenzene	1700	MW 31B	600
1,3 dichlorobenzene	300	MW 31B	N/A
1,4 dichlorobenzene	1400	MW 31B	75
1,2,4 trichlorobenzene	8.7	MW 39B	70
1,1 dichloroethane	6.1	MW 35B	7
trichloroethene	16	MW 31B	5

J= estimated value

B. 2013 Feasibility Study – Addendum II

Dover Chemical has completed several FS studies as part of the investigative work conducted since 1981. In 1996, an FS was completed in response to the 1983 AOC. EPA did not approve the off-site groundwater portion of this FS and requested that an addendum be completed to look at ways to address this contamination. In 2001, Dover Chemical submitted an FS Addendum (FSA) for the off-site groundwater plume, which required additional work.

Dover Chemical prepared an FSA work plan to gather additional data to evaluate monitored natural attenuation (MNA) as a viable groundwater cleanup option and prepared a second Feasibility Study Addendum (referred to as the 2013 FSA-II).

Dover Chemical installed an extensive network of piezometers, which demonstrated an inward groundwater flow gradient toward the facility. The existing groundwater pumping scheme, which operates pursuant to the 2000 AOC, effectively prevents contaminated groundwater from leaving the Site.

The 2013 FSA-II provided the following information about the off-site plume:

- the conceptual model;
- the stability of the aquifer such that the plume is not changing over time;

- a three-dimensional delineation of the plume;
- the geochemical conditions; and
- microbial population and compound specific isotopes to evaluate whether the in-situ microbial population is appropriate to biodegrade the plume contaminants.

This work indicates that (1) the off-site groundwater plume is stable in size and is not expanding; (2) the groundwater pumping system has maintained capture of contaminated groundwater on-site and contaminated groundwater is no longer migrating off-site; (3) geochemical conditions within the off-site groundwater plume indicate that natural attenuation including biological processes is naturally occurring in the aquifer; and (4) modification of the geochemical conditions in the off-site plume could accelerate these biological processes and help reduce contaminant concentrations within the plume.

Figure 4 shows the estimated boundaries of the B-zone off-site groundwater plume where total chlorobenzenes exceed 100 ug/l as of March 2014. This is the plume that will be addressed by this action.

C. On-Site Active Remediation

Soil Vapor Extraction (SVE)

To address contaminant sources located in the plant area on-site, Dover Chemical implemented a Soil Vapor Extraction (SVE) system in Area G beginning in 2005. Nearly 50,000 pounds of VOCs have been removed from the subsurface to date. In 2014, Dover Chemical added a second SVE system in Area H to accelerate groundwater cleanup in the plant area (see Figure 2). SVE may be expanded to other areas of the plant in the future.

Groundwater Pump and Treat System

Dover Chemical has used groundwater for non-contact cooling water since the beginning of plant operations. It installed additional production wells in 1988 (PW-5) and 1992 (PW-6) to increase plant cooling water capacity and to keep groundwater contamination from moving off-site. Pumping wells PW-7 and PW-8 were installed in December 2000, and PW-9 was installed in 2004, to minimize mobilization of dioxins and to further reduce the potential for contaminated groundwater to migrate off-site. Figure 2 identifies the locations of the current pumping wells. Extracted groundwater is treated by air stripping to remove VOCs before discharge to Sugar Creek under a National Pollution Discharge Elimination System (NPDES) permit.

Dioxins are relatively insoluble, and are believed to have migrated to the aquifer beneath the Dover Chemical facility in organic liquids. Subsequent dissolution of those liquids is believed to have left the dioxins in the aquifer as small particulates that may be mobilized by groundwater pumping.

With the discovery of dioxins in groundwater on-site, the pumping system was reassessed to help determine an optimal pumping scenario for the production/remediation wells so that Dover

Chemical could continue to recover VOCs without causing migration of dioxins. After a failed attempt in 2005-2007 to optimize the pumping scheme to achieve this goal, Dover Chemical is currently evaluating a revised scheme (pumping scenario 2013A).

III. Community Participation

The Site Investigation and Feasibility Study addendum, proposed plan and other relevant documents for the Site were made available to the public on or before June 22, 2015. These documents can be found in the Site Repository at the Dover Public Library in Dover, Ohio. EPA published the date of the public meeting and location of Site Repository in the Times Reporter Newspaper on June 14, 2015. EPA held a public comment period from June 22, 2015 to July 22, 2015, and a public meeting on June 25, 2015 to present the proposed cleanup plan to the general public. At this meeting, the EPA, with support from the Ohio EPA, answered questions and solicited comments on the EPA proposed cleanup alternatives. A response to the comments received during the comment period is included in the Part 3: Responsiveness Summary section of this ROD.

IV. Scope and Role of Response Action

The remedy selected in this ROD is intended to address the contaminants of concern associated with the off-site groundwater plume. The selected remedy will be implemented under remedial authority pursuant to section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), and 40 CFR 300.430 *et seq.*

The major components of the selected remedy are:

- In-Situ Chemical Oxidation (ISCO) within an injection grid at the origin of the off-site groundwater plume plus injections of an aerobic amendment in a traverse along the center of the off-site groundwater plume as necessary to locally reverse the reducing conditions of the aquifer to promote aerobic biodegradation within the off-site plume,
- Followed by MNA.

V. Site Characteristics

The Site is located in Tuscarawas County in east central Ohio. The facility is located off of Interstate I-77, and consists of four parcels of land encompassing approximately 60 acres near the City of Dover city limits. The City of Dover, Ohio has a population of approximately 13,000. Land use around the Site is varied and includes industrial, commercial, and residential areas.

The Site is located on a meander plain of Sugar Creek that overlies a buried valley filled with glaciofluvial sediments comprised primarily of sand and gravel. The buried valley varies between 0.5 and 2 miles wide and is up to 290 feet deep. In the vicinity of the off-site groundwater plume, the buried valley is greater than 200 feet deep. The upper foot of soil is predominantly fine grained that transitions to coarse sand and gravel below 10 feet. The

permeable outwash deposits result in a relatively homogenous and isotropic aquifer. These deposits are underlain by inter-bedded layers of marine sandstone, shale, limestone, and coal. Locally these consolidated sedimentary strata appear to be horizontal.

A. Monitored Natural Attenuation Analysis of Off-Site Groundwater Plume

The off-site groundwater plume associated with the Site has been defined in three dimensions by the existing monitoring well and piezometer network. The collected data support the consideration of natural attenuation, and include trend analysis, geochemical data, compound specific isotope analysis, and molecular biological assessment with and without in-situ amendments. Table 1 is a summary of well identification numbers and locations in relation to the off-site plume (*i.e.* upgradient, bounding, plume, sentinel), roles of the well (*i.e.* transect, centerline), sampling dates, and field and laboratory analysis methods for monitoring wells screened in the B-zone of the aquifer.

Groundwater elevation data has been collected at the off-site groundwater plume quarterly since 2005. A complete set of groundwater elevation data was collected in June 2012 from all locations, both on-site and off-site, to gain an accurate picture of groundwater flow within the on-site and off-site B-zone plume. Figure 5 presents a contour map of the B-Zone groundwater potentiometric surface (35-50 feet below the water table) using 0.5 foot contour intervals for the off-site plume. The groundwater flow regime is well established and well understood.

B. Trend Analysis

Chlorinated benzene compounds are the predominant contaminants in the off-site groundwater plume. The heart of the off-site plume is downgradient in the natural flow field from a known source area on-site identified as the former fractionation tower area (see Figure 2). Although on-site groundwater is captured by the pumping of multiple extractions wells, (also used by Dover Chemical for non-contact cooling water), it is likely that desorption from soils in the saturated zone off-site continues to contribute chlorinated benzenes to off-site groundwater and on-site groundwater near the extreme southern boundary of the Site at MW-39B.

Since March 2005, Dover Chemical has collected quarterly groundwater monitoring data. In general, contaminant concentrations of monochlorobenzene (MCB), 1,2-DCB, and 1,4-DCB have decreased over time and with distance from the Site. In May 2013, DCBs and MCB concentration plume maps were prepared using data collected from the B-Zone of the aquifer from March 2005 and March 2012 to illustrate concentrations of MCB and DCBs both on-site and within the off-site plume. Figure 6 of this ROD was prepared using the same data set, but only using concentrations for total chlorobenzenes (both MCB and DCBs) in the off-site plume to help illustrate this point. Both sets of plume maps show that the overall contaminant concentrations decreased and the area of the off-site plume shrunk between 2005 and 2012.

Figures 7 and 8 present trend analysis of total DCB and MCB concentrations for quarterly events from 2005 to 2012, using data points along the center line of the off-site groundwater plume at

MW-39B (0.1 mile from the Site), MW-25B (0.3 mile from the Site), MW-31B (0.5 miles from the Site), and MW-38B (0.9 miles from the Site).

The trend analysis for DCB concentrations illustrated in Figure 7 indicates that DCB concentrations decreased over time at MW-39B (near the southern boundary of the Site) and MW-25B (0.3 miles downgradient from the Site), increased at MW-31B (0.5 miles downgradient from the Site), and were not detected at downgradient sentinel well location MW-38B (0.9 miles downgradient from the Site). The trend analysis for MCB concentrations illustrated in Figure 8 indicates that MCB concentrations were below the MCL at MW-39B and trending slightly down from 2005 to 2012. At MW-25B, MCB concentrations trended down toward levels below the MCL. At MW-31B, MCB concentrations were highly variable with no apparent trend and were generally above the MCL. At sentinel well MW-38B, MCB concentrations trended up slightly, but concentrations remained below the MCL. This apparent increase in MCB downgradient may reflect degradation of DCBs to an MCB intermediate.

Figure 9 presents MCB and total DCB concentrations and trend lines from March 2005 through March 2012 for three wells within the most contaminated part of the off-site plume: MW-25B, MW-31B, and MW-37B. MCB and DCB concentrations in wells MW 25B and MW 37B have decreased over time since 2005. At MW-25B, MCB concentrations decreased by about 35% and DCB concentrations decreased by about 55% from 2005 to 2012. At MW-37B, MCB and DCB concentrations decreased by about 35% from 2005 to 2012. At well MW-31B, MCB and DCB concentrations vary irregularly and do not show a clear trend over the time period considered. MCB concentrations in wells MW-25B and MW-37B have trended to below the MCL from 2005 to 2012.

Dover Chemical also analyzed the total mass of the plume using data collected from March 2005 through March 2012 from MW-25B, MW-31B and MW-37B. The results of this analysis are presented in the FSA-II. The analysis shows that DCB mass decreases over time and MCB mass increases over time, supporting the conclusion that natural attenuation processes are reducing the DCB concentrations and producing MCB along the centerline of the off-site plume.

C. Geochemical Conditions

A site specific study was completed to determine if natural attenuation is ongoing in the off-site groundwater plume and whether enhancement through the manipulation of groundwater biogeochemistry would be beneficial. Seventeen monitoring wells located within the off-site groundwater plume were identified for analysis during four quarters of sampling (June 2011, September 2011, December 2011 and March 2012). The following sections of this ROD summarize the geochemical testing conducted.

Dissolved Oxygen (DO) – DO was monitored to assess the current level of oxygen in the B-zone horizon of the aquifer where contamination has been found. DO data are essential for understanding the type of bacteria that may be active in the aquifer and how biodegradation of VOCs of interest could potentially be enhanced. DO data collected from the A-Zone indicate that aerobic conditions ($DO > 1.9$ mg/L) prevail in A-Zone groundwater. DO data collected

from the B-Zone indicate that anaerobic conditions ($DO < 1$ mg/L) prevail in the B-Zone groundwater within, cross-gradient, and upgradient from the off-site contaminant plume. These data indicate that a strong DO gradient exists within the aquifer, with strongly aerobic conditions existing at the water table, dropping quickly to anaerobic conditions within a few feet. Based on this data, natural conditions within the B-Zone where the contaminant plume resides are anaerobic.

pH – pH was monitored to determine relative groundwater acidity that may inhibit biological community health and for evidence of pH depression due to formation of carbon dioxide, generated as a byproduct during biodegradation of chlorinated organic contaminants. Microbial activity generally requires a pH range of 6 to 8. Groundwater pH levels were primarily between 7 and 8.

Eh – Eh was monitored to gather information regarding redox conditions, which indicate whether the B-Zone horizon of the aquifer at a particular well location is a reducing or oxidizing environment. Understanding existing redox conditions is essential in evaluating how to manipulate the subsurface to facilitate in-situ biological contaminant destruction. Results indicate a mild to moderately reduced groundwater capable of supporting reductive dechlorination of chlorinated VOCs.

Carbon Dioxide (CO₂), Chloride – CO₂ and chloride were monitored for evidence of natural degradation of chlorinated organics in the groundwater. The presence of elevated chloride in conjunction with elevated CO₂ can in some instances provide a line of evidence of natural degradation of chlorinated organic groundwater contaminants. Carbon dioxide is formed during the metabolic processes of many biodegradation reactions and is also used as an electron acceptor during the process of methanogenesis. Results of these indicators suggest intrinsic biodegradation is occurring in the heart of the off-site plume.

Dissolved gases: methane, ethene, ethane – Methane forms under strongly reducing conditions while ethene and ethane can be generated from the degradation of chlorinated aliphatic organic contaminants. Methane can be used as a co-metabolite in the aerobic degradation of chlorinated compounds. Methane was not detected in the background well and both ethene and ethane were not detected at any locations throughout the off-site groundwater plume. This suggests that the natural condition of the aquifer is not strongly reducing, and that high concentrations of ethene and ethane are not present within the off-site plume.

Table 2 presents geochemical parameters and VOC concentrations within the off-site plume and boundary wells. A full explanation of these geochemical results can be found in the FSA-II completed for the Site.

D. Biotrap Sampling

Biotraps (also called in-situ microcosms) were used to collect samples for compound specific isotope analysis (CSIA) and microbial population monitoring within the off-site groundwater plume. Both un-baited biotrap (to determine baseline conditions within the aquifer) and baited

biotraps (which included amendments to help evaluate potential for biological enhancement within the aquifer) were deployed and analyzed.

Quantitative polymerase chain reaction (qPCR) was used on bacteria collected from the biotraps to identify specific enzymes present that could only be created by certain bacteria known to degrade chlorinated aliphatic and aromatic compounds. The biotrap analyses identified populations of the following microbes and genes on certain unbaited biotraps:

- dehalococcoides (DHC);
- dehalobacter (DHBt);
- methane oxidizing bacteria (MOB);
- tceA reductase (TCE);
- vinyl chloride reductase (VCR);
- soluble methane monooxygenase (sMMO);
- phenol hydroxylase (PHE); and,
- toluene dioxygenases (TOD).

The qPCR baseline analysis identified concentrations of DHC (produced by reductive dechlorination of TCE); DHBt (produced by reductive dechlorination of MCB and DCBs); and PHE and TOD (produced by oxidation of DCBs) without the addition of amendments. PHE and TOD are bacterial oxygenase genes that are involved with the biodegradation of aromatic compounds such as chlorobenzenes. These functional genes were detected in each of the bio traps. Numbers of PHE and TOD genes detected were higher in baited bio traps from the same wells indicating that the aquifer could benefit from an amendment to accelerate the attenuation of chlorobenzenes in the plume.

Dehalococcoides populations, including TCE reductase gene (tceA) and the vinyl chloride genes (VCR and BVC), are dechlorinating bacteria that are present in some anaerobic aquifers and are well documented degraders of TCE. Limited populations of cells containing the DHC and the TCE functional genes were detected in the traps.

E. Compound Specific Isotope Analysis (CSIA)

The recently developed field of CSIA has emerged as a tool that has proven useful in certain chlorinated organic groundwater contamination situations to assess the occurrence of biodegradation of certain compounds. CSIA can be used to distinguish contaminant degradation caused by biological processes from physical processes. A number of samples were collected and analyzed using CSIA in October 2011 and March 2012. There were some difficulties with these sample analyses. However, the MCB generally became enriched in heavier isotopes as it moved downgradient, supporting the overall conclusion that MCB degradation is occurring within the natural environment and can be bioenhanced. A full explanation of this CSIA sampling can be found the FSA-II.

VI. Current and Potential Future Land and Water Uses

A. Land Use

Land use surrounding the Dover Chemical manufacturing plant consists of mixed residential, commercial and industrial areas. Industrial facilities are located to the north and south of the plant. Several blocks of residences are located east of the Site and extend to the north and south. See Figure 1 for a Site map.

B. Groundwater Use

Groundwater in the Site vicinity is found in glacial outwash sediments that fill stream valleys in the Dover Area. Sediments form a high yield, unconfined aquifer that overlies the valley floor bedrock. The Dover Chemical Site has several wells that pump groundwater for use as noncontact cooling water and have been configured to maintain groundwater capture at the facility. The drinking water source for local residents and industries, as well as the Dover Chemical Company, is a groundwater production field maintained and operated by the City of Dover. This field is located approximately 1,000 feet north of the Dover Chemical property. The City of Dover supplies drinking water for all residences and businesses in Dover, Ohio. These wells are tested on a regular basis and are not contaminated. The City of Dover has an ordinance (No. 34-96), which bans installing groundwater wells for human consumption throughout the City. No potable groundwater wells have been identified within the footprint of the off-site groundwater plume. However, EPA is aware of two locations within the vicinity of the off-site groundwater plume where private wells may be used for non-potable purposes such as watering lawns. These locations include the Warther Museum and Harmon Burial Vault Company. When evaluating risk associated with groundwater use within the vicinity of the off-site groundwater plume, the EPA determined that the residential exposure scenarios were the most conservative for determining the need to remediate the plume.

VII. Summary of Off-Site Risks

In May 1995, EPA completed a Baseline Risk Assessment for the Dover Chemical Site that included both an on-site and off-site risk evaluation as well as an ecological assessment. Potential off-site residential exposure to groundwater was evaluated as part of the 1995 baseline risk assessment. This assessment considered groundwater exposure via three pathways: (1) ingestion, (2) inhalation of VOCs during showering, and (3) dermal contact during showering. However the 1995 off-site groundwater evaluation was based on exposure point concentrations (EPC) calculated using analytical results from six on-site monitoring wells, a majority of which were screened in the shallow portion of the aquifer beneath the Site. Therefore, EPA determined that an updated risk assessment for the off-site portion of the plume, using off-site monitoring well data, was necessary to support the selected remedy for the off-site plume. The EPA completed a risk assessment in 2015 for the off-site portion of the plume.

Superfund Human Health Risk Assessments (HHRAs) are typically prepared following the process in EPA's Risk Assessment Guidance for Superfund (RAGS). Because EPA only

updated the 1995 HHRA for the off-site plume, a streamlined “ratio” approach using Regional Screening Levels (RSLs) was used to evaluate the current risk and hazard posed by the off-site groundwater plume.

A. Risk Assessment Methodology

A HHRA typically consists of four general components:

1. Data Evaluation and Selection of Chemicals of Potential Concern (COPC)
2. Exposure Assessment
3. Toxicity Assessment
4. Risk Characterization

In a typical Superfund HHRA, medium-specific analytical data collected as part of an RI are evaluated and screened using medium-specific screening levels to identify contaminants of potential concern. A conceptual site model (CSM) is developed to present the potential sources of site-related contamination and the release and transport mechanisms by which contamination moves from the sources into and through the environment, resulting in actual or potential human exposure at various locations via various exposure pathways. Exposure parameter values are assumed to characterize a reasonable maximum exposure (RME) condition for each of the receptor-specific exposure pathways identified. These exposure assumptions are used to calculate chemical and pathway-specific exposure doses for each receptor identified.

Next, pathway-specific cancer and non-cancer-based toxicity factors are identified for each of the COPCs in accordance with EPA’s preferred toxicity factor hierarchy. Finally, the exposure doses calculated under RME conditions are combined with the toxicity factors to quantify chemical, pathway, and receptor-specific cancer risk and non-cancer hazards. The risks are compared with EPA’s acceptable cancer risk range (1E-06 to 1E-04) and a target hazard index of 1. The alternative “ratio” approach used to prepare the off-site HHRA for this action is discussed below.

B. Site-Specific Ratio Approach

The ratio approach used to evaluate off-site risk in this case, involves calculating the ratio between concentrations in groundwater and EPA tap water RSLs to evaluate chemical-specific risks and hazards. The tap water RSLs are calculated concentrations in groundwater that incorporate EPA-approved residential exposure assumptions and chemical-specific toxicity factors. Risks and hazards are calculated for COPCs selected according to RAGS guidelines.

C. Data Evaluation and Selection of COPCs

The off-site B-Zone groundwater contamination was evaluated in the 2015 risk assessment. B-Zone has the highest contaminant concentrations within the off-site plume. VOCs are typically

either not detected in the A and C-Zones, or are present at concentrations several orders of magnitude below concentrations in the B-Zone.

COPCs (and EPCs for each of these COPCs) were calculated using the most recent four quarters of analytical data from the center, most concentrated area of the groundwater plume. The B-Zone monitoring wells used for this evaluation include MW-23B, MW-25B, MW-31B, MW-35B, MW-37B, and MW-39B (see Figure 4).

Table 3 outlines the occurrence, distribution and selection of COPCs in the off-site plume.

The 1995 HHRA identified chlorinated organics (primarily VOCs), a limited number of pesticides (including β -BHC and lindane [γ -BHC]), 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD), and a single metal (manganese) as Contaminants of Potential Concern (COPCs) in groundwater. Non-VOC COPCs were either not detected, were detected at levels below their screening levels, or were detected at concentrations below background in the off-site groundwater. Therefore, off-site VOC groundwater data only was necessary for the risk assessment.

The following 10 VOCs were detected in off-site groundwater at concentrations greater than their EPA tap water RSLs and represent the off-site groundwater COPCs:

- Benzene
- Chloroform
- 1,2-DCB
- 1,3-DCB (screened using 1,2-DCB as a surrogate)
- 1,4-DCB
- 1,1-Dichloroethane
- Monochlorobenzene
- Tetrachloroethene
- 1,2,4-Trichlorobenzene
- TCE

D. Human Health Risk Assessment (HHRA) Conclusions

Only residential receptors were evaluated in the off-site groundwater HHRA. Residential receptors are considered the reasonable maximum exposure scenario, and a conservative surrogate for other receptors such as industrial/commercial workers and other general population receptors (such as recreational receptors). Construction and utility workers are unlikely to be exposed to B-Zone groundwater contamination because the B-Zone begins well below the depth of a typical construction/utility trench or excavation. In addition, the presence of the over-lying A-Zone groundwater prevents the migration of volatile B-Zone contaminants into the air within a construction or utility trench.

The 2015 updated HHRA found:

The total cancer risk is 1E-03, which exceeds EPA's target risk range of 1E-06 to 1E-04. COPC-specific risks are summarized below:

- 1,4-DCB (1E-03) – this risk exceeds EPA's target risk range of 1E-06 to 1E-04.
- benzene (4E-06), chloroform (1E-06), 1,1-dichloroethane (2E-06), 1,2,4-trichlorobenzene (5E-06), and TCE (2E-05) – these risks are within EPA's target risk range of 1E-06 to 1E-04.
- tetrachloroethene (7E-07) – this risk is less than 1E-06 and considered insignificant.

The total non-cancer hazard is 10, which exceeds the target hazard of 1. COPC-specific hazards are summarized below:

- 1,2-dichlorobenzene (2), monochlorobenzene (2), and TCE (3). These hazards all exceed 1.
- benzene (0.05), chloroform (0.003), 1,3-DCB (0.4), 1,4-DCB (0.9), 1,1-dichloroethane (0.003), tetrachloroethene (0.2), and 1,2,4-trichlorobenzene (1). These hazards are less than or equal to 1 and considered insignificant individually.
- Collectively, 1,3-DCB, 1,4-DCB, and 1,2,4-trichlorobenzene all affect the same target organ (liver) with a total hazard of 3.

In summary, there are a total of nine groundwater contaminants of concern (COCs) in the off-site groundwater plume with risks greater than or equal to 1E-06 or hazards greater than 1, which were identified (individually or collectively based on target organ):

- Benzene
- Chloroform
- 1,1-Dichloroethane
- 1,2-DCB
- 1,3-DCB
- 1,4-DCB
- Monochlorobenzene
- 1,2,4-Trichlorobenzene
- TCE

E. Vapor Intrusion (VI)

The presence of a lens of uncontaminated groundwater above the contaminated groundwater in the B-zone of the aquifer limits potential for vapor intrusion in the area above the off-site plume.

Residential VI exposure would be to VOCs found in the off-site groundwater from the A-zone, rather than the B-zone. Data from the A-zone in the off-site plume are limited to wells MW 31-A and MW-35A, located in the center of the plume. Review of historical data from these two monitoring wells shows that no samples from A-zone groundwater exceeded the vapor intrusion screening level (VISL) for any of the VOCs except TCE in well MW31A, which exceeded the VISL for TCE in 2004, but did not exceed the VISL in three subsequent samples collected from this well. Additional discussion regarding this comparison can be found in the revised risk assessment completed by EPA in 2015.

Based on current information, there is no significant VI risk or hazard from the off-site groundwater plume. However, existing data indicate that the main body of the groundwater plume passes beneath a primarily industrial area. The currently available A-Zone wells are located in the industrial area, cross-gradient from the residential neighborhood where potential VI receptors are located. Because groundwater data from the A-zone is not available in the residential area, additional evaluation may be merited.

VIII. Remedial Action Objectives

The preferred alternative identified in this ROD is necessary to protect public health, welfare, or the environment from actual or threatened releases of hazardous substances into the environment. Remedial Action Objectives (RAOs) are general descriptions of the goals established for protecting human health and the environment to be accomplished through remedial actions. RAOs normally identify the medium of concern, COCs, allowable risk levels, potential exposure routes, and potential receptors.

The Conceptual Site Model (CSM) is presented in flow chart form in Figure 10. This figure describes the primary contaminant sources, the primary release mechanisms, and migration pathways. Activities that caused the releases of compounds to the environment include disposal of still bottoms from a chlorobenzene distillation process in a low lying area in the southwest part of the plant in Area H; temporary storage of hexachlorocyclohexane (commonly known as benzene hexachloride or BHC) near building 21 in Area G, in the center of the plant; and various spills, tank and piping leaks, and other unintentional discharges during the 1950s, 1960s, and 1970s. Raw materials from the phenol process used to manufacture chlorobenzenes are believed to have contained dioxins that were concentrated in the still bottoms deposited in Area H (see Figure 2). These areas have been controlled on Site. There is a downgradient, secondary source area where contamination has absorbed to subsurface materials just off the Dover Chemical property at the head of the off-site plume. EPA's selected remedy will address this area.

The following RAO has been identified for the Dover Chemical off-site groundwater plume: to prevent residential exposure, via dermal contact, ingestion, or inhalation of groundwater containing site-related contaminants of concern exceeding Maximum Contaminant Levels (MCLs). In addition, consistent with the NCP section 300.430 (a)(iii)(C), the selected remedial action will be expected to return the contaminated off-site groundwater to its beneficial use – drinking water.

The COCs in the off-site groundwater plume and their cleanup standards include:

COC	MCL (µg/L)
Benzene	5
Monochlorobenzene	100
Chloroform	80
1,2-Dichlorobenzene	600
1,3-Dichlorobenzene	NA *see note
1,4-Dichlorobenzene	75
1,1-Dichloroethane	5
1,2,4-Trichlorobenzene	70
Trichloroethene (TCE)	5

Note* There is no MCL or toxicity value available for 1,3 DCB. When evaluating carcinogenic and noncarcinogenic risks for 1,3 DCB, toxicity values for 1,2 DCB were used as a surrogate. Based on the last four quarters of data used to evaluate risk in the off-site groundwater plume, 1,3 DCB has a specific hazard quotient of 0.3. It is when this compound is collectively assessed with 1,4 DCB and 1,2,4 TCB that we see a total hazard of 3 affecting the same target organ (liver). It is expected that once clean up values are reached for all compounds there will be no risk associated with 1,3 DCB.

A. Institutional Controls for Off-Site Groundwater Plume

Currently, groundwater within the off-site groundwater plume is not used for human consumption. The City of Dover has an ordinance (No. 34-96), which bans installing groundwater wells for human consumption. No potable groundwater wells have been identified within the footprint of the off-site groundwater plume. As part of the 2000 AOC, Dover Chemical implemented institutional controls for the on-site areas in the form of a restrictive covenant in August 2006.

IX. Description of Alternatives

A total of four remedial alternatives were developed to address the off-site groundwater contamination. The following cleanup alternatives were evaluated against the nine criteria identified in the National Contingency Plan (NCP). These alternatives are:

- Alternative 1 - No Action.
- Alternative 2 – Monitored Natural Attenuation (MNA).
- Alternative 3 - Chemical Injection followed by MNA. Each of the sub Alternative 3 scenarios combines Alternative 2 – MNA with chemical injection in a gridded area near the Site boundary. Alternative 3B and Alternative 3C also include additional amendment injections, down-gradient along the center line of the off-site plume, as necessary to

enhance biological degradation within the plume either aerobically or anaerobically (see Figure 11). EPA anticipates that Site-specific bench- and /or pilot testing will be performed as part of the Remedial Design to help determine the optimal implementation for this alternative. These sub-alternatives include:

Alternative 3A - In-Situ Chemical Oxidation (ISCO), followed by Alternative 2-MNA in the heart of plume.

Alternative 3B - ISCO plus aerobic amendments followed by Alternative 2- MNA.

Alternative 3C - ISCO plus reductive dechlorination followed by Alternative 2- MNA.

- Alternative 4 - (Also known as Alternative 4B in the FSA II) Groundwater extraction and treatment by air stripping off-site.

Alternative 1 - No Action

Estimated Capital Cost: \$0

Estimated Total O&M Cost: \$0

Estimated Present worth Cost: \$0

Estimated Construction Timeframe: N/A

Estimated Time to Reach RAO: N/A

Regulations governing the Superfund program require that the “no action” alternative be evaluated to establish a baseline for comparison. Under this alternative, there would be no action to address the off-site groundwater plume. The conditions of the off-site plume would remain unaltered except for changes that may occur naturally, without intervention or other action. No groundwater monitoring would occur.

Alternative 2 - Monitored Natural Attenuation (MNA)

Estimated Capital Cost: \$200,000

Estimated Total O&M: \$3,400,000

Estimated Present worth Cost: \$1,800,000

Estimated Construction Timeframe: none

Estimated Time to Reach Remediation Goals: 23 years±

This alternative relies on natural attenuation processes to achieve site specific remedial objectives within a timeframe that is reasonable compared to other methods. The natural attenuation processes that are at work in this approach induce a variety of physical, chemical or biological processes such as diffusion, dispersion, absorption, and degradation, that act without human intervention to reduce toxicity, mobility, or volume of contaminants in soil and groundwater. The groundwater plume is monitored until the remedial action objectives are achieved.

The estimated time for this alternative to reach remediation goals is 23 years. It should be noted however, that the MNA time frame is based on an assumption provided as part of the 2001 Draft FSA that no continued mass loading was occurring in the plume. It is anticipated that without addressing absorbed contamination at the head of the off-site groundwater plume, the time frame to reach RAOs could be significantly longer. The total estimated capital, annual operation and maintenance, and total present worth costs, using a discount rate of 7% over 30 years is presented in Appendix B.

Alternative 3A - In-Situ Chemical Oxidation (ISCO) within the injection grid, followed by MNA in the heart of plume.

Estimated Capital Cost: \$2,300,000
Estimated Total O&M: \$4,500,000
Estimated Present Worth Cost: \$4,800,000
Estimated Construction Timeframe: 1 year
Estimated time to Reach Remediation Goals: 25 – 28 years

This alternative is a combination of ISCO injections in a gridded area near the origin of the off-site plume, followed by Alternative 2-MNA. This alternative is designed to reduce the chlorinated benzene levels at the up-gradient portions of the off-site plume, and ultimately throughout the plume as groundwater flows down gradient. The injection design consists of a combination of chemical oxidants in a 54,000 square foot area intended to address residual soil contamination below the water table. Re-injections would be performed as necessary until contamination in the area of the injection grid is reduced sufficiently such that mass loading of the off-site plume has ceased. The remaining portion of the off-site plume would be degraded via MNA processes. Site Specific bench and/or pilot scale testing would be performed as part of the Remedial Design process. Performance monitoring would be conducted during the implementation of this action to assure the action is performing as expected.

The estimated time for this alternative to reach remediation goals is 25 – 28 years. This time frame is based on the calculations that following the injections, it will take approximately 2 – 5 years to reach remediation goals in this area. While the remainder of the off-site ground water plume would take approximately 23 years under MNA to reach remedial goals. The total estimated capital, annual operation and maintenance, and total present worth costs, using a discount rate of 7% over 30 years is presented in Appendix B for this alternative.

Alternative 3B - ISCO plus aerobic amendments followed by Alternative 2 - MNA.

SELECTED REMEDIAL ACTION

Estimated Capital Cost: \$3,700,000
Estimated Total O&M: \$6,000,000
Estimated Total Present worth Cost: \$7,400,000
Estimated Construction Timeframe: 3 years

Estimated Time Frame to Reach Remediation Goals: 5 to 7 years

This alternative combines ISCO injections in a grid near the origin of the off-site plume and injections of an aerobic amendment in traverses along the center of the off-site plume to locally reverse the reducing conditions of the aquifer, promoting aerobic biodegradation within the offsite plume, followed by Alternative 2 – MNA. This approach will chemically oxidize the chlorinated benzenes at the origin of the plume and promote aerobic biodegradation in the center of the plume.

This alternative would be implemented in a phased approach. The initial phase would include at least one injection of chemical oxidants, then continued groundwater quality and MNA parameter monitoring within the off-site plume.

After a minimum of four rounds of quarterly monitoring, data would be evaluated to determine when to inject amendments to stimulate aerobic bioremediation down-gradient off-site in traverses along the center line of the plume. The amendments would include oxygen and micronutrients to the target zone. Continued monitoring would be conducted to inform the need for additional injections.

It is estimated that remediation goals would be met within 5 years following the completion of injections. The total estimated capital, annual operation and maintenance, and total present worth costs, using a discount rate of 7% over 30 years is presented in Appendix B for this alternative.

Alternative 3C - ISCO plus reductive dechlorination followed by Alternative 2-MNA.

Estimated Capital Cost: \$3,300,000

Estimated Total O&M Cost: \$6,200,000

Estimated Total Present Worth Cost: \$7,200,000

Estimated Construction Timeframe: 3 years

Estimated time to Reach Remediation Goals: 10 to 12 years

This alternative combines ISCO injections in a grid near the origin of the off-site plume and injections of an anaerobic amendment in traverses along the center of the off-site plume to enhance reductive dechlorination. This approach will chemically oxidize the chlorinated benzenes at the origin of the plume and promote anaerobic biodegradation in the plume center.

This alternative would be implemented in a phased approach. The initial phase would include at least one injection of chemical oxidant near the origin of the off-site plume, and continued groundwater quality and MNA parameters monitoring within the off-site plume.

After a minimum of four rounds of quarterly monitoring, data will be evaluated to determine when to inject anaerobic amendments to the target zone within the plume. Continued monitoring would be conducted to inform the need for additional injections.

It is estimated that remediation goals would be met within 10 years following the completion of injections. The total estimated capital, annual operation and maintenance, and total present worth costs, using a discount rate of 7% over 30 years is presented in Appendix B for this alternative.

Alternative 4 - Pump and Treat by Air Stripping off-Site

Estimated capital Cost: \$4,900,000

Estimated Total O&M Cost: \$17,600,000

Estimated Present Worth Cost: \$12,500,000

Estimated Construction Timeframe: 6 months

Estimated Time to Reach Remediation Goals: over 30 years

This alternative includes the installation of three pumping wells, off-site air stripping treatment of contaminated groundwater, with treated water being discharged to Sugar Creek. The volatilized contaminants would be captured on carbon. The estimated time to reach remediation goals is over 30 years. The total estimated capital, annual operation and maintenance, and total present worth costs, using a discount rate of 7% over 30 years is presented in Appendix B for this alternative.

X. Comparative Analysis of Alternatives

In accordance with the National Contingency Plan (NCP), nine criteria are used to evaluate the different remediation alternatives individually and against each other in order to select a remedy. This section of the Record of Decision profiles the relative performance of each alternative against the nine criteria, noting how it compares to the other options that were considered. The nine evaluation criteria are described below. The "Detailed Analysis of Alternatives" can be found in the FSA-II.

Overall Protection of Human Health and the Environment determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

Compliance with ARARs evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.

Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.

Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.

Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

Cost includes estimated capital and annual operation and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms with today's dollar value. Cost estimates are expected to be accurate within a range of +50 and -30 percent.

State/Support Agency Acceptance considers whether the State agrees with EPA's analysis and recommendations, as described in the Proposed Plan.

Community Acceptance considers whether the local community agrees with EPA's analysis and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

A. Comparison of Alternatives to the Nine Criteria

The comparative analysis of the remedial alternatives is presented below:

1. Overall Protection of Human Health and the Environment

The overall protection associated with each alternative is based largely on the exposure pathways and scenarios set forth in the baseline human health risk assessment (HHRA).

Alternative 1, No Action, would not provide protection of human health and the environment, as it would do nothing to treat, remove, or isolate the contaminated groundwater in the Dover off-site plume. While there are no current exposures to the Dover Chemical off-site contaminated groundwater plume, the No Action alternative would allow this contaminated groundwater to remain, which could result in future exposures.

Alternative 2, MNA, may provide protection of human health and the environment; however, it is uncertain how long it would take Alternative 2 to achieve remedial action objectives, and it is unlikely to do so in a reasonable timeframe. The estimated time to achieve RAOs was derived from the earlier 1996 FS. In that document, the time to achieve cleanup goals was only provided for MCB, estimated at 12 years and p-DCB, estimated at 23 years, assuming no continued mass loading to the plume. Since the plume mass loading would continue without upgradient treatment, Alternative 2 would be expected to take much longer than 23 years.

Alternatives 3A, 3B, 3C and 4 would provide protection of human health and the environment.

Based on Site specific data provided to the vendors familiar with this type of work, it was estimated that it would take 2-5 years to reach remediation goals for Alternative 3A in the higher concentrated plume grid area. After that, the timeframe estimated (an additional 23 years) to

reach cleanup goals via MNA would apply. This would result in an overall timeframe to reach cleanup goals of between 25 to 28 years.

Using published biodegradation half-life values for contaminants found in the off-site groundwater, it is estimated that Alternative 3B would reach RAOs in 5 to 7 years, and Alternative 3C would reach RAOs in 10 to 12 years. Both of these alternatives address the higher concentration grid area followed by additional treatment along the heart of the plume with either aerobic amendments (Alternative 3B) or anaerobic amendments (Alternative 3C). In the case that RAOs are not met in the calculated timelines, both of these alternatives allow for the use of MNA, should that be necessary, following the completion of amendment injections. If MNA is necessary, the full time to reach RAOs would be far less than the 23 years estimated for MNA in Alternative 3A.

It is estimated that Alternative 4 would take over 30 years (anywhere between 20 – 144 years) to reach RAOs.

2. Compliance with ARARs

The ARARs associated with the remedial alternatives include the following:

Groundwater

Safe Drinking Water Act (SDWA) (42 U.S.C 300 *et seq.*) – The groundwater in the vicinity of the Site is used as a municipal drinking water supply for the City of Dover and some residents via private drinking water wells, including those located along 14th street to the east of the facility. There are currently no known uses of groundwater as a potable water supply within the limits of the off-site groundwater plume. The national Primary Drinking Water Standards, promulgated under the SDWA are Maximum Contaminant Levels (MCLs), which are numerical human health based drinking water limits. MCLs have been established for all but one of the contaminants of concern.

Ohio Drinking Water Regulations (OAC 3745-81) – The Ohio Drinking Water Regulations represent the State equivalent of the SDWA.

Surface Water

Clean Water Act (CWA) (33 U.S.C. 1251 *et seq.*) – The CWA is an ARAR for remedial Alternative 4 which involves the discharge of treated water to a surface water body. This alternative would likely include the discharge of treated water to Sugar Creek.

Ohio Surface Water Quality Criteria (OAC 3745-01) – The Ohio Surface Water Quality Criteria represent the State equivalent of the CWA.

A complete table of potential ARARs associated with the remedial action alternatives considered for this action are summarized in Appendix A.

Alternative 1 and Alternative 2 would not comply with ARARs in the foreseeable future as the current contaminant concentrations in the off-site plume would remain above applicable criteria (SDWA MCLs) for an extended length of time.

Alternatives 3A, 3B and 3C and Alternative 4 would comply with ARARs.

3. Long-Term Effectiveness and Permanence

Alternative 1 would not achieve long term effectiveness.

Alternatives 3A, 3B and 3C would achieve long term effectiveness and permanence through eventual complete destruction of the COCs within the off-site plume to harmless end products. Alternative 2 and Alternative 4 would eventually achieve long term effectiveness and permanence; however the time frames would be significantly greater than with Alternatives 3A, 3B and 3C.

4. Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment

No reduction of contaminant toxicity, mobility or volume would be provided by Alternative 1. The off-site plume would be allowed to remain in place at its current location and concentrations. Alternative 2 would include monitoring to document the reduction of the toxicity and volume of contaminants through natural processes.

Alternatives 3A, 3B, and 3C would result in the reduction of contaminants toxicity, mobility, and volume through chemically-injected treatment. Alternative 3A includes less treatment than Alternatives 3B and 3C. Alternative 4 would include reduction in the volume of contaminated groundwater via extraction from the subsurface, and transfer of contaminants to vapor-phase through air stripping treatment. Contaminants in vapor phase would be captured onto carbon.

5. Short-Term Effectiveness

Alternative 1 would take no time to implement and would present no additional short-term risks.

Alternative 2 would require monitoring groundwater, which presents very little short-term risk. It would require very little time to originally implement, however it would take a very long time to reach remedial action objectives.

Alternatives 3A, 3B and 3C would also present very little short term risk. Groundwater monitoring and injection of substrate presents little risk to the community. Based on estimated cleanup times presented in the FSA-II, contaminant concentration would be expected to decline within a faster time frame than other options.

The groundwater extraction and treatment included in Alternative 4 would present minimal short-term risk to the local community. However, it would require more construction activity than the other alternatives.

The estimated time for each of the alternatives to achieve RAOs is presented above in the *Overall Protection of Human Health and the Environment* section.

6. Implementability

All of the alternatives are readily implementable.

Alternatives 1 and 2 would be the most implementable. Alternative 3A would be moderately more difficult to implement as an access agreement would be required beyond the Dover Chemical Plant boundaries.

Alternatives 3B and 3C would be slightly more difficult to implement than Alternative 3A as numerous access agreements would be required to implement the additional injections required as part of these alternatives.

Alternative 4 presents the greatest degree of difficulty to implement. In addition to numerous long term access agreements, this alternative requires permitting and significant construction activities.

7. Cost

The estimated present value cost for Alternative 2 is \$1.8 million; Alternative 3A is \$4.8 million; Alternative 3B is \$7.4 million; Alternative 3C is \$7.2 million; and Alternative 4 is \$12.5 million. Complete cost tables for each of the alternatives considered can be found in Appendix B.

8. State/Support Agency Acceptance

The State of Ohio has indicated concurrence with the selected remedy. Their concurrence letter will be added to Appendix C of this document upon receipt.

9. Community Acceptance

A small number of public comments were received on the proposal. Most comments were in support of the proposed alternative.

XI. Principal Threat Wastes

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site whenever 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. Source materials include or contain hazardous substances, pollutants, or contaminants that act as a

reservoir for migration of contamination to groundwater, surface water or air, or act as a source for direct exposure. Principal threat wastes 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 decision to treat these wastes is made on a site-specific basis through a detailed analysis of the alternatives using the nine remedy selection criteria. This analysis provides a basis for making a statutory finding that the remedy employs treatment as a principal element. Contaminated groundwater generally is not considered to be a source material.

The heart of the off-site Dover Chemical plume is down gradient from the on-site source area known as the former fractionation tower. It is possible there is some desorption from soils at the origin of the off-site plume that continues to contribute chlorinated benzenes to groundwater (see Figure 11). These areas that may continue to desorb chemicals may be considered "source areas" which would be addressed through the preferred Alternative 3B.

XII. Selected Remedy

EPA Region 5 has selected Alternative 3B to address the off-site groundwater plume associated with the Dover Chemical Corporation Site.

The selected remedy must be protective of human health and the environment, comply with ARARs, and be cost-effective. With the exception of Alternative 1, all of the alternatives would be protective and comply with ARARs.

There is some uncertainty that Alternative 2 would comply with ARARs and meet RAOs in a reasonable timeframe. There is potential for continued contaminant mass loading to the off-site plume from residual soil contamination.

Alternatives 3A, 3B, and 3C would protect human health and the environment and achieve MCLs in a reasonable time frame. Alternatives 3B and 3C present greater implementation difficulties due to the need to gain access to properties owned by others. Of the three alternatives, 3A is less likely to impact all areas of concern in a reasonable time frame.

Alternative 3A treats only the area near the origin of the off-site plume and does not provide treatment for the remainder of the plume. Alternatives 3B and 3C treat the area near the origin of the off-site plume and provide treatment along the center of the off-site plume to help shrink it faster. Alternative 3B uses an aerobic chemical amendment to address the chlorobenzenes, while Alternative 3C increases the anaerobic degradation rate within the plume. It is believed that chlorobenzenes can be degraded both aerobically and anaerobically; and biodegradation generally proceeds faster aerobically. Therefore, Alternative 3B is expected to be able to achieve reduction in concentrations and meet cleanup standards for chlorobenzenes in a more timely fashion.

Alternative 4 can also provide protection of human health and the environment and achieve ARARs. However, the time frame associated with this alternative is expected to be extensive. This option would also be the most expensive of all the options to implement.

Alternative 3B was selected over other alternatives because it is expected to achieve substantial and long-term risk reduction through treatment, and it is expected to prevent future exposure to currently contaminated groundwater. The selected alternative also reduces the risk within a reasonable time frame at a reasonable cost when compared to costs associated with Alternative 4. This alternative also provides for long-term reliability of the remedy.

It is anticipated that Site-specific bench and/or pilot-testing will be performed prior to the remedial design and remedial action. This activity will help determine the optimal location for ISCO treatment and geochemical amendment.

Based on the information available at this time, EPA with OEPA concurrence, believes that Alternative 3B will be protective of human health and the environment, will comply with ARARs, will be cost-effective, and will utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. It will treat the contaminated groundwater and will meet the statutory preference for the selection of a remedy that involves treatment as a principal element.

XIII. Statutory Determinations

Under CERCLA Section 121 (as required by the NCP section 300.430(f)(5)(ii)), EPA must select remedies that are (1) protective of human health and the environment, (2) comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), (3) are cost effective, and (4) use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity or mobility of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the selected remedy meets these statutory requirements.

A. Protection of Human Health and the Environment

The selected remedy, Alternative 3B, will protect human health and the environment by addressing the Site risks through treatment via ISCO injection and aerobic amendments to stimulate naturally occurring processes within the off-site groundwater plume. Contaminant levels would be reduced to meet the cleanup goals established.

B. Compliance with Applicable or Relevant and Appropriate Requirements

The selected remedy for the Dover Chemical Site meets the respective ARARs. Attachment A includes the lists of the federal and state chemical specific, location specific and action specific ARARs for the selected remedy.

C. Cost Effectiveness

The selected remedy is cost effective and represents a reasonable value for the money to be spent. Pursuant to NCP Section 300.430(f)(1)(ii)(D), the selected remedy is considered cost effective if the costs are proportional to the remedy's overall effectiveness. The overall effectiveness of the remedial alternative is determined by evaluating the following three of the five balancing criteria: (1) long term effectiveness and permanence; (2) reduction in toxicity, mobility and volume through treatment (TMV); (3) short-term effectiveness. Overall effectiveness is then compared to cost to determine whether a remedy is cost effective.

Alternatives 2, 3A, 3B, and 3C are all cost effective but Alternative 3B provides a greater return on investment compared to the other alternatives. Alternative 1, No Action, does not meet the threshold criteria and was not further evaluated. Alternative 2 is the least expensive of the alternatives considered, but it does not provide treatment for the principal threat source material and it is uncertain if it would meet RAOs in a reasonable timeframe. Alternative 4, Pump and Treat, is the most costly alternative evaluated at \$12.5 million; and the time line associated with the cleanup is estimated to be far longer than what would be required for Alternatives 3A, 3B, and 3C.

Alternatives 3A, 3B, and 3C provide treatment, but alternatives 3B and 3C provide additional treatment in the heart of the plume to address contamination in the short term. The selected remedy, Alternative 3B, is expected to reduce VOC contaminant levels faster than 3C.

EPA evaluated alternatives 2, 3A, 3B, 3C, and 4 for overall effectiveness and then compared their costs to determine which remedies were cost effective. All alternatives are cost effective but Alternative 3B provides the best balance of the nine criteria with cost.

D. Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

EPA has determined that the selected remedy for the Dover Chemical Site represents the maximum extent to which permanent solutions and treatment technologies can be used in a practicable manner at the site. Of the alternatives that are protective of human health and the environment and comply with ARARs, EPA has determined that the selected remedy provides the best balance of trade-offs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element, and considering State and community acceptance.

The selected remedy, Alternative 3B, treats contamination through ISCO plus aerobic amendments by injection. Both of these processes have been implemented at other hazardous waste sites and the technology can be readily implemented. The treatment of this principal threat material satisfies the criteria for long term effectiveness and reduction of toxicity, mobility or volume through treatment without the implementability and short term effectiveness issues associated with Alternative 4.

E. Preference for Treatment as a Principal Element

The selected remedy, Alternative 3B, satisfies the preference for treatment as a principal element since contaminated areas will be treated by in-situ chemical oxidation and aerobic injections. This is expected to restore groundwater to federal and state drinking water standards.

F. Five Year Review Requirements

Because Alternative 3B will result in hazardous substances, pollutants or contaminants remaining in groundwater above levels that allow for unlimited use and unrestricted exposure, a statutory review of the remedy will be conducted every 5 years after initiation of remedial action until remedial action objectives are achieved, to ensure that the remedy is, or will be, protective of human health and the environment.

XIV. Documentation of Significant Changes from Preferred Alternative of Proposed Plan

EPA released the Proposed Plan for the off-site groundwater plume for public comment on June 22, 2015. The Proposed Plan identified Alternative 3B as the preferred alternative for addressing the risks for the Dover Chemical Corporation off-site groundwater plume. EPA reviewed all written and verbal comments submitted during the public comment period and determined that no significant changes to the remedy as originally identified in the Proposed Plan were necessary or appropriate.

PART 3. RESPONSIVENESS SUMMARY

As required by CERCLA section 117, NCP sections 300.430(f)(3)(i)(F) and 300.430(f)(5)(iii)(B), EPA is required to prepare a written summary of significant comments, criticisms and new relevant information submitted during the public comment period and develop a response to each issue. A complete copy of all comments received is included in the Administrative Record for the Site. A copy of the completed public meeting transcript is also included in the Administrative Record.

A. Stakeholder Issues and EPA Responses

Comments received from Dover Chemical Corporation on the proposed plan follow. EPA responses indicate that modifications and changes are part of the ROD:

General Comment

“During the Annual Meeting held at DCC, on April 14, 2015, DCC affirmed and EPA acknowledged that there are other potential sources in the area that contribute to the offsite groundwater plume, including contaminants of concern 1,1-DCA, PCE, TCE, and benzene.”

EPA concurs with this comment.

Specific Comments on the Proposed Plan

1. “Section II.a, Off-Site Groundwater Monitoring, Table: Maximum Recent Contaminant Concentrations (B-Zone). Units are missing from maximum concentration column. “J” qualifier is not defined.”

Units ($\mu\text{g/L}$) have been added to the table and J qualifier has been defined on the table used in the ROD.

2. “Section II.b. paragraph 1. The 1996 Feasibility Study was completed in response to the 1983 AOC, it was not part of the 1983 AOC.”

EPA concurs with this statement. ROD language has been adjusted.

3. “Section IV, Site Characteristics. The subsection, Monitored Natural Attenuation, first paragraph, appears to be out of place. Should be presented in the alternatives section or removed.”

EPA concurs with this statement and will make any adjustments in the ROD language as required.

4. “Section IV, Site Characteristics, Trend Analysis, paragraph 5. The text should be revised to reference MW-25B. Currently the text incorrectly references MW-31B in several trend statements.”

The text portion used in the ROD has been modified to more accurately describe the concentration trends illustrated in Figure 9.

5. "Section IV, Site Characteristics, Geochemical Conditions, Dissolved Oxygen. The section discusses the natural conditions of the B-Zone portion of the aquifer. The text states B-Zone natural conditions are aerobic. The data collected for the Offsite Groundwater Plume Feasibility Study indicate B-Zone groundwater is anaerobic (Table 2, Well MW-14B). The text should be revised."

A DO survey conducted after the Proposed Plan was prepared indicates that A Zone groundwater typically has DO concentrations indicating aerobic conditions, and that B-Zone groundwater within, cross-gradient, and upgradient from the contaminant plume has low DO concentrations and is considered anaerobic. Information used in the ROD has been modified.

6. "Section IV, Site Characteristics, Biotrap Sampling, paragraph 2. The text should be expanded to state that qPCR was used to identify bacteria known to degrade chlorinated aliphatic and aromatic compounds."

The text used in the ROD from this section has been modified.

7. "Section V, Scope and Role of the Action, second paragraph. B-zone is incorrectly defined as beginning below the upper 10-feet of saturated thickness. B-zone has been defined as 35-50 feet below the water table."

This text was not included in the ROD; all other references to the B-Zone indicate that the B-Zone extends from 35 to 50 feet below the water table.

8. "Section VI, Summary of Site Risks, Vapor Intrusion, paragraph 1, second sentence. The statement regarding risk should be revised. There is currently no risk identified to residential receptors for vapor intrusion from A-Zone groundwater associated with Dover Chemical, based on the groundwater sampling completed to date."

The discussion of vapor intrusion risks as written does not indicate that a risk has been identified from A-Zone groundwater. The statement indicates that if vapor intrusion posed a risk, the risk would originate from A-Zone groundwater rather than from B-Zone groundwater, and that A-Zone groundwater data in the residential area is somewhat limited.

9. "Section VI, Summary of Site Risks, Vapor Intrusion, paragraph 2, last sentence. The statement regarding plume orientation should be revised. There is no A-Zone contaminant plume in the Offsite Groundwater Plume."

The discussion of vapor intrusion risks in the proposed plan does not indicate that there is a contaminant plume in the A-Zone. The statement indicates that A-Zone groundwater data is limited to the industrial area and that future evaluation of vapor intrusion risks in the residential area may be merited. The Proposed Plan indicated that residential receptors may be present downgradient from the plume. This section has been modified for clarity in the ROD.

10. "Section VIII, Description of Alternatives, fourth bullet, Alternative 4, last sentence. Please clarify that this alternative includes the extraction of groundwater with a treatment

facility to be constructed at a location in the community and off the Dover Chemical Plant property.”

Text used in the ROD has been modified to clarify this.

Comments received from the Ohio Environmental Protection Agency:

1. “Short-term effectiveness is not clearly discussed on p. 24 of the Proposed Plan. The short-term effectiveness section of the proposed plan should discuss the short-term effectiveness of each alternative and, if applicable, any additional short-term risks or hazards posed by the alternative (for example, soil excavation could result in short-term direct-contact exposure to construction/excavation workers). However, currently this section states, for example, “Alternative 1 would take no time to implement and would present no short term risks because no action would be taken.” It should be clarified that Alternative 1 presents no additional short-term risks (i.e. beyond those presented from the potable groundwater pathway, as quantified in the HHRA) and would not be effective at restoring groundwater in the short-term. Similar consideration is necessary for the other alternatives under the fifth criterion.”

Short-term effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation. The risk assessment summary appropriately discusses the risk from the un-remediated Site. The long-term effectiveness and protectiveness discussions appropriately provide information that the Alternative 1 would not be effective in restoring the groundwater.

2. “Within Section VIII. Description of Alternatives, Ohio EPA feels that it would be beneficial to also list the *Estimated Time to Achieve Remedial Action Objectives (RAOs)* in addition to the other *Estimations* that are listed in regard to each Alternative such as *Capital Cost, Total O&M Cost, etc.*”

Estimated Time to Achieve Remedial Action Objectives has been added in the ROD.

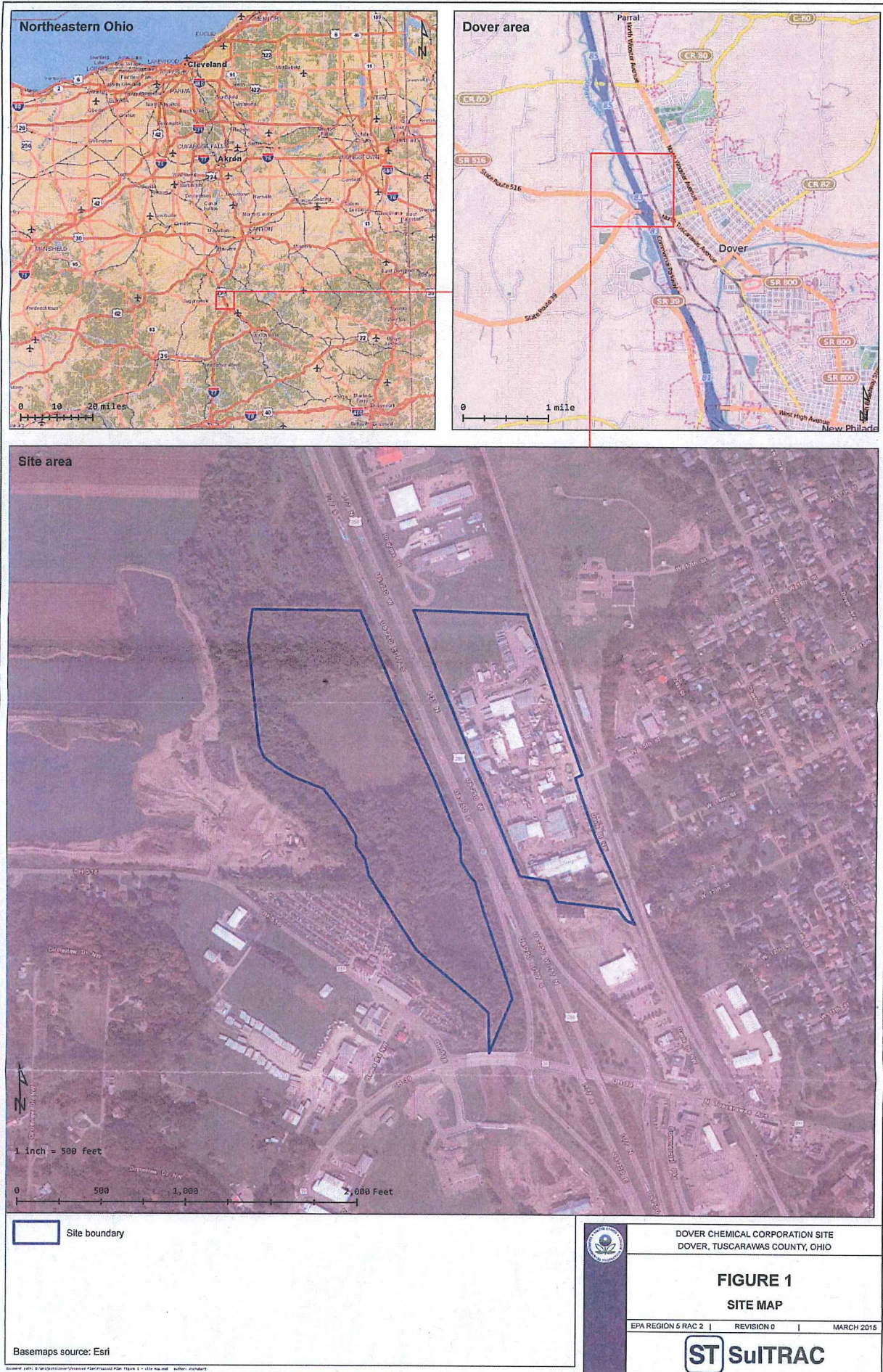
Comments received during the public meeting held in Dover, Ohio on June 25, 2015:

1. A comment was received indicating that the commenter would prefer that the Agency select the pump and treat option.




After reviewing all the alternatives options presented for the cleanup of the off-site groundwater plume and completing an evaluation of each against the nine criteria identified in the NCP, the Agency believes that Alternative 3B will best address the plume in a reasonable time frame.

2. Other comments received during the public meeting generally were in support of the preferred remedy and in support of the Agencies continued work with Dover Chemical.

FIGURES





-  Pumping well
-  Interim removal action area
-  Site boundary



DOVER CHEMICAL CORPORATION SITE
DOVER, TUSCARAWAS COUNTY, OHIO

FIGURE 2
INTERIM REMOVAL ACTION AREAS

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- Approximate limits of non-time-critical removal excavation
- Area with post-excitation soil concentrations exceeding action levels
- Site boundary

Source: TRC, 2014.

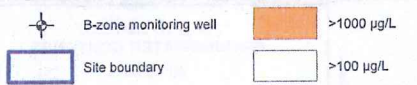


DOVER CHEMICAL CORPORATION SITE
DOVER, TUSCARAWAS COUNTY, OHIO

FIGURE 3
NON-TIME-CRITICAL REMOVAL
ACTION EXCAVATION AREAS

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Note:
 March 2014 Total Chlorobenzene Concentrations were taken from
 "Dover Chemical Corporation Site Quarterly Status Report - December 2014"
 (TRC, 2015)



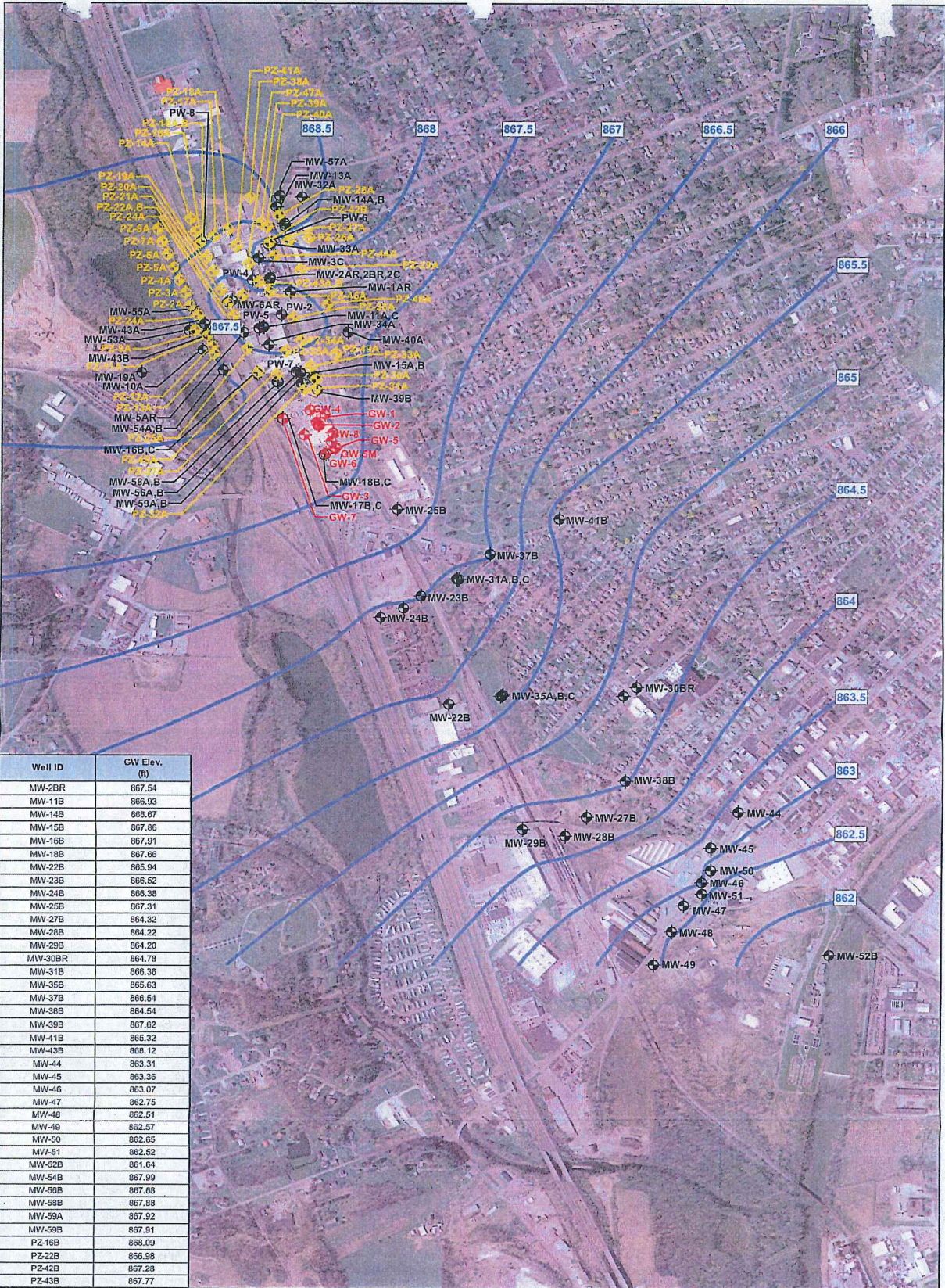
DOVER CHEMICAL CORPORATION SITE
 DOVER, TUSCARAWAS COUNTY, OHIO

FIGURE 4

OFF-SITE PLUME - TOTAL CHLOROBENZENES
 IN B-ZONE GROUNDWATER - MARCH 2014

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Well ID	GW Elev. (ft)
MW-2BR	867.54
MW-11B	866.93
MW-14B	868.67
MW-15B	867.86
MW-16B	867.91
MW-18B	867.66
MW-22B	865.91
MW-23B	866.52
MW-24B	866.38
MW-25B	867.31
MW-27B	864.32
MW-28B	864.22
MW-29B	864.20
MW-30BR	864.78
MW-31B	866.36
MW-35B	865.63
MW-37B	866.54
MW-38B	864.54
MW-39B	867.62
MW-41B	865.32
MW-43B	868.12
MW-44	863.31
MW-45	863.36
MW-46	863.07
MW-47	862.75
MW-48	862.51
MW-49	862.57
MW-50	862.65
MW-51	862.52
MW-52B	861.64
MW-54B	867.99
MW-55B	867.68
MW-58B	867.88
MW-59A	867.92
MW-59B	867.91
PZ-16B	868.09
PZ-22B	866.98
PZ-42B	867.28
PZ-43B	867.77

— Approximate Equipotential Groundwater Elevation (0.5 foot interval)
 Site Boundary
⊕ MW-1AR Monitoring Well
⊕ GW-1 AMKO Well
⊕ PW-2 Pumping Well
⊕ PZ-1 Piezometer Location

0 500 1,000 1,500
 Feet

Wannalancit Mills
 650 Suffolk Street
 Lowell, MA 01854
 978-970-5600

**B-ZONE 0.5-FOOT
 GROUNDWATER CONTOURS
 JUNE 2012
 DOVER CHEMICAL**

PROJECT NO.: 106597	OCTOBER 2012	FIGURE 5
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R:\Projects\GIS_2008\106597_Dover\mxd\gmp\2012\FSA\Fig4 GW Contours_BZone_pit5\1_2012Jun_2012-10-22.mxd

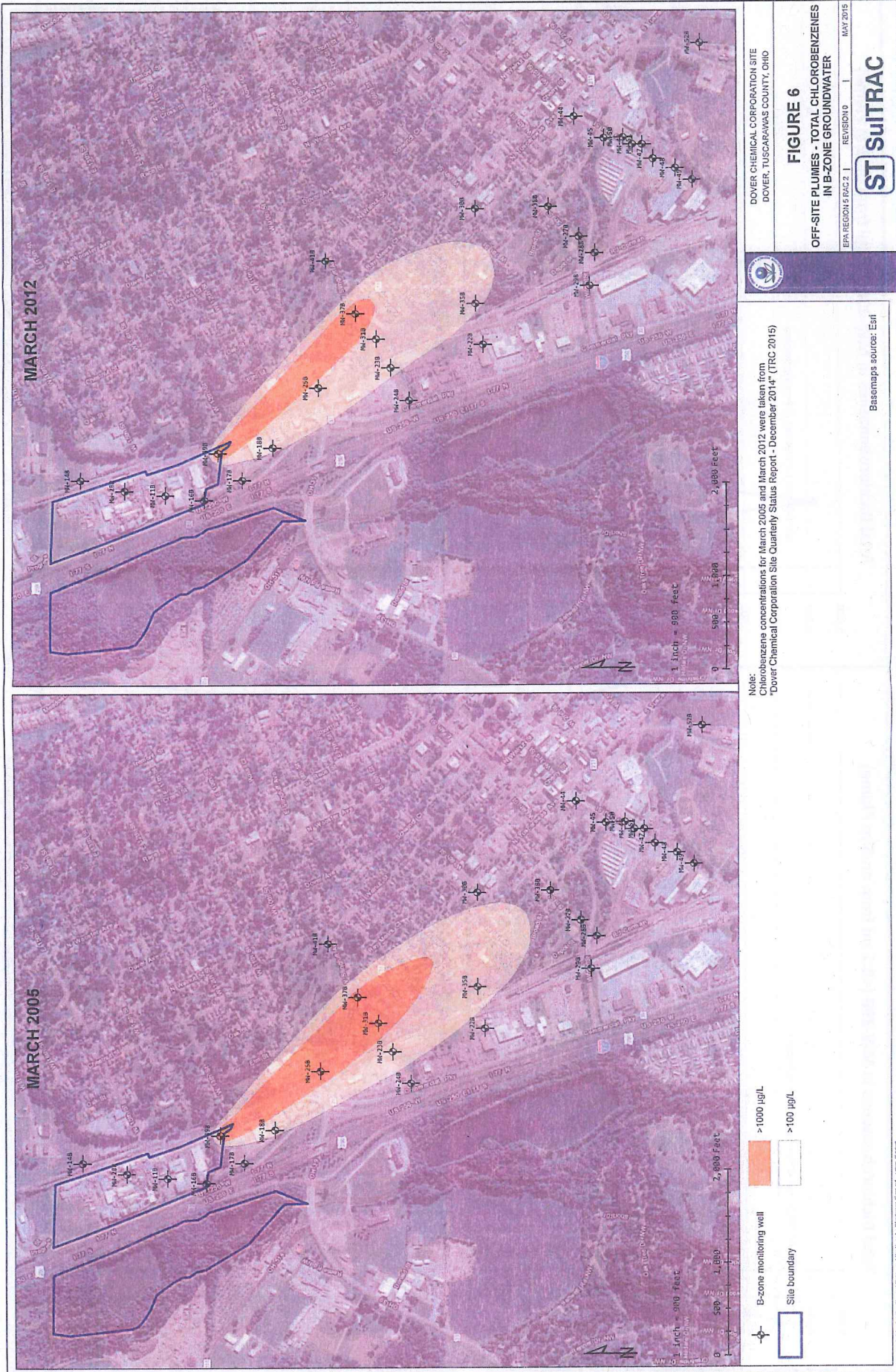


Figure 7 Dichlorobenzene Concentrations along the Centerline of Off-site Plume, March 2005- March 2012

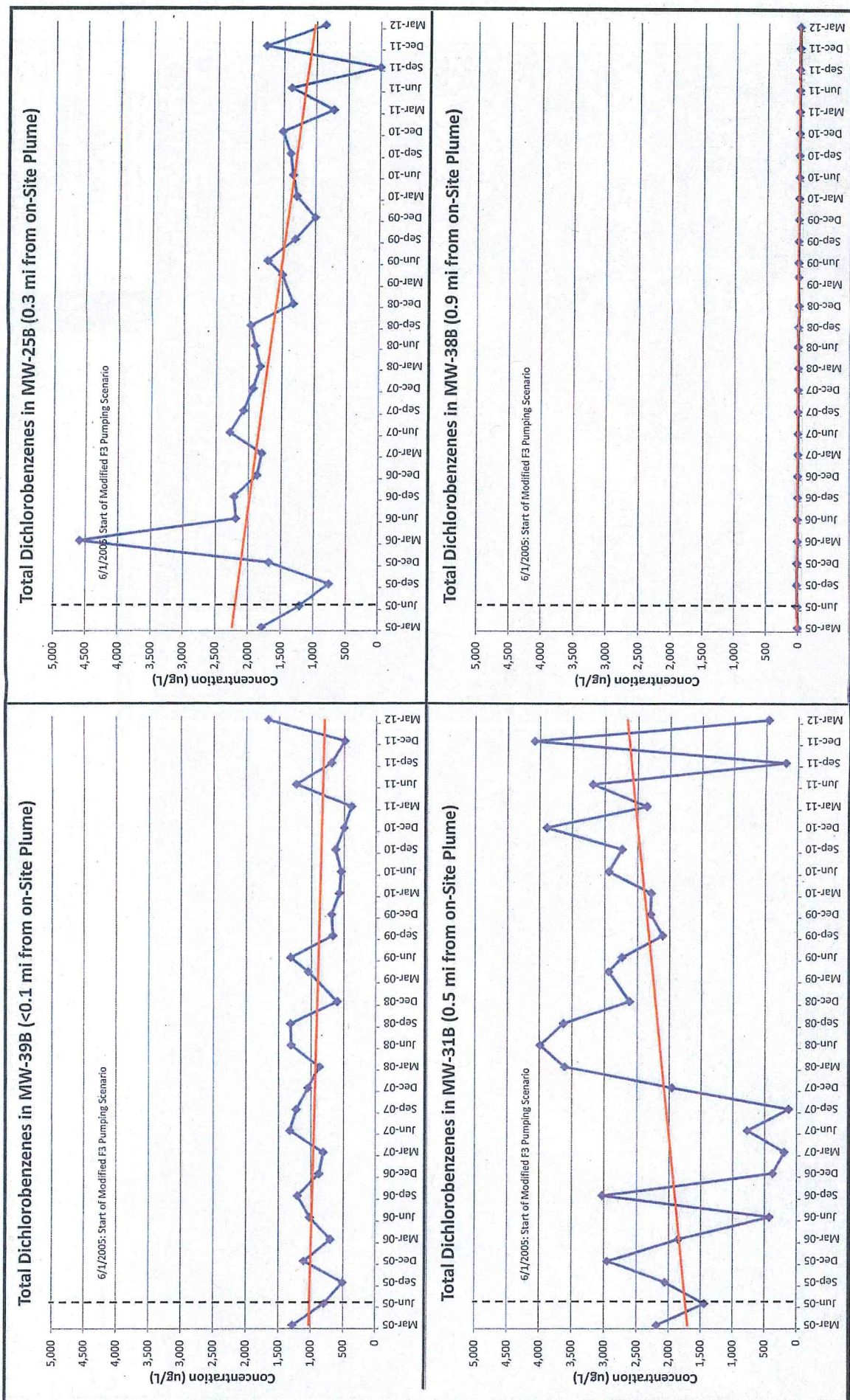
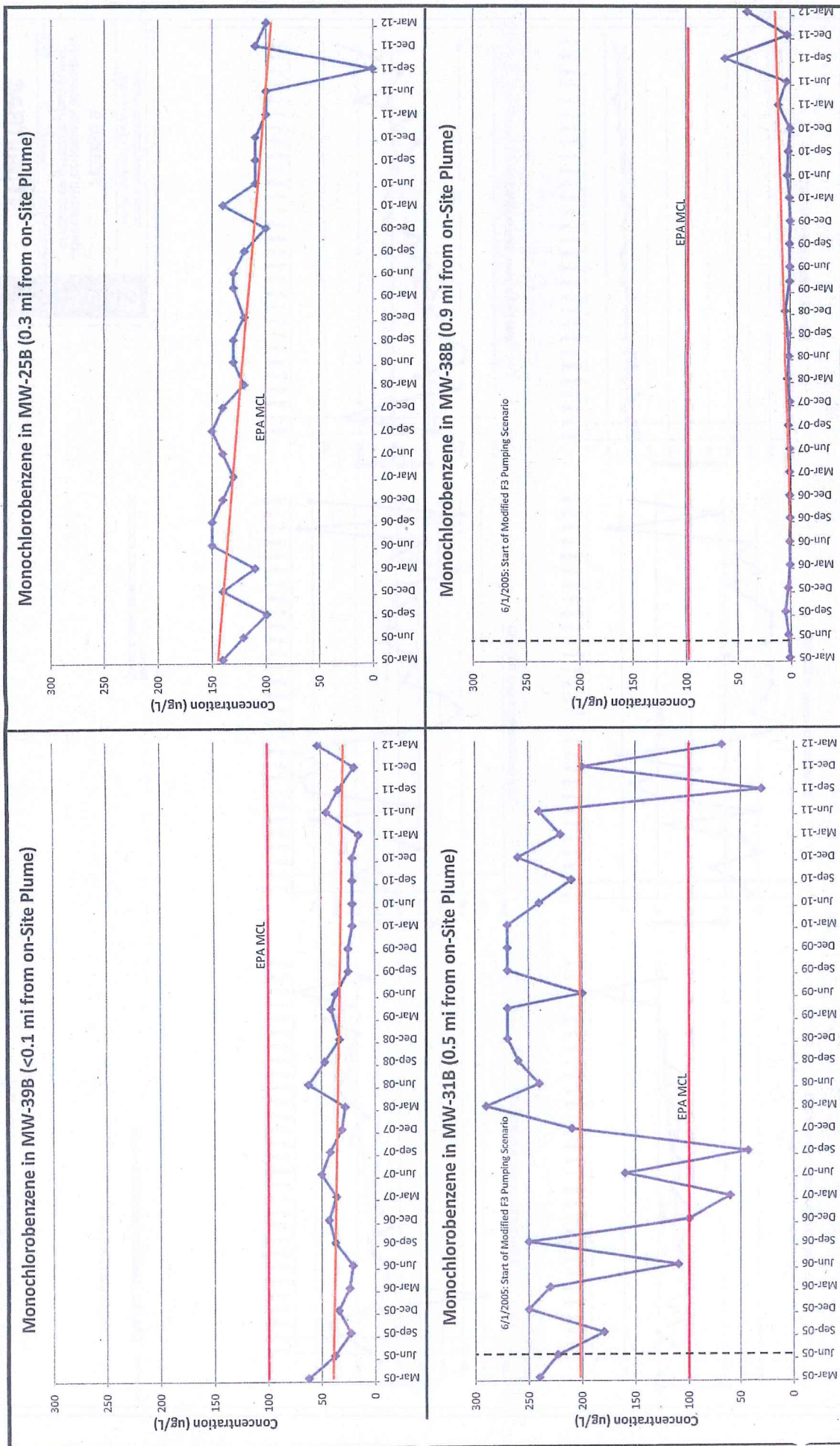
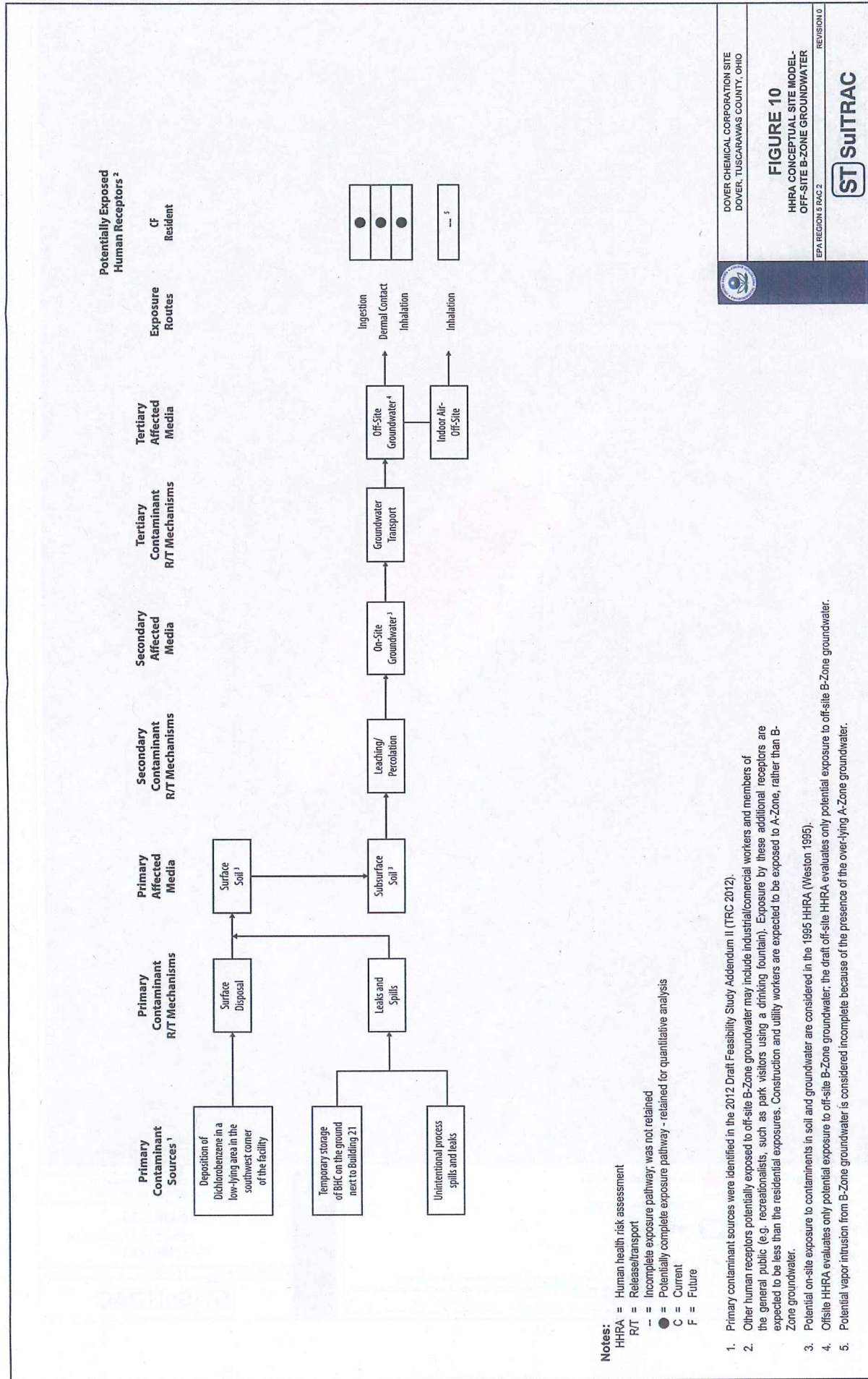


Figure 0 Monochlorobenzene Concentrations Along the Centerline of the Off-site Plume
March 2005-March 2012





- Notes:**
 HHRA = Human health risk assessment
 R/T = Release/transport
 - - = Incomplete exposure pathway; was not retained
 ● = Potentially complete exposure pathway - retained for quantitative analysis
 C = Current
 F = Future

1. Primary contaminant sources were identified in the 2012 Draft Feasibility Study Addendum II (TRC 2012).
2. Other human receptors potentially exposed to off-site B-Zone groundwater may include industrial/commercial workers and members of the general public (e.g. recreationalists, such as park visitors using a drinking fountain). Exposure by these additional receptors are expected to be less than the residential exposures. Construction and utility workers are expected to be exposed to A-Zone, rather than B-Zone groundwater.
3. Potential on-site exposure to contaminants in soil and groundwater are considered in the 1995 HHRA (Weston 1995).
4. Offsite HHRA evaluates only potential exposure to off-site B-Zone groundwater, the draft off-site HHRA evaluates only potential exposure to off-site B-Zone groundwater.
5. Potential vapor intrusion from B-Zone groundwater is considered incomplete because of the presence of the over-lying A-Zone groundwater.

DOVER CHEMICAL CORPORATION SITE
DOVER, TUSCATAWAS COUNTY, OHIO

FIGURE 10
HHRA CONCEPTUAL SITE MODEL-
OFF-SITE B-ZONE GROUNDWATER

EPA REGION 5 PAC-2

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TABLES

Table 1
Well Numbers, Location-Role, Sampling Dates, and Analytical Methods Groundwater Elevations
Dover Chemical Corporation

Sampling Location	Location	Role	PDB Deployment		PDB Sample Collection VOCs		Low Flow Sampling		Unbaited Biotrap Deployment		Unbaited Biotrap Deployment		VRC Baited Biotrap Deployment		VRC Baited Biotrap Deployment		ORC Baited Biotrap Deployment		ORC Baited Biotrap Deployment		
			5/24/2011	6/30/2011	6/14/2011	6/28/2011	6/14/2011	6/28/2011	6/14/2011	6/28/2011	6/14/2011	6/28/2011	6/14/2011	6/28/2011	6/14/2011	6/28/2011	6/14/2011	6/28/2011	6/14/2011	6/28/2011	6/14/2011
MW-14B	Upgradient	Background	5/24/2011	6/30/2011																	
MW-17B	Plume	Transect	6/14/2011	6/28/2011																	
MW-18B	Plume	Centerline	6/14/2011	6/28/2011																	
MW-22B	Bounding	Transect	6/14/2011	6/28/2011																	
MW-23B	Plume	Transect	5/24/2011	6/28/2011																	
MW-24B	Bounding	Transect	5/24/2011	6/28/2011																	
MW-25B	Plume	Centerline	5/24/2011	6/28/2011																	
MW-27B	Plume	Centerline	5/24/2011	6/28/2011																	
MW-28B	Bounding	Transect	6/14/2011	6/30/2011																	
MW-30BR	Bounding	Transect	6/14/2011	6/28/2011																	
MW-31B	Plume	Centerline	5/24/2011	6/14/2011																	
MW-35B	Plume	Centerline	5/24/2011	6/14/2011																	
MW-37B	Plume	Centerline	5/24/2011	6/14/2011																	
MW-38B	Plume	Centerline	5/24/2011	6/14/2011																	
MW-39B	Plume	Centerline	5/24/2011	6/14/2011																	
MW-41B	Bounding	Transect	5/24/2011	6/28/2011																	
MW-51-20	Sentinel	Centerline	5/24/2011	6/14/2011																	
MW-14B	Upgradient	Background	8/16/2012	9/6/2012																	
MW-17B	Plume	Transect	8/16/2012	9/13/2012																	
MW-18B	Plume	Centerline	8/16/2012	9/6/2012					9/6/2012	10/18/2012											
MW-22B	Bounding	Transect	8/16/2012	9/16/2012																	
MW-23B	Plume	Transect	8/16/2012	9/6/2012					9/9/2012	10/18/2012											
MW-24B	Bounding	Transect	8/16/2012	9/13/2012																	
MW-25B	Plume	Centerline	8/16/2012	9/6/2012					9/9/2012	10/18/2012											
MW-27B	Plume	Centerline	8/16/2012	9/9/2012					9/9/2012												
MW-28B	Bounding	Transect	8/16/2012	9/16/2012					9/16/2012	10/18/2012											
MW-30BR	Bounding	Transect	9/16/2012	9/12/2012					9/12/2012												
MW-31B	Plume	Centerline	8/16/2012	9/6/2012					9/6/2012	10/18/2012											
MW-35B	Plume	Centerline	8/16/2012	9/6/2012					9/9/2012	10/18/2012											
MW-37B	Plume	Centerline	8/16/2012	9/6/2012					9/12/2012												
MW-38B	Plume	Centerline	8/16/2012	9/6/2012					9/12/2012	10/18/2012											
MW-39B	Plume	Centerline	8/16/2012	9/6/2012					9/8/2012	10/18/2012											
MW-41B	Bounding	Transect	8/16/2012	9/6/2012					9/13/2012												
MW-51-20	Sentinel	Centerline	8/16/2012	9/6/2012					9/13/2012												
MW-14B	Upgradient	Background	11/21/2011	12/13/2011																	
MW-17B	Plume	Transect	11/21/2011	12/12/2011																	
MW-18B	Plume	Centerline	11/21/2011	12/12/2011																	
MW-22B	Bounding	Transect	11/21/2011	12/13/2011																	
MW-23B	Plume	Transect	11/21/2011	12/6/2012																	
MW-24B	Bounding	Transect	11/21/2011	12/13/2011																	
MW-25B	Plume	Centerline	11/21/2011	12/6/2012																	
MW-27B	Plume	Centerline	11/21/2011	12/14/2011																	12/19/2011
MW-28B	Bounding	Transect	11/21/2011	12/14/2011																	
MW-30BR	Bounding	Transect	11/21/2011	12/14/2011																	
MW-31B	Plume	Centerline	11/21/2011	12/6/2012																	
MW-35B	Plume	Centerline	11/21/2011	12/6/2012																	
MW-37B	Plume	Centerline	11/21/2011	12/6/2012																	
MW-38B	Plume	Centerline	11/21/2011	12/6/2012																	
MW-39B	Plume	Centerline	11/21/2011	12/6/2012																	
MW-41B	Bounding	Transect	11/21/2011	12/13/2011																	
MW-51-20	Sentinel	Centerline	11/21/2011	12/6/2012																	
MW-14B	Upgradient	Background	3/1/2012	3/15/2012																	
MW-17B	Plume	Transect	3/1/2012	3/19/2012																	
MW-18B	Plume	Centerline	3/1/2012	3/15/2012																	
MW-22B	Bounding	Transect	3/1/2012	3/23/2012																	
MW-23B	Plume	Transect	3/1/2012	3/15/2012																	
MW-24B	Bounding	Transect	3/1/2012	3/15/2012																	
MW-25B	Plume	Centerline	3/1/2012	3/19/2012																	
MW-27B	Plume	Centerline	3/1/2012	3/15/2012																	
MW-28B	Bounding	Transect	3/1/2012	3/23/2012																	
MW-30BR	Bounding	Transect	3/1/2012	3/15/2012																	
MW-31B	Plume	Centerline	3/1/2012	3/15/2012																	
MW-35B	Plume	Centerline	3/1/2012	3/15/2012																	
MW-37B	Plume	Centerline	3/1/2012	3/15/2012																	
MW-38B	Plume	Centerline	3/1/2012	3/15/2012																	
MW-39B	Plume	Centerline	3/1/2012	3/15/2012																	
MW-41B	Bounding	Transect	3/1/2012	3/15/2012																	
MW-51-20	Sentinel	Centerline	3/1/2012	3/15/2012																	

Notes:
1 - DOC Omitted from December 2011 and March 2012 Analyses
2 - temperature, dissolved oxygen, specific conductance, pH, Eh, turbidity, ferrous iron (Fe²⁺)

Abbreviations:

As: arsenic
BVC: In-vitro Reductase
CSIA: Compound Specific Isotope Analysis
DHBT: Dehalobacter spp.
DHC: Dehalococoides spp.
Dis: dissolved
DOC: dissolved organic carbon
Fe: iron
HRC: Hydrogen Release Compound
MEB: methane, ethane, ethene
Mn: manganese

MOB: Methane Oxidizing Bacteria
ORC: Oxygen Release Compound
PDB: Passive Diffusion Bag
PHE: Phenol Hydroxylase
MMMO: Soluble Methane Monooxygenase
TCE (Bacteria): In-situ Reductase
TCE Concentration: trichloroethene
TOC: total organic carbon
TOD: Toluene Dioxygenase
VCR: Vinyl Chloride Reductase
VOCs: volatile organic compounds

Laboratory Analytical Methods:

As: 200.7
CO₂ and MEB: RSK-175
Chloride, Sulfate, TOC, DOC: general chemistry
Fe and Mn: 6010B
VOCs: 8260B

Table 2: Geochemical Results
Dover Chemical, Dover Ohio

Well	Location	Date	Trichloroethene (ug/L)	1,1-Dichloroethene (ug/L)	1,2-Dichloroethene (ug/L)	1,1,1-Trichloroethene (ug/L)	1,1,2-Trichloroethene (ug/L)	1,1,2,2-Tetrachloroethene (ug/L)	1,1,1,2-Tetrachloroethene (ug/L)	1,1,1,2,2-Pentachloroethene (ug/L)	1,1,1,2,2,2-Hexachloroethane (ug/L)	Radon Potential	Dissolved Oxygen (mg/L)	pH (sat sat)	EC (microsiemens)	Temperature (C)	Turbidity (NTU)	Carbon Dioxide (ug/L)	Chloride (ug/L)	Total Ammonia (ug/L)	Dissolved Ammonia (ug/L)	Total Iron (ug/L)	Ferrous Iron (ug/L)	Permanganate (ug/L)	Total Manganese (ug/L)	Dissolved Manganese (ug/L)	Methane (ug/L)	Ethane (ug/L)	Ethane (ug/L)	Total Organic Carbon (ug/L)	Dissolved Organic Carbon (ug/L)	Sulfate (ug/L)	
MW-14B	Upgrade	Jan-11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.17	691	7.44	11.2	13.65	9.7	7,440	31,000 J	10 U	10 U	1,800	200 U	1,800	15 U (+)	15 U (+)	0.50 U	0.50 U	0.50 U	940 J	140,000		
	Upgrade	Sep-11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.23	685	7.54	13.2	13.70	6.5	7,780	46,000	10 U	10 U	950	200 U	950	4.7 J	12.3	0.50 U	0.50 U	0.50 U	770 J	1,100 (+)	340,000	
	Upgrade	Dec-11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.65	697	7.60	10.5	12.53	7.3	7,470	46,000	10 U	10 U	470	200 U	470	15 U (+)	15 U (+)	0.50 U	0.50 U	0.50 U	710 J	NA	130,000	
	Upgrade	Mar-12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.27	534	7.59	13.1	11.84	7.0	7,590	48,000	10 U	10 U	290	200 U	290	15 U (+)	15 U (+)	0.50 U	0.50 U	0.50 U	NA	130,000		
MW-17B	Phase	Jun-11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.38	725	6.86	29	15.23	3.8	6,810	43,000 J	10 U	10 U	340	200 U	340	13 J	6.4 J	4.6	0.50 U	0.50 U	0.50 U	1,300	370,000	
	Phase	Sep-11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.12	745	7.46	64.2	16.56	2.73	6,590	42,000	10 U	10 U	80 J	200 U	80 J	15 U (+)	15 U (+)	0.50 U	0.50 U	0.50 U	2,100	3,200 (+)	160,000	
	Phase	Dec-11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.09	692	7.63	15.9	11.91	21.1	6,530	40,000 (+)	3.5 J	10 U	720	200 U	720	15 U (+)	15 U (+)	0.50 U	0.50 U	0.50 U	2,200	NA	380,000	
	Phase	Mar-12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.31	549	7.66	36	14.02	0.1	6,350	41,000	10 U	10 U	100 U	200 U	100 U	15 U (+)	15 U (+)	0.50 U	0.50 U	0.50 U	1,600	NA	160,000	
MW-18B	Phase	Jun-11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.48	622	7.33	16	13.46	4.7	5,890	32,000 J	10 U	10 U	210	200 U	210	4.9 J	6.8 J	5.6	0.50 U	0.50 U	0.50 U	1,200	330,000	
	Phase	Sep-11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.05	633	7.66	29	14.18	5.6	5,940	32,000	10 U	10 U	330	200 U	330	15 U (+)	15 U (+)	0.50 U	0.50 U	0.50 U	1,600	2,000 (+)	140,000	
	Phase	Dec-11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.78	657	7.68	13.20	6.3	6,350	37,000	10 U	10 U	570	200 U	570	22	15 U (+)	8.9	0.30 U	0.30 U	0.30 U	1,900	NA	160,000	
	Phase	Mar-12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.54	595	7.64	92	13.05	3.9	6,740	42,000	10 U	10 U	260	200 U	260	15 U (+)	15 U (+)	0.50 U	0.50 U	0.50 U	1,200	NA	140,000	
MW-22B	Bandring	Jan-11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.08	924	7.34	21	16.20	7.3	9,990	120,000 J	4.3 J	10 U	940	200 U	940	10 U	10 U	0.50 U	0.50 U	0.50 U	2,400	2,700	130,000	
	Bandring	Sep-11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.24	834	7.56	60	12.85	11.0	8,770	80,000	10 U	10 U	570	200 U	570	63	57	0.24 J	0.24 J	0.24 J	1,200	1,900 (+)	140,000	
	Bandring	Dec-11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.68	681	7.64	33	14.01	3.3	7,490	67,000	10 U	10 U	170	200 U	170	60	58	0.41 J	0.41 J	0.41 J	1,200	NA	140,000	
	Bandring	Mar-12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.30	588	7.65	11.7	13.72	17.0	8,320	54,000	10 U	10 U	2,900	200	2,700	71 U (+)	38 U (+)	0.34	0.50 U	0.50 U	1,700	NA	150,000	
MW-23B	Phase	Jun-11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.28	728	8.02	7.1	14.12	2.2	7,710	65,000 J	3.2 J	10 U	710	200 U	710	37	35	2.3	0.50 U	0.50 U	0.50 U	1,500	130,000	
	Phase	Sep-11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.27	836	7.48	103.6	17.17	7.5	8,550	93,000	10 U	10 U	1,500	600	1,100	61	57	1.1	0.50 U	0.50 U	1,200	1,900 (+)	130,000	
	Phase	Dec-11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.01	717	7.56	76.8	13.88	6.4	9,280	79,000	10 U	10 U	750	200 U	750	63	60	1.3	0.50 U	0.50 U	1,300	NA	130,000	
	Phase	Mar-12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.23	637	7.53	70	10.90	3.9	9,960	97,000	10 U	10 U	630	500	110	67	65	1.1	0.50 U	0.50 U	1,600	NA	150,000	
MW-24B	Bandring	Jun-11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.55	715	8.12	28	16.84	1.3	5,820	48,000 J	0.0 J	10 U	100 U	100 U	100 U	100 U	38	44	0.22 J	0.22 J	0.22 J	1,700	2,200	150,000
	Bandring	Sep-11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.26	721	7.60	14	13.36	4.4	5,060	45,000	10 U	10 U	100 U	100 U	100 U	68	44	0.42 J	0.42 J	0.42 J	1,500	2,800 (+)	150,000	
	Bandring	Dec-11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.24	724	7.67	11	13.58	10.1	5,510	48,000	10 U	10 U	110	200 U	110	63	51	0.20 J	0.20 J	0.20 J	1,500	NA	170,000	
	Bandring	Mar-12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.15	540	7.66	87	12.73	10.0	6,130	42,000	10 U	10 U	500	200 U	500	67	54	0.31 J	0.31 J	0.31 J	1,600	NA	200,000	
MW-25B	Phase	Jun-11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.43	708	7.63	2.8	15.27	2.4	7,160	40,000 J	10 U	10 U	270	200 U	270	34	29	2.5	0.50 U	0.50 U	0.50 U	630	170,000	
	Phase	Sep-11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.19	741	7.44	5.7	15.03	2.0	7,250	37,000	10 U	10 U	160	200 U	160	25	24	1.9	0.50 U	0.50 U	1,300	2,900 (+)	170,000	
	Phase	Dec-11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.44	662	7.59	40.3	11.81	1.0	7,260	45,000	10 U	10 U	100 U	100 U	100 U	24	23	2	0.50 U	0.50 U	0.50 U	1,500	NA	170,000
	Phase	Mar-12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.21	610	7.59	18	14.21	0.3	6,920	43,000	10 U	10 U	100 U	100 U	100 U	26 U (+)	27 U (+)	0.50 U	0.50 U	0.50 U	1,300	NA	170,000	
MW-27B	Phase	Jun-11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.11	898	7.46	58	13.36	4.4	9,390	71,000 J	10 U	10 U	410	200 U	410	120	63	0.50 U	0.50 U	0.50 U	2,000	4,500	180,000	
	Phase	Sep-11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.17	825	7.44	11.7	16.92	9.9	9,070	62,000	10 U	10 U	770	600	770	120	130	1.0	0.50 U	0.50 U	1,600	3,900 (+)	190,000	
	Phase	Dec-11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.39	823	7.53	82	11.82	19.3	10,100	63,000	10 U	10 U	770	200 U	770	120	130	1.0	0.50 U	0.50 U	1,700	NA	180,000	
	Phase	Mar-12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.83	718	7.54	44	19.00	4.8	8,390	61,000	10 U	10 U	370	200 U	370	120	130	1.3	0.50 U	0.50 U	1,600	NA	200,000	

Table 3
 OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
 OFF-SITE RESIDENTIAL B-ZONE GROUNDWATER
 DOVER CHEMICAL CORPORATION SITE
 DOVER, TUSCARAWAS COUNTY, OHIO

Exposure Area	Analyte Class	Cas. Number	Analyte Name	Minimum Concentration [Qualifier] ¹	Maximum Concentration [Qualifier] ¹	Units	Location of Maximum	Frequency of Detection	Range of Detection Limits	Screening Concentration ²	Screening Value ³ (basis)	COPC	Rationale ³
Off-Site Plume	VOCs	67-64-1	Acetone	4.2	4.2	µg/L	MW-23B-061A	1/24	10-560	4.2	RSL-nc	N	BSL
Off-Site Plume	VOCs	71-43-2	Benzene	0.36	1.7	µg/L	MW-25B-1213	3/24	2.5-56	1.7	RSL-nc**	Y	ASL
Off-Site Plume	VOCs	108-90-7	Chlorobenzene	20	360	µg/L	MW-33B-0913	22/24	1.0-1.0	360	RSL-nc	Y	ASL
Off-Site Plume	VOCs	67-66-3	Chloroform	0.28	0.28	µg/L	MW-25B-1213	1/24	1.0-56	0.28	RSL-nc*	Y	ASL
Off-Site Plume	VOCs	95-50-1	1,2-Dichlorobenzene	0.48	1700	µg/L	MW-31B-0913	19/24	1.0-14	1700	RSL-nc	Y	ASL
Off-Site Plume	VOCs	541-73-1	1,3-Dichlorobenzene	0.91	300	µg/L	MW-31B-0913	16/24	1.0-14	300	RSL-nc	Y	ASL
Off-Site Plume	VOCs	106-48-7	1,4-Dichlorobenzene	1.2	1400	µg/L	MW-31B-0913	18/24	1.0-56	1400	RSL-nc	Y	ASL
Off-Site Plume	VOCs	120-82-1	1,2,4-Trichlorobenzene	4.8	8.7	µg/L	MW-33B-0913	4/24	1.0-56	8.7	RSL-nc	Y	ASL
Off-Site Plume	VOCs	75-34-3	1,1-Dichloroethane	0.17	6.1	µg/L	MW-35B-061A	6/24	1.0-56	6.1	RSL-nc	Y	ASL
Off-Site Plume	VOCs	156-59-2	cis-1,2-Dichloroethene	0.44	3.1	µg/L	MW-35B-061A	9/24	5.0-56	3.1	RSL-nc	N	BSL
Off-Site Plume	VOCs	127-18-4	Tetrachloroethene	1.2	23	µg/L	MW-31B-0913	9/24	1.0-33	23	RSL-nc	Y	ASL
Off-Site Plume	VOCs	75-01-6	Trichloroethene	0.25	16	µg/L	MW-31B-0913	20/24	20-33	16	RSL-nc	Y	ASL

COPC: Chemical of potential concern
 * Estimated value (- bias)
 RSL: Regional Screening Level
 VOC: Volatile organic compound
 µg/L: Micrograms per liter

- Notes:
1. Minimum/maximum detected concentration.
 2. Maximum detected concentration used as the screening concentration.
 3. Screening values are EPA Regional Screening Levels (RSL) for residential tap water. (EPA 2014) Screening Value Basis Codes:
 nc: Cancer endpoint and a target cancer risk of 1×10^{-4}
 ca*: Cancer endpoint where noncancer RSL $\leq 100 \times$ cancer RSL
 ca**: Cancer endpoint where noncancer RSL $\leq 10 \times$ cancer RSL
 nc: noncancer endpoint and a target hazard quotient of 0.1
 1,2-Dichlorobenzene was used as a surrogate for 1,3-dichlorobenzene
 4. The following surrogates were used:
 5. Rationale Codes for selection or exclusion are COPC:
 Selection:
 ASL: Above screening criteria
 BSL: Below screening criteria

References:
 EPA 2014. Regional Screening Levels (RSL) for residential tap water based on a target risk of 1×10^{-6} and a target hazard quotient (HQ) of 0.1. May
<http://www.epa.gov/region9/suppl/ndr01.pdf>

APPENDIX A

Chemical-Specific ARARs and TBCs

Standard, Requirement, Criteria, or Limitation	Regulatory Citation	Description	Applicability (Yes/No)	Justification Comments
GROUNDWATER				
Safe Drinking Water Act (SDWA)	42 USC 300f et seq	Regulations and standards (MCLs) to protect public health from contaminants in drinking water	Yes	Groundwater is being used by the City and the residents upgradient of the site.
Ohio Drinking Water Regulations	OAC 3745-81	State-level equivalent of SDWA. Establishes regulations to protect the public from the contaminants in drinking water	Yes	Groundwater is being used by the City and the residents upgradient of the site.
Ohio Hazardous Waste Management Regulations	OAC 3745-54:94 Table 1	Regulates "Maximum Concentration of Constituents for Groundwater Protection" for selected compounds.	Yes	Applicable based on groundwater usage.
SURFACE WATER				
Clean Water Act (CWA)	33 USC 1251 et seq.	Establishes Ambient Water Quality Criteria for (1) protection of human health, and (2) protection of aquatic life.	Yes	Applicable to constituents present in the plant discharge for both categories of protection.
Ohio Water Quality Standards	OAC 3745-1	Establishes water quality criteria based on the classification of the water body.	Yes	Applicable to constituents present in the plant discharge.

**Location-Specific
ARARs**

Standard, Requirement, Criteria, or Limitation	Regulatory Citation	Description	Applicability (Yes/No)	Justification Comments
Endangered Species Act	16 USC 1531 et seq.	Any proposed activities must conserve endangered or threatened species.	No	No endangered or threatened plants or animals are present in the project areas.
Fish and Wildlife Coordination Act	16 USC Sect. 661-666	Development, protection, rearing, and stocking of species, resources, and habitat; and controlling losses due to disease or other causes including overabundance.	Yes	Potentially applicable to water quality of discharge from treated effluent if the selected alternative involves discharge to Sugar Creek..

**Action-Specific
ARARs**

Standard, Requirement, Criteria, or Limitation	Regulatory Citation	Description	Applicability (Yes/No)	Justification Comments
GROUNDWATER				
Safe Drinking Water Act (SDWA)	42 USC 300 f et seq	Regulation of Underground Injection Control (UIC) program.	Yes	Potentially applicable if the selected alternative involves injection of amendments to stimulate biodegradation.
SURFACE WATER				
Clean Water Act (CWA)	CWA Sections 402, 403 40 CFR 122 40 CFR 125	Effluent standards for point source discharges to: <ul style="list-style-type: none"> Surface water body - governed by the National Pollution Discharge Elimination System (NPDES) permitting requirements. Indirect discharge to a POTW - governed by pretreatment regulations. Establishes effluent standards to discharge of water to a surface water body. Specific requirements are regulated by the state on a case-by-case basis.	Yes	Potentially applicable if the selected alternative involves discharge to Sugar Creek.
Ohio NPDES Regulations	OAC 3745-33		Yes	Potentially applicable if the selected alternative involves discharge of treated water to Sugar Creek.

APPENDIX B

MNA Only						
Site: Dover Location: Dover, Ohio Phase: Feasibility Study (-30% to +50%) Base Year: 2012 Date: Oct. 2012		Description: MNA, including monitoring well clusters and individual monitoring wells offsite plume. Capital costs occur in Year 0. Annual costs occur in Years 1-30. Periodic costs occur every 5 yrs for 30 years of operation.				
BASE YEAR COSTS						
DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES	
GW Monitoring Program						
Equipment & Labor	4	LS	\$14,141.63	\$56,567	Quarterly	
Rental Equipment	4	LS	\$5,835.83	\$23,343	Quarterly	
Lab Services	4	LS	\$11,547.64	\$46,191	Quarterly	
SUBTOTAL				\$126,100		
Reporting						
Annual Report	1	EA	\$8,060.00	\$8,060	Annually	
SUBTOTAL				\$8,060		
SUBTOTAL						
				\$134,160		
Contingency (20% Scope + 25% bid)			45%	\$60,372.18		
TOTAL YEAR 0 COST:				\$194,533		
ANNUAL O&M COSTS						
DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES	
GW Monitoring Program						
Equipment & Labor	4	LS	\$14,141.63	\$56,567	Quarterly to year 5; biannual yrs 6-30	
Rental Equipment	4	LS	\$5,835.83	\$23,343	Quarterly to year 5; biannual yrs 6-30	
Lab Services	4	LS	\$11,547.64	\$46,191	Quarterly to year 5; biannual yrs 6-30	
SUBTOTAL				\$126,100		
Reporting						
Annual Report	1	EA	\$8,060.00	\$8,060	Annually	
SUBTOTAL				\$8,060		
SUBTOTAL						
				\$134,160		
Contingency (10% Scope + 20% bid)			30%	\$40,248.12		
TOTAL ANNUAL O&M COST				\$174,409		
PERIODIC COSTS:						
DESCRIPTION	YR	QTY	UNIT	UNIT COST	TOTAL	NOTES
Five Year Report	5-30	1	EA	\$20,050.00	\$20,050.00	
Well Repairs	5-30	1	DAY	\$1,500.00	\$1,500.00	
					\$21,550.00	
Well Abandonment	30	6	DAY	\$3,000.00	\$18,000.00	
Abandonment Report	30	22	EA	\$125.00	\$2,750.00	
Remedial Action Report	30	1	LS	\$20,050.00	\$20,050.00	
					\$40,800.00	
PRESENT VALUE ANALYSIS:						
COST TYPE	YEAR	TOTAL COST	TOTAL COST/YR	DISCOUNT FACTOR	PRESENT VALUE	NOTES
Capital	0	\$194,533	\$194,533	-	-	See support sheet for discount factors and Present Value calculation Quarterly Monitoring Biannual Monitoring
Annual O&M Cost	1	\$174,409	\$174,409	-	-	
Annual O&M Cost	2-5	\$719,184	\$174,409	-	-	
Annual O&M Cost	6-30	\$2,311,081	\$103,110	-	-	
TOTAL PRESENT VALUE		\$3,399,207			\$1,729,599	NPV of OM&M @ 7% discount factor

PRESENT VALUE CALCULATION

Site: Dover Description:
 Location: Dover, Ohio
 Phase: Feasibility Study (-30% to +50%)
 Base Year: 2012
 Date: Oct. 2012

Year		Annual Costs (\$)	Periodic Costs (\$)	Total Costs (\$)	Discount Factor at 7%	Total Present Value Cost at 7% (\$)
0	2012	\$194,533		\$194,533	1.000	\$194,533
1	2013	\$174,409		\$174,409	0.935	\$162,999
2	2014	\$174,409		\$174,409	0.873	\$152,335
3	2015	\$174,409		\$174,409	0.816	\$142,369
4	2016	\$174,409		\$174,409	0.763	\$133,055
5	2017	\$174,409	\$21,550	\$195,959	0.713	\$139,716
6	2018	\$92,443		\$92,443	0.666	\$61,599
7	2019	\$92,443		\$92,443	0.623	\$57,569
8	2020	\$92,443		\$92,443	0.582	\$53,803
9	2021	\$92,443		\$92,443	0.544	\$50,283
10	2022	\$92,443	\$21,550	\$113,993	0.508	\$57,948
11	2023	\$92,443		\$92,443	0.475	\$43,919
12	2024	\$92,443		\$92,443	0.444	\$41,046
13	2025	\$92,443		\$92,443	0.415	\$38,361
14	2026	\$92,443		\$92,443	0.388	\$35,851
15	2027	\$92,443	\$21,550	\$113,993	0.362	\$41,316
16	2028	\$92,443		\$92,443	0.339	\$31,314
17	2029	\$92,443		\$92,443	0.317	\$29,265
18	2030	\$92,443		\$92,443	0.296	\$27,351
19	2031	\$92,443		\$92,443	0.277	\$25,561
20	2032	\$92,443	\$21,550	\$113,993	0.258	\$29,458
21	2033	\$92,443		\$92,443	0.242	\$22,326
22	2034	\$92,443		\$92,443	0.226	\$20,866
23	2035	\$92,443		\$92,443	0.211	\$19,501
24	2036	\$92,443		\$92,443	0.197	\$18,225
25	2037	\$92,443	\$21,550	\$113,993	0.184	\$21,003
26	2038	\$92,443		\$92,443	0.172	\$15,918
27	2039	\$92,443		\$92,443	0.161	\$14,877
28	2040	\$92,443		\$92,443	0.150	\$13,904
29	2041	\$92,443		\$92,443	0.141	\$12,994
30	2042	\$92,443	\$62,350	\$154,793	0.131	\$20,335

TOTAL PRESENT VALUE

\$1,728,599

TRC Labor Cost Sub-Element

P/T Level	Hourly Rate	Task Hours	Task Cost	Task Permits Hours	Task Permits Cost	Task Progress Reporting Hours	Task Progress Reporting Cost	Task 5-Year Report Hours	Task 5-Year Report Cost	GW Sampling O&M Hours	GW Sampling O&M Cost
CAT 1	225 /hr		\$0		\$0		\$0		0		\$0
CAT 2	200 /hr		\$0		\$0		\$0		10		\$0
CAT 3	160 /hr		\$0		\$0		\$6,400		70		\$2,560
CAT 4	155 /hr		\$0		\$0		\$0		20		\$2,100
CAT 5	105 /hr		\$0		\$0		\$840		0		\$0
CAT 6	90 /hr		\$0		\$0		\$0		0		\$0
CAT 7	75 /hr		\$0		\$0		\$600		60		\$4,200
CAT 8	70 /hr		\$0		\$0		\$0		0		\$0
CAT 9	60 /hr		\$0		\$0		\$0		0		\$0
	total hrs										
Total Direct Labor (hours/\$)	Mark-up		\$0	base	0	base	\$7,840	base	\$19,500	base	\$12,220
Materials	0.1		\$0		\$0		\$0		\$0		\$0
Travel & per diem	0.1		\$0		\$0		\$0		\$0		\$0
Equipment Rental	0.1		\$0		\$0		\$0		\$0		\$0
ODCs (phone, fax, Fed Ex)	0.1		\$0		\$0		\$220		\$550		\$220
Subcontractor	0.1		\$0		\$0		\$0		\$0		\$0
Price by task			\$0	Estimate	\$0	Estimate	\$8,060	Estimate	\$20,050	Estimate	\$13,911

Assume 10 hour days. Per Diem = \$45/day and \$33.75/day (75%) on travel days. Hotel reimbursement is \$100/night. Travel reimbursement is \$200/trip in addition to car rental.

Notes:

Capital Cost Sub-Element LABORATORY SERVICES		COST WORKSHEET					
Site:	Dover	Prepared by:	JCM	Checked by:	ACH		
Location:	Dover, Ohio	Date:	Oct-12	Date:	Oct-12		
Phase:	Feasibility Study (-30% to +50%)						
Base Year:	2012						
Date:	Oct. 2012						
Work Statement:							
22 wells with 3 duplicates (1 per 10) for VOCs, collected via PDB. 20 wells with 2 duplicates (1 per 10) for remaining parameters and field measurement of DO and ORP, collected via HydraSleeve. Samples shipped to lab on ice.							
Cost Analysis:							
						UNIT	
DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	TOTAL	TOTAL
VOCs (8260B)	25	EA	-	-	-	\$125.00	\$3,125.00
Dissolved Gasses (RSK-175)	22	EA	-	-	-	\$120.00	\$2,640.00
CO2 (RSK-175)	22	EA	-	-	-	\$85.00	\$1,870.00
Chloride (325.2)	22	EA	-	-	-	\$18.00	\$396.00
Nitrate (353.2)	22	EA	-	-	-	\$13.75	\$302.50
Iron, Total (6010B)	22	EA	-	-	-	\$14.00	\$308.00
Iron, Ferrous (6010B)	22	EA	-	-	-	\$30.00	\$660.00
Sulfate (EPA 300.0)	22	EA	-	-	-	\$11.00	\$242.00
							\$9,543.50
Subcontractor Overhead						0%	\$0.00
SUBTOTAL							\$9,544
Subcontractor Profit						0%	\$0.00
SUBTOTAL							\$9,543.50
Contractor Overhead						10%	\$954
SUBTOTAL							\$10,498
Contractor Profit						10%	\$1,049.79
TOTAL UNIT COST							\$11,547.64
Source of Cost Data:							
	Invoices from Lab						
Cost Adjustment Factor:							
	FACTOR:		NOTES:				
	H&S Productivity (labor & equip)	<input type="checkbox"/>					
	Escalation to Base Year	<input type="checkbox"/>					
	Area Cost Factor	<input type="checkbox"/>					
	Subcontractor Overhead & Prof.	<input type="checkbox"/>					
	Prime Contractor Overhead & Prof.	<input checked="" type="checkbox"/>					

Cost Sub-Element
GROUND WATER SAMPLING EQUIPMENT

COST WORKSHEET

Site: Dover
 Location: Dover, Ohio
 Phase: Feasibility Study (-30% to +50%)
 Base Year: 2012
 Date: Oct. 2012

Prepared by: JCM
 Date: Oct-12
 Checked by: ACH
 Date: Oct-12

Work Statement:

Sampling event will consist of two mobilizations. During the first mob, one person will deploy PDBs and HydraSleeves in 22 wells over 5 days (4 nights), screening the well mouths with an FID. HydraSleeves will be retrieved and sampled per Table 13, including DO and ORP field measurements. During the second mobilization consisting of 3 days (2 nights), one person will retrieve the PDBs and sample for VOCs, screening the well mouth with an FID. Samples will be shipped to the lab on ice. Each mobilization will include a vehicle rental, travel to and from the site, with per diem and lodging reimbursement.

Cost Analysis:

DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	TOTAL	TOTAL
Packaging Tape	1	PKG	\$0.00	\$6.00	\$0.00	\$6.00	\$6.00
Ziplock bags	2	EA	\$0.00	\$5.00	\$0.00	\$5.00	\$10.00
Duct Tape	1	EA	\$0.00	\$10.00	\$0.00	\$10.00	\$10.00
Nitrile gloves	1	BOX	\$0.00	\$0.00	\$11.00	\$11.00	\$11.00
Safety Glasses	1	EA	\$0.00	\$0.00	\$4.00	\$4.00	\$4.00
5-gallon buckets	3	EA	\$0.00	\$4.00	\$0.00	\$4.00	\$12.00
Graduated Cylinder (250 mL)	1	EA	\$0.00	\$0.00	\$25.00	\$25.00	\$25.00
Kimwipes (4.5"x8.5")	1	BOX	\$0.00	\$0.00	\$8.00	\$8.00	\$8.00
Poly Sheeting	1	EA	\$0.00	\$10.00	\$0.00	\$10.00	\$10.00
Alconox Detergent (4lb box)	1	EA	\$0.00	\$0.00	\$31.00	\$31.00	\$31.00
Field Book	1	EA	\$0.00	\$0.00	\$9.00	\$9.00	\$9.00

TOTAL COST/SAMPLING ROUND

\$136.00

Subcontractor Overhead

0% \$0.00

SUBTOTAL

\$136

Subcontractor Profit

0% \$0.00

SUBTOTAL

\$136.00

Contractor Overhead

10% \$14

SUBTOTAL

\$150

Contractor Profit

10% \$14.96

TOTAL UNIT COST

\$164.56

Source of Cost Data:

Vendors

Applied escalation factor of 1.4

\$ 230.38

Cost Adjustment Factor:

FACTOR:

H&S Productivity (labor & equip)

Escalation to Base Year

Area Cost Factor

Subcontractor Markup

Prime Contractor Markup

NOTES:

Cost Sub-Element GROUND WATER SAMPLING EQUIPMENT		COST WORKSHEET					
Site:	Dover	Prepared by:	JCM	Checked by:	ACH		
Location:	Dover, Ohio	Date:	Oct-12	Date:	Oct-12		
Phase:	Feasibility Study (-30% to +50%)						
Base Year:	2012						
Date:	Oct. 2012						
Work Statement:							
<p>Sampling event will consist of two mobilizations. During the first mob, one person will deploy PDBs and HydraSleeves in 22 wells over 5 days (4 nights), screening the well mouths with an FID. HydraSleeves will be retrieved and sampled per Table 13, including DO and ORP field measurements. During the second mobilization consisting of 3 days (2 nights), one person will retrieve the PDBs and sample for VOCs, screening the well mouth with an FID. Samples will be shipped to the lab on-ice. Each mobilization will include a vehicle rental, travel to and from the site, with per diem and lodging reimbursement.</p>							
Cost Analysis:							
DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	UNIT TOTAL	TOTAL
YSI 600 XL MP	1	WK	\$0.00	\$300.00	\$0.00	\$300.00	\$300.00
FID rental includes cal gas (1 @ \$250/wk)	2	WK	\$0.00	\$250.00	\$0.00	\$250.00	\$500.00
Vehicles (1 SUV @ \$350/wk)	2	WK	\$0.00	\$350.00	\$0.00	\$350.00	\$700.00
PDBs	30	EA	\$0.00	\$18.00	\$0.00	\$18.00	\$540.00
HydraSleeves	25	EA	\$0.00	\$30.00	\$0.00	\$30.00	\$750.00
DI Water	5	GAL.	\$0.00	\$75.00	\$0.00	\$75.00	\$375.00
Interface probe (1 units)	2	WK	\$0.00	\$140.00	\$0.00	\$140.00	\$280.00
TOTAL COST/WEEK						\$3,445.00	
Subcontractor Overhead						0%	\$0.00
SUBTOTAL							\$3,445
Subcontractor Profit						0%	\$0.00
SUBTOTAL							\$3,445.00
Contractor Overhead						10%	\$345
SUBTOTAL							\$3,790
Contractor Profit						10%	\$378.95
TOTAL UNIT COST							\$4,168.45
Source of Cost Data:							
Vendors							\$5,835.83
Cost Adjustment Factor:							
FACTOR:		NOTES:					
H&S Productivity (labor & equip)		<input type="checkbox"/>					
Escalation to Base Year		<input type="checkbox"/>					
Area Cost Factor		<input type="checkbox"/>					
Subcontractor Markup		<input type="checkbox"/>					
Prime Contractor Markup		<input checked="" type="checkbox"/>					

MNA with RegenOx						
Site: Dover Location: Dover, Ohio Phase: Feasibility Study (-30% to +50%) Base Year: 2012 Date: Oct. 2012		Description: MNA, including monitoring well clusters and individual monitoring wells for offshore plume. Grid injection of RegenOx with ORC primers. Capital costs occur in Year 0. Annual costs occur in Years 1-30. Periodic costs occur every 5 yrs for 30 years of operation.				
BASE YEAR COSTS						
DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES	
Well Installation and Injection Event #1						
Injection Well Installation	1	LS	\$798,545.55	\$798,546		
RegenOx Event	1	LS	\$435,995.52	\$435,996		
- TRC Labor - Injection Well Installation	1	LS	\$112,290.25	\$112,290		
- TRC Labor - RegenOx Injection	1	LS	\$41,508.25	\$41,508		
Permits & Access Agreements	1	LS	\$10,025.00	-\$10,025		Assume 50% of 5 year report cost
Post-injection report	1	EA	\$11,200	\$11,200		1 week of PM, field tech; 1 day pubs
SUBTOTAL				\$1,409,565		
GW Monitoring Program						
Equipment & Labor	4	LS	\$14,141.63	\$56,567		Quarterly
Rental Equipment	4	LS	\$5,835.83	\$23,343		Quarterly
Lab Services	4	LS	\$11,547.64	\$46,191		Quarterly
SUBTOTAL				\$126,100		
Reporting						
Annual Report	1	EA	\$8,060.00	\$8,060		Annually
SUBTOTAL				\$8,060		
SUBTOTAL				\$1,543,725		
Contingency (20% Scope - 25% bid)			45%	\$694,676.23		
TOTAL YEAR 0 COST:				\$2,238,401		
ANNUAL O&M COSTS						
DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES	
GW Monitoring Program						
Equipment & Labor	4	LS	\$14,141.63	\$56,567		Quarterly to year 5; biannual yrs 6-30
Rental Equipment	4	LS	\$5,835.83	\$23,343		Quarterly to year 5; biannual yrs 6-30
Lab Services	4	LS	\$11,547.64	\$46,191		Quarterly to year 5; biannual yrs 6-30
SUBTOTAL				\$126,100		
Reporting						
Annual Report	1	EA	\$8,060.00	\$8,060		Annually
SUBTOTAL				\$8,060		
SUBTOTAL				\$134,160		
Contingency (10% Scope - 20% bid)			30%	\$40,248.12		
TOTAL ANNUAL O&M COST				\$174,408		
PERIODIC COSTS:						
DESCRIPTION	YR	QTY	UNIT	UNIT COST	TOTAL	NOTES
Injection Events #2 and #3						
RegenOx Event		1	LS	\$435,995.52	\$435,996	
- TRC Labor - RegenOx Injection		1	LS	\$41,508.25	\$41,508	
Post-injection report		1	EA	\$5,600	\$5,600	Assume 50% of initial report
SUBTOTAL					\$483,104	
Five Year Report	5-30	1	EA	\$20,050.00	\$20,050.00	
Well Repairs	5-30	6	DAY	\$1,500.00	\$9,000.00	
SUBTOTAL					\$29,050.00	
Injection Point Abandonment	6	23	DAY	\$3,000.00	\$69,000.00	
Abandonment Report	6	125	EA	\$125.00	\$16,875.00	
SUBTOTAL					\$85,875.00	
Well Abandonment	30	6	DAY	\$3,000.00	\$18,000.00	
Abandonment Report	30	22	EA	\$125.00	\$2,750.00	
Remedial Action Report	30	1	LS	\$20,050.00	\$20,050.00	
SUBTOTAL					\$40,800.00	
PRESENT VALUE ANALYSIS:						
COST TYPE	YEAR	TOTAL COST	TOTAL COST/YR	DISCOUNT FACTOR	PRESENT VALUE	NOTES
Capital	0	\$2,238,401	\$2,238,401	-	-	See support sheet for discount factors and Present Value Calculation Quarterly monitoring Biannual monitoring
Annual O&M Cost	1	\$174,408	\$174,408	-	-	
Annual O&M Cost	2-5	\$697,634.06	\$174,409	-	-	
Annual O&M Cost	6-30	\$2,311,061	\$62,443	-	-	
TOTAL PRESENT VALUE		\$5,421,525			\$4,720,334	

PRESENT VALUE CALCULATION

Site: Dover Description:
 Location: Dover, Ohio
 Phase: Feasibility Study (-30% to +50%)
 Base Year: 2012
 Date: Oct. 2012

Year	Annual Costs (\$)	Periodic Costs (\$)	Total Costs (\$)	Discount Factor at 7%	Total Present Value Cost at 7% (\$)
0	2012	\$2,238,401		1.000	\$2,238,401
1	2013	\$174,409	\$483,104	0.935	\$614,497
2	2014	\$174,409	\$483,104	0.873	\$574,297
3	2015	\$174,409		0.816	\$142,369
4	2016	\$174,409		0.763	\$133,055
5	2017	\$174,409	\$29,050	0.713	\$145,063
6	2018	\$92,443	\$85,875	0.666	\$118,821
7	2019	\$92,443		0.623	\$57,569
8	2020	\$92,443		0.582	\$53,803
9	2021	\$92,443		0.544	\$50,283
10	2022	\$92,443	\$29,050	0.508	\$61,761
11	2023	\$92,443		0.475	\$43,919
12	2024	\$92,443		0.444	\$41,046
13	2025	\$92,443		0.415	\$38,361
14	2026	\$92,443		0.388	\$35,851
15	2027	\$92,443	\$29,050	0.362	\$44,035
16	2028	\$92,443		0.339	\$31,314
17	2029	\$92,443		0.317	\$29,265
18	2030	\$92,443		0.296	\$27,351
19	2031	\$92,443		0.277	\$25,561
20	2032	\$92,443	\$29,050	0.258	\$31,396
21	2033	\$92,443		0.242	\$22,326
22	2034	\$92,443		0.226	\$20,856
23	2035	\$92,443		0.211	\$19,501
24	2036	\$92,443		0.197	\$18,225
25	2037	\$92,443	\$29,050	0.184	\$22,385
26	2038	\$92,443		0.172	\$15,918
27	2039	\$92,443		0.161	\$14,877
28	2040	\$92,443		0.150	\$13,904
29	2041	\$92,443		0.141	\$12,994
30	2042	\$92,443	\$69,850	0.131	\$21,320

TOTAL PRESENT VALUE

\$4,720,334

TRC Labor Cost Sub-Element

P/T Level	Hourly Rate	Task Injection Points Installation	Task RegenOx Injections	Task ORC-A Injections	Task 3-DME Injections	Task Permits and Injection Reporting	Task Progress Reporting	Task 5-Year Report	Task GW Sampling O&M
		Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
CAT 1	225 /hr	0	0	0	0	0	0	0	0
CAT 2	200 /hr	0	0	0	0	0	0	10	0
CAT 3	160 /hr	136	46	0	0	40	40	70	16
CAT 4	155 /hr	0	0	0	0	0	0	0	0
CAT 5	105 /hr	764	300	0	0	40	8	20	92
CAT 6	90 /hr	0	0	0	0	0	0	0	0
CAT 7	75 /hr	8	0	0	0	8	8	0	0
CAT 8	70 /hr	0	0	0	0	0	0	60	0
CAT 9	60 /hr	0	0	0	0	0	0	0	0
	total hrs	908	346	0	0	88	56	160	108
	Mark-up	base	base	base	base	base	base	base	base
Total Direct Labor (hours/\$)		\$102,580	\$38,860	\$0	\$0	\$11,200	\$7,840	\$19,500	\$12,220
Materials	0.1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Travel & per diem	0.1	\$9,710	\$2,648	\$0	\$0	\$0	\$0	\$0	\$1,471
Equipment Rental	0.1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
ODCS (phone, fax, Fed Ex)	0.1	\$0	\$0	\$0	\$0	\$220	\$220	\$550	\$220
Subcontractor	0.1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Price by task		Estimate \$112,290	Estimate \$41,508	Estimate \$0	Estimate \$0	Estimate \$11,420	Estimate \$8,060	Estimate \$20,050	Estimate \$13,911

Notes: Assume 10 hour days. Per Diem = \$45/day and \$33.75/day (75%) on travel days. Hotel reimbursement is \$100/night. Travel reimbursement is \$200/hrp in addition to car rental.

Capital Cost Sub-Element LABORATORY SERVICES		COST WORKSHEET					
Site:	Dover	Prepared by:	JCM	Checked by:	ACH		
Location:	Dover, Ohio	Date:	Oct-12	Date:	Oct-12		
Phase:	Feasibility Study (-30% to +50%)						
Base Year:	2012						
Date:	Oct. 2012						
Work Statement:							
22 wells with 3 duplicates (1 per 10) for VOCs, collected via PDB. 20 wells with 2 duplicates (1 per 10) for remaining parameters and field measurement of DO and ORP, collected via HydraSleeve. Samples shipped to lab on ice.							
Cost Analysis:							
DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	UNIT TOTAL	TOTAL
VOCs (8260B)	25	EA	-	-	-	\$125.00	\$3,125.00
Dissolved Gasses (RSK-175)	22	EA	-	-	-	\$120.00	\$2,640.00
CO2 (RSK-175)	22	EA	-	-	-	\$85.00	\$1,870.00
Chloride (325.2)	22	EA	-	-	-	\$18.00	\$396.00
Nitrate (353.2)	22	EA	-	-	-	\$13.75	\$302.50
Iron, Total (6010B)	22	EA	-	-	-	\$14.00	\$308.00
Iron, Ferrous (6010B)	22	EA	-	-	-	\$30.00	\$660.00
Sulfate (EPA 300.0)	22	EA	-	-	-	\$11.00	\$242.00
						\$9,543.50	
Subcontractor Overhead						0%	\$0.00
SUBTOTAL							\$9,544
Subcontractor Profit						0%	\$0.00
SUBTOTAL							\$9,543.50
Contractor Overhead						10%	\$954
SUBTOTAL							\$10,498
Contractor Profit						10%	\$1,049.79
TOTAL UNIT COST							\$11,547.64
Source of Cost Data:							
	Invoices from Lab						
Cost Adjustment Factor:							
	FACTOR:		NOTES:				
	H&S Productivity (labor & equip)	<input type="checkbox"/>					
	Escalation to Base Year	<input type="checkbox"/>					
	Area Cost Factor	<input type="checkbox"/>					
	Subcontractor Overhead & Prof.	<input type="checkbox"/>					
	Prime Contractor Overhead & Prof.	<input checked="" type="checkbox"/>					

Capital Cost Sub-Element INJECTION WELL INSTALLATION		COST WORKSHEET						
Site:	Dover	Prepared by:	JCM	Checked by:	ACH			
Location:	Dover, Ohio	Date:	Oct-12	Date:	Oct-12			
Phase:	Feasibility Study (-30% to +50%)							
Base Year:	2012							
Date:	Oct. 2012							
Work Statement:								
Assumes 135 injection wells in a grid w/ 20' spacing. Wells will be 2" pvc, screened from 35' to 60' bgs, flush mount with conc. pad.								
Cost-Analysis:								
DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	UNIT TOTAL	TOTAL	
Mob./DeMob. Rig & Equipment	1	LS	\$600.00	\$0.00	\$0.00	\$600.00	\$600.00	
Daily Travel	68	Day	\$300.00	\$0.00	\$0.00	\$300.00	\$20,400.00	
6" Sonic Drilling	8100	Foot	\$0.00	\$0.00	\$35.00	\$35.00	\$283,500.00	
2" PVC Well	8100	Foot	\$0.00	\$0.00	\$25.00	\$25.00	\$202,500.00	
Flush Mount and Pad	135	Each	\$0.00	\$0.00	\$350.00	\$350.00	\$47,250.00	
DOT 55gal Drum&filled	7	Each	\$0.00	\$65.00	\$0.00	\$65.00	\$455.00	
Well Development (est)	7	Hour	\$175.00	\$0.00	\$0.00	\$175.00	\$1,225.00	
Decon Unit	4	Day	\$125.00	\$0.00	\$0.00	\$125.00	\$500.00	
Temporary Decon Pad	1	Each	\$0.00	\$300.00	\$0.00	\$300.00	\$300.00	
Water/Support Truck	70	Day	\$0.00	\$150.00	\$0.00	\$150.00	\$10,500.00	
Bobcat	14	Week	\$0.00	\$1,250.00	\$0.00	\$1,250.00	\$17,500.00	
Well Log	135	Each	\$25.00	\$0.00	\$0.00	\$25.00	\$3,375.00	
Standby Time Sonic Rig w/3 men	0	Hour	\$400.00	\$0.00	\$0.00	\$400.00	\$0.00	
IDW Hauling		OPEN Hour	\$150.00	\$0.00	\$0.00	open	\$0.00	
Police Detail/Barriers	68	Day	\$0.00	\$0.00	\$0.00	\$1,000.00	\$68,000.00	
Vehicles (1 SUV @-\$350/wk)	11	WK	\$0.00	\$350.00	\$0.00	\$350.00	\$3,850.00	
TOTAL COST							\$659,955.00	
SUBTOTAL								
Subcontractor Overhead							0%	\$0.00
SUBTOTAL							0%	\$659,955
Subcontractor Profit							0%	\$0.00
SUBTOTAL							0%	\$659,955.00
Contractor Overhead							10%	\$65,996
SUBTOTAL							10%	\$725,951
Contractor Profit							10%	\$72,595.05
TOTAL UNIT COST							\$798,545.55	
Source of Cost Data:								
Driller's estimate								
Cost Adjustment Factor:								
FACTOR:								
H&S Productivity (labor & equip)							<input type="checkbox"/>	
Escalation to Base Year							<input checked="" type="checkbox"/>	
Area Cost Factor							<input type="checkbox"/>	
Subcontractor Overhead & Prof.							<input type="checkbox"/>	
Prime Contractor Overhead & Prof.							<input checked="" type="checkbox"/>	
NOTES:								

Capital Cost Sub-Element CHEMICAL INJECTIONS		COST WORKSHEET					
Site: Dover Location: Dover, Ohio Phase: Feasibility Study (-30% to +50%) Base Year: 2012 Date: Oct. 2012	Prepared by: JCM Date: Oct-12 Checked by: ACH Date: Oct-12						
Work Statement: RegenOx and ORC primer pumped into 135 previously installed injection wells in the grid.							
Cost Analysis:							
DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	UNIT TOTAL	TOTAL
Event 1							
Mob./DeMob. Rig & Equipment	1	LS	\$600.00	\$0.00	\$0.00	\$600.00	\$600.00
Purchase RegenOx	50,625	LB	\$0.00	\$0.00	\$1.75	\$1.75	\$88,593.75
Purchase ORC	27,000	LB	\$0.00	\$0.00	\$6.50	\$6.50	\$175,500.00
Injections by driller	25	DAY	\$1,650.00	\$0.00	\$0.00	\$1,650.00	\$41,250.00
Police Detail/Barriers	25	DAY	\$0.00	\$0.00	\$0.00	\$1,000.00	\$25,000.00
Shipping Estimate and Tax	1	LS	\$0.00	\$0.00	\$28,333.13	\$28,333.13	\$28,333.13
Vehicles (1 SUV @ \$350/wk)	3	WK	\$0.00	\$350.00	\$0.00	\$350.00	\$1,050.00
SUBTOTAL							\$360,326.88
Subcontractor Overhead							0% \$0.00
SUBTOTAL							0% \$0.00
Subcontractor Profit							\$0
SUBTOTAL							10% \$36,032.69
Contractor Overhead							\$396,360
SUBTOTAL							10% \$39,635.96
Contractor Profit							\$435,995.52
Source of Cost Data:							
Cost Adjustment Factor:							
FACTOR:			NOTES:				
H&S Productivity (labor & equip)							
Escalation to Base Year							
Area Cost Factor							
Subcontractor Overhead & Prof.							
Prime Contractor Overhead & Prof.			X				

Cost Sub-Element GROUND WATER SAMPLING EQUIPMENT		COST WORKSHEET		
Site: Dover	Prepared by: JCM	Checked by: ACH		
Location: Dover, Ohio	Date: Oct-12	Date: Oct-12		
Phase: Feasibility Study (-30% to +50%)				
Base Year: 2012				
Date: Oct. 2012				
Work Statement:				
<p>Sampling event will consist of two mobilizations. During the first mob, one person will deploy PDBs and HydraSleeves in 22 wells over 5 days (4 nights), screening the well mouths with an FID. HydraSleeves will be retrieved and sampled per Table 13, including DO and ORP field measurements. During the second mobilization consisting of 3 days (2 nights), one person will retrieve the PDBs and sample for VOCs, screening the well mouth with an FID. Samples will be shipped to the lab on ice. Each mobilization will include a vehicle rental, travel to and from the site, with per diem and lodging reimbursement.</p>				
Cost Analysis:				
DESCRIPTION	QTY	UNIT	LABOR EQUIP MTRL TOTAL TOTAL	
Packaging Tape	1	PKG	\$0.00 \$6.00 \$0.00 \$6.00 \$6.00	
Ziplock bags	2	EA	\$0.00 \$5.00 \$0.00 \$5.00 \$10.00	
Duct Tape	1	EA	\$0.00 \$10.00 \$0.00 \$10.00 \$10.00	
Nitrile gloves	1	BOX	\$0.00 \$0.00 \$11.00 \$11.00 \$11.00	
Safety Glasses	1	EA	\$0.00 \$0.00 \$4.00 \$4.00 \$4.00	
5-gallon buckets	3	EA	\$0.00 \$0.00 \$4.00 \$4.00 \$12.00	
Graduated Cylinder (250 mL)	1	EA	\$0.00 \$0.00 \$25.00 \$25.00 \$25.00	
Kimwipes (4.5"x8.5")	1	BOX	\$0.00 \$0.00 \$8.00 \$8.00 \$8.00	
Poly Sheeting	1	EA	\$0.00 \$10.00 \$0.00 \$10.00 \$10.00	
Alconox Detergent (4lb box)	1	EA	\$0.00 \$0.00 \$31.00 \$31.00 \$31.00	
Field Book	1	EA	\$0.00 \$0.00 \$9.00 \$9.00 \$9.00	
TOTAL COST/SAMPLING ROUND				\$136.00
Subcontractor Overhead			0%	<u>\$0.00</u>
SUBTOTAL				<u>\$136</u>
Subcontractor Profit			0%	<u>\$0.00</u>
SUBTOTAL				<u>\$136.00</u>
Contractor Overhead			10%	<u>\$14</u>
SUBTOTAL				<u>\$150</u>
Contractor Profit			10%	<u>\$14.96</u>
TOTAL UNIT COST				\$164.56
Source of Cost Data:				
Vendors	Applied escalation factor of 1.4			\$ 230.38
Cost Adjustment Factor:				
FACTOR:		NOTES:		
H&S Productivity (labor & equip)	<input type="checkbox"/>			
Escalation to Base Year	<input checked="" type="checkbox"/>			
Area Cost Factor	<input type="checkbox"/>			
Subcontractor Markup	<input type="checkbox"/>			
Prime Contractor Markup	<input checked="" type="checkbox"/>			

Cost Sub-Element
GROUND WATER SAMPLING EQUIPMENT

COST WORKSHEET

Site: Dover
 Location: Dover, Ohio
 Phase: Feasibility Study (-30% to +50%)
 Base Year: 2012
 Date: Oct. 2012

Prepared by: JCM
 Date: Oct-12
 Checked by: ACH
 Date: Oct-12

Work Statement:

Sampling event will consist of two mobilizations. During the first mob, one person will deploy PDBs and HydraSleeves in 22 wells over 5 days (4 nights), screening the well mouths with an FID. HydraSleeves will be retrieved and sampled per Table 13, including DO and ORP field measurements. During the second mobilization consisting of 3 days (2 nights), one person will retrieve the PDBs and sample for VOCs, screening the well mouth with an FID. Samples will be shipped to the lab on ice. Each mobilization will include a vehicle rental, travel to and from the site, with per diem and lodging reimbursement.

Cost Analysis:

DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	UNIT	
						TOTAL	TOTAL
YSI 600 XL MP	1	WK	\$0.00	\$300.00	\$0.00	\$300.00	\$300.00
FID rental includes cal gas (1 @ \$250/wk)	2	WK	\$0.00	\$250.00	\$0.00	\$250.00	\$500.00
Vehicles (1 SUV @ \$350/wk)	2	WK	\$0.00	\$350.00	\$0.00	\$350.00	\$700.00
PDBs	30	EA	\$0.00	\$18.00	\$0.00	\$18.00	\$540.00
HydraSleeves	25	EA	\$0.00	\$30.00	\$0.00	\$30.00	\$750.00
DI Water	5	GAL	\$0.00	\$75.00	\$0.00	\$75.00	\$375.00
Interface probe (1 units)	2	WK	\$0.00	\$140.00	\$0.00	\$140.00	\$280.00
TOTAL COST/WEEK							\$3,445.00

Subcontractor Overhead	0%	\$0.00
SUBTOTAL		\$3,445
Subcontractor Profit	0%	\$0.00
SUBTOTAL		\$3,445.00
Contractor Overhead	10%	\$345
SUBTOTAL		\$3,790
Contractor Profit	10%	\$378.95
TOTAL UNIT COST		\$4,168.45
Source of Cost Data:		
Vendors		\$5,835.83

Cost Adjustment Factor:

FACTOR:	
H&S Productivity (labor & equip)	<input type="text"/>
Escalation to Base Year	<input type="text"/>
Area Cost Factor	<input type="text"/>
Subcontractor Markup	<input type="text"/>
Prime Contractor Markup	<input checked="" type="checkbox"/>

NOTES:

MNA with RegenOx and ORC-A						
Site: Dover Location: Dover, Ohio Phase: Feasibility Study (30% to +50%) Base Year: 2012 Date: Oct. 2012		Description: MNA, including monitoring well clusters and individual monitoring wells for offsite plume. Grid injection of RegenOx with ORC primer, and line injection of ORC-A. Capital costs occur in Year 0. Annual costs occur in Years 1-30. Periodic costs occur every 5 yrs for 30 years of operation.				
BASE YEAR COSTS						
DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES	
Well Installation and Injection Event #1						
Injection Well Installation	1	LS	\$1,353,294.25	\$1,353,294		
RegenOX Event	1	LS	\$435,995.52	\$435,996		
ORC-A Event 1	1	LS	\$261,490.08	\$261,490		
- TRC Labor - Injection Well Installation	1	LS	\$226,626.75	\$226,627		
- TRC Labor - RegenOx Injection	1	LS	\$41,508.25	\$41,508		
- TRC Labor - ORC-A Injection	1	LS	\$26,725.50	\$26,726		
Permits & Access Agreements	1	LS	\$10,025.00	\$10,025		Assume 50% of 5 year report cost
Post-injection report	1	EA	\$11,200.00	\$11,200		1 week of PM, field tech; 1 day o/s
SUBTOTAL				\$2,366,867		
GW Monitoring Program						
Equipment & Labor	4	LS	\$14,141.63	\$56,567		Quarterly
Rental Equipment	4	LS	\$5,835.83	\$23,343		Quarterly
Lab Services	4	LS	\$11,547.64	\$46,181		Quarterly
SUBTOTAL				\$126,100		
Reporting						
Annual Report	1	EA	\$8,060.00	\$8,060		Annually
SUBTOTAL				\$8,060		
SUBTOTAL				\$2,501,028		
Contingency (20% Scope + 25% bid)			45%	\$1,125,462.48		
TOTAL YEAR 0 COST:				\$3,626,490		
ANNUAL O&M COSTS						
DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES	
GW Monitoring Program						
Equipment & Labor	4	LS	\$14,141.63	\$56,567		Quarterly to year 5; biannual yrs 6-30
Rental Equipment	4	LS	\$5,835.83	\$23,343		Quarterly to year 5; biannual yrs 6-30
Lab Services	4	LS	\$11,547.64	\$46,181		Quarterly to year 5; biannual yrs 6-30
SUBTOTAL				\$126,100		
Reporting						
Annual Report	1	EA	\$8,060.00	\$8,060		Annually
SUBTOTAL				\$8,060		
SUBTOTAL				\$134,160		
Contingency (10% Scope - 20% bid)			30%	\$40,248.12		
TOTAL ANNUAL O&M COST				\$174,408		
PERIODIC COSTS:						
DESCRIPTION	YR	QTY	UNIT	UNIT COST	TOTAL	NOTES
Injection Events #2 through #5						
RegenOX Event #2 and #3		1	LS	\$404,616.44	\$404,616	
- TRC Labor - RegenOx Injection		1	LS	\$41,508.25	\$41,508	
Post-injection report		1	EA	\$5,600.00	\$5,600	Assume 50% of initial report
SUBTOTAL				\$451,725		
ORC-A Event		1	LS	\$261,490.08	\$261,490	
- TRC Labor - ORC-A Injection		1	LS	\$26,725.50	\$26,726	
Post-injection report		1	EA	\$5,600.00	\$5,600	Assume 50% of initial report
SUBTOTAL				\$293,816		
Five Year Report	5-30	1	EA	\$20,050.00	\$20,050.00	
Well Repairs	5-30	6	DAY	\$1,500.00	\$9,000.00	
SUBTOTAL				\$29,050.00		
Injection Point Abandonment	6	44	DAY	\$3,000.00	\$132,000.00	
Abandonment Report	6	220	EA	\$125.00	\$27,500.00	
SUBTOTAL				\$159,500.00		
Well Abandonment	30	6	DAY	\$3,000.00	\$18,000.00	
Abandonment Report	30	22	EA	\$125.00	\$2,750.00	
Remedial Action Report	30	1	LS	\$20,050.00	\$20,050.00	
SUBTOTAL				\$40,800.00		
PRESENT VALUE ANALYSIS:						
COST TYPE	YEAR	TOTAL COST	TOTAL COST/YR	DISCOUNT FACTOR	PRESENT VALUE	NOTES
Capital	0	\$3,626,490	\$3,626,490	-	-	See support sheet for discount factors and Present Value calculation
Annual O&M Cost	1	\$174,409	\$174,409	-	-	Quarterly monitoring
Annual O&M Cost	2-5	\$562,989	\$174,409	-	-	Biannual monitoring
Annual O&M Cost	6-30	\$2,311,081	\$103,110	-	-	
TOTAL PRESENT VALUE		\$6,704,969			\$7,305,450	NPV of O&M @ 7% discount factor

PRESENT VALUE CALCULATION

Site: Dover Description:
 Location: Dover, Ohio
 Phase: Feasibility Study (-30% to +50%)
 Base Year: 2012
 Date: Oct. 2012

Year		Annual Costs (\$)	Periodic Costs (\$)	Total Costs (\$)	Discount Factor at 7%	Total Present Value Cost at 7% (\$)
0	2012	\$3,626,490		\$3,626,490	1.000	\$3,626,490
1	2013	\$174,409	\$745,540	\$919,949	0.935	\$859,765
2	2014	\$174,409	\$745,540	\$919,949	0.873	\$803,519
3	2015	\$174,409	\$293,816	\$468,224	0.816	\$382,210
4	2016	\$174,409	\$293,816	\$468,224	0.763	\$357,206
5	2017	\$174,409	\$322,866	\$497,274	0.713	\$354,550
6	2018	\$92,443	\$159,500	\$251,943	0.666	\$167,880
7	2019	\$92,443		\$92,443	0.623	\$57,569
8	2020	\$92,443		\$92,443	0.582	\$53,803
9	2021	\$92,443		\$92,443	0.544	\$50,283
10	2022	\$92,443	\$29,050	\$121,493	0.508	\$61,761
11	2023	\$92,443		\$92,443	0.475	\$43,919
12	2024	\$92,443		\$92,443	0.444	\$41,046
13	2025	\$92,443		\$92,443	0.415	\$38,361
14	2026	\$92,443		\$92,443	0.388	\$35,851
15	2027	\$92,443	\$29,050	\$121,493	0.362	\$44,035
16	2028	\$92,443		\$92,443	0.339	\$31,314
17	2029	\$92,443		\$92,443	0.317	\$29,265
18	2030	\$92,443		\$92,443	0.296	\$27,351
19	2031	\$92,443		\$92,443	0.277	\$25,561
20	2032	\$92,443	\$29,050	\$121,493	0.258	\$31,396
21	2033	\$92,443		\$92,443	0.242	\$22,326
22	2034	\$92,443		\$92,443	0.226	\$20,866
23	2035	\$92,443		\$92,443	0.211	\$19,501
24	2036	\$92,443		\$92,443	0.197	\$18,225
25	2037	\$92,443	\$29,050	\$121,493	0.184	\$22,385
26	2038	\$92,443		\$92,443	0.172	\$15,918
27	2039	\$92,443		\$92,443	0.161	\$14,877
28	2040	\$92,443		\$92,443	0.150	\$13,904
29	2041	\$92,443		\$92,443	0.141	\$12,994
30	2042	\$92,443	\$69,850	\$162,293	0.131	\$21,320

TOTAL PRESENT VALUE

\$7,305,450

TFC Labor Cost Sub-Element

P/T Level	Hourly Rate	Injection Points Installation		RegenOx Injections		ORC-A Injections		3-DME Injections		Permits and Injection Reporting		Task Progress Reporting		Task 5-Year Report		GW Sampling O&M	
		Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost
CAT 1	225 /hr	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
CAT 2	200 /hr	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
CAT 3	180 /hr	272	\$43,520	46	\$7,360	30	\$4,800	0	\$0	40	\$6,400	40	\$6,400	70	\$11,200	16	\$2,560
CAT 4	155 /hr	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
CAT 5	105 /hr	1528	\$160,440	300	\$31,500	192	\$20,160	0	\$0	40	\$4,200	8	\$840	20	\$2,100	92	\$9,660
CAT 6	90 /hr	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
CAT 7	75 /hr	8	\$600	0	\$0	0	\$0	0	\$0	8	\$600	8	\$600	0	\$0	0	\$0
CAT 8	70 /hr	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	60	\$4,200	0	\$0
CAT 9	60 /hr	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
		1808	\$204,560	0	\$38,860	222	\$24,960	0	\$0	88	\$11,200	56	\$7,840	160	\$19,500	108	\$12,220
		base	\$0	base	\$0	base	\$0	base	\$0	base	\$0	base	\$0	base	\$0	base	\$0
		0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
		20062.5	\$22,069	2407.5	\$2,648	1605	\$1,766	0	\$0	0	\$0	0	\$0	0	\$0	1337.5	\$1,471
		0	\$0	0	\$0	0	\$0	0	\$0	200	\$220	200	\$220	500	\$550	200	\$220
		0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
		Estimate	\$226,629	Estimate	\$41,508	Estimate	\$26,726	Estimate	\$0	Estimate	\$11,420	Estimate	\$6,060	Estimate	\$20,050	Estimate	\$13,911

Notes: Assume 10 hour days. Per Diem = \$45/day and \$33.75/day (75%) on travel days. Hotel reimbursement is \$100/night. Travel reimbursement is \$200/trip in addition to car rental.

Capital Cost Sub-Element LABORATORY SERVICES		COST WORKSHEET	
Site:	Dover	Prepared by:	JCM
Location:	Dover, Ohio	Date:	Oct-12
Phase:	Feasibility Study (-30% to +50%)	Checked by:	ACH
Base Year:	2012	Date:	Oct-12
Date:	Oct. 2012		
Work Statement:			
22 wells with 3 duplicates (1 per 10) for VOCs, collected via PDB. 20 wells with 2 duplicates (1 per 10) for remaining parameters and field measurement of DO and ORP, collected via HydraSleeve. Samples shipped to lab on ice.			
Cost Analysis:			
	QTY	UNIT	UNIT TOTAL
DESCRIPTION			
VOCs (8260B)	25	EA	\$125.00
Dissolved Gasses (RSK-175)	22	EA	\$120.00
CO2 (RSK-175)	22	EA	\$85.00
Chloride (325.2)	22	EA	\$18.00
Nitrate (353.2)	22	EA	\$13.75
Iron, Total (6010B)	22	EA	\$14.00
Iron, Ferrous (6010B)	22	EA	\$30.00
Sulfate (EPA 300.0)	22	EA	\$11.00
			\$9,543.50
Subcontractor Overhead			0%
SUBTOTAL			\$9,544
Subcontractor Profit			0%
SUBTOTAL			\$9,543.50
Contractor Overhead			10%
SUBTOTAL			\$954
Contractor Profit			10%
			\$1,049.79
TOTAL UNIT COST			\$11,547.64
Source of Cost Data:			
	Invoices from Lab		
Cost Adjustment Factor:			
	FACTOR:		
	H&S Productivity (labor & equip)	<input type="checkbox"/>	
	Escalation to Base Year	<input type="checkbox"/>	
	Area Cost Factor	<input type="checkbox"/>	
	Subcontractor Overhead & Prof.	<input type="checkbox"/>	
	Prime Contractor Overhead & Prof.	<input checked="" type="checkbox"/>	
	NOTES:		

Capital Cost Sub-Element
INJECTION WELL INSTALLATION **COST WORKSHEET**

Site: Dover
 Location: Dover, Ohio
 Phase: Feasibility Study (-30% to +50%)
 Base Year: 2012
 Date: Oct. 2012

Prepared by: JCM
 Date: Oct-12

Checked by: AH
 Date: Oct-12

Work Statement:
 Assumes 220 injection wells - 135 in a grid w/ 20' spacing installed at 2/day, and 85 in a line w/ 20' spacing installed at 1.25/day. Wells will be 2" pvc, screened from 35' to 80' bgs, flush mount with conc. pad.

Cost Analysis:

DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	UNIT TOTAL	TOTAL
Mob./DeMob: Rig & Equipment	1	LS	\$600.00	\$0.00	\$0.00	\$600.00	\$600.00
Daily Travel	136	Day	\$300.00	\$0.00	\$0.00	\$300.00	\$40,800.00
6" Sonic Drilling	13200	Foot	\$0.00	\$0.00	\$35.00	\$35.00	\$462,000.00
2" PVC Well	13200	Foot	\$0.00	\$0.00	\$25.00	\$25.00	\$330,000.00
Flush Mount and Pad	220	Each	\$0.00	\$0.00	\$350.00	\$350.00	\$77,000.00
DOT 55gal Drum & filled	10	Each	\$0.00	\$65.00	\$0.00	\$65.00	\$650.00
Well Development (est)	10	Hour	\$175.00	\$0.00	\$0.00	\$175.00	\$1,750.00
Decon Unit	5	Day	\$125.00	\$0.00	\$0.00	\$125.00	\$625.00
Temporary Decon Pad	1	Each	\$0.00	\$300.00	\$0.00	\$300.00	\$300.00
Water/Support Truck	138	Day	\$0.00	\$150.00	\$0.00	\$150.00	\$20,700.00
Bobcat	27	Week	\$0.00	\$1,250.00	\$0.00	\$1,250.00	\$33,750.00
Well Log	220	Each	\$25.00	\$0.00	\$0.00	\$25.00	\$5,500.00
Standby Time Sonic Rig w/3 men	0	Hour	\$400.00	\$0.00	\$0.00	\$400.00	\$0.00
IDW Hauling	OPEN	Hour	\$150.00	\$0.00	\$0.00	open	\$0.00
Police Detail/Barriers	136	Day				\$ 1,000.00	\$ 136,000.00
Vehicles (1 SUV @ \$350/wk)	25	WK	\$0.00	\$350.00	\$0.00	\$ 350.00	\$ 8,750.00
TOTAL COST							\$1,118,425.00

SUBTOTAL							\$1,118,425
Subcontractor Overhead					0%		\$0.00
SUBTOTAL							\$1,118,425
Subcontractor Profit					0%		\$0.00
SUBTOTAL							\$1,118,425.00
Contractor Overhead					10%		\$111,843
SUBTOTAL							\$1,230,268
Contractor Profit					10%		\$123,026.75
TOTAL UNIT COST							\$1,353,294.25

Source of Cost Data:
 Driller's estimate

Cost Adjustment Factor:

FACTOR:	
H&S Productivity (labor & equip)	<input type="checkbox"/>
Escalation to Base Year	<input checked="" type="checkbox"/>
Area Cost Factor	<input type="checkbox"/>
Subcontractor Overhead & Prof.	<input type="checkbox"/>
Prime Contractor Overhead & Prof.	<input checked="" type="checkbox"/>

NOTES:

Capital Cost Sub-Element CHEMICAL INJECTIONS		COST WORKSHEET					
Site: Dover Location: Dover, Ohio Phase: Feasibility Study (-30% to +50%) Base Year: 2012 Date: Oct. 2012.	Prepared by: JCM Checked by: ACH Date: Oct-12 Date: Oct-12						
Work Statement: RegenOx and ORC primer pumped into 135 previously installed injection wells in the grid:							
Cost Analysis:							
DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	UNIT TOTAL	TOTAL
Event 1							
Mob./DeMob. Rig & Equipment	1	LS	\$600.00	\$0.00	\$0.00	\$600.00	\$600.00
Purchase RegenOx	50,625	LB	\$0.00	\$0.00	\$1.75	\$1.75	\$88,593.75
Purchase ORC	27,000	LB	\$0.00	\$0.00	\$6.50	\$6.50	\$175,500.00
Injections by driller	25	DAY	\$1,650.00	\$0.00	\$0.00	\$1,650.00	\$41,250.00
Police Detail/Barriers	25	DAY	\$0.00	\$0.00	\$0.00	\$1,000.00	\$25,000.00
Shipping Estimate and Tax	1	LS	\$0.00	\$0.00	\$28,333.13	\$28,333.13	\$28,333.13
Vehicles (1 SUV @ \$350/wk)	3	WK	\$0.00	\$350.00	\$0.00	\$350.00	\$1,050.00
SUBTOTAL							\$360,326.88
Subcontractor Overhead							0% <u>\$0.00</u>
SUBTOTAL							0% <u>\$0.00</u>
Subcontractor Profit							10% <u>\$36,032.69</u>
SUBTOTAL							10% <u>\$396,360</u>
Contractor Overhead							10% <u>\$39,635.96</u>
SUBTOTAL							10% <u>\$435,995.52</u>
Contractor Profit							<u>\$435,995.52</u>
Source of Cost Data:							
Cost Adjustment Factor:							
FACTOR:							
H&S Productivity (labor & equip)	<input type="text"/>						
Escalation to Base Year	<input type="text"/>						
Area Cost Factor	<input type="text"/>						
Subcontractor Overhead & Prof.	<input type="text"/>						
Prime Contractor Overhead & Prof.	<input checked="" type="checkbox"/>						
NOTES:							

Capital Cost Sub-Element CHEMICAL INJECTIONS						COST WORKSHEET	
Site:	Dover	Prepared by:	JCM	Checked by:	ACH		
Location:	Dover, Ohio	Date:	Oct-12	Date:	Oct-12		
Phase:	Feasibility Study (-30% to +50%)						
Base Year:	2012						
Date:	Oct. 2012.						
Work Statement:							
ORC-A pumped into 85 previously installed injection wells in the line.							
Cost Analysis:							
DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	UNIT TOTAL	TOTAL
Event 1							
Mob./DeMob. Rig & Equipment	1	LS	\$600.00	\$0.00	\$0.00	\$600.00	\$600.00
Purchase ORC-A	25,500	LB	\$0.00	\$0.00	\$6.50	\$6.50	\$165,750.00
Injections by driller	15	DAY	\$1,650.00	\$0.00	\$0.00	\$1,650.00	\$24,750.00
Police Detail/Barriers	15	DAY	\$0.00	\$0.00	\$0.00	\$1,000.00	\$15,000.00
Shipping Estimate and Tax	1	LS	\$0.00	\$0.00	\$9,307.50	\$9,307.50	\$9,307.50
Vehicles (1 SUV @ \$350/wk)	2	WK	\$0.00	\$350.00	\$0.00	\$350.00	\$700.00
SUBTOTAL						\$216,107.50	
Subcontractor Overhead						0%	\$0.00
SUBTOTAL						0%	\$0.00
Subcontractor Profit						10%	\$21,610.75
SUBTOTAL						10%	\$237,718
Contractor Overhead						10%	\$23,771.83
SUBTOTAL						10%	\$261,490.08
Contractor Profit							\$261,490.08
Source of Cost Data:							
Cost Adjustment Factor:							
FACTOR:							
H&S Productivity (labor & equip)	<input type="checkbox"/>						
Escalation to Base Year	<input type="checkbox"/>						
Area Cost Factor	<input type="checkbox"/>						
Subcontractor Overhead & Prof.	<input type="checkbox"/>						
Prime Contractor Overhead & Prof.	<input checked="" type="checkbox"/>						
NOTES:							

Capital Cost Sub-Element CHEMICAL INJECTIONS		COST WORKSHEET					
Site: Dover Location: Dover, Ohio Phase: Feasibility Study (-30% to +50%) Base Year: 2012 Date: Oct. 2012	Prepared by: JCM Date: Oct-12 Checked by: ACH Date: Oct-12						
Work Statement: ORC-A pumped into 85 previously installed injection wells in the line.							
Cost Analysis:							
DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	UNIT TOTAL	TOTAL
Events 2-5							
Mob./DeMob. Rig & Equipment	1	LS	\$600.00	\$0.00	\$0.00	\$600.00	\$600.00
Purchase ORC-A	25,500	LB	\$0.00	\$0.00	\$6.50	\$6.50	\$165,750.00
Injections by driller	15	DAY	\$1,650.00	\$0.00	\$0.00	\$1,650.00	\$24,750.00
Police Detail/Barriers	15	DAY	\$0.00	\$0.00	\$0.00	\$1,000.00	\$15,000.00
Shipping Estimate and Tax	1	LS	\$0.00	\$0.00	\$9,307.50	\$9,307.50	\$9,307.50
Vehicles (1 SUV @ \$350/wk)	2	WK	\$0.00	\$350.00	\$0.00	\$350.00	\$700.00
SUBTOTAL							\$216,107.50
						0%	\$0.00
Subcontractor Overhead						0%	\$0
SUBTOTAL						0%	\$0.00
Subcontractor Profit						10%	\$0
SUBTOTAL						10%	\$21,610.75
Contractor Overhead						10%	\$237,718
SUBTOTAL						10%	\$23,771.83
Contractor Profit							\$261,490.08
Source of Cost Data:							
Cost Adjustment Factor:							
FACTOR:							
H&S Productivity (labor & equip)	<input type="checkbox"/>						
Escalation to Base Year	<input type="checkbox"/>						
Area Cost Factor	<input type="checkbox"/>						
Subcontractor Overhead & Prof.	<input type="checkbox"/>						
Prime Contractor Overhead & Prof.	<input checked="" type="checkbox"/>						
NOTES:							

Cost Sub-Element
GROUND WATER SAMPLING EQUIPMENT

COST WORKSHEET

Site: Dover
 Location: Dover, Ohio
 Phase: Feasibility Study (-30% to +50%)
 Base Year: 2012
 Date: Oct. 2012

Prepared by: JCM
 Date: Oct-12
 Checked by: ACH
 Date: Oct-12

Work Statement:

Sampling event will consist of two mobilizations. During the first mob, one person will deploy PDBs and HydraSleeves in 22 wells over 5 days (4 nights), screening the well mouths with an FID. HydraSleeves will be retrieved and sampled per Table 13, including DO and ORP field measurements. During the second mobilization consisting of 3 days (2 nights), one person will retrieve the PDBs and sample for VOCs, screening the well mouth with an FID. Samples will be shipped to the lab on ice. Each mobilization will include a vehicle rental, travel to and from the site, with per diem and lodging reimbursement.

Cost Analysis:

DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	TOTAL	TOTAL
Packaging Tape	1	PKG	\$0.00	\$6.00	\$0.00	\$6.00	\$6.00
Ziplock bags	2	EA	\$0.00	\$5.00	\$0.00	\$5.00	\$10.00
Duct Tape	1	EA	\$0.00	\$10.00	\$0.00	\$10.00	\$10.00
Nitrile gloves	1	BOX	\$0.00	\$0.00	\$11.00	\$11.00	\$11.00
Safety Glasses	1	EA	\$0.00	\$0.00	\$4.00	\$4.00	\$4.00
5-gallon buckets	3	EA	\$0.00	\$4.00	\$0.00	\$4.00	\$12.00
Graduated Cylinder (250 mL)	1	EA	\$0.00	\$0.00	\$25.00	\$25.00	\$25.00
Kimwipes (4.5"x8.5")	1	BOX	\$0.00	\$0.00	\$8.00	\$8.00	\$8.00
Poly Sheeting	1	EA	\$0.00	\$10.00	\$0.00	\$10.00	\$10.00
Alconox Detergent (4lb box)	1	EA	\$0.00	\$0.00	\$31.00	\$31.00	\$31.00
Field Book	1	EA	\$0.00	\$0.00	\$9.00	\$9.00	\$9.00

TOTAL COST/SAMPLING ROUND

\$136.00

Subcontractor Overhead

0% \$0.00

SUBTOTAL

\$136

Subcontractor Profit

0% \$0.00

SUBTOTAL

\$136.00

Contractor Overhead

10% \$14

SUBTOTAL

\$150

Contractor Profit

10% \$14.96

TOTAL UNIT COST

\$164.56

Source of Cost Data:

Vendors

Applied escalation factor of 1.4

\$ 230.38

Cost Adjustment Factor:

FACTOR:

H&S Productivity (labor & equip)

Escalation to Base Year

Area Cost Factor

Subcontractor Markup

Prime Contractor Markup

NOTES:

Cost Sub-Element GROUND WATER SAMPLING EQUIPMENT		COST WORKSHEET					
Site:	Dover	Prepared by:	JCM	Checked by:	ACH		
Location:	Dover, Ohio	Date:	Oct-12	Date:	Oct-12		
Phase:	Feasibility Study (-30% to +50%)						
Base Year:	2012						
Date:	Oct. 2012						
Work Statement:							
<p>Sampling event will consist of two mobilizations. During the first mob, one person will deploy PDBs and HydraSleeves in 22 wells over 5 days (4 nights), screening the well mouths with an FID. HydraSleeves will be retrieved and sampled per Table 13, including DO and ORP field measurements. During the second mobilization consisting of 3 days (2 nights), one person will retrieve the PDBs and sample for VOCs, screening the well mouth with an FID. Samples will be shipped to the lab on ice. Each mobilization will include a vehicle rental, travel to and from the site, with per diem and lodging reimbursement.</p>							
Cost Analysis:							
DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	UNIT TOTAL	TOTAL
Y5I 600 XL MP	1	WK	\$0.00	\$300.00	\$0.00	\$300.00	\$300.00
FID rental includes cal gas (1 @ \$250/wk)	2	WK	\$0.00	\$250.00	\$0.00	\$250.00	\$500.00
Vehicles (1 SUV @ \$350/wk)	2	WK	\$0.00	\$350.00	\$0.00	\$350.00	\$700.00
PDBs	30	EA	\$0.00	\$18.00	\$0.00	\$18.00	\$540.00
HydraSleeves	25	EA	\$0.00	\$30.00	\$0.00	\$30.00	\$750.00
DI Water	5	GAL	\$0.00	\$75.00	\$0.00	\$75.00	\$375.00
Interface probe (1 units)	2	WK	\$0.00	\$140.00	\$0.00	\$140.00	\$280.00
TOTAL COST/WEEK						\$3,445.00	
Subcontractor Overhead						0%	\$0.00
SUBTOTAL							\$3,445
Subcontractor Profit						0%	\$0.00
SUBTOTAL							\$3,445.00
Contractor Overhead						10%	\$345
SUBTOTAL							\$3,790
Contractor Profit						10%	\$378.95
TOTAL UNIT COST							\$4,168.45
Source of Cost Data:							
Vendors							\$5,835.83
Cost Adjustment Factor:							
FACTOR:		NOTES:					
H&S Productivity (labor & equip)		<input type="checkbox"/>					
Escalation to Base Year		<input type="checkbox"/>					
Area Cost Factor		<input type="checkbox"/>					
Subcontractor Markup		<input type="checkbox"/>					
Prime Contractor Markup		<input checked="" type="checkbox"/>					

MNA with RegenOx and 3-DME						
Site: Dover Location: Dover, Ohio Phase: Feasibility Study (-30% to +50%) Base Year: 2012 Date: Oct. 2012		Description: MNA, including monitoring well clusters and individual monitoring wells for heart of offsite plume. Grid injection of RegenOx with ORC primer, and a line injection of 3-DME. Capital costs occur in Year 0. Annual costs occur in Years 1-30. Periodic costs occur every 5 yrs for 30 years of operation.				
BASE YEAR COSTS						
DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES	
Well Installation and Injection Event #1.						
Injection Well Installation	1	LS	\$1,063,234.35	\$1,063,234		
RegenOx Event	1	LS	\$435,995.52	\$435,996		
3-DME Event	1	LS	\$308,716.98	\$308,717		
- TRC Labor - Injection Well Installation	1	LS	\$226,628.75	\$226,629		
- TRC Labor - RegenOx Injection	1	LS	\$41,508.25	\$41,508		
- TRC Labor - 3-DME Injection	1	LS	\$13,900.00	\$13,900		
Permits & Access Agreements	1	LS	\$10,025.00	\$10,025	Assume 50% of 5 year report cost	
Post-injection report	1	EA	\$11,200.00	\$11,200	1 week of PM, field tech; 1 day pub	
SUBTOTAL				\$2,131,209		
GW Monitoring Program						
Equipment & Labor	4	LS	\$14,141.63	\$56,567	Quarterly	
Rental Equipment	4	LS	\$5,835.83	\$23,343	Quarterly	
Lab Services	4	LS	\$11,547.64	\$46,191	Quarterly	
SUBTOTAL				\$126,100		
Reporting						
Annual Report	1	EA	\$8,060.00	\$8,060	Annually	
SUBTOTAL				\$8,060		
SUBTOTAL				\$2,265,369		
Contingency (20% Scope + 25% bid)			45%	\$1,018,416.16		
TOTAL YEAR 0 COST:				\$3,284,785		
ANNUAL O&M COSTS						
DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES	
GW Monitoring Program						
Equipment & Labor	4	LS	\$14,141.63	\$56,567	Quarterly to year 5; biannual yrs 6-30	
Rental Equipment	4	LS	\$5,835.83	\$23,343	Quarterly to year 5; biannual yrs 6-30	
Lab Services	4	LS	\$11,547.64	\$46,191	Quarterly to year 5; biannual yrs 6-30	
SUBTOTAL				\$126,100		
Reporting						
Annual Report	1	EA	\$8,060.00	\$8,060	Annually	
SUBTOTAL				\$8,060		
SUBTOTAL				\$134,160		
Contingency (10% Scope + 20% bid)			30%	\$40,248.12		
TOTAL ANNUAL O&M COST				\$174,409		
PERIODIC COSTS:						
DESCRIPTION	YR	QTY	UNIT	UNIT COST	TOTAL	NOTES
Injection Events #2 through #5						
RegenOx Event #2 and #3		1	LS	\$404,616.44	\$404,616	
- TRC Labor - RegenOx Injection		1	LS	\$41,508.25	\$41,508	
Post-injection report		1	EA	\$5,600.00	\$5,600	Assume 50% of annual report
SUBTOTAL					\$451,725	
3-DME Event						
- TRC Labor - 3-DME Injection		1	LS	\$308,716.98	\$308,717	
Post-injection report		1	EA	\$5,600.00	\$5,600	Assume 50% of annual report
SUBTOTAL					\$328,217	
Five Year Report						
Well Repairs	5-30	1	EA	\$20,050.00	\$20,050.00	
	5-30	6	DAY	\$1,500.00	\$9,000.00	
SUBTOTAL					\$29,050.00	
Injection Point Abandonment						
Abandonment Report	6	34	DAY	\$3,000.00	\$102,000.00	
	6	220	EA	\$125.00	\$27,500.00	
SUBTOTAL					\$129,500.00	
Well Abandonment						
Abandonment Report	30	6	DAY	\$3,000.00	\$18,000.00	
Remedial Action Report	30	22	EA	\$125.00	\$2,750.00	
	30	1	LS	\$20,050.00	\$20,050.00	
SUBTOTAL					\$40,800.00	
PRESENT VALUE ANALYSIS:						
COST TYPE	YEAR	TOTAL COST	TOTAL COST/YR	DISCOUNT FACTOR	PRESENT VALUE	NOTES
Capital	0	\$3,284,785	\$3,284,785	-	-	See support sheet for discount factors and Present Value calculation
Annual O&M Cost	1	\$174,409	\$174,409	-	-	Quarterly monitoring
Annual O&M Cost	2-5	\$592,986	\$174,409	-	-	Biannual monitoring
Annual O&M Cost	6-30	\$2,311,081	\$103,110	-	-	
TOTAL PRESENT VALUE		\$6,363,264			\$7,084,806	NPV of O&M @ 7% discount factor

PRESENT VALUE CALCULATION

Site: Dover Description:
 Location: Dover, Ohio
 Phase: Feasibility Study (-30% to +50%)
 Base Year: 2012
 Date: Oct. 2012

Year	Annual Costs (\$)	Periodic Costs (\$)	Total Costs (\$)	Discount Factor at 7%	Total Present Value Cost at 7% (\$)
0	2012	\$3,284,785		1.000	\$3,284,785
1	2013	\$174,409	\$779,942	0.935	\$891,916
2	2014	\$174,409	\$779,942	0.873	\$833,566
3	2015	\$174,409	\$328,217	0.816	\$410,292
4	2016	\$174,409	\$328,217	0.763	\$383,451
5	2017	\$174,409	\$357,267	0.713	\$379,077
6	2018	\$92,443	\$129,500	0.666	\$147,890
7	2019	\$92,443		0.623	\$57,569
8	2020	\$92,443		0.582	\$53,803
9	2021	\$92,443		0.544	\$50,283
10	2022	\$92,443	\$29,050	0.508	\$61,761
11	2023	\$92,443		0.475	\$43,919
12	2024	\$92,443		0.444	\$41,046
13	2025	\$92,443		0.415	\$38,361
14	2026	\$92,443		0.388	\$35,851
15	2027	\$92,443	\$29,050	0.362	\$44,035
16	2028	\$92,443		0.339	\$31,314
17	2029	\$92,443		0.317	\$29,265
18	2030	\$92,443		0.296	\$27,351
19	2031	\$92,443		0.277	\$25,561
20	2032	\$92,443	\$29,050	0.258	\$31,396
21	2033	\$92,443		0.242	\$22,326
22	2034	\$92,443		0.226	\$20,866
23	2035	\$92,443		0.211	\$19,501
24	2036	\$92,443		0.197	\$18,225
25	2037	\$92,443	\$29,050	0.184	\$22,385
26	2038	\$92,443		0.172	\$15,918
27	2039	\$92,443		0.161	\$14,877
28	2040	\$92,443		0.150	\$13,904
29	2041	\$92,443		0.141	\$12,994
30	2042	\$92,443	\$69,850	0.131	\$21,320

TOTAL PRESENT VALUE

\$7,084,808

TRC Labor Cost Sub-Element

P/T Level	Hourly Rate	Task Injection Points Installation	Task RegenOx Injections	Task ORC-A Injections	Task 3-DME Injections	Task Permits and Injection Reporting	Task Progress Reporting	Task 5-Year Report	Task GW Sampling O&M
		Hours Cost	Hours Cost	Hours Cost	Hours Cost	Hours Cost	Hours Cost	Hours Cost	Hours Cost
CAT 1	225 /hr	0	0	0	0	0	0	0	0
CAT 2	200 /hr	0	0	0	0	0	0	0	0
CAT 3	180 /hr	272	46	0	16	40	40	10	0
CAT 4	155 /hr	0	0	0	0	0	0	70	16
CAT 5	105 /hr	1528	300	0	108	40	8	20	0
CAT 6	90 /hr	0	0	0	0	0	0	0	0
CAT 7	75 /hr	8	0	0	0	8	0	0	0
CAT 8	70 /hr	0	0	0	0	0	8	0	0
CAT 9	60 /hr	0	0	0	0	0	0	60	0
		1808	0	0	124	88	56	160	108
	total hrs								
Total Direct Labor (hours/\$)	Mark-up	base	base	base	base	base	base	base	base
Materials	0.1	\$204,560	\$38,660	\$0	\$13,900	\$11,200	\$7,840	\$19,500	\$12,220
Travel & per diem	0.1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Equipment Rental	0.1	\$22,069	\$2,648	\$1,766	\$0	\$0	\$0	\$0	\$1,471
DOCs (phone, fax, Fed Ex)	0.1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Subcontractor	0.1	\$0	\$0	\$0	\$0	\$220	\$200	\$550	\$220
Price by task		Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate
		\$226,629	\$41,508	\$1,766	\$13,900	\$11,420	\$8,060	\$20,050	\$13,911

Assume 10 hour days. Per Diem = \$45/day and \$33.75/day (75%) on travel days. Hotel reimbursement is \$100/night. Travel reimbursement is \$200/trip in addition to car rental.

Notes:

Capital Cost Sub-Element LABORATORY SERVICES		COST WORKSHEET					
Site:	Dover	Prepared by:	JCM	Checked by:	ACH		
Location:	Dover, Ohio	Date:	Oct-12	Date:	Oct-12		
Phase:	Feasibility Study (-30% to +50%)						
Base Year:	2012						
Date:	Oct. 2012						
Work Statement:							
22 wells with 3 duplicates (1 per 10) for VOCs, collected via PDB. 20 wells with 2 duplicates (1 per 10) for remaining parameters and field measurement of DO and ORP, collected via HydraSleeve. Samples shipped to lab on ice.							
Cost Analysis:							
DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	UNIT TOTAL	TOTAL
VOCs (8260B)	25	EA	-	-	-	\$125.00	\$3,125.00
Dissolved Gasses (RSK-175)	22	EA	-	-	-	\$120.00	\$2,640.00
CO2 (RSK-175)	22	EA	-	-	-	\$85.00	\$1,870.00
Chloride (325.2)	22	EA	-	-	-	\$18.00	\$396.00
Nitrate (353.2)	22	EA	-	-	-	\$13.75	\$302.50
Iron, Total (6010B)	22	EA	-	-	-	\$14.00	\$308.00
Iron, Ferrous (6010B)	22	EA	-	-	-	\$30.00	\$660.00
Sulfate (EPA 300.0)	22	EA	-	-	-	\$11.00	\$242.00
							\$9,543.50
Subcontractor Overhead						0%	\$0.00
SUBTOTAL							\$9,544
Subcontractor Profit						0%	\$0.00
SUBTOTAL							\$9,543.50
Contractor Overhead						10%	\$954
SUBTOTAL							\$10,498
Contractor Profit						10%	\$1,049.79
							\$11,547.64
TOTAL UNIT COST							
Source of Cost Data:							
	Invoices from Lab						
Cost Adjustment Factor:							
FACTOR:							
H&S Productivity (labor & equip)	<input type="checkbox"/>						
Escalation to Base Year	<input type="checkbox"/>						
Area Cost Factor	<input type="checkbox"/>						
Subcontractor Overhead & Prof.	<input type="checkbox"/>						
Prime Contractor Overhead & Prof.	<input checked="" type="checkbox"/>						
NOTES:							

Capital Cost Sub-Element INJECTION WELL INSTALLATION		COST WORKSHEET					
Site:	Dover	Prepared by:	JCM	Checked by:	ACH		
Location:	Dover, Ohio	Date:	Oct-12	Date:	Oct-12		
Phase:	Feasibility Study (-30% to +50%)						
Base Year:	2012						
Date:	Oct. 2012						
Work Statement:							
Assumes 220 injection wells -135 in a grid w/ 20' spacing installed at 2/day, and 44 in a line w/ 40' spacing installed at 1.25/day. Wells will be 2" pvc, screened from 35' to 60' bgs, flush mount with conc. pad.							
Cost Analysis:							
DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	UNIT TOTAL	TOTAL
Mob./DeMob. Rig & Equipment	1	LS	\$600.00	\$0.00	\$0.00	\$600.00	\$600.00
Daily Travel	104	Day	\$300.00	\$0.00	\$0.00	\$300.00	\$31,200.00
6" Sonic Drilling	10740	Foot	\$0.00	\$0.00	\$35.00	\$35.00	\$375,900.00
2" PVC Well	10740	Foot	\$0.00	\$0.00	\$25.00	\$25.00	\$268,500.00
Flush Mount and Pad	179	Each	\$0.00	\$0.00	\$350.00	\$350.00	\$62,650.00
DOT 55gal Drum&filled	9	Each	\$0.00	\$65.00	\$0.00	\$65.00	\$585.00
Well Development (est)	9	Hour	\$175.00	\$0.00	\$0.00	\$175.00	\$1,575.00
Decon Unit	4	Day	\$125.00	\$0.00	\$0.00	\$125.00	\$500.00
Temporary Decon Pad	1	Each	\$0.00	\$300.00	\$0.00	\$300.00	\$300.00
Water/Support Truck	106	Day	\$0.00	\$150.00	\$0.00	\$150.00	\$15,900.00
Bobcat	21	Week	\$0.00	\$1,250.00	\$0.00	\$1,250.00	\$26,250.00
Well Log	179	Each	\$25.00	\$0.00	\$0.00	\$25.00	\$4,475.00
Standby Time;Sonic.Rig:w/3 men	0	Hour	\$400.00	\$0.00	\$0.00	\$400.00	\$0.00
IDW Hauling		OPEN Hour	\$150.00	\$0.00	\$0.00	open	\$0.00
Police Detail/Barriers	104	Day				\$1,000.00	\$ 104,000
Vehicles (1 SUV @ \$350/wk)	8	WK	\$0.00	\$350.00	\$0.00	\$350.00	\$ 2,800
TOTAL COST							\$895,235.00
SUBTOTAL							
Subcontractor Overhead						0%	\$0.00
SUBTOTAL							\$895,235
Subcontractor Profit						0%	\$0.00
SUBTOTAL							\$895,235.00
Contractor Overhead						10%	\$89,524
SUBTOTAL							\$984,759
Contractor Profit						10%	\$98,475.85
TOTAL UNIT COST							\$1,083,234.35
Source of Cost Data:							
Driller's estimate							
Cost Adjustment Factor:							
FACTOR:							
H&S Productivity (labor & equip)							<input type="checkbox"/>
Escalation to Base Year							<input checked="" type="checkbox"/>
Area Cost Factor							<input type="checkbox"/>
Subcontractor Overhead & Prof.							<input type="checkbox"/>
Prime Contractor Overhead & Prof.							<input checked="" type="checkbox"/>
NOTES:							

Capital Cost Sub-Element CHEMICAL INJECTIONS		COST WORKSHEET					
Site: Dover	Prepared by: JCM	Checked by: ACH					
Location: Dover, Ohio	Date: Oct-12	Date: Oct-12					
Phase: Feasibility Study (-30% to +50%)							
Base Year: 2012							
Date: Oct. 2012							
Work Statement:							
RegenOx and ORC primer pumped into 135 previously installed injection wells in the grid.							
Cost Analysis:							
DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	UNIT TOTAL	TOTAL
Event 1							
Mob./DeMob. Rig & Equipment	1	LS	\$600.00	\$0.00	\$0.00	\$600.00	\$600.00
Purchase RegenOx	50,625	LB	\$0.00	\$0.00	\$1.75	\$1.75	\$88,593.75
Purchase ORC	27,000	LB	\$0.00	\$0.00	\$6.50	\$6.50	\$175,500.00
Injections by driller	25	DAY	\$1,650.00	\$0.00	\$0.00	\$1,650.00	\$41,250.00
Police Detail/Barriers	25	DAY	\$0.00	\$0.00	\$0.00	\$1,000.00	\$25,000.00
Shipping Estimate and Tax	1	LS	\$0.00	\$0.00	\$28,333.13	\$28,333.13	\$28,333.13
Vehicles (1 SUV @ \$350/wk)	3	WK	\$0.00	\$350.00	\$0.00	\$350.00	\$1,050.00
SUBTOTAL							\$360,326.88
Subcontractor Overhead						0%	\$0.00
SUBTOTAL						0%	\$0.00
Subcontractor Profit							\$0
SUBTOTAL						10%	\$36,032.69
Contractor Overhead							\$396,360
SUBTOTAL						10%	\$39,635.96
Contractor Profit							\$435,995.52
Source of Cost Data:							
Cost Adjustment Factor:							
FACTOR:							
H&S Productivity (labor & equip)			<input type="checkbox"/>				NOTES:
Escalation to Base Year			<input type="checkbox"/>				
Area Cost Factor			<input type="checkbox"/>				
Subcontractor Overhead & Prof.			<input type="checkbox"/>				
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Cost Sub-Element
GROUND WATER SAMPLING EQUIPMENT

COST WORKSHEET

Site: Dover
Location: Dover, Ohio
Phase: Feasibility Study (-30% to +50%)
Base Year: 2012
Date: Oct. 2012

Prepared by: JCM
Date: Oct-12
Checked by: ACH
Date: Oct-12

Work Statement:

Sampling event will consist of two mobilizations. During the first mob, one person will deploy PDBs and HydraSleeves in 22 wells over 5 days (4 nights), screening the well mouths with an FID. HydraSleeves will be retrieved and sampled per Table 13, including DO and ORP field measurements. During the second mobilization consisting of 3 days (2 nights), one person will retrieve the PDBs and sample for VOCs, screening the well mouth with an FID. Samples will be shipped to the lab on ice. Each mobilization will include a vehicle rental, travel to and from the site, with per diem and lodging reimbursement.

Cost Analysis:

DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	TOTAL	TOTAL
Packaging Tape	1	PKG	\$0.00	\$6.00	\$0.00	\$6.00	\$6.00
Ziplock bags	2	EA	\$0.00	\$5.00	\$0.00	\$5.00	\$10.00
Duct Tape	1	EA	\$0.00	\$10.00	\$0.00	\$10.00	\$10.00
Nitrile gloves	1	BOX	\$0.00	\$0.00	\$11.00	\$11.00	\$11.00
Safety Glasses	1	EA	\$0.00	\$0.00	\$4.00	\$4.00	\$4.00
5-gallon buckets	3	EA	\$0.00	\$4.00	\$0.00	\$4.00	\$12.00
Graduated Cylinder (250 mL)	1	EA	\$0.00	\$0.00	\$25.00	\$25.00	\$25.00
Kimwipes (4.5"x8.5")	1	BOX	\$0.00	\$0.00	\$8.00	\$8.00	\$8.00
Poly Sheeting	1	EA	\$0.00	\$10.00	\$0.00	\$10.00	\$10.00
Alconox Detergent (4lb box)	1	EA	\$0.00	\$0.00	\$31.00	\$31.00	\$31.00
Field Book	1	EA	\$0.00	\$0.00	\$9.00	\$9.00	\$9.00

TOTAL COST/SAMPLING ROUND

\$136.00

Subcontractor Overhead

0% \$0.00

SUBTOTAL

\$136

Subcontractor Profit

0% \$0.00

SUBTOTAL

\$136.00

Contractor Overhead

10% \$14

SUBTOTAL

\$150

Contractor Profit

10% \$14.96

TOTAL UNIT COST

\$164.56

Source of Cost Data:

Vendors Applied escalation factor of 1.4

\$ 230.38

Cost Adjustment Factor:

FACTOR:

- H&S Productivity (labor & equip)
- Escalation to Base Year
- Area Cost Factor
- Subcontractor Markup
- Prime Contractor Markup

NOTES:

Cost Sub-Element
GROUND WATER SAMPLING EQUIPMENT

COST WORKSHEET

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Cost Analysis:

DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	UNIT TOTAL	TOTAL
YSI 600 XL MP	1	WK	\$0.00	\$300.00	\$0.00	\$300.00	\$300.00
FID rental includes cal gas (1 @ \$250/wk)	2	WK	\$0.00	\$250.00	\$0.00	\$250.00	\$500.00
Vehicles (1 SUV @ \$350/wk)	2	WK	\$0.00	\$350.00	\$0.00	\$350.00	\$700.00
PDBs	30	EA	\$0.00	\$18.00	\$0.00	\$18.00	\$540.00
HydraSleeves	25	EA	\$0.00	\$30.00	\$0.00	\$30.00	\$750.00
DI Water	5	GAL	\$0.00	\$75.00	\$0.00	\$75.00	\$375.00
Interface probe (1 units)	2	WK	\$0.00	\$140.00	\$0.00	\$140.00	\$280.00

TOTAL COST/WEEK

\$3,445.00

Subcontractor Overhead

0% \$0.00

SUBTOTAL

\$3,445

Subcontractor Profit

0% \$0.00

SUBTOTAL

\$3,445.00

Contractor Overhead

10% \$345

SUBTOTAL

\$3,790

Contractor Profit

10% \$378.95

TOTAL UNIT COST

\$4,168.45

Source of Cost Data:

Vendors

\$5,835.83

Cost Adjustment Factor:

- FACTOR:
- H&S Productivity (labor & equip)
 - Escalation to Base Year
 - Area Cost Factor
 - Subcontractor Markup
 - Prime Contractor Markup

NOTES:

PUMP & TREAT ALTERNATIVE						
Site:	Dover		Description: Long term hydraulic containment by pump-and-treat. Install three vertical pumping wells to treat plume area.			
Location:	Dover, Ohio		Capital costs occur in Year 0. Annual costs occur in Years 1-30. Periodic costs occur every 5 yrs for 30 years of operation.			
Phase:	Feasibility Study (30% to ~50%)					
Base Year:	2012					
Date:	Oct 2012					
BASE YEAR COSTS						
DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES	
Reports/Design						
Remedy Selection Report	1	LS *	\$26,330.00	\$26,330		
Remedial Action Design	1	LS	\$243,500.00	\$243,500		
Bid Process	1	LS	\$30,100.00	\$30,100		
SUBTOTAL				\$301,930		
Site Work						
Purchase/Rental Agreement of land for treatment bldg.	1	LS				
Temporary Facilities & Utilities	1	LS	\$12,184.70	\$12,185		
Site General Equipment & Supplies	1	LS	\$5,825.90	\$5,826		
Access Driveway	1	LS	\$15,000.00	\$15,000		175 ft
Perimeter security fence	410	LF	\$75.25	\$30,633		
Gate	1	LS	\$7,000.00	\$7,000		
Surveying	80	HR	\$62.00	\$4,960		
Perimeter Monitoring Equipment	1	LS	\$6,470.55	\$6,480		
Lab Services	1	LS	\$12,251.25	\$12,251		
Restoration	1	LS	\$10,000.00	\$10,000		
Progress Reporting	3	EA	\$5,020.00	\$15,060		
SUBTOTAL				\$118,794		
Hydraulic Containment						
Vertical Well Installation & MW clusters	1	LS	\$338,988.47	\$338,988		
Excavation of Trench to Treatment Building	1	LS	\$96,167.18	\$96,167		
Pump Equip. & Installation	1	LS	\$1,157,852.76	\$1,157,853		
Electrical Power/Control Materials & Installation	1	LS	\$277,034.82	\$277,035		
Treatment System	1	LS	\$857,319.82	\$857,320		
- TRC Labor	1	LS	\$66,495.34	\$66,495		
Startup/Proveout	1	LS	\$8,785.88	\$8,786		
- TRC Labor	1	LS	\$25,023.84	\$25,024		
Permits	1	LS	\$30,700.00	\$30,700		
Progress Reporting	1	EA	\$5,020.00	\$5,020		
SUBTOTAL				\$2,675,388		
Post-construction report	1	LS	\$38,800.00	\$38,800		
SUBTOTAL				\$3,134,912		
Construction Management	1	LS	\$284,800.00	\$284,800		
Contingency (25% Scope & 20% Bid)	45%			\$1,410,710		
TOTAL YEAR 0 COST:				\$4,830,423		
ANNUAL O&M COSTS						
DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES	
Treatment System Performance Monitoring						
Influent (Well Specific)/Effluent Monitoring	12	EA	\$150.00	\$1,800	VOC analysis: quarterly	
Tedler Bag	8	EA	\$115.36	\$923	Quarterly	
Highly Volatile Non-Polar Organics (Vapor)	8	EA	\$351.68	\$2,813	Quarterly	
Treatment System Operation, Maintenance, Repair	1	LS	\$252,597.02	\$252,597		
Electrical Usage	1	YR	\$137,313.67	\$137,314		
Discharge of Treated Effluent, low charge	0.00	Mgal	\$300.000	\$0		
Discharge of Treated Effluent, surcharge	0	Gal	\$0.0015	\$0		
Progress Reports	1	LS	\$5,020.00	\$5,020		
Site Monitoring						
Groundwater Sampling - Equipment and Labor	4	EA	\$17,344.24	\$69,377		
Groundwater Analysis - VOCs/SVOCs	180	EA	\$450.00	\$81,000	4 quarters of sampling	
SUBTOTAL				\$51,844		
SUBTOTAL				\$51,844		
Contingency (10% Scope + 20% bid)			30%	\$165,553		
TOTAL ANNUAL O&M COST				\$717,397		
PERIODIC COSTS:						
DESCRIPTION	YR	QTY	UNIT	UNIT COST	TOTAL	NOTES
Five Year Report	5-30	1	EA	\$26,750.00	\$26,750.00	
Repair/Replace Parts	5-30	1	EA	\$85,731.99	\$85,731.99	Assume 10% of initial system cost
SUBTOTAL					\$112,481.99	
Derob of P&T System	30	1	EA	\$25,000.00	\$25,000.00	Remove equipment and piping
Well Abandonment	30	3	EA	\$3,000.00	\$9,000.00	3 extraction wells
Abandonment Report	30	3	EA	\$125.00	\$375.00	
Remedial Action Report	30	1	LS	\$38,800.00	\$38,800.00	
SUBTOTAL					\$73,175.00	
PRESENT VALUE ANALYSIS:						
COST TYPE	YEAR	TOTAL COST	TOTAL COST/YR	DISCOUNT FACTOR	PRESENT VALUE	NOTES
Capital	0	\$4,830,422	\$4,830,423	-	-	See support sheet for discount factors and Present Value calculation
Annual O&M Cost	1	\$717,397	\$717,397	-	-	Assume 15% off initial Annual
Annual O&M Cost	2-5	\$2,439,130	\$609,782	-	-	Assume 20% off initial Annual
Annual O&M Cost	6-30	\$14,347,943	\$573,918	-	-	(Percentage assumptions assume per discharge and electrical usage remain constant)
						7% Discount Factor applied
TOTAL PRESENT VALUE		\$22,334,913			\$12,413,322	

PRESENT VALUE CALCULATION

Site: Dover Description:
 Location: Dover, Ohio
 Phase: Feasibility Study (-30% to +50%)
 Base Year: 2012
 Date: Oct. 2012

Year	Annual Costs (\$)	Periodic Costs (\$)	Total Costs (\$)	Discount Factor at 7%	Total Present Value Cost at 7% (\$)
0	2012	\$4,830,423	\$4,830,423	1.000	\$4,830,423
1	2013	\$717,397	\$717,397	0.935	\$670,465
2	2014	\$609,788	\$609,788	0.873	\$532,612
3	2015	\$609,788	\$609,788	0.816	\$497,768
4	2016	\$609,788	\$609,788	0.763	\$465,204
5	2017	\$609,788	\$704,270	0.713	\$502,134
6	2018	\$573,918	\$573,918	0.666	\$382,426
7	2019	\$573,918	\$573,918	0.623	\$357,407
8	2020	\$573,918	\$573,918	0.582	\$334,025
9	2021	\$573,918	\$573,918	0.544	\$312,173
10	2022	\$573,918	\$668,400	0.508	\$339,781
11	2023	\$573,918	\$573,918	0.475	\$272,664
12	2024	\$573,918	\$573,918	0.444	\$254,826
13	2025	\$573,918	\$573,918	0.415	\$238,155
14	2026	\$573,918	\$573,918	0.388	\$222,575
15	2027	\$573,918	\$668,400	0.362	\$242,259
16	2028	\$573,918	\$573,918	0.339	\$194,406
17	2029	\$573,918	\$573,918	0.317	\$181,688
18	2030	\$573,918	\$573,918	0.296	\$169,802
19	2031	\$573,918	\$573,918	0.277	\$158,693
20	2032	\$573,918	\$668,400	0.258	\$172,727
21	2033	\$573,918	\$573,918	0.242	\$138,609
22	2034	\$573,918	\$573,918	0.226	\$129,541
23	2035	\$573,918	\$573,918	0.211	\$121,066
24	2036	\$573,918	\$573,918	0.197	\$113,146
25	2037	\$573,918	\$668,400	0.184	\$123,152
26	2038	\$573,918	\$573,918	0.172	\$98,826
27	2039	\$573,918	\$573,918	0.161	\$92,361
28	2040	\$573,918	\$573,918	0.150	\$86,318
29	2041	\$573,918	\$573,918	0.141	\$80,671
30	2042	\$573,918	\$741,575	0.131	\$97,419

TOTAL PRESENT VALUE

\$12,413,322

TIRC Labor Cost Sub-Element

PT Level	Hourly Rate	Remedy Selection Report		Design		PA Report		Bid Process		Construction Management		Treatment System Construction		Startup/Proveout		Permits		Compliance Exception Area		Progress Reporting		5-Year Report		GW Sampling	
		Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost
CAT 1	125 /hr	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
CAT 2	200 /hr	40	\$8,000	240	\$48,000	25	\$5,000	30	\$6,000	40	\$8,000	0	\$0	40	\$8,000	0	\$0	0	\$0	0	\$0	40	\$8,000	18	\$3,600
CAT 3	160 /hr	0	\$0	600	\$96,000	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
CAT 4	155 /hr	0	\$0	600	\$93,000	1000	\$155,000	180	\$27,900	120	\$18,000	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
CAT 5	105 /hr	0	\$0	600	\$63,000	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
CAT 6	95 /hr	0	\$0	600	\$57,000	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
CAT 7	75 /hr	0	\$0	240	\$18,000	200	\$15,000	180	\$13,500	120	\$9,000	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
CAT 8	70 /hr	0	\$0	240	\$16,800	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
CAT 9	60 /hr	100	\$6,000	200	\$12,000	100	\$6,000	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
		220	\$28,000	1880	\$227,000	325	\$38,500	230	\$29,000	1800	\$216,000	400	\$44,000	280	\$29,600	220	\$30,700	250	\$33,500	34	\$4,800	200	\$26,000	96	\$12,200
		base	\$28,000	base	\$227,000	base	\$38,500	base	\$29,000	base	\$216,000	base	\$44,000	base	\$29,600	base	\$30,700	base	\$33,500	base	\$4,800	base	\$26,000	base	\$12,200
	Markup	0.1	\$2,800	0.1	\$22,700	0.1	\$3,850	0.1	\$2,900	0.1	\$21,600	0.1	\$4,400	0.1	\$2,960	0.1	\$3,070	0.1	\$3,350	0.1	\$480	0.1	\$2,600	0.1	\$1,220
	Travel & per diem	0	\$0	10000	\$11,000	0	\$0	0	\$0	5000	\$5,500	19223.04	\$21,145	4805.76	\$5,286	0	\$0	0	\$0	0	\$0	0	\$0	200	\$2,000
	Equipment Rental	0	\$0	500	\$5,000	3000	\$33,000	500	\$5,500	0	\$0	0	\$0	125	\$1,375	0	\$0	0	\$0	4000	\$44,000	200	\$2,200	500	\$5,500
	Subcontractor	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
	Price by task				\$243,500		\$38,500		\$30,100		\$284,400		\$66,495		\$35,024		\$30,700		\$40,300		\$5,020		\$28,750		\$15,565
	Estimate				\$243,500		\$38,500		\$30,100		\$284,400		\$66,495		\$35,024		\$30,700		\$40,300		\$5,020		\$28,750		\$15,565

Notes: Total Direct Labor (hours) 220. Markup 0.1. Travel & per diem 10000. Equipment Rental 500. Subcontractor 0. Price by task. Estimate \$243,500. Estimate \$38,500. Estimate \$30,100. Estimate \$66,495. Estimate \$35,024. Estimate \$30,700. Estimate \$40,300. Estimate \$5,020. Estimate \$28,750. Estimate \$15,565.

Per diem = \$60 - 100 for two p.m. - 1.5 weeks or 8 days (work weekend)

Treatment System Construction - Assumes 1 CAT 5 or 1 CAT 7 onsite to oversee construction of the vertical wells, the trench and piping and the treatment structure. CAT 5 onsite for 4 weeks working 8 hr days; CAT 7 onsite for 4 weeks working 8 hr days.

Capital Cost Sub-Element TEMPORARY FACILITIES AND UTILITIES						COST WORKSHEET	
Site:	Dover	Prepared by:	AH	Checked by:	JCM		
Location:	Dover, Ohio	Date:	Oct. 2012	Date:	Oct-12		
Phase:	Feasibility Study (-30% to +50%)						
Base Year:	2012						
Date:	Oct. 2012						
Work Statement:							
Assuming onsite construction time of 8 weeks for the construction of the remediation system at 4 weeks/month. Assumes setup of site trailer in the vicinity of the treatment bldg requires utility connections.							
Cost Analysis:							
DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	UNIT TOTAL	TOTAL
Clear and grub treatment bldg site	1	LS				\$3,000	\$3,000
Mob/Demob Temporary Storage Trailer	1	EA	-	-	-	\$340	\$340.00
Temporary Storage Trailer	2	MO	-	-	-	\$150	\$300.00
Mob/Demob Temporary Office with steps	1	EA	-	-	-	\$430	\$430.00
Temporary Office	2	MO	-	-	\$1,000.00	\$1,000.00	\$2,000.00
Utility connection/disconnection	2	EA	-	-	\$2,000	\$2,000	\$4,000.00
SUBTOTAL - Local							\$10,070.00
Subcontractor Overhead						0%	\$0.00
SUBTOTAL							\$10,070.00
Subcontractor Profit						0%	\$0.00
SUBTOTAL							\$10,070.00
Contractor Overhead						10%	\$1,007.00
SUBTOTAL							\$11,077.00
Contractor Profit						10%	\$1,107.70
TOTAL UNIT COST							\$12,184.70
Source of Cost Data:							
Local unit costs from on ongoing project.							
Cost Adjustment Factor:							
FACTOR:		NOTES:					
H&S Productivity (labor & equip)		<input type="checkbox"/>					
Escalation to Base Year		<input type="checkbox"/>					
Area Cost Factor		<input type="checkbox"/>					
Subcontractor Overhead & Prof.		<input type="checkbox"/>					
Prime Contractor Overhead & Prof.		<input checked="" type="checkbox"/>					

Capital Cost Sub-Element SITE GENERAL EQUIPMENT & SUPPLIES		COST WORKSHEET					
Site: Dover Location: Dover, Ohio Phase: Feasibility Study (-30% to +50%) Base Year: 2012 Date: Oct. 2012	Prepared by: AH Date: Oct. 2012 Checked by: JCM Date: Oct-12						
Work Statement:							
Assuming total time onsite of approx 2 months.							
Cost Analysis:							
DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	UNIT TOTAL	TOTAL
Install/Remove Dumpsters	1	EA	-	-	-	\$100.00	\$100.00
Dumpsters	2	MO	-	-	-	\$30.00	\$60.00
Vehicles (SUV or Minivan; 1 @ \$350/WK)	8	WK	\$0.00	\$350.00	\$0.00	\$350.00	\$2,800.00
Motorola SP-10 Radios (2 mile radius)	8	WK	\$0.00	\$0.00	\$60.00	\$60.00	\$480.00 4 radios
Install/Remove Water Coolers	1	EA	-	-	-	\$100.00	\$100.00
Water Cooler	2	MO	-	-	-	\$125.00	\$250.00
SUBTOTAL							\$3,790.00
Contractor Overhead						10%	\$379
SUBTOTAL							\$4,169.00
Contractor Profit						10%	\$416.90
SUBTOTAL							\$4,585.90
DESCRIPTION (TRC Rates)	QTY	UNIT	LABOR	EQUIP	MTRL	TOTAL	TOTAL
Weather Station	2	MO	\$0.00	\$0.00	\$360.00	\$360.00	\$720.00
Camera	40	DAY	\$0.00	\$0.00	\$10.00	\$10.00	\$400.00
Tool Box	2	MO	\$0.00	\$0.00	\$60.00	\$60.00	\$120.00
							\$1,240.00
TOTAL UNIT COSTS							\$5,826
Source of Cost Data:							
Building Construction Cost Data, RS Means, 58th Edition, 2000 Local unit costs from an ongoing project.							
Cost Adjustment Factor:							
FACTOR:							NOTES:
H&S Productivity (labor & equip)	<input type="checkbox"/>						
Escalation to Base Year	<input type="checkbox"/>						
Area Cost Factor	<input checked="" type="checkbox"/>						
Subcontractor Overhead & Prof.	<input type="checkbox"/>						
Prime Contractor Overhead & Prof.	<input checked="" type="checkbox"/>						

Capital Cost Sub-Element SAMPLING EQUIPMENT		COST WORKSHEET						
Site:	Dover	Prepared by:	AH	Checked by:	JCM			
Location:	Dover, Ohio	Date:	Oct-12	Date:	Oct-12			
Phase:	Feasibility Study (-30% to +50%)							
Base Year:	2012							
Date:	Oct. 2012							
Work Statement:								
Equipment for the monitoring and sampling as needed.								
Cost Analysis:								
DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	UNIT TOTAL	TOTAL	
Field Book	3	EA	\$0.00	\$0.00	\$15.00	\$15.00	\$45.00	
Nitrile gloves	10	BOX	\$0.00	\$0.00	\$11.00	\$11.00	\$110.00	
FID rental (2 @ \$250/WK)	8	WK	\$0.00	\$500.00	\$0.00	\$500.00	\$4,000.00	
LEL/O2 Meter	8	WK	\$0.00	\$150.00	\$0.00	\$150.00	\$1,200.00	
TOTAL COST						\$5,355.00		
Subcontractor Overhead							0%	\$0.00
SUBTOTAL								\$5,355
Subcontractor Profit							0%	\$0.00
SUBTOTAL								\$5,355.00
Contractor Overhead							10%	\$536
SUBTOTAL								\$5,891
Contractor Profit							10%	\$589.05
TOTAL UNIT COST								\$6,479.55
Source of Cost Data:								
Vendors								
Cost Adjustment Factor:								
FACTOR:								
H&S Productivity (labor & equip)							<input type="checkbox"/>	
Escalation to Base Year							<input type="checkbox"/>	
Area Cost Factor							<input type="checkbox"/>	
Subcontractor Overhead & Prof.							<input type="checkbox"/>	
Prime Contractor Overhead & Prof.							<input checked="" type="checkbox"/>	
NOTES:								

Capital Cost Sub-Element LABORATORY SERVICES						COST WORKSHEET	
Site: Dover		Prepared by: AH		Checked by: JCM			
Location: Dover, Ohio		Date: Oct-12		Date: Oct-12			
Phase: Feasibility Study (-30% to +50%)							
Base Year: 2012							
Date: Oct. 2012							
Work Statement:							
Cost Analysis:							
DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	UNIT TOTAL	TOTAL
VOCs (8260B)	81	EA				\$125.00	\$10,125.00
							\$10,125.00
Subcontractor Overhead						0%	\$0.00
SUBTOTAL							\$10,125
Subcontractor Profit						0%	\$0.00
SUBTOTAL							\$10,125.00
Contractor Overhead						10%	\$1,013
SUBTOTAL							\$11,138
Contractor Profit						10%	\$1,113.75
TOTAL UNIT COST							\$12,251.25
Source of Cost Data:							
Invoices from Lab							
Cost Adjustment Factor:							
FACTOR:				NOTES:			
H&S Productivity (labor & equip)				<input type="checkbox"/>			
Escalation to Base Year				<input type="checkbox"/>			
Area Cost Factor				<input type="checkbox"/>			
Subcontractor Overhead & Prof.				<input type="checkbox"/>			
Prime Contractor Overhead & Prof.				<input checked="" type="checkbox"/>			

Capital Cost Sub-Element BEDROCK WELL INSTALLATION						COST WORKSHEET	
Site:	Dover	Prepared by:	AH	Checked by:	JCM		
Location:	Dover, Ohio	Date:	Oct-12	Date:	Oct-12		
Phase:	Feasibility Study (-30% to +50%)						
Base Year:	2012						
Date:	Oct. 2012						
Work Statement:							
Assumes 3 bonngs will be advanced using roller bit drilling; assumes 10" diameter wells; casing will be seated 50' and grouted in-place. After curing, the noles will be advanced to 100'. Assumes the installation will take 2 weeks to complete. Assumes aquifer pump test is not necessary.							
Cost Analysis:							
						UNIT	
DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	TOTAL	TOTAL
Mob/Demob	1	EA	-	-	-	\$2,832.08	\$2,832.08
8.75-inch Roller Bit Drilling	300	LF	-	-	-	\$40.67	\$12,199.73
6-inch Steel Casing Grouted-in-Place	150	LF	-	-	-	\$36.31	\$5,446.31
Driller	120	HR	-	-	-	\$145.23	\$17,428.19
Per Diem	15	DAY	-	-	-	\$217.85	\$3,267.78
Pumping well surface completion (installed)	3	EA	-	-	-	\$7,261.74	\$21,785.23
							\$62,959.32
Markup Factor for Larger Diameter Well (10") (Not applied to MW cluster installation)	2.5						\$159,250.05
MW cluster installation (3 wells/cluster)	10	EA				\$12,000.00	\$120,000.00
Well Permit	3	EA	\$0.00	\$0.00	\$100.00	\$100.00	\$300.00
Contaminated soil disposal	4.8	CY				\$125.00	\$605.71
TOTAL COST							\$280,155.76
SUBTOTAL							
Subcontractor Overhead						0%	\$0.00
SUBTOTAL							\$280,156
Subcontractor Profit						0%	\$0.00
SUBTOTAL							\$280,155.76
Contractor Overhead						10%	\$28,016
SUBTOTAL							\$308,171
Contractor Profit						10%	\$30,817.13
TOTAL UNIT COST							\$338,988.47
Source of Cost Data:							
	Driller's estimate						
Cost Adjustment Factor:							
	FACTOR:						
	H&S Productivity (labor & equip)	<input type="checkbox"/>					
	Escalation to Base Year	<input checked="" type="checkbox"/>					
	Area Cost Factor	<input type="checkbox"/>					
	Subcontractor Overhead & Prof.	<input type="checkbox"/>					
	Prime Contractor Overhead & Prof.	<input checked="" type="checkbox"/>					
NOTES:							

Capital Cost Sub-Element TRENCH CONSTRUCTION		COST WORKSHEET					
Site: Dover Location: Dover, Ohio Phase: Feasibility Study (-30% to +50%) Base Year: 2012 Date: Oct. 2012	Prepared by: AH Date: Oct-12 Checked by: JCM Date: Oct-12						
Work Statement:							
Excavation of trench 5 ft deep and 2' wide for HDPE pipe. Assumes 3710 LF of trench required to treatment structure. Excavated volume increased by 20% to account for soil expansion.							
Cost Analysis:							
DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	UNIT TOTAL	TOTAL
Mob/demob	1	LS				\$5,000.00	\$5,000.00
Backfill for Trench - Sand Bedding (2') - delivered and dumped	660	LCY	\$6.15	\$2.23	\$17.00	\$25.38	\$16,739.52
Backfill for Trench - Gravel Material (3') - delivered and dumped	989	LCY	\$6.15	\$2.23	\$26.00	\$34.38	\$34,013.28
Compact Trench w/Vibrating Plate	1,374	CY	\$3.51	\$0.17	\$0.00	\$3.68	\$5,059.61
Outlet Protection	1	LS				\$5,000.00	\$5,000.00
SUBTOTAL							\$65,812.41
Area Cost Factor						12%	\$7,897
							\$73,710
Excavation of trench	1,649	CY	-	-	-	\$4.50	\$7,420.00
Hauling & Disposal of Excavated Soil	0	CY	-	-	-	\$125.00	\$0.00
						0%	\$0.00
Subcontractor Overhead							\$81,130
SUBTOTAL						0%	\$0.00
Subcontractor Profit							\$81,130
SUBTOTAL						10%	\$8,112.99
Contractor Overhead							\$89,243
SUBTOTAL						10%	\$8,924.29
Contractor Profit							\$98,167.18
							\$98,167.18
Source of Cost Data:				RS Means Building Construction Cost Data 2012			
Cost Adjustment Factor:				NOTES:			
FACTOR:							
H&S Productivity (labor & equip)							
Escalation to Base Year							
Area Cost Factor						X	
Subcontractor Overhead & Prof.							
Prime Contractor Overhead & Prof.						X	

Capital Cost Sub-Element PUMP EQUIPMENT & INSTALLATION						COST WORKSHEET	
Site: Dover		Prepared by: AH		Checked by: JCM			
Location: Dover, Ohio		Date: Oct-12		Date: Oct-12			
Phase: Feasibility Study (-30% to +50%)							
Base Year: 2012							
Date: Oct. 2012							
Work Statement: Installation of groundwater pipe from treatment bldg. to pumping wells; unit price includes installation. Material costs for pumps, pressure transducers and level switches (2/well). Included 2 days of labor for well equipment installation.							
Cost Analysis:							
DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	UNIT TOTAL	TOTAL
Submersible pump (300-500 gpm)	3	EA	-	-	-	\$14,954.00	\$44,862.00
Pressure Transducer	3	EA	-	-	-	\$1,771.45	\$5,314.35
Shipping	1	LS	-	-	-	\$150.00	\$150.00
Backhoe	3	DAY	-	\$350.00	-	\$519.38	\$1,558.13
Operator	24	HR	\$40.00	-	-	\$59.36	\$1,424.58
Level Switches	12	EA	-	-	-	\$186.98	\$2,243.71
Technician	24	HR	\$70.00	-	-	\$76.85	\$1,844.40
Labor (2 laborers at \$34/day)	48	HR	\$50.45	-	-	\$50.45	\$2,421.79
Mob/demob	1	LS	-	-	-	\$5,000.00	\$5,000.00
Secondary Containment Pipe Leak Detector	3	EA	-	-	-	\$5,935.75	\$17,807.26
HDPE Well Piping	11,330	LF	-	-	-	\$77.16	\$874,276.89 Installed
SUBTOTAL						\$956,903.11	
Subcontractor Overhead						0%	\$0.00
SUBTOTAL						\$956,903.11	
Subcontractor Profit						0%	\$0.00
SUBTOTAL						\$956,903.11	
Contractor Overhead						10%	\$95,690.31
SUBTOTAL						\$1,052,593.42	
Contractor Profit						10%	\$105,259.34
TOTAL COST						\$1,157,852.76	
Source of Cost Data: Local ongoing project							
Cost Adjustment Factor:							
FACTOR:				NOTES:			
H&S Productivity (labor & equip)	<input type="checkbox"/>						
Escalation to Base Year	<input type="checkbox"/>						
Area Cost Factor	<input type="checkbox"/>						
Subcontractor Overhead & Prof.	<input type="checkbox"/>						
Prime Contractor Overhead & Prof.	<input checked="" type="checkbox"/>						

Capital Cost Sub-Element ELECTRICAL COMPONENTS		COST WORKSHEET																																																																																																																																																																								
Site: Dover Location: Dover, Ohio Phase: Feasibility Study (-30% to +50%) Base Year: 2012 Date: Oct. 2012	Prepared by: AH Date: Oct-12 Checked by: JCM Date: Oct-12																																																																																																																																																																									
Work Statement: Install PVC conduits and electrical wiring from pumping wells to treatment structure. Assumes installation of 2 electrical handholds. Linear footage of materials based on 2500 LF of trench to treatment structure. Assumes 1/2 day of backhoe and operator to install electrical handholds.																																																																																																																																																																										
Cost Analysis:																																																																																																																																																																										
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4 wires/well</td> <td style="text-align: center;">12,420</td> <td style="text-align: center;">LF</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> <td style="text-align: right;">\$2.97</td> <td style="text-align: right;">\$36,861.02</td> </tr> <tr> <td>Electrical Handholds</td> <td style="text-align: center;">3</td> <td style="text-align: center;">EA</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> <td style="text-align: right;">\$2,967.88</td> <td style="text-align: right;">\$8,903.63</td> </tr> <tr> <td>Backhoe</td> <td style="text-align: center;">1</td> <td style="text-align: center;">DAY</td> <td style="text-align: center;">-</td> <td style="text-align: right;">\$350.00</td> <td style="text-align: center;">-</td> <td style="text-align: right;">\$519.38</td> <td style="text-align: right;">\$519.38</td> </tr> <tr> <td>Operator</td> <td style="text-align: center;">8</td> <td style="text-align: center;">HR</td> <td style="text-align: right;">\$40.00</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> <td style="text-align: right;">\$59.36</td> <td style="text-align: right;">\$474.86</td> </tr> <tr> <td>SUBTOTAL</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td style="text-align: right; 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4 wires/well	12,420	LF	-	-	-	\$2.97	\$36,861.02	Electrical Handholds	3	EA	-	-	-	\$2,967.88	\$8,903.63	Backhoe	1	DAY	-	\$350.00	-	\$519.38	\$519.38	Operator	8	HR	\$40.00	-	-	\$59.36	\$474.86	SUBTOTAL							\$228,954	Area Cost Factor						0%	\$0	Subcontractor Overhead						0%	\$228,954	SUBTOTAL							\$228,954.39	Subcontractor Profit						0%	\$0.00	SUBTOTAL							\$228,954.39	Contractor Overhead						10%	\$22,895.44	SUBTOTAL							\$251,849.83	Contractor Profit						10%	\$25,184.98	TOTAL UNIT COST							\$277,035	Source of Cost Data: Local costs from an ongoing project; unit costs include installation.		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Capital Cost Sub-Element TREATMENT SYSTEM		COST WORKSHEET						
Site:	Dover	Prepared by:	AH	Checked by:	JCM			
Location:	Dover, Ohio	Date:	Oct-12	Date:	Oct-12			
Phase:	Feasibility Study (-30% to +50%)							
Base Year:	2012							
Date:	Oct. 2012							
Work Statement:								
Assumes contaminants in groundwater can be removed using an air stripper. Assumes vapor contaminants can be removed using activated carbon. Assumes precast concrete treatment structure is 32' x 60' x 10' (internal dimensions) that requires 6 trips to the site. Structure unit cost includes setup onsite w/a vendor technician. Assumes no Class I, Div II equipment necessary.								
Cost Analysis:								
DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	UNIT TOTAL	TOTAL	
Low profile Air Stripper (skid mounted)	4	EA	-	-	-	\$69,745.08	\$278,980	
- includes 5 hp transfer pump, 20 hp blower, shipping								
Carbon Vessel - Vapor (3,000 lbs ea)	4	EA	-	-	-	\$13,355.44	\$53,422	
Carbon	12,000	LB	-	-	\$2.23	\$2.23	\$26,711	
Shipping	1	LS	-	-	-	\$2,000.00	\$2,000	
Control Panel	1	LS	-	-	-	\$20,000.00	\$20,000	
Foundation Preparation	240	SY	-	-	-	\$22.00	\$5,275	
Foundation	1	LS	-	-	-	\$10,000.00	\$10,000	
Pre-cast concrete building	160	SY	-	-	-	\$154.33	\$24,668	
Delivery	12	LOAD	-	-	-	\$2,967.88	\$35,615	
Mob/Demob 300 LC Excavator	2	LS	-	\$2,967.88	-	\$2,967.88	\$5,935.75	
Supervisor	32	HR	\$89.04	-	-	\$89.04	\$2,849.16	
Supervisor OT	8	HR	\$133.55	-	-	\$133.55	\$1,068.44	
300 LC Excavator	4	DAY	-	\$1,500.00	-	\$1,500.00	\$6,000.00	
Operator	32	EA	\$59.36	-	-	\$59.36	\$1,899.44	
Operator OT	8	HR	\$89.04	-	-	\$89.04	\$712.29	
Level D PPE (@ \$30/worker/day)	4	DAY	\$44.52	-	-	\$44.52	\$178.07	
Gas connection	1	LS	-	-	-	\$1,500.00	\$1,500.00	
Heating system	1	LS	\$3,301.22	-	\$3,330.61	\$6,631.84	\$6,631.84	
Water & Sewer connection incl. permits	1	LS	-	-	-	\$13,579.10	\$13,579.10	
Piping (materials, labor & equipment)	1	LS	-	-	-	\$25,175.51	\$25,175.51	
Electrical (Lighting, Alarm, Wiring bet. System components)	1	LS	\$11,566.22	-	\$7,043.07	\$18,609.29	\$18,609.29	
Electrical Design	-	-	-	-	-	5%	\$930.46	
Manlift	1	MO	-	\$1,500.00	-	\$1,500.00	\$1,500.00	
							\$543,240	
Area Cost Factor							0%	\$0
Subcontractor Overhead							0%	\$0
SUBTOTAL								\$543,240
Subcontractor Profit							0%	\$0
SUBTOTAL								\$543,240
Contractor Overhead							10%	\$54,324
SUBTOTAL								\$597,564
Contractor Profit							10%	\$59,756
TOTAL UNIT COST								\$657,320
Source of Cost Data:								
Vendor estimate based on preliminary site information.								
Cost Adjustment Factor:								
FACTOR:								
H&S Productivity (labor & equip)	<input type="checkbox"/>							
Escalation to Base Year	<input checked="" type="checkbox"/>							
Area Cost Factor	<input type="checkbox"/>							
Subcontractor Overhead & Prof.	<input type="checkbox"/>							
Prime Contractor Overhead & Prof.	<input checked="" type="checkbox"/>							
NOTES:								

Capital Cost Sub-Element STARTUP-PROVEOUT		COST WORKSHEET																																																																																																																																																																																																						
Site: Dover Location: Dover, Ohio Phase: Feasibility Study (-30% to +50%) Base Year: 2012 Date: Oct. 2012	Prepared by: AH Date: Oct-12 Checked by: JCM Date: Oct-12																																																																																																																																																																																																							
Work Statement: Two weeks of startup/proveout testing. Analytical costs marked up by 50% to account for quick turnaround.																																																																																																																																																																																																								
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pH; ORP; Cond	0.5	MO	-	-	\$1,800.00	\$1,800.00	\$900.00	Zobell ORP Solution	1	EA	-	-	\$35.00	\$35.00	\$35.00	1000 US/CM Conductivity Solution	1	EA	-	-	\$15.00	\$15.00	\$15.00	Equipment Allowance	1	EA	-	-	-	\$1,000.00	\$1,000.00	Discharge of Treated Effluent to surface water	0	GAL	-	-	\$0.006	\$0.006	\$0.00								\$3,662.50	Chloride (Lab)	6	EA	-	-	\$26.66	\$26.66	\$159.93	COD	1	EA	-	-	\$39.14	\$39.14	\$39.14	Tedlar Bag	9	EA	-	-	\$103.00	\$103.00	\$927.00	Highly Volatile Non-Polar Organics (Vapor)	9	EA	-	-	\$471.23	\$471.23	\$4,241.03								\$5,367.09	Area Cost Factor						12%	\$644.05								\$4,306.55	Subcontractor Overhead						0%	\$0.00	SUBTOTAL							\$7,969.05	Subcontractor Profit						0%	\$0.00	SUBTOTAL							\$7,969.05	Contractor Overhead						5%	\$398.45	SUBTOTAL							\$8,367.50	Contractor Profit						5%	\$418.38								\$8,785.88	TOTAL UNIT COST							\$8,785.88
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O & M Cost Sub-Element ELECTRICAL USAGE						COST WORKSHEET			
Site: Dover	Prepared by: AH	Checked by: JCM							
Location: Dover, Ohio	Date: Oct-12	Date: Oct-12							
Phase: Feasibility Study (-30% to +50%)									
Base Year: 2012									
Date: Oct. 2012									
Work Statement: Assuming 3-40 hp GW pumps, 2-20 hp system blower and 10 hp allowance for miscellaneous transfer pumps.									
Cost Analysis:									
DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	UNIT TOTAL	TOTAL		
Miscellaneous Electrical Site Usage	12	MO	\$0.00	\$0.00	\$247.20	\$247.20	\$2,966.40	Means	
Cont op of GW pumps/system pumps & blower	12	MO	\$0.00	\$0.00	\$9,180.00	\$9,180.00	\$110,160.00		
SUBTOTAL							<u>\$113,126.40</u>		
Area Cost Factor							12%	<u>\$356</u>	Means
Subcontractor Overhead							0%	<u>\$0.00</u>	
SUBTOTAL							\$113,482.37		
Subcontractor Profit							0%	<u>\$0.00</u>	
SUBTOTAL							\$113,482.37		
Contractor Overhead							10%	<u>\$11,348.24</u>	
SUBTOTAL							\$124,830.60		
Contractor Profit							10%	<u>\$12,483.06</u>	
TOTAL UNIT COST/YR of Operation							<u>\$137,313.67</u>		
Source of Cost Data: Environmental Remediation Cost Data, RS Means, 7th Edition, 2001									
Cost Adjustment Factor:									
FACTOR:									
H&S Productivity (labor & equip)	<input type="checkbox"/>								
Escalation to Base Year	<input type="checkbox"/>								
Area Cost Factor	<input type="checkbox"/>								
Subcontractor Overhead & Prof.	<input type="checkbox"/>								
Prime Contractor Overhead & Prof.	<input checked="" type="checkbox"/>								
NOTES:									

Capital Cost Sub-Element TREATMENT SYSTEM O&M						COST WORKSHEET	
Site:	Dover	Prepared by:	AH	Checked by:	JCM		
Location:	Dover, Ohio	Date:	Oct-12	Date:	Oct-12		
Phase:	Feasibility Study (-30% to +50%)						
Base Year:	2012						
Date:	Oct. 2012						
Work Statement:							
Assume oversight and maintenance of system requires visit to site at a rate of 4/month for 8 hrs includes 2 hr travel time to site. Assume a carbon changeout rate of 1 time/year.							
Cost Analysis:							
DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	UNIT TOTAL	TOTAL
Phone/Internet	12	MO	\$0.00	\$0.00	\$350.00	\$350.00	\$4,200.00
Operations Labor (2 laborers at \$100/HR)	1,152	HR	\$100.00	\$0.00	\$0.00	\$100.00	\$115,200.00
							\$119,400.00
Means							
Blower & Pump Maintenance/Repair	4	EA	\$321.40	\$39.20	\$0.00	\$523.72	\$2,094.87
Carbon Replacement	12,000	LB	\$0.00	\$0.00	\$1.50	\$2.18	\$26,142.28
Remove and dispose of spent carbon - Haz.	12,000	LB	\$0.00	\$0.00	\$0.00	\$4.36	\$52,284.56
							\$80,521.71
Area Cost Factor						12%	\$9,662.60
							\$209,584.31
Subcontractor Overhead						0%	\$0.00
SUBTOTAL							\$209,584.31
Subcontractor Profit						0%	\$0.00
SUBTOTAL							\$209,584.31
Contractor Overhead						10%	\$20,958.43
SUBTOTAL							\$230,542.74
Contractor Profit						10%	\$23,054.27
							\$253,597.02
TOTAL UNIT COST							
							\$253,597.02
Source of Cost Data:							
Environmental Remediation Cost Data, RS Means, 7th Edition, 2001							
Cost Adjustment Factor:							
FACTOR:							
H&S Productivity (labor & equip)							<input type="text"/>
Escalation to Base Year							<input type="text"/>
Area Cost Factor							<input checked="" type="checkbox"/>
Subcontractor Overhead & Prof.							<input type="text"/>
Prime Contractor Overhead & Prof.							<input checked="" type="checkbox"/>
NOTES:							

Cost Sub-Element COST WORKSHEET
GROUND WATER SAMPLING EQUIPMENT

Site: Dover
 Location: Dover, Ohio
 Phase: Feasibility Study (-30% to +50%)
 Base Year: 2012
 Date: Oct. 2012

Prepared by: AH
 Date: Oct-12

Checked by: JCM
 Date: Oct-12

Work Statement:
 Purge with Grundfos pump or whale pump w/low flow controller and collect sample with disposable bailers; prepreserved bottles. TRC supplies all of their own equipment.

Cost Analysis:

DESCRIPTION	QTY	UNIT	LABOR	EQUIP	MTRL	TOTAL	TOTAL	
3M, 2", Clear Tape	1	PKG	\$0.00	\$0.00	\$27.49	\$27.49	\$27.49	6/PKG
Ziplock bags	10	EA	\$0.00	\$0.00	\$3.79	\$3.79	\$37.90	
Duct Tape	4	EA	\$0.00	\$0.00	\$6.38	\$6.38	\$25.52	
Nitrile gloves	6	BOX	\$0.00	\$0.00	\$12.00	\$12.00	\$72.00	100pairs/BOX
Safety Glasses	4	EA	\$0.00	\$0.00	\$6.05	\$6.05	\$24.20	
5-gallon buckets	6	EA	\$0.00	\$0.00	\$3.97	\$3.97	\$23.82	
pH paper	2	EA	\$0.00	\$0.00	\$7.00	\$7.00	\$14.00	
Graduated Cylinder (250 mL)	2	EA	\$0.00	\$0.00	\$7.05	\$7.05	\$14.10	
Kimwipes (4.5"x8.5")	2	BOX	\$0.00	\$0.00	\$8.00	\$8.00	\$16.00	
YSI Batteries (C-Cell; 2 sets of 4)	1	EA	\$0.00	\$0.00	\$11.35	\$11.35	\$11.35	8/Pack
ORP Solution	2	EA	\$0.00	\$0.00	\$17.00	\$17.00	\$34.00	
1413 US/CM Conductivity Solution	2	EA	\$0.00	\$0.00	\$11.00	\$11.00	\$22.00	
pH Calibration Solutions, 1L (pH 4, 7 and 10)	2	EA	\$0.00	\$0.00	\$44.70	\$44.70	\$89.40	
Turbidity meter batteries (9V)	1	EA	\$0.00	\$0.00	\$11.35	\$11.35	\$11.35	4/Pack
Poly Sheeting	2	EA	\$0.00	\$0.00	\$36.80	\$36.80	\$73.60	
Brush	2	EA	\$0.00	\$0.00	\$11.50	\$11.50	\$23.00	
Alconox Detergent (4lb box)	1	EA	\$0.00	\$0.00	\$20.00	\$20.00	\$20.00	
20 gal Container	2	EA	\$0.00	\$0.00	\$22.50	\$22.50	\$45.00	
Field Book	2	EA	\$0.00	\$0.00	\$15.00	\$15.00	\$30.00	
Whale Pump	2	EA	\$0.00	\$0.00	\$20.00	\$55.00	\$110.00	
Whale Pump low flow controller	1	EA	\$0.00	\$0.00	\$325.00	\$325.00	\$325.00	

TOTAL COST/SAMPLING ROUND \$1,049.73

Subcontractor Overhead	0%	\$0.00
SUBTOTAL		\$1,050
Subcontractor Profit	0%	\$0.00
SUBTOTAL		\$1,049.73
Contractor Overhead	10%	\$105
SUBTOTAL		\$1,155
Contractor Profit	10%	\$115.47

TOTAL UNIT COST \$1,270.17

Source of Cost Data:
 Vendors Applied escalation factor of 1.4 \$1,778.24

Cost Adjustment Factor:

FACTOR:	
H&S Productivity (labor & equip)	<input type="checkbox"/>
Escalation to Base Year	<input checked="" type="checkbox"/>
Area Cost Factor	<input type="checkbox"/>
Subcontractor Markup	<input type="checkbox"/>
Prime Contractor Markup	<input checked="" type="checkbox"/>

NOTES:

APPENDIX C

State concurrence letter will be added upon receipt

APPENDIX D

Martin, Linda

From: Austin, Janice <jaustin@doverchem.com>
Sent: Wednesday, July 22, 2015 2:41 PM
To: Narsete, Virginia; Martin, Linda
Cc: Moore, Jim; Cormier, Ken
Subject: 2015-7_DCC Comments on Proposed Plan_Offsite Groundwater Plume
Attachments: 2015-7_DCC Comments on Proposed Plan_Offsite Groundwater Plume.pdf

Good afternoon,

Please find the attached comments on behalf of Dover Chemical related to EPA's proposed plan for the offsite groundwater plume for inclusion as part of the public comment period.

Should you have any questions, please feel free to contact me.

Best regards,

Janice D. Austin, P.E., Environmental Manager | Dover Chemical Corporation
3676 Davis Road NW | Dover OH 44622
Phone: 330-365-3671 | Fax: 330-365-3971 | Cell: 330-987-8291
Email: jaustin@doverchem.com



3676 Davis Road N.W. • Dover, Ohio 44622 • (330) 343-7711 • 1-800-321-8805 • Fax: (330) 364-9626

- **Section IV, Site Characteristics, Trend Analysis, paragraph 5.** The text should be revised to reference MW-25B. Currently the text incorrectly references MW-31B in several trend statements.
- **Section IV, Site Characteristics, Geochemical Conditions, Dissolved Oxygen.** The section discusses the natural conditions of the B-Zone portion of the aquifer. The text states B-Zone natural conditions are aerobic. The data collected for the Offsite Groundwater Plume Feasibility Study indicate B-Zone groundwater is anaerobic (Table 2, Well MW-14B). The text should be revised.
- **Section IV, Site Characteristics, Biotrap Sampling, paragraph 2.** The text should be expanded to state that qPCR was used to identify bacteria known to degrade chlorinated aliphatic *and aromatic* compounds.
- **Section V, Scope and Role of the Action, second paragraph.** B-zone is incorrectly defined as beginning below the upper 10-feet of saturated thickness. B-zone has been defined as 35-50 feet below the water table.
- **Section VI, Summary of Site Risks, Vapor Intrusion, paragraph 1, second sentence.** The statement regarding risk should be revised. There is currently no risk identified to residential receptors for vapor intrusion from A-Zone groundwater associated with Dover Chemical, based on the groundwater sampling completed to date.
- **Section VI, Summary of Site Risks, Vapor Intrusion, paragraph 2, last sentence.** The statement regarding plume orientation should be revised. There is no A-Zone contaminant plume in the Offsite Groundwater Plume.
- **Section VIII, Description of Alternatives, fourth bullet, Alternative 4, last sentence.** Please clarify that this alternative includes the extraction of groundwater with a treatment facility to be constructed at a location in the community and off the Dover Chemical Plant property.

Sincerely,

A handwritten signature in black ink that reads "Jim Moore".

Jim Moore
EHS&S Director
Dover Chemical Corporation
jmoore@doverchem.com

Cc: Janice Austin, DCC
Ken Cormier, TRC



3676 Davis Road N.W. • Dover, Ohio 44622 • (330) 343-7711 • 1-800-321-8805 • Fax: (330) 364-9626

July 21, 2015

Linda Martin
Remedial Project Manager
U.S. EPA Region 5
77 West Jackson Blvd. – Mail Code SR-6J
Chicago, IL 60604

Virginia Narsete
Community Involvement Coordinator
U.S. EPA Region 5
77 West Jackson Blvd. – Mail Code SR-6J
Chicago, IL 60604

Re: Comments on the Proposed Plan
Offsite Groundwater Plume
Dover Chemical Corporation Site

Dover Chemical Corporation (DCC) submits the following comments on the U.S. Environmental Protection Agency (EPA) proposed plan of remediation for the off-site groundwater contamination associated with the DCC Superfund Site.

General Comment

During the Annual Meeting held at DCC, on April 14, 2015, DCC affirmed and EPA acknowledged that there are other potential sources in the area that contribute to the offsite groundwater plume, including contaminants of concern 1,1-DCA, PCE, TCE, and benzene.

Specific Comments

- **Section II.a, Off-Site Groundwater Monitoring, Table: Maximum Recent Contaminant Concentrations (B-Zone).** Units are missing from maximum concentration column. "J" qualifier is not defined.
- **Section II.b. paragraph 1.** The 1996 Feasibility Study was completed in response to the 1983 AOC, it was not part of the 1983 AOC.
- **Section IV, Site Characteristics.** The subsection, Monitored Natural Attenuation, first paragraph, appears to be out of place. Should be presented in the alternatives section or removed.

Martin, Linda

From: kristy.hunt@epa.ohio.gov
Sent: Wednesday, July 22, 2015 2:06 PM
To: Martin, Linda
Cc: John.Rochotte@epa.ohio.gov
Subject: RE: Final Proposed Plan for the off site groundwater plume

Linda,

Ohio EPA has the following editorial comments, regarding the June 2015 Proposed Plan for the Dover Chemical Off-site Plume, that we would appreciate the consideration of as USEPA moves toward the development of the Record of Decision document:

1. Short-term effectiveness is not clearly discussed on p. 24 of the Proposed Plan. The short-term effectiveness section of the proposed plan should discuss the short-term effectiveness of each alternative and, if applicable, any additional short-term risks or hazards posed by the alternative (for example, soil excavation could result in short-term direct-contact exposure to construction/excavation workers). However, currently this section states, for example, "Alternative 1 would take no time to implement and would present no short term risks because no action would be taken." It should be clarified that Alternative 1 presents no additional short-term risks (i.e. beyond those presented from the potable groundwater pathway, as quantified in the HHRA) and would not be effective at restoring groundwater in the short-term. Similar consideration is necessary for the other alternatives under the fifth criterion.
2. Within Section VIII. Description of Alternatives, Ohio EPA feels that it would be beneficial to also list the *Estimated Time to Achieve Remedial Action Objectives (RAOs)* in addition to the other *Estimations* that are listed in regard to each Alternative such as *Capital Cost, Total O&M Cost, etc.*

Please let me know if you have any additional questions.

Regards,

Kristy

Kristy Hunt, Site Coordinator
Ohio EPA | Division of Environmental Response & Revitalization
Southeast District Office
2195 Front Street
Logan, Ohio 43138
Ph: 740-380-5247
Fax: 740-385-6490
kristy.hunt@epa.ohio.gov

From: Martin, Linda [<mailto:martin.lindab@epa.gov>]
Sent: Friday, June 12, 2015 4:09 PM
To: Moore, Jim; Ken Cormier; Austin, Janice
Cc: "Plumb, Mike" <MPlumb@TRCSOLUTIONS.com>; Rik Lantz; Hunt, Kristy
Subject: Final Proposed Plan for the off site groundwater plume

Hi Everyone,

The Proposed plan for the Dover Chemical off site groundwater plume has been finalized. I have attached a copy for you.

The public comment period of the proposed plan will run from June 22, 2015 - July 22, 2015

The ad announcing the proposed plan and public comment period is scheduled to run in the local paper on Sunday June 14, 2015

The public meeting will take place at the Dover Public Library on Thursday June 25 at 6:00pm.

If you have any questions please feel free to contact me.

Thank you;

Linda Martin
Remedial Project Manager
US EPA
77 West Jackson (SR-6J)
Chicago Il 60604
312-886-3854
Fax: 312-692-2411

Martin, Linda

From: Narsete, Virginia
Sent: Tuesday, June 30, 2015 9:44 AM
To: Martin, Linda
Subject: FW: (025091058) Dover Public Comments

Ginny Narsete/ U.S. EPA
Community Involvement and Outreach Section
77 West Jackson
Chicago IL 60604
Toll free: 800-621-8431, ext. 64359
<http://www.epa.gov/region5/>

312-886-4359 Office Phone

-----Original Message-----

From: idaemon@unixmail.rtpnc.epa.gov [mailto:idaemon@rtpnc.epa.gov]
Sent: Thursday, June 25, 2015 8:11 AM
To: Narsete, Virginia
Subject: (025091058) Dover Public Comments

2-Name

Andrew Ireland

3-Organization

4-E-mail

andrewkireland@gmail.com

5-Street

1209 Oak St

6-City

Dover

7-State

OH

8-Zipcode

44622

9-Comments

I am glad a plan has been proposed and action will be taken to clean up the contaminates. My concern is that The EPA will hold Dover Chemical's feet to the fire. The plant continually has incidents and spills with no real repercussions. Their spills have hurt people and in general we have a uneasy feeling about what is under our feet.

After several of the recent incidents, I noticed pattern of covering and minimizing spills. In their 2012 incident they were telling local authorities that nothing was wrong while a vapor cloud was making people sick on the highway.

After that they released chemicals and cause a fish kill that started right at the outlet pipe. They denied it for quite some time before being force to admit it was them.

I'm glad somebody is forcing a clean up for the offsite contamination. I just have a concern that it will be seen through all the way and that the site itself will eventually clean.

Thank you

UserWord

light

Word

light

submit2

Send Comments

WARNING NOTICE

This electronic mail originated from a federal government computer system of the United States Environmental Protection Agency (EPA). Unauthorized access or use of this EPA system may subject violators to criminal, civil and/or administrative action. For official purposes, law enforcement and other authorized personnel may monitor, record, read, copy and disclose all information which an EPA system processes. Any person's access or use, authorized and unauthorized, of this EPA system to send electronic mail constitutes consent to these terms.

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Browser: Mozilla/5.0 (Windows NT 6.3; WOW64; rv:38.0) Gecko/20100101 Firefox/38.0

Referred: <http://www.epa.gov/region5/cleanup/dover/pubcomment.html>

TSSMS: region05

Mail to File: dover.txt

THE DAVID GROUP

Invoice Number:	122134
Order Number:	339263
Client Name:	Tetra Tech EM Inc.
Ad:	Dover Proposed Plan
Publication:	Times Reporter
Run dates:	Jun 14 2015



**Public Comment Period Begins
On a Proposed Groundwater Cleanup Plan
Dover Chemical Site
Dover, Ohio**

**Public Meeting: Thursday, June 25, 2015
Public Comment Period: June 22 – July 22, 2015**

The U.S. Environmental Protection Agency, working with the Ohio EPA, is proposing a cleanup plan for the off-site contaminated groundwater associated with the Dover Chemical Corp. site. U.S. EPA is accepting comments from the public on the proposed plan.

You may comment orally or in writing at a public meeting Thursday, June 25, at 6 p.m., at the Dover Public Library, 525 N. Walnut St., Dover. You may submit written comments before July 22. Mail to:

Ginny Narsete
Community Involvement Coordinator
U.S. EPA Region 5 (SI-7J)
77 W. Jackson Blvd.
Chicago, IL 60604-3590

Or comment online at www.epa.gov/region5/cleanup/dover.

If you need special accommodations for the public meeting, contact Ginny Narsete at 800-621-8431, Ext. 64359, 9:30 a.m. – 5:30 p.m., weekdays, or at narsete.virginia@epa.gov.

The plan is explained in a fact sheet available at www.epa.gov/region5/cleanup/dover. More details are in a document called the *Feasibility Study Addendum II*, which can be found on the same website and in the local information repository at the Dover Public Library.

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APPENDIX E

**U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION**

**ADMINISTRATIVE RECORD
FOR THE
DOVER CHEMICAL CORPORATION SITE
DOVER, TUSCARAWAS COUNTY, OHIO**

**UPDATE 5
JUNE 18, 2015
SEMS ID: 918767**

<u>NO.</u>	<u>SEMS ID</u>	<u>DATE</u>	<u>AUTHOR</u>	<u>RECIPIENT</u>	<u>TITLE/DESCRIPTION</u>	<u>PAGES</u>
1	234635	8/3/88	Constantelos, B., U.S. EPA and R. Shank, Ohio EPA	Monaco, J., Dover Chemical Corp.	Administrative Order by Consent re: Remedial Investigation and Feasibility Study (Signed)	46
2	234657	5/1/95	Black & Veatch	U.S. EPA	Baseline Risk Assessment	206
3	234671	12/1/96	Roy F. Weston	Dover Chemical Corp.	Final Feasibility Study	516
4	246929	10/20/00	Muno, D., U.S. EPA	Rankin, D., Dover Chemical Corp.	Administrative Order by Consent (Signed)	129
5	406318	7/27/01	Puglionesi, P., Duke Engineering	Short, T., U.S. EPA	Feasibility Study Addendum- Off-Site Groundwater Remediation	468
6	478878	10/6/05	Martin, L., U.S. EPA	Rankin, D., Dover Chemical Corp.	Letter re: Modification of the Administrative Order by Consent Dated October 20, 2000 - Lagoon Area and Canal Soils/Sediment and Plant Area Soil	2
7	478877	7/1/06	TRC Environmental Corp.	Dover Chemical Corp.	Excavation Work Plan- July 2006	43
8	478876	2/13/07	Plumb, M., TRC Environmental Corp.	Martin, L., U.S. EPA	Excavation Summary Report - February 2007	30
9	478874	10/15/08	Cormier, K., TRC Environmental Corp.	Martin, L., U.S. EPA and M. Sherron, Ohio EPA	Demonstration Study Report - Modified F3 Pumping Scenario	50

10	478852	3/23/09	Cormier, K., TRC Environmental Corp.	Martin, L., U.S. EPA and M. Sherron, Ohio EPA	Work Plan: Addendum A- West Third Street Area of the Off-Site Groundwater Plume (Cover Letter Attached)	27
11	478855	6/1/11	Cormier, K., TRC Environmental Corp.	Martin, L., U.S. EPA and C. Osborne, Ohio EPA	Feasibility Study Addendum 2011 Work Plan (Cover Letter Attached)	64
12	478856	6/8/11	Martin, L., U.S. EPA	Clark-Dross, M., Dover Chemical Corp.	Letter re: Feasibility Study Addendum Work Plan Dated June 1, 2011 Off Site Ground Water Plume	1
13	478879	7/2/12	Martin, L., U.S. EPA	Clark-Dross, M., Dover Chemical Corp.	Letter re: Completion of Response Action Design Work Plan Dated July 2003	2
14	911496	5/15/13	Cormier, K., TRC Environmental Corp.	Martin, L., U.S. EPA and K. O'Hara, Ohio EPA	Feasibility Study Addendum II- Off-Site Groundwater Plume (Cover Letter Attached)	1085
15	478853	9/24/13	Cormier, K., and C. Race, TRC Environmental Corp.	Martin, L., U.S. EPA and K. Vanecko, Ohio EPA	Hydraulic Control of Groundwater Minimum Pumping Rate Assessment (Cover Letter Attached)	26
16	915340	4/1/14	Cormier, K., TRC Environmental Corp.	Hunt, K., Ohio EPA and L. Martin, U.S. EPA	Quarterly Status Report- December 2013 Long Term Groundwater Monitoring Program Pumping Scenario 2013A (Cover Letter Attached)	89
17	478880	6/30/14	Martin, L., U.S. EPA	May, B., Dover Chemical Corp.	Letter re: Pre-Final/Final Inspection for the Soil Excavation Work Completed as Part of the October 2000 AOC (With Attachments)	46
18	915341	7/8/14	Cormier, K., TRC Environmental Corp.	Hunt, K., Ohio EPA and L. Martin, U.S. EPA	Quarterly Status Report- March 2014 Long Term Groundwater Monitoring Program Pumping Scenario 2013A (Cover Letter Attached)	205
19	478886	9/17/14	Morton, E., sulTRAC	Martin, L., U.S. EPA	Memo re: Proposed Approach for Dover Off-Site Groundwater Human Health Risk Assessment	7
20	478875	9/25/14	TRC Environmental Corp.	Dover Chemical Corp.	Excavation Summary Report - July 2007 (Re-Issued 9/25/14)	352

21	478887	10/1/14	Martin, L., U.S. EPA	Hunt, K., Ohio EPA and J. Moore, Dover Chemical Corp.	Memo re: Updated Risk Assessment for the Dover Chemical Off-Site Groundwater Plume	10
22	478854	12/16/14	Cormier, K., TRC Environmental Corp.	Hunt, K., Ohio EPA and L. Martin, U.S. EPA	Quarterly Status Report- June/July 2014 Long Term Groundwater Monitoring Program Pumping Scenario 2013A (Cover Letter Attached)	88
23	918759	1/16/15	Cormier, K., and M. Plumb, TRC Environmental Corp.	Hunt, K., Ohio EPA and L. Martin, U.S. EPA	Soil Vapor Extraction Construction Complete Report - Area H and Former Fractionation Tower	167
24	915346	4/1/15	suTRAC	U.S. EPA	Final Human Health Risk Assessment for Off-Site B-Zone Groundwater	56
25	918752	5/1/15	Cormier, K., TRC Environmental Corp.	Hunt, K., Ohio EPA and L. Martin, U.S. EPA	Quarterly Status Report – Long Term Groundwater Monitoring Program – December 2014 (Cover Letter Attached)	120
26	478885	6/1/15	U.S. EPA	Public	Dover Chemical Superfund Site Proposed Plan (With Attachments)	42

**U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION**

**ADMINISTRATIVE RECORD
FOR THE
DOVER CHEMICAL CORPORATION SITE
DOVER, TUSCARAWAS COUNTY, OHIO**

**UPDATE 6
SEPTEMBER, 2015
SEMS ID:**

<u>NO.</u>	<u>SEMS ID</u>	<u>DATE</u>	<u>AUTHOR</u>	<u>RECIPIENT</u>	<u>TITLE/DESCRIPTION</u>	<u>PAGES</u>
1	918783	6/25/15	Hill Court Reporters	U.S. EPA	Transcript of Public Meeting for Proposed Cleanup Plan	47

APPENDIX 3

**REMEDIAL DESIGN / REMEDIAL ACTION
STATEMENT OF WORK
DOVER CHEMICAL CORPORATION SUPERFUND SITE OPERABLE UNIT 2
Dover, Tuscarawas County, State of Ohio
EPA Region 5**

July 2017

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1. INTRODUCTION

1.1 Purpose of the SOW. This Statement of Work (SOW) sets forth the procedures and requirements for implementing the Work. The Work is the Remedial Design and Remedial Action (RD/RA) set forth in the Record of Decision (ROD) for the geographic area which is defined in the Consent Decree (to which this SOW is attached) as the Dover Chemical Superfund Site Operable Unit 2 (“Site”), and which is referred to in the ROD as the “Off-Site Groundwater Plume.” The ROD for the Site was signed by the Director of the Superfund Division of the U.S. Environmental Protection Agency, Region 5, on September 18, 2015. This SOW works in conjunction with the Consent Decree. The Settling Defendant (SD) shall comply with the ROD, the Consent Decree, and this SOW.

1.2 Structure of the SOW.

- Section 2 (Community Involvement) sets forth EPA’s and SD’s responsibilities for community involvement.
- Section 3 (Remedial Design) sets forth the process for developing the RD, which includes the submission of specified primary deliverables and may include SD’s responsibility to conduct, study and report field investigations and treatability studies.
- Section 4 (Remedial Action) sets forth requirements regarding the completion of the RA, including primary deliverables related to completion of the RA.
- Section 5 (Reporting) sets forth SD’s reporting obligations.
- Section 6 (Deliverables) describes the content of the supporting deliverables and the general requirements regarding SD’s submission of, and EPA’s review of, approval of, comment on, and/or modification of, the deliverables.
- Section 7 (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 RA.
- Section 8 (State Participation) addresses State participation.
- Section 9 (References) provides a list of references, including URLs.

1.3 The Scope of the Remedy includes the actions described in Section IV of the ROD, including the selected remedy Alternative 3B and Sections IX, XII, and XIII of the ROD and discussed below.

Under the federal Superfund law, EPA selected Alternative 3B to address the Site. Dover Chemical shall implement the selected remedy, which includes In-Situ Chemical Oxidation (ISCO) injections in a grid near the origin of the Off-Site Groundwater plume, plus injections of an aerobic amendment along the center line of the plume that extends from the origin, followed by Monitored Natural Attenuation (MNA).

1.4 The terms used in this SOW that are defined in CERCLA, in regulations promulgated under CERCLA, or in the Consent Decree, have the meanings assigned to them in CERCLA, in such regulations, or in the Consent 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 Community Involvement Responsibilities

- (a) EPA has the lead responsibility for developing and implementing community involvement activities at the Site. Previously during the RI/FS phase, EPA developed a Community Involvement Plan (CIP) for the Site and prepared an updated CIP in January 2000. 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.
- (b) If requested by EPA, SD 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. SD’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 Plan (TAP) 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 SD’s responsibilities for community involvement activities. All community involvement activities conducted by SD at EPA’s request are subject to EPA’s oversight.
- (c) **SD’s CI Coordinator.** If requested by EPA, SD shall, within 30 days, designate and notify EPA of SD’s Community Involvement Coordinator (SD’s CI Coordinator). SD may hire a contractor for this purpose. SD’s notice must include the name, title, and qualifications of SD’s CI Coordinator. SD’s CI Coordinator is responsible for providing support regarding EPA’s community involvement activities, including coordinating with EPA’s CI Coordinator regarding responses to the public’s inquiries about the Site.

2.2 SD’s Responsibilities for Technical Assistance

- (a) If EPA requests, SD shall arrange for a qualified community group to receive the services of a technical advisor(s) who can: (i) help group members understand Site cleanup issues (specifically, to interpret and comment on Site-related documents developed under this SOW); and (ii) share this information with others in the community. The technical advisor(s) will be independent from the SD. SD’s TAP assistance will be limited to \$50,000, except as provided in ¶ 2.2(d)(3), and will end when EPA issues the Certification of Work Completion under ¶ 4.8. SD shall implement this requirement under a Technical Assistance Plan (TAP).

- (b) If EPA requests, SD shall cooperate with EPA in soliciting interest from community groups regarding a TAP for the Site. If more than one community group expresses an interest in a TAP, SD shall cooperate with EPA in encouraging the groups to submit a single, joint application for a TAP.
- (c) If EPA requests, SD shall, within 60 days, submit a proposed TAP for EPA approval. The TAP must describe SD's plans for the qualified community group to receive independent technical assistance. The TAP must include the following elements:
 - (1) For SD to arrange for publication of a notice in local media that they have received a Letter of Intent (LOI) to submit an application for a TAP. The notice should explain how other interested groups may also try to combine efforts with the LOI group or submit their own applications, by a reasonable specified deadline;
 - (2) For SD to review the application(s) received and determine the eligibility of the community group(s). The proposed TAP must include eligibility criteria as follows:
 - (i) A community group is eligible if it is: (a) comprised of people who are affected by the release or threatened release at the Site, and (b) able to demonstrate its ability to adequately and responsibly manage TAP-related responsibilities.
 - (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; or (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 SD to notify EPA of its 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 SD 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 SD 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 SD's evaluation process to determine whether the process satisfactorily follows the criteria in ¶ 2.2(c)(4). TAP assistance may be awarded to only one qualified group at a time;
- (6) For SD to notify all applicant(s) about SD's decision;
- (7) For SD to designate a person (TAP Coordinator) to be its primary contact with the selected community group;
- (8) A description of SD's plans to implement the requirements of ¶ 2.2(d) (Agreement with Selected Community Group); and
- (9) For SD to submit quarterly progress reports regarding the implementation of the TAP.

(d) Agreement with Selected Community Group

- (1) SD shall negotiate an agreement with the selected community group that specifies the duties of SD 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 SD'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 will pass before construction completion will be achieved;

- (ii) EPA requires treatability studies or evaluation of new and innovative technologies;
 - (iii) EPA reopens the ROD;
 - (iv) The public health assessment (or related activities) for the Site indicates the need for further health investigations and/or health-related activities;
 - (v) After SD's selection of the Community Group for the TAP, EPA designates additional operable units at the Site;
 - (vi) EPA issues an Explanation of Significant Differences for the ROD;
 - (vii) After SD's selection of the Community Group, a legislative or regulatory change results in significant new information relating to the Site;
 - (viii) Significant public concern about the Site exists, as evidenced, e.g., by relatively large turnout at meetings, the need for multiple meetings, the need for numerous copies of documents to inform community members, etc.;
 - (ix) Any other factor that, in EPA's judgment, indicates that the Site is unusually complex; or
 - (x) A RI/FS costing at least \$2 million was performed at the Site.
- (4) SD is entitled to retain any unobligated TAP funds upon EPA's Certification of Work Completion under ¶ 4.8.
 - (5) SD shall submit a draft of the proposed agreement to EPA for its comments.

3. REMEDIAL DESIGN

3.1 RD Work Plan. SD shall submit a Remedial Design (RD) Work Plan (RDWP) for EPA approval. The RDWP must include:

- (a) Plans for implementing all RD activities identified in this SOW, in the RDWP, or required by EPA to be conducted to develop the RD;
- (b) A description of the overall management strategy for performing the RD, including a proposal for phasing of design and construction, if applicable;
- (c) A description of the proposed general approach to contracting, construction, operation, maintenance, and monitoring of the Remedial Action (RA) as necessary to implement the Work;

- (d) A description of the responsibility and authority of all organizations and key personnel involved with the development of the RD;
- (e) Descriptions of any areas requiring clarification and/or anticipated problems (e.g., data gaps);
- (f) Description of any proposed pre-design investigation;
- (g) Description of any proposed treatability study;
- (h) Descriptions of any applicable permitting requirements and other regulatory requirements;
- (i) Description of plans for obtaining access in connection with the Work, such as property acquisition, property leases, access agreements, and/or easements; and
- (j) The following supporting deliverables described in ¶ 6.7 (Supporting Deliverables): Health and Safety Plan, Field Sampling Plan, Quality Assurance Plan, Site Wide Monitoring Plan, and Emergency Response Plan.

3.2 SD shall confer (by in-person meeting, or by telephone) regularly with EPA to discuss design issues as necessary, as directed or determined by EPA.

3.3 Pre-Design Investigation. The purpose of the Pre-Design Investigation (PDI) is to address data gaps by conducting additional field investigations. If EPA determines that a PDI is required, Respondent shall complete the following:

- (a) **PDI Work Plan.** If EPA requests, SD shall submit a PDI Work Plan (PDIWP) for EPA approval. The PDIWP must include:
 - (1) An evaluation and summary of existing data and description of data gaps;
 - (2) A sampling plan including media to be sampled, contaminants or parameters for which sampling will be conducted, location (areal extent and depths), and number of samples; and
 - (3) Cross references to quality assurance/quality control (QA/QC) requirements set forth in the Quality Assurance Project Plan (QAPP) as described in ¶ 6.7(d).
- (b) Following the PDI, SD shall submit a PDI Evaluation Report. This report must include:
 - (1) Summary of the investigations performed;
 - (2) Summary of investigation results;
 - (3) Summary of validated data (i.e. tables and graphics);

- (4) Data validation reports and laboratory data reports;
 - (5) Narrative interpretation of data and results;
 - (6) Results of statistical and modeling analyses;
 - (7) Photographs documenting the work conducted; and
 - (8) Conclusions and recommendations for RD, including design parameters and criteria.
- (c) EPA may require SD to supplement the PDI Evaluation Report and/or to perform additional pre-design studies.

3.4 Treatability Study – If EPA determines that a Treatability Study is required;

- (a) SD shall perform a Treatability Study (TS) for the purpose of determining the effectiveness of in-situ treatment to achieve reduction in concentrations in the Off-Site Groundwater plume.
- (b) SD shall submit a TS Work Plan (TSWP) for EPA approval. SD shall prepare the TSWP in accordance with EPA's *Guide for Conducting Treatability Studies under CERCLA, Final* (Oct. 1992), as supplemented for RD by the *Remedial Design/Remedial Action Handbook*, EPA 540/R-95/059 (June 1995).
- (c) Following completion of the TS, SD shall submit a TS Evaluation Report for EPA comment.
- (d) EPA may require SD to supplement the TS Evaluation Report and/or to perform additional treatability studies.

3.5 Preliminary (30%) RD. SD shall submit a Preliminary (30%) RD for EPA's comment. The Preliminary RD must include:

- (a) A design criteria report, as described in the *Remedial Design/Remedial Action Handbook*, EPA 540/R-95/059 (June 1995);
- (b) Preliminary drawings and specifications;
- (c) Descriptions of permit requirements, if applicable;
- (d) Preliminary Operation and Maintenance (O&M) Plan and O&M Manual;
- (e) A description of how the RA will be implemented in a manner that minimizes environmental impacts in accordance with EPA's *Principles for Greener Cleanups* (Aug. 2009);
- (f) A description of monitoring and control measures to protect human health and the environment, such as air monitoring and dust suppression, during the RA;

- (g) Any proposed revisions to the RA Schedule that is set forth in ¶ 7.3 (RA Schedule); and
- (h) Updates of all supporting deliverables required to accompany the RDWP and the following additional supporting deliverables described in ¶ 6.7 (Supporting Deliverables): Field Sampling Plan; Quality Assurance Project Plan; Site Wide Monitoring Plan; Construction Quality Assurance/Quality Control Plan; Transportation and Off-Site Disposal Plan; O&M Plan; O&M Manual; and Institutional Controls Implementation and Assurance Plan.

3.6 Pre-Final (95%) RD. SD shall submit the Pre-final (95%) RD for EPA's comment. The Pre-final RD must be a continuation and expansion of the previous design submittal and must address EPA's comments regarding the Preliminary RD. The Pre-final RD will serve as the approved Final (100%) RD if EPA approves the Pre-final RD without comments. The Pre-final RD 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 Master Format 2012;
- (b) A survey and engineering drawings showing existing Site features, such as elements, property borders, easements, and Site conditions;
- (c) Pre-Final versions of the same elements and deliverables as are required for the Preliminary RD;
- (d) A specification for photographic documentation of the RA; and
- (e) Updates of all supporting deliverables required to accompany the Preliminary (30%) RD.

3.7 Final (100%) RD. SD shall submit the Final (100%) RD for EPA approval. The Final RD must address EPA's comments on the Pre-final RD and must include final versions of all Pre-final RD deliverables.

4. REMEDIAL ACTION

4.1 RA Work Plan. SD shall submit a RA Work Plan (RAWP) for EPA approval that includes:

- (a) A proposed RA Construction Schedule in the format of a Gantt chart or a critical path method.
- (b) An updated health and safety plan that covers activities during the RA; 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.

- (d) Proposed criteria to measure effectiveness of in-situ treatment (ISCO injections or Amendments).

4.2 Meetings and Inspections

- (a) **Preconstruction Conference.** SD shall hold a preconstruction conference with EPA and others as directed or approved by EPA and as described in the *Remedial Design/Remedial Action Handbook*, EPA 540/R-95/059 (June 1995). SD shall prepare minutes of the conference and shall distribute the minutes to all Parties.
- (b) **Periodic Meetings.** During the construction portion of the RA (RA Construction), SD shall meet regularly with EPA, and others as directed or determined by EPA, to discuss construction issues. SD shall distribute an agenda and list of attendees to all Parties prior to each meeting. SD shall prepare minutes of the meetings and shall distribute the minutes to all Parties.
- (c) **Inspections**
 - (1) EPA or its representative shall conduct periodic inspections of or have a presence at the Site during the Work. At EPA's request, the Supervising Contractor or other designee shall accompany EPA or its representative during inspections.
 - (2) SD shall provide personal protective equipment needed for EPA personnel and any oversight officials to perform their oversight duties.
 - (3) Upon notification by EPA of any deficiencies in the RA Construction, SD shall take all necessary steps to correct the deficiencies and/or bring the RA Construction into compliance with the approved Final RD, any approved design changes, and/or the approved RAWP. If applicable, SD shall comply with any schedule provided by EPA in its notice of deficiency.

4.3 Emergency Response and Reporting

- (a) **Emergency Response and Reporting.** 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, SD 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 ¶ 4.3(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 SD is required to report pursuant to Section 103 of CERCLA,

42 U.S.C. § 9603, or Section 304 of the Emergency Planning and Community Right-to-know Act (EPCRA), 42 U.S.C. § 11004, SD shall immediately notify the authorized EPA officer orally.

- (c) The “authorized EPA officer” for purposes of immediate oral notifications and consultations under ¶ 4.3(a) and ¶ 4.3(b) is the EPA Project Coordinator, the EPA Alternate Project Coordinator (if the EPA Project Coordinator is unavailable), or the EPA Emergency Response Branch, Region 5 (if neither EPA Project Coordinator is available).
- (d) For any event covered by ¶ 4.3(a) and ¶ 4.3(b), SD shall: (1) within 20 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 ¶ 4.3 are in addition to the reporting required by CERCLA § 103 or EPCRA § 304.

4.4 Off-Site Shipments

- (a) SD may ship hazardous substances, pollutants, and contaminants from the Site to an off-site facility only if such facility complies with Section 121(d)(3) of CERCLA, 42 U.S.C. § 9621(d)(3), and 40 C.F.R. § 300.440. SD will be deemed to be in compliance with CERCLA § 121(d)(3) and 40 C.F.R. § 300.440 regarding a shipment if SD 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) SD 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. SD 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. SD shall provide the notice after the award of the contract for RA construction and before the Waste Material is shipped.
- (c) SD may ship Investigation Derived Waste (IDW) from the Site to an off-site facility only if it complies with Section 121(d)(3) of CERCLA, 42 U.S.C. § 9621(d)(3), 40 C.F.R. § 300.440, EPA’s *Guide to Management of Investigation Derived Waste*, OSWER 9345.3-03FS (Jan. 1992), and any IDW-specific

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

4.5 RA Construction Completion

- (a) For purposes of this ¶ 4.5, the “system” refers to a system of injections points or monitoring wells, and “RA Construction” refers to the construction of such system (for example, to deliver appropriate in-situ treatment) and the performance of all activities necessary for such system to function properly and as designed to eventually achieve Performance Standards.
- (b) **Inspection of Constructed Remedy.** If requested by EPA, SD shall schedule an inspection to review the construction and operation of the system and to review whether the system is functioning properly and as designed. The inspection must be attended by SD and EPA and/or their representatives. A re-inspection must be conducted if requested by EPA.
- (c) **Shakedown Period.** There shall be a shakedown period of up to one year for EPA to review whether the remedy is functioning properly and performing as designed. SD shall provide such information as EPA requests for such review.
- (d) **RA Report.** Following construction of the system or delivery of appropriate in-situ treatment, SD shall submit an “RA Report” requesting EPA’s determination that RA Construction has been completed. The RA Report must: (1) include statements by a registered professional engineer and by SD’s Project Coordinator that construction of the system is complete and that the system has been constructed properly and as designed; (2) include supporting documentation demonstrating that construction of the system is complete and as designed; (3) include as-built drawings signed and stamped by a registered professional engineer; (4) be prepared in accordance with Chapter 2 (Remedial Action Completion) of EPA’s *Close Out Procedures for NPL Sites* guidance (May 2011); and (5) be certified in accordance with ¶ 6.5 (Certification).
- (e) **RA Evaluation Report.** Following the shakedown period, SD shall submit an “RA Evaluation Report” evaluating the effectiveness of the in-situ treatment or MNA. The RA Evaluation Report must: (1) include a determination based on the criteria approved in the RA Work Plan that the remedial action is effective and is functioning properly and performing as designed; (2) include supporting documentation demonstrating the determination; and (3) include recommendations as to the implementation of any subsequent phase of the remedial action.
- (f) If EPA determines that RA Construction is not complete, EPA shall so notify SD. EPA’s notice must include a description of, and schedule for, the activities that SD must perform to complete RA Construction. EPA’s notice may include a

schedule for completion of such activities or may require SD to submit a proposed schedule for EPA approval. SD shall perform all activities described in the EPA notice in accordance with the schedule.

- (g) If EPA determines, based on the initial or any subsequent RA Report, that RA Construction is complete, EPA shall so notify SD.

4.6 Certification of RA Completion

- (a) **RA Completion Monitoring Report.** SD shall submit an RA Completion Monitoring Report to EPA requesting EPA's Certification of RA Completion. The report must: (1) include certifications by a registered professional engineer and by SD's Project Coordinator that the RA is complete; (2) be prepared in accordance with Chapter 2 (Remedial Action Completion) of EPA's *Close Out Procedures for NPL Sites* guidance (May 2011); (3) contain monitoring data to demonstrate that Performance Standards have been achieved; and (5) be certified in accordance with ¶ 6.5 (Certification).
- (b) If EPA concludes that the RA is not Complete, EPA shall so notify SD. EPA's notice must include a description of any deficiencies. EPA's notice may include a schedule for addressing such deficiencies or may require SD to submit a schedule for EPA approval. SD shall perform all activities described in the notice in accordance with the schedule.
- (c) If EPA concludes, based on the initial or any subsequent RA Completion Monitoring Report requesting Certification of RA Completion, that the RA is Complete, EPA shall so notify SD. This certification will constitute the Certification of RA Completion for purposes of the CD. Certification of RA Completion will not affect SD's remaining obligations under the CD.

- 4.7 **Periodic Review Support Plan (PRSP).** SD shall submit the periodic review support plan (PRSP) for EPA approval. The PRSP addresses the studies and investigations that SD shall conduct to support EPA's reviews of whether the RA is protective of human health and the environment in accordance with Section 121(c) of CERCLA, 42 U.S.C. § 9621(c) (also known as "Five-year Reviews"). SD 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 guidance.

4.8 Certification of Work Completion

- (a) **Work Completion Inspection.** SD shall schedule an inspection for the purpose of obtaining EPA's Certification of Work Completion. The inspection must be attended by SD and EPA and/or their representatives.
- (b) **Work Completion Report.** Following the inspection, SD shall submit a report to EPA requesting EPA's Certificate of Work Completion. The report must: (1) include certifications by a registered professional engineer and by SD's Project Coordinator that the Work, including all O&M activities, is complete; and

(2) be certified in accordance with ¶ 6.5 (Certification). If the RA Completion Monitoring Report submitted under ¶ 4.6(a) includes all elements required under this ¶ 4.8(b), then the RA Completion Monitoring Report satisfies all requirements under this ¶ 4.8(b).

- (c) If EPA concludes that the Work is not complete, EPA shall so notify SD. EPA's notice must include a description of the activities that SD must perform to complete the Work. EPA's notice must include specifications and a schedule for such activities or must require SD to submit specifications and a schedule for EPA approval. SD 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 SD. 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 VIII (Property Requirements), XIX (Retention of Records), and XVIII (Access to Information) of the CD; (3) Institutional Controls obligations as provided in the ICIAP; and (4) payment of Response Costs under Section X (Payments For Response Costs) of the CD.

5. REPORTING

5.1 Progress Reports. Commencing with the month following the lodging of the CD and continuing until EPA approves the RA Completion, SD shall submit progress reports to EPA on a monthly basis or as otherwise requested by EPA. The reports must cover all activities that took place during the prior reporting period, including:

- (a) The actions that have been taken toward achieving compliance with the CD;
- (b) A summary of all results of sampling, tests, and all other data received or generated by SD;
- (c) A description of all deliverables that SD submitted to EPA;
- (d) A description of all activities relating to RA Construction that are scheduled for the next six weeks;
- (e) An updated RA Construction Schedule (if the schedule has been modified), 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 SD 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.

5.2 Notice of Progress Report Schedule Changes. If the schedule for any activity described in the Progress Reports, including activities required to be described under ¶ 5.1(d), changes, SD shall notify EPA of such change at least seven days before the scheduled performance of the activity.

6. DELIVERABLES

6.1 Applicability. SD 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 6.2 (In Writing) through 6.4 (Technical Specifications) apply to all deliverables. Paragraph 6.5 (Certification) applies to any deliverable that is required to be certified. Paragraph 6.6 (Approval of Deliverables) applies to any deliverable that is required to be submitted for EPA approval.

6.2 In Writing. All deliverables under this SOW must be in writing unless otherwise specified.

6.3 General Requirements for Deliverables. All deliverables must be submitted by the deadlines in the RD Schedule or RA Schedule, as applicable. SD shall submit all deliverables in electronic form. If any deliverable includes maps, drawings, or other exhibits that are larger than 8.5" by 11", SD shall also provide EPA with paper copies of such exhibits, unless otherwise agreed by EPA. Technical specifications for sampling and monitoring data and spatial data are addressed in ¶ 6.4.

6.4 Technical Specifications

- (a) Sampling and monitoring data should be submitted in standard Regional Electronic Data Deliverable (EDD) format. Other delivery methods may be allowed if electronic direct submission presents a significant burden or as technology changes.
- (b) Spatial data, including spatially-referenced data and geospatial data, should be submitted: (1) in the ESRI File Geodatabase format; and (2) as unprojected geographic coordinates in decimal degree format using North American Datum 1983 (NAD83) or World Geodetic System 1984 (WGS84) as the datum. If applicable, submissions should include the collection method(s). Projected coordinates may optionally be included but must be documented. Spatial data should be accompanied by metadata, and such metadata should be compliant with the Federal Geographic Data Committee (FGDC) Content Standard for Digital Geospatial Metadata and its EPA profile, the EPA Geospatial Metadata Technical Specification. An add-on metadata editor for ESRI software, the EPA Metadata Editor (EME), complies with these FGDC and EPA metadata requirements and is available at <https://edg.epa.gov/EME/>.

- (c) Each file must include an attribute name for each site unit or sub-unit submitted. Consult <http://www.epa.gov/geospatial/policies.html> for any further available guidance on attribute identification and naming.
- (d) Spatial data submitted by SD does not, and is not intended to, define the boundaries of the Site.

6.5 Certification. All deliverables that require compliance with this ¶ 6.5 must be signed by the SD's Project Coordinator, or other responsible official of SD, and must contain the following statement:

I certify under penalty of law 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.

6.6 Approval of Deliverables

(a) Initial Submissions

- (1) After review of any deliverable that is required to be submitted for EPA approval under the Consent 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 ¶ 6.6(a) (Initial Submissions), or if required by a notice of approval upon specified conditions under ¶ 6.6(a), SD 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 SD to correct the deficiencies; or (5) any combination of the foregoing.

- (c) **Implementation.** Upon approval, approval upon conditions, or modification by EPA under ¶ 6.6(a) (Initial Submissions) or ¶ 6.6(b) (Resubmissions), of any deliverable, or any portion thereof: (1) such deliverable, or portion thereof, will be incorporated into and enforceable under the Consent Decree; and (2) SD 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 ¶ 6.6(a) or ¶ 6.6(b) does not relieve SD of any liability for stipulated penalties under Section XIV Stipulated Penalties) of the CD.

6.7 Supporting Deliverables. SD shall submit each of the following supporting deliverables for EPA approval, except as specifically provided. SD shall develop the deliverables in accordance with all applicable regulations, guidance, and policies (see Section 9 (References)). SD 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.** The Health and Safety Plan (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. SD shall develop the HASP in accordance with EPA's Emergency Responder Health and Safety and Occupational Safety and Health Administration (OSHA) requirements under 29 C.F.R. §§ 1910 and 1926. The HASP should cover RD activities and should be, as appropriate, updated to cover activities during the RA and updated to cover activities after RA 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.** If required, the Emergency Response Plan (ERP) must describe procedures to be used in the event of an accident or emergency at the Site (for example, power outages, water impoundment failure, treatment plant failure, slope failure, etc.). The ERP must include:
 - (1) Name of the person or entity responsible for responding in the event of an emergency incident;
 - (2) Plan and date(s) for meeting(s) with the local community, including local, state, and federal agencies involved in the cleanup, as well as local emergency squads and hospitals;
 - (3) Spill Prevention, Control, and Countermeasures (SPCC) Plan (if applicable), consistent with the regulations under 40 C.F.R. Part 112, describing measures to prevent, and contingency plans for, spills and discharges;
 - (4) Notification activities in accordance with ¶ 4.3(b) (Release Reporting) in the event of a release of hazardous substances requiring reporting under Section 103 of CERCLA, 42 U.S.C. § 9603, or Section 304 of the

Emergency Planning and Community Right-to-know Act (EPCRA), 42 U.S.C. § 11004; and

- (5) A description of all necessary actions to ensure compliance with ¶ 4.3 in the event of an occurrence during the performance of the Work that causes or threatens a release of Waste Material from the Site that constitutes an emergency or may present an immediate threat to public health or welfare or the environment.
- (c) **Field Sampling Plan.** If required by EPA, the Field Sampling Plan (FSP) addresses all sample collection activities. The FSP must be written so that a field sampling team unfamiliar with the project would be able to gather the samples and field information required. SD shall develop the FSP in accordance with *Guidance for Conducting Remedial Investigations and Feasibility Studies*, EPA/540/G 89/004 (Oct. 1988).
 - (d) **Quality Assurance Project Plan.** The Quality Assurance Project Plan (QAPP) augments the FSP and addresses sample analysis and data handling regarding the Work. The QAPP must include a detailed explanation of SD's quality assurance, quality control, and chain of custody procedures for all treatability, design, compliance, and monitoring samples. SD shall develop the QAPP in accordance with *EPA Requirements for Quality Assurance Project Plans*, QA/R-5, EPA/240/B-01/003 (Mar. 2001, reissued May 2006); *Guidance for Quality Assurance Project Plans*, QA/G-5, EPA/240/R 02/009 (Dec. 2002); and *Uniform Federal Policy for Quality Assurance Project Plans*, Parts 1-3, EPA/505/B-04/900A through 900C (Mar. 2005). The QAPP also must include procedures:
 - (1) To ensure that EPA and its authorized representative have reasonable access to laboratories used by SD in implementing the Work (SD's Labs);
 - (2) To ensure that SD's Labs analyze all samples submitted by EPA pursuant to the QAPP for quality assurance monitoring;
 - (3) To ensure that SD's Labs perform all analyses using EPA-accepted methods (i.e., the methods documented in *USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis*, ILM05.4 (Dec. 2006); *USEPA Contract Laboratory Program Statement of Work for Organic Analysis*, SOM01.2 (amended Apr. 2007); and *USEPA Contract Laboratory Program Statement of Work for Inorganic Superfund Methods (Multi-Media, Multi-Concentration)*, ISM01.2 (Jan. 2010)) or other methods acceptable to EPA;
 - (4) To ensure that SD's Labs participate in an EPA-accepted QA/QC program or other QA/QC program acceptable to EPA;
 - (5) For SD to provide EPA with notice at least 28 days prior to any sample collection activity;

- (6) For SD to provide split samples and/or duplicate samples to EPA upon request;
 - (7) For EPA to take any additional samples that it deems necessary;
 - (8) For EPA to provide to SD, upon request, split samples and/or duplicate samples in connection with EPA's oversight sampling; and
 - (9) For SD to submit to EPA all sampling and tests results and other data in connection with the implementation of the Work.
- (e) **Site-Wide Monitoring Plan.** The purpose of the Site Wide Monitoring Plan (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 RA; to obtain information regarding contamination levels to determine whether Performance Standards (PS) are achieved; and to obtain information to determine whether to perform additional actions, including further Site monitoring. The SWMP must include:
- (1) Description of the environmental media to be monitored;
 - (2) Description of the data collection parameters, including existing and proposed monitoring devices and locations, schedule and frequency of monitoring, analytical parameters to be monitored, and analytical methods employed;
 - (3) Description of how performance data will be analyzed, interpreted, and reported, and/or other Site-related requirements;
 - (4) Description of verification sampling procedures;
 - (5) Description of deliverables that will be generated in connection with monitoring, including sampling schedules, laboratory records, monitoring reports, and monthly and annual reports to EPA and state agencies; 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).
- (f) **Construction Quality Assurance/Quality Control Plan (CQA/QCP).** The purpose of the Construction Quality Assurance Plan (CQAP) is to describe planned and systemic activities that provide confidence that the RA construction will satisfy all plans, specifications, and related requirements, including quality objectives. The purpose of the Construction Quality Control Plan (CQCP) is to

describe the activities to verify that RA construction has satisfied all plans, specifications, and related requirements, including quality objectives. The CQA/QCP must:

- (1) Identify, and describe the responsibilities of, the organizations and personnel implementing the CQA/QCP;
 - (2) Describe the PS required to be met to achieve Completion of the RA;
 - (3) Describe the activities to be performed: (i) to provide confidence that PS will be met; and (ii) to determine whether PS have been met;
 - (4) Describe verification activities, such as inspections, sampling, testing, monitoring, and production controls, under the CQA/QCP;
 - (5) Describe industry standards and technical specifications used in implementing the CQA/QCP;
 - (6) Describe procedures for tracking construction deficiencies from identification through corrective action;
 - (7) Describe procedures for documenting all CQA/QCP activities; and
 - (8) Describe procedures for retention of documents and for final storage of documents.
- (g) **O&M Plan.** If required by EPA, the O&M Plan describes the requirements for inspecting, operating, and maintaining the RA. SD shall develop the O&M Plan in accordance with *Operation and Maintenance in the Superfund Program*, OSWER 9200.1 37FS, EPA/540/F-01/004 (May 2001). The O&M Plan must include the following additional requirements:
- (1) Description of PS required to be met to implement the ROD;
 - (2) Description of activities to be performed: (i) to provide confidence that PS will be met; and (ii) to determine whether PS have been met;
 - (3) **O&M Reporting.** Description of records and reports that will be generated during O&M, such as daily operating logs, laboratory records, records of operating costs, reports regarding emergencies, personnel and maintenance records, monitoring reports, and monthly and annual reports to EPA and state agencies;
 - (4) Description of corrective action in case of systems failure, including:
(i) alternative procedures to prevent the release or threatened release of Waste Material which may endanger public health and the environment or may cause a failure to achieve PS; (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 PS are not achieved; and a schedule for implementing these corrective actions.
 - (h) **O&M Manual.** If required by EPA, the O&M Manual serves as a guide to the purpose and function of the equipment and systems that make up the remedy. SD shall develop the O&M Manual in accordance with *Operation and Maintenance in the Superfund Program*, OSWER 9200.1 37FS, EPA/540/F-01/004 (May 2001).
 - (i) **Institutional Controls Implementation and Assurance Plan.** The Institutional Controls Implementation and Assurance Plan (ICIAP) describes plans to implement, maintain, and enforce the Institutional Controls (ICs) at the Site. SD 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). The ICIAP must include the following additional requirements:
 - (1) 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
 - (2) Legal descriptions and survey maps that are prepared according to current American Land Title Association (ALTA) Survey guidelines and certified by a licensed surveyor.

7. SCHEDULES

- 7.1 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 RD and RA Schedules set forth below. SD may submit proposed revised RD Schedules or RA Schedules for EPA Project Coordinator's approval. Upon EPA Project Coordinator's approval, the revised RD and/or RA Schedules supersede the RD and RA Schedules set forth below, and any previously-approved RD and/or RA Schedules.

7.2 RD Schedule for each phase of the Remedial Action (ISCO, Amendments, MNA)

	Description of Deliverable, Task	¶ Ref.	Deadline
1	TAP	2.2(c)	60 days after EPA request
2	Designate TAP Coordinator	2.2(c)(7)	60 days after EPA request
3	PDIWP, including supporting documents	3.3(a), 6.7	90 days after EPA's Authorization to Proceed regarding Supervising Contractor under ¶ 9.c of Consent Decree or 90 days after the approval of the RA Evaluation Report for previous phase of work
4	PDI Evaluation Report	3.3(b)	60 days after completion of PDI field work
5	RDWP, including supporting documents	3.1, 6.7	90 days after approval of the PDI Evaluation Report or approval of RA Evaluation Report for previous phase of work
6	Preliminary (30%) RD	3.5	90 days after EPA approval of Final RDWP
7	Pre-final (95%) RD	3.6	90 days after EPA comments on Preliminary RD
8	Final (100%) RD	3.7	60 days after EPA comments on Pre-final RD

7.3 RA Schedule

	Description of Deliverable / Task	¶ Ref.	Deadline
1	Award RA contract		90 days after EPA Notice of Authorization to Proceed with RA
2	RAWP	4.1	90 days after EPA Notice of Authorization to Proceed with RA or approval of RA Evaluation Report for previous phase of work or approval of RD Report
3	Pre-Construction Conference	4.2(a)	15 days after Approval of RAWP
4	Start of Construction		60 days after Approval of RAWP or approval RA Evaluation Report for previous phase of work
5	Completion of Construction		In accordance with schedule in approved RAWP.
6	Inspection of Constructed Remedy	4.5(b)	15 days after completion of construction, if requested by EPA
7	RA Report	4.5(d)	60 days after construction of system or delivery of appropriate in-situ treatment
8	RA Evaluation Report	4.5(e)	90 days after a minimum of 4 rounds of monitoring data
9	RA Completion Monitoring Report	4.6(a)	Within 90 days after achieving and maintaining performance standards based on the results of a minimum of 4 consecutive monitoring events.
10	Work Completion Report	4.8(b)	30 days after a successful Work Completion Inspection pursuant to 4.8(a) of this SOW
11	Periodic Review Support Plan	4.7	Four years after Start of RA Construction

8. STATE PARTICIPATION

- 8.1 Copies.** SD shall, at any time it sends a deliverable to EPA, send a copy of such deliverable to the Ohio Environmental Protection Agency (OEPA). EPA shall, at any time it sends a notice, authorization, approval, disapproval, or certification to SD, send a copy of such document to OEPA.
- 8.2 Review and Comment.** OEPA will have a reasonable opportunity for review and comment prior to:
- (a) Any EPA approval or disapproval under ¶ 6.6 (Approval of Deliverables) of any deliverables that are required to be submitted for EPA approval; and

- (b) Any approval or disapproval of the Construction Phase under ¶ 4.5 (RA Construction Completion), any disapproval of, or Certification of RA Completion under ¶ 4.6 (Certification of RA Completion), and any disapproval of, or Certification of Work Completion under ¶ 4.8 (Certification of Work Completion).

9. REFERENCES

9.1 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 two EPA Web pages listed in ¶ 9.2:

- (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/G-90/001 (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) Guidance for Evaluating the Technical Impracticability of Groundwater Restoration, OSWER Directive 9234.2-25 (Sept. 1993)
- (k) National Oil and Hazardous Substances Pollution Contingency Plan; Final Rule, 40 C.F.R. Part 300 (Oct. 1994).

- (l) Consistent Implementation of FY 1993 Guidance on Technical Impracticability of Groundwater Restoration at Superfund Sites, OSWER Directive 9200.4-14, (Jan. 1995).
- (m) Guidance for Scoping the Remedial Design, OSWER 9355.0-43, EPA/540/R-95/025 (Mar. 1995).
- (n) Remedial Design/Remedial Action Handbook, OSWER 9355.0-04B, EPA/540/R-95/059 (June 1995).
- (o) Use of Monitored Natural Attenuation of Superfund, RCRA Corrective Action, and Underground Storage Tank Sites, Final OSWER Directive, Publication EPA/540/R-99/009 (April 1999).
- (p) EPA Guidance for Data Quality Assessment, Practical Methods for Data Analysis, QA/G-9, EPA/600/R-96/084 (July 2000).
- (q) Operation and Maintenance in the Superfund Program, OSWER 9200.1-37FS, EPA/540/F-01/004 (May 2001).
- (r) Comprehensive Five-year Review Guidance, OSWER 9355.7-03B-P, 540-R-01-007 (June 2001).
- (s) Guidance for Quality Assurance Project Plans, QA/G-5, EPA/240/R-02/009 (Dec. 2002).
- (t) Institutional Controls: Third Party Beneficiary Rights in Proprietary Controls (Apr. 2004).
- (u) Quality management systems for environmental information and technology programs - Requirements with guidance for use, ASQ/ANSI E4:2014 (American Society for Quality, February 2014).
- (v) Uniform Federal Policy for Quality Assurance Project Plans, Parts 1-3, EPA/505/B-04/900A through 900C (Mar. 2005).
- (w) Superfund Community Involvement Handbook, EPA/540/K-05/003 (Apr. 2005).
- (x) EPA Guidance on Systematic Planning Using the Data Quality Objectives Process, QA/G-4, EPA/240/B-06/001 (Feb. 2006).
- (y) EPA Requirements for Quality Assurance Project Plans, QA/R-5, EPA/240/B-01/003 (Mar. 2001, reissued May 2006).
- (z) EPA Requirements for Quality Management Plans, QA/R-2, EPA/240/B-01/002 (Mar. 2001, reissued May 2006).

- (aa) USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis, ILM05.4 (Dec. 2006).
- (bb) USEPA Contract Laboratory Program Statement of Work for Organic Analysis, SOM01.2 (amended Apr. 2007).
- (cc) EPA National Geospatial Data Policy, CIO Policy Transmittal 05-002 (Aug. 2008), available at <http://www.epa.gov/geospatial/policies.html> and http://www.epa.gov/geospatial/docs/National_Geospatial_Data_Policy.pdf.
- (dd) Summary of Key Existing EPA CERCLA Policies for Groundwater Restoration, OSWER 9283.1-33 (June 2009).
- (ee) Principles for Greener Cleanups (Aug. 2009), available at <http://www.epa.gov/oswer/greenercleanups/>.
- (ff) USEPA Contract Laboratory Program Statement of Work for Inorganic Superfund Methods (Multi-Media, Multi-Concentration), ISM01.2 (Jan. 2010).
- (gg) Close Out Procedures for National Priorities List Sites, OSWER 9320.2-22 (May 2011).
- (hh) Groundwater Road Map: Recommended Process for Restoring Contaminated Groundwater at Superfund Sites, OSWER 9283.1-34 (July 2011).
- (ii) Recommended Evaluation of Institutional Controls: Supplement to the “Comprehensive Five-Year Review Guidance,” OSWER 9355.7-18 (Sep. 2011).
- (jj) Memo Regarding Classification of OSWER’s 1995 Technical Impracticability Waiver Policy- OSWER 9355.5-32 (Sept 2011).
- (kk) Construction Specifications Institute's MasterFormat 2012, available from the Construction Specifications Institute, www.csinet.org/masterformat.
- (ll) Summary of Technical Impracticability Waivers at National Priorities List Sites: Report with General Technical Impracticability Information Sheets- OSWER 9230.2-24 (August 2012).
- (mm) Updated Superfund Response and Settlement Approach for Sites Using the Superfund Alternative Approach , OSWER 9200.2-125 (Sep. 2012)
- (nn) 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).
- (oo) 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).

- (pp) EPA's Emergency Responder Health and Safety Manual, OSWER 9285.3-12 (July 2005 and updates), http://www.epaossc.org/_HealthSafetyManual/manual-index.htm
- (qq) Broader Application of Remedial Design and Remedial Action Pilot Project Lessons Learned, OSWER 9200.2-129 (Feb. 2013).
- (rr) Guidance for Evaluating Completion of Groundwater Restoration Remedial Actions, OSWER 9355.0-129 (Nov. 2013).
- (ss) Groundwater Remedy Completion Strategy: Moving Forward with the End in Mind, OSWER 9200.2-144 (May 2014).
- (tt) Use of Monitored Natural Attenuation for Inorganic Contaminants in Groundwater at Superfund Sites, OSWER 9283.1-36 (August 2015).

9.2 A more complete list may be found on the following EPA Web pages:

Laws, Policy, and Guidance <http://www.epa.gov/superfund/policy/index.htm>

Test Methods Collections <http://www.epa.gov/fem/methcollectns.htm>

9.3 For any regulation or guidance referenced in the Order 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 SD receive notification from EPA of the modification, amendment, or replacement.