BEFORE THE

OHIO ENVIRONMENTAL PROTECTION AGENCY

IN THE MATTER OF:	
OCCIDENTAL CHEMICAL CORPORATION 14555 Dallas Parkway, Suite 400 DALLAS, TX 75254	DIRECTOR'S FINAL FINDINGS AND ORDERS FOR REMEDIAL DESIGN AND REMEDIAL ACTION
WORK RESPONDENT	
AND	
MARIANA PROPERTIES, INC. 5 GREENWAY PLAZA, SUITE 110 HOUSTON, TX 77046-0521	
LANDOWNER RESPONDENT	
FOR:	
Operable Unit 15 DIAMOND SHAMROCK PAINESVILLE WORKS SITE FAIRPORT NURSERY ROAD	
PAINESVILLE, LAKE COUNTY, OHIO	

annual the to be a true and accurate copy of the tal documents as filed in the records of the enmant of Protection Arte toy.

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PREAMBLE

It is agreed to by the Parties hereto as follows:

I. JURISDICTION

1. These Director's Final Findings and Orders ("Orders") are issued to Occidental Chemical Corporation ("Work Respondent"), and Mariana Properties, Inc. ("Landowner Respondent"), pursuant to the authority vested in the Director of Ohio EPA under Ohio Revised Code ("ORC") §§ 3734.02, 3734.13, 3734.20, 6111.03, and 3745.01.

II. PARTIES BOUND

2. These Orders, including the Appendices, shall apply to and be binding upon Respondents and their successors in interest liable under Ohio law.

3. No change in ownership or legal status of the Respondents including, but not limited to, any transfer of assets or real or personal property shall in any way alter Respondents' obligations under these Orders.

4. Work Respondent shall provide a copy of these Orders to all contractors, subcontractors, laboratories and consultants retained to conduct any portion of the Work performed pursuant to these Orders, within fourteen (14) days of the Effective Date (as defined below) of these Orders or upon date of retention. Work Respondent shall require that all contractors, subcontractors, laboratories and consultants retained to perform the Work pursuant to these Orders also comply with the applicable provisions of these Orders.

III. DEFINITIONS

5. Unless otherwise expressly provided herein, all terms used in these Orders or in any appendices shall have the same meaning as defined in ORC Chapters 3734 and 6111, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and the rules promulgated thereunder. Whenever the terms listed below are used in these Orders or in any appendices, attached hereto and incorporated herein, the following definitions shall apply:

- a. "CERCLA" means the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, 42 U.S.C. 9601 et seq.
- b. "Contaminant" and "Contamination" means (1) any "hazardous waste" under ORC § 3734.01(J); (2) any "industrial waste" under ORC § 6111.01(C); and/or (3) any "other wastes" under ORC § 6111.01(D), including any release of one or more of the same.
- c. "Day" means a calendar day unless expressly stated to be a business day. "Business day" shall mean a day other than a Saturday, Sunday, or state holiday. In computing any period of time under these Orders, where the last day would fall on a Saturday, Sunday, or state holiday, the period shall run until the close of the next business day.
- d. "Decision Document" means the document detailing the remedial action selected by Ohio EPA for OU15 as set forth in the document attached to these Orders as Appendix A.

- e. "Environmental Covenant" ("EC") means a servitude arising under an environmental response project that imposes activity and use limitations and that meets the requirements established in ORC § 5301.82.
- f. "Feasibility Study" ("FS") means a study undertaken to develop and evaluate options for remedial action. The FS is generally performed concurrently and in an interactive fashion with the Remedial Investigation. The term also refers to a report that describes the results of the study.
- g. "Landowner Respondent" means Mariana Properties, Inc., or its successors.
- h. "NCP" means the National Oil and Hazardous Substances Pollution Contingency Plan, codified at 40 C.F.R. Part 300 (1990), as amended.
- i. "Ohio EPA" means the Ohio Environmental Protection Agency and its designated representatives.
- j. "Operable Unit 15" ("OU15") means the portion of the Diamond Shamrock Painesville Works Site which is addressed by these Orders for Remedial Design and Remedial Action entered into by Respondents. OU15 is identified on the map attached hereto and incorporated herein as Appendix E.
- k. "Orders" means these Director's Final Findings and Orders and all appendices hereto.
- I. "Painesville PRP Group" means the following companies, individuals, and municipalities: Tierra (f/k/a Chemical Land Holdings, Inc.), Fairport Harbor Village Board of Education, Hach Excavation and Demolition, Inc., Paul W. and Marlene E. Hach, James Paul Management, Inc., Little Seedlings, Inc., Maxus Energy Corporation, OCC, Painesville Township Board of Trustees, RDL Properties, Schuster Service, Inc., Tartan Yachts, Inc. (a/k/a TLH Properties, Ltd.), Technical Engineered Products, Consolidated Tooling, John Grantham, Perseverance, LLC, Elm Street Properties, LLC, and the Village of Fairport Harbor. The Painesville PRP Group are signatories to the September 27, 1995, Director of Ohio EPA's Final Findings and Orders ("1995 DFFOs") for completion of a Remedial Investigation and Feasibility Study ("RI/FS") at the Site.
- m. "Paragraph" means a portion of these Orders identified by an Arabic numeral or an uppercase or lowercase letter.
- n. "Parties" means Respondents and the Ohio EPA.
- o. "Respondents" means Work Respondent and Landowner Respondent.
- p. "Remedial Action" ("RA") means those activities to be undertaken by Work Respondent to implement and maintain the effectiveness of the final plans and specifications submitted by Work Respondent pursuant to the Remedial Design and Remedial Action Work Plan.
- q. "Remedial Design" ("RD") means those activities to be undertaken by Work Respondent to develop the final plans and specifications for the Remedial Action pursuant to the Remedial Design and Remedial Action Work Plan.

- r. "Remedial Design and Remedial Action Work Plan" ("RD/RA Work Plan") means the document submitted by Work Respondent and approved by Ohio EPA pursuant to the Performance of Work Section of these Orders.
- s. "Response Costs" means all costs incurred by Ohio EPA in a manner not inconsistent with the NCP and these Orders including, but not limited to, payroll costs, contractor costs, travel costs, direct costs, overhead costs, legal and enforcement related costs, oversight costs, laboratory costs, and the costs of reviewing or developing plans, reports, and other items pursuant to these Orders, verifying the Work, or otherwise implementing or enforcing these Orders.
- t. "Section" means a portion of these Orders identified by a roman numeral.
- u. "Site" means the former Diamond Shamrock Painesville Works facility as depicted in Appendix E of these Orders and located in Lake County, Ohio, within the boundaries of the city of Painesville, Painesville Township, and the Village of Fairport Harbor, where the treatment, storage, and/or disposal of hazardous or solid waste, and/or the discharge to waters of the state of industrial waste or other wastes have occurred, including any other area where such hazardous wastes, solid wastes, industrial wastes, and/or other wastes have migrated or threaten to migrate.
- v. "Statement of Work" ("SOW") means the "Model Statement of Work for Remedial Design and Remedial Action" for the implementation of the Remedial Design and Remedial Action at the OU15, as set forth in Appendix B of these Orders. The SOW is generic and not specific to any Site, but shall be used as an outline for developing OU15-specific work plans.
- w. "Supporting Documents" means the field sampling plan ("FSP"), quality assurance project plan ("QAPP") and health and safety plan ("HASP") developed concurrently with the RD/RA Work Plan pursuant to these Orders and Section 4 of the SOW.
- x. "Transferee" means any future owner of any interest in OU15, including but not limited to, owners of an interest in fee simple, easement holders, and lessees.
- y. "Work" means all activities Work Respondent is required to perform under the Performance of the Work by Work Respondent and Additional Work Sections of these Orders.
- z. "Work Respondent" means Occidental Chemical Corporation.

IV. FINDINGS

6. All of the findings necessary for the issuance of these Orders pursuant to ORC Chapters 3734, 3745 and 6111 have been made and are outlined below. Nothing in these Orders shall constitute an admission by Respondents of any matter of fact or law. The Director of Ohio EPA has determined the following findings:

Site-Wide Findings:

a. The Site is located in northern Lake County, Ohio, as depicted in Appendix E of these Orders. The Site is bordered by industrial and vacant property to the east, residential

and commercial/industrial properties to the west, Lake Erie to the north, and residential property to the south. The Grand River bisects the Site from east to west. The Site has been divided into 24 Operable Units ("OU").

- b. The Diamond Shamrock Chemicals Company (formerly named Diamond Alkali Company and Diamond Shamrock Corporation) ("Diamond Shamrock") began operations at the Site in Lake County in 1912. Diamond Shamrock produced a variety of chemical products and by-products, including sodium hydroxide (caustic soda), hydrochloric acid (muriatic acid), chlorinated paraffins (Chlorowax), bicarbonate of soda (baking soda), magnesium oxide, coke, carbon tetrachloride, hydrogen and liquid hydrogen, ammonia, benzene, toluene and related hydrocarbons, calcium carbonate, cement, sal soda, lye, cleaners (soaps), sodium carbonate (Soda Ash), chlorine sodium bichromate, chromic acid, potassium bichromate, sodium sulfate, vinyl chloride monomer and polyvinyl chloride, pickle liquor (spent hydrochloric acid), fly ash, secondary metals, and others.
- c. The Site is approximately 1100 acres in size. The Site includes all known areas of manufacturing or other industrial use, areas of waste disposal, and other areas which are or may be contaminated. Diamond Shamrock began shutting down the Site in 1972, and the last Site operations ceased in 1977. Portions of the Site were sold to other entities, which performed a variety of commercial and industrial activities within its boundaries.
- d. On September 4, 1986, all the outstanding stock of the Diamond Shamrock Chemicals Company was acquired by Oxy-Diamond Alkali Corporation from Maxus Energy Corporation, and the Diamond Shamrock Chemicals Company name was changed to Occidental Electrochemicals Corporation. Subsequently, on November 30, 1987, Occidental Electrochemicals Corporation was merged into OCC. A portion of the Site property was transferred to Chemical Land Holdings, a subsidiary of Maxus Energy Corporation. Chemical Land Holdings changed its name to Tierra in 2002. A portion of the Site, including the property comprising OU15, was transferred to Mariana Properties, Inc., an affiliate of OCC, on August 11, 2017.
- e. In May 1993, U.S. EPA proposed placing the Site on the National Priorities List ("NPL"), describing a threat to the drinking water intakes along Lake Erie, and to fisheries, wetlands, and sensitive environments in the Grand River and Lake Erie.
- f. On October 1, 1992, the Ohio EPA entered into a Cooperative Agreement with U.S. EPA to act as lead agency under CERCLA with respect to the Site. In February 1995, Ohio EPA issued special notice letters with an invitation to participate in negotiations for an administrative consent order to 33 potentially responsible parties, including the Work Respondent.
- g. The 1995 DFFOs were issued by the Director of Ohio EPA to Chemical Land Holdings, Inc., Maxus Energy Corporation, OCC, Painesville Township Board of Trustees, Uniroyal Chemical Company, Inc., Village of Fairport Harbor, and the Painesville PRP Group for completion of a RI/FS at the Site.
- h. On October 5, 1995, Ohio EPA notified the Painesville PRP Group that Ohio EPA would not be pursuing NPL finalization for the Site.

- i. On July 25, 1999, Ohio EPA approved the Remedial Investigation ("RI") Report for Phase I activities at the Site. These activities included the collection and analysis of soil, ground water, surface water and sediment samples across the Site.
- j. On September 22, 2003 the Phase II RI Report was approved by Ohio EPA. The Phase I and Phase II RI Reports identified public health and environmental risks at the Site resulting from contaminated ground water, soil, surface water, and sediment. The RI Reports characterized the nature and extent of the contaminants released at the Site and the potential risks to human health and safety and the environment. The Phase I and Phase II RIs revealed that the principal contaminants of concern ("COC") in soils were aluminum, manganese, vanadium, benzo(a)anthracene, benzo(a)pyrene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene.
- k. On October 4, 2005, the State of Ohio, Chemical Land Holdings, and all of the signatories to the 1995 DFFOs, except Uniroyal Chemical Company, entered into a consent order in *State of Ohio v. Chemical Land Holdings, et. al,* United States District Court for the Northern District of Ohio Case No. 1:02CV0193, which required completion of the RI/FS for the Site, including OU15.
- I. During the RI, the Site was divided into 22 land-based and three ground water-based OUs.

OU15 Findings:

- m. OU15 is located in the north-central portion of the Site. Fairport Nursery Road (S.R. 585), which runs in the east/west direction, bisects OU15. It is bordered to the north by Lake Erie; to the east by OU2, OU6, OU16 and OU20; to the south by the Grand River; and to the west by OU7, OU12 and an off-Site commercial/residential area.
- n. OU15 is currently owned by Mariana Properties, Inc. and consists of vacant land.
- o. On February 27, 2003, the Lake County Board of Commissioners and Lakeview Bluffs, LLC were awarded a \$3 million grant from the State of Ohio to perform a voluntary interim action within OU15, upgrading the land use from industrial to recreational/residential. The voluntary interim action was performed under the 1995 DFFOs, with approval of documents and oversight by Ohio EPA.
- p. On October 10, 2007 Ohio EPA approved the OU15 Construction Certification Report for the voluntary interim action performed by the Lake County Board of Commissioners and Lakeview Bluffs, LLC.
- q. A post-remedy risk assessment was performed on OU15 following completion of the voluntary interim action. The following COCs remained in soils within OU15: aluminum, dieldrin, hexavalent chromium, manganese, and vanadium. All of the areas of elevated COCs, with the exception of hexavalent chromium, were removed as part of bank stabilization activities performed within OU15.
- r. OU15 residential areas have a minimum of 4-feet of soils at the surface which meet residential risk-based standards and commercial/recreational areas have a minimum of 2-feet of soils at the surface which meet commercial/recreational risk-based standards.

- s. During the installation of a storm drain, chromite ore processing residue ("COPR"), which contains high levels of hexavalent chromium, a known human carcinogen, was found in the southern portion of OU15 and is identified in Appendix F. COPR has the unique property of migrating upwards through material, eventually reaching ground surface. Although the COPR within OU15 is below the minimum point of compliance ("POC"), failure to remediate the area may result in an exceedance of risk-based standards within the 2-foot or 4-foot minimum POCs.
- t. In October 2007, Ohio EPA approved the FS Report for OU15, which presented an array of remedial alternatives to address remaining contamination within the OU.
- u. In May 2008, Ohio EPA notified the public of its Preferred Plan for remediation of OU15 and solicited public comments. The Preferred Plan summarizes the OU15 information presented in the Phase I and Phase II RI and FS Reports prepared by SECOR Environmental and Hull and Associates on behalf of the Painesville PRP Group, and identifies and explains Ohio EPA's preferred alternative for the remedial action at OU15. The preferred remedial alternative in this Preferred Plan includes the following elements:
 - i. Delineation and remediation of the COPR area of concern identified in Appendix F. Remediation will include, off-site disposal, consolidation in OU16 consolidation area, capping in place, or a combination of these options.
 - ii. Establishment of an EC which would prohibit residential uses on certain portions of OU15, require establishment of a 4-foot minimum POC in residential areas and a 2-foot minimum POC in commercial/recreational areas, prohibit excavation below the applicable POC, prohibit the construction of subgrade habitable structures, prohibit the extraction of ground water for potable non-potable and purposes with the exception of environmental investigation/remediation/monitoring, and prohibit all excavations bv construction workers unless performed under an Ohio EPA-approved risk management plan ("RMP").
- v. On July 31, 2008, Ohio EPA held a public meeting and hearing on the Preferred Plan. The public comment period ended on August 8, 2008.
- w. As part of bank stabilization activities conducted under the Clean Ohio Revitalization Fund ("CORF") project, the Painesville PRP Group stockpiled soils containing SOLVAY process waste (predominantly limestone fines) in the northeastern portion of OU15. Although the original plan was to reincorporate these soils into the regarded bank, this could not be done for engineering purposes and the Painesville PRP Group requested permission to move the material to OU7, which contains a large amount of SOLVAY process waste. A number of sampling events were required to determine that the soils met residential risk-based standards before it could be moved. The Painesville PRP Group relocated the material from July 8, through July 18, 2013 and documented this process in a report dated October 16, 2013.
- x. On July 21, 2015, Ohio EPA issued a Decision Document, which selected the remedy for the OU15 and included responses to the public comments in the form of a responsiveness summary. The Decision Document is attached hereto as Appendix A, and incorporated by reference herein. Ohio EPA's responsiveness summary, dated July 21, 2015, is attached to the Decision Document.

- y. OU15 is a hazardous waste facility, solid waste facility or other location where hazardous waste or solid waste was treated, stored or disposed.
- z. Because of their quantity, concentration, physical or chemical characteristics, the hexavalent chromium found at OU15 is "hazardous waste" as defined under ORC § 3734.01(J).
- aa. The hexavalent chromium found at OU15 is "industrial waste" or "other wastes" as defined under ORC §§ 6111.01(C) and (D).
- bb. The ground waters at OU15 are "waters of the state" as defined in ORC § 6111.01(H).
- cc. Ohio EPA has incurred Response Costs and continues to incur Response Costs associated with OU15.
- dd. Each Respondent is a "person" as defined under ORC §§ 3734.01(G) and 6111.01(I).
- ee. Work Respondent and or its predecessors were generators of contaminants or contamination at OU15. Work Respondent's predecessors directly or indirectly allowed contamination and/or directed the placement and/or disposal of contaminants at the Site.
- ff. Without implementation of the proposed Remedial Action, conditions at OU15 constitute a substantial threat to public health or safety or are causing or contributing to, or threatening to cause or contribute to air or water pollution or soil contamination as provided in ORC § 3734.20(B).
- gg. The migration or threatened migration of contaminants to ground water, or surface water at or from OU15 constitutes a discharge or threatened discharge to "waters of the state," as the term is defined in ORC § 6111.01(H).
- hh. The Work required pursuant to these Orders will contribute to the prohibition or abatement of any discharge of contaminants to waters of the State.
- ii. In issuing these Orders, the Director has given consideration to, and based her determination on, evidence relating to technical feasibility and economic reasonableness of complying with these Orders, and to evidence relating to conditions calculated to result from compliance with these Orders, and their relation to the benefits to the people of the state to be derived from such compliance.
- jj. The actions to be taken pursuant to these Orders are reasonable and necessary to protect the public health or safety or the environment as provided in ORC § 3734.20.

V. GENERAL PROVISIONS

7. Objectives of the Parties

The objectives of the Parties in entering into these Orders are to protect public health and safety and the environment from the disposal, discharge, or release of contaminants through design, construction, implementation, operation, and maintenance of the remedy by Work Respondent as set forth in the Decision Document and in accordance with these Orders.

8. <u>Commitment of Work Respondent</u>

Work Respondent agrees to perform the Work in accordance with these Orders, including but not limited to consideration of all applicable relevant criteria set forth in: the SOW, all guidance documents, and all standards, specifications, and schedules as approved by Ohio EPA pursuant to these Orders. Work Respondent also agrees to reimburse Ohio EPA for all Response Costs (as required by Section XVI of these Orders) and perform all other obligations of these Orders.

9. <u>Compliance With Law</u>

a. All activities undertaken by Work Respondent pursuant to these Orders shall be performed in accordance with the requirements of all applicable federal, state and local laws and regulations, and in a manner consistent with the NCP.

b. The activities conducted pursuant to these Orders, if approved by Ohio EPA, are necessary and consistent with the NCP.

c. Where any portion of the Work requires a permit, license or other authorization from Ohio EPA or any other state, federal or local government agency, Work Respondent shall submit applications in a timely manner and take all other reasonable actions necessary to obtain such permit, license or other authorization, unless the Director determines that such permit, license or other authorization is not necessary. These Orders are not, and shall not be construed to be, a permit, license or other authorization issued pursuant to any statute or regulation. Any delay in the issuance of a permit, license or other authorization shall extend the time for performance of any Work for which the permit, license or other authorization is necessary.

VI. PERFORMANCE OF THE WORK BY WORK RESPONDENT

10. Supervising Contractor

All Work performed pursuant to these Orders shall be under the direction and supervision of a contractor with expertise in hazardous waste site investigation and remediation. Prior to the initiation of the Work, Work Respondent shall notify Ohio EPA in writing of the name of the supervising contractor and any subcontractor to be used in performing the Work under these Orders.

11. Remedial Design and Remedial Action

a. <u>RD/RA project initiation meeting.</u> Within seven (7) days of the Effective Date of these Orders, unless otherwise mutually agreed to by the Parties, Work Respondent shall meet with Ohio EPA to discuss the requirements of the RD/RA Work Plan.

b. <u>Submission of RD/RA Work Plan.</u> Within thirty (30) days after the Effective Date of these Orders, unless otherwise specified in writing by Ohio EPA, Work Respondent shall submit to Ohio EPA a RD/RA Work Plan and schedule for implementation of the Work required under this Section of these Orders. The RD/RA Work Plan shall provide for the design, construction, final operation and maintenance of the remedy as set forth in the Decision Document.

c. <u>Criteria for RD/RA Work Plan development</u>. The RD/RA Work Plan, Supporting Documents, and any other deliverables required under the approved RD/RA Work Plan shall be developed in conformance with the RD/RA SOW contained in Appendix B of these Orders, and the guidance documents listed in Appendix C of these Orders. The RD/RA Work Plan shall include a proposed schedule that includes a completion date for each task. If Ohio EPA determines that any additional or revised guidance documents affect the Work to be performed in implementing the RD/RA, Ohio EPA will notify Work Respondent, and the RD/RA Work Plan and other affected documents shall be modified accordingly.

d. <u>Handling any inconsistencies.</u> Should Work Respondent identify any inconsistency between any of the laws and regulations and guidance documents that Work Respondent is required to follow by these Orders; Work Respondent shall notify Ohio EPA in writing of each inconsistency and the effect of the inconsistencies upon the Work to be performed. Work Respondent shall also recommend, along with a supportable rationale justifying each recommendation, the requirement that Work Respondent believes should be followed. Work Respondent shall implement the affected Work as directed in writing by Ohio EPA.

e. <u>Review of RD/RA Work Plan.</u> Ohio EPA will review the RD/RA Work Plan and the Supporting Documents pursuant to the procedures set forth in the Review of Submissions Section of these Orders.

f. <u>Implementation of the RD/RA Work Plan.</u> Upon Ohio EPA's approval of the RD/RA Work Plan, Work Respondent shall implement the RD/RA Work Plan as approved. Work Respondent shall submit all plans, reports, or other deliverables required under the approved RD/RA Work Plan, in accordance with the approved schedule, for Ohio EPA's review and approval pursuant to the Review of Submissions Section of these Orders.

VII. LAND USE AND CONVEYANCE OF TITLE

12. Environmental Covenant

Within thirty (30) days after Ohio EPA approves the final Operation and Maintenance Plan, Landowner Respondent shall record with the Lake County Recorder's Office an EC for OU15. The EC shall be consistent with the template contained in Appendix D, shall be signed by Landowner Respondent, and shall be approved and signed by Ohio EPA. The EC shall be recorded in the deed or official records of the County Recorder of Lake County, Ohio pursuant to ORC § 5301.82. The terms and conditions of the EC are incorporated into these Orders and shall be binding upon Landowner Respondent. Thereafter, if Landowner Respondent conveys any interest in OU15, each deed, title, or other instrument shall contain a notice stating that OU15 is subject to these Orders and shall reference any monitoring, treatment, or containment systems present on OU15 as a result of these Orders.

13. Proof of Filing Environmental Covenant

Within thirty (30) days after filing with the Lake County Recorder the executed EC, Landowner Respondent shall certify to Ohio EPA that the EC has been filed for recording, and include with the certification a file and date-stamped copy of the recorded EC.

14. Land Use Self-Reporting Requirement

Landowner Respondent shall comply with the EC. Landowner Respondent shall submit on an annual basis, written documentation verifying that any security, containment, treatment, monitoring systems, or EC use limitations are in place and operational for so long as Landowner Respondent owns any interest in OU15.

15. Notice of Intention to Transfer Property

Prior to each conveyance by Landowner Respondent of an interest in any portion of OU15, including but not limited to, easements, deeds, leases and mortgages, Landowner Respondent shall notify the prospective Transferee of the existence of the activity and use limitations and shall provide a copy of these Orders to the prospective Transferee. Landowner Respondent shall notify Ohio EPA at least thirty (30) days in advance of each conveyance of an interest in any portion of OU15 that is owned by Landowner Respondent. Landowner Respondent's notice shall include the name and address of the Transferee and a description of the provisions made for the continuance of the activity and use limitations.

16. Instrument and Confirmation of Conveyance

Upon each conveyance by Landowner Respondent of an interest in any portion of OU15, including but not limited to easements, deeds, leases and mortgages, Landowner Respondent shall include in the instrument of conveyance a restatement consistent with paragraph 10 of the EC. Within thirty (30) days after each conveyance of an interest in any portion of OU15 that is owned by Landowner Respondent, Landowner Respondent shall submit to Ohio EPA, via certified mail, the following information:

a. A copy of the deed or other documentation evidencing the conveyance;

b. The name, address, and telephone number of the new property owner and the name, address, and telephone number of the contact person for the property owner;

c. A legal description of the property, or the portion of the property, being transferred;

d. A survey map of the property, or the portion of the property, being transferred; and

e. The closing date of the transfer of ownership of the property, or portion of the property.

VIII. ADDITIONAL WORK

17. Ohio EPA or Work Respondent may determine that in addition to the tasks defined in the approved RD/RA Work Plan, additional Work may be necessary to accomplish the Objectives of the Parties as provided in the General Provisions Section of these Orders. Additional Work may also include, pursuant to ORC § 3734.20 or other applicable law, the implementation of interim actions to address substantial threats to public health or safety or the environment should such threats be identified during the conduct of the RD/RA.

18. Within thirty (30) days of receipt of written notice from Ohio EPA that additional Work is necessary, unless otherwise specified in writing by Ohio EPA, Work Respondent shall submit a proposed addendum to the RD/RA Work Plan ("RD/RA Work Plan Addendum"), which contains (a) a work plan for the implementation of the additional Work, (b) any revisions to the Supporting Documents and other RD/RA deliverables, as appropriate, (c) a schedule for the performance of the additional Work, and (d) revisions to other schedules impacted by the additional Work, if any. If Work Respondent disputes the necessity of additional Work, Work Respondent shall initiate the procedures for dispute resolution set forth in the Dispute Resolution Section of these Orders within fourteen (14) days after receipt of Ohio EPA's notification of the need for additional Work. The RD/RA Work Plan Addendum shall conform to the standards and requirements set forth in the documents attached to these Orders as Appendices B and C, RD/RA SOW and List of Relevant Guidance Documents, respectively. Upon approval of the RD/RA Work Plan Addendum by Ohio EPA pursuant to the Review of Submissions Section of these Orders, Work Respondent shall implement the approved RD/RA Work Plan Addendum in accordance with the schedules contained therein.

19. If Work Respondent determines that additional Work is necessary, Work Respondent shall submit a proposal to Ohio EPA to explain what the additional Work is, why the additional Work is necessary, and what impact, if any, the additional Work will have on the RD/RA Work Plan and schedule. If Ohio EPA concurs with the request to perform additional Work, Work Respondent shall submit a RD/RA Work Plan Addendum, as described above, for the performance of additional Work. The RD/RA Work Plan Addendum shall conform to the standards and requirements set forth in the documents attached to these Orders as Appendices B and C. Upon approval of the RD/RA Work Plan Addendum by Ohio EPA pursuant to the Review of Submissions Section of these Orders, Work Respondent shall implement the approved RD/RA Work Plan Addendum in accordance with the schedules contained therein. Additional Work does not include any activity performed in response to an emergency at OU15 for which Work Respondent submits to Ohio EPA written notice of the performed activity.

IX. SAMPLING AND DATA AVAILABILITY

20. Unless otherwise agreed to by the Site Coordinators, Work Respondent shall notify Ohio EPA not less than fifteen (15) days in advance of all sample collection activity. Upon request, Work Respondent shall allow split and/or duplicate samples to be taken by Ohio EPA or its designated contractor. Ohio EPA shall also have the right to take any additional samples it deems necessary. Upon request, Ohio EPA shall allow Work Respondent to take split and/or duplicate samples of any samples Ohio EPA takes as part of its oversight of Work Respondent's implementation of the Work. Unless such samples are taken on an emergency basis, Ohio EPA shall make reasonable efforts to provide three (3) working days notice of such sampling to allow Work Respondent shall make reasonable efforts to inform the Ohio EPA Site Coordinator as soon as practicable.

21. Within seven (7) days of Work Respondent's receipt of a request by Ohio EPA, Work Respondent shall electronically submit to Ohio EPA copies of the results of all sampling and/or tests or other data, including raw data and original laboratory reports, generated by or on behalf of Work Respondent with respect to OU15 and/or the implementation of these Orders. An electronic copy shall also be provided in a format approved by Ohio EPA. Work Respondent may submit to Ohio EPA any interpretive reports and written explanations concerning the raw data and original laboratory reports. Such interpretive reports and written explanations shall not

be submitted in lieu of original laboratory reports and raw data. Should Work Respondent subsequently discover an error in any report or raw data, Work Respondent shall promptly notify Ohio EPA of such discovery and provide the correct information.

X. ACCESS

22. Ohio EPA and its contractors shall have access at all reasonable times to OU15 and any other property to which access is required for the implementation of these Orders, to the extent access to the property is controlled by Respondents. Access under these Orders shall be for the purposes of conducting any activity related to these Orders including but not limited to the following:

a. Monitoring the Work;

b. Conducting sampling including background monitoring wells;

c Inspecting and copying records, operating logs, contracts, and other documents related to the implementation of these Orders;

d. Conducting investigations, tests, and other activities associated with the implementation of these Orders; and

e. Verifying any data and/or other information submitted to Ohio EPA.

23. To the extent that OU15 or any other property to which access is required for the implementation of these Orders is owned or controlled by persons other than Respondents, Respondents shall use all reasonable efforts to secure from such persons access for Respondents and Ohio EPA and its contractors as necessary to effectuate these Orders. All reasonable efforts shall not be construed to include payment of money for access. Copies of each access agreement obtained by Respondents shall be provided to Ohio EPA upon execution of the access agreement. If any access required to implement these Orders is not obtained prior to Work Respondent's submission of the RD/RA Work Plan, unless otherwise agreed to in writing by Ohio EPA, Work Respondent shall promptly notify Ohio EPA in writing of the steps Work Respondent has taken to attempt to obtain access. Ohio EPA may, as it deems appropriate, assist Respondents in obtaining access.

24. Notwithstanding any provision of these Orders, the State of Ohio retains all of its access rights and authorities, including enforcement authorities related thereto, under any applicable statute or regulation including but not limited to ORC §§ 3734.20 and 6111.05.

XI. DESIGNATED SITE COORDINATORS

25. Within seven (7) days of the Effective Date of these Orders, Work Respondent shall notify Ohio EPA, in writing, of the name, address and telephone number and email address of its designated Site Coordinators and Alternate Site Coordinators. Ohio EPA shall also notify the Work Respondent, in writing, of the name, address, telephone number, and email address of its designated Site Coordinator.

26. As used in these Orders, the term "Site Coordinator" refers interchangeably to the Site Coordinator and the Alternate Site Coordinator designated for a named party. If any designated Site Coordinator is changed, the identity of the successor will be given to the other party at

least seven (7) days before the changes occur, unless impracticable, but in no event later than the actual day the change is made.

27. To the maximum extent practicable, except as specifically provided in these Orders, communications between Work Respondent and Ohio EPA concerning the implementation of these Orders shall be made between the Site Coordinators. Work Respondent's Site Coordinators shall be available for communication with Ohio EPA regarding the implementation of these Orders for the duration of these Orders. Each Site Coordinator shall be responsible for ensuring that all communications from the other Party are appropriately disseminated and processed. Work Respondent's Site Coordinators shall be present on the Site or on call during all hours of Work at the Site.

28. Without limitation of any authority conferred on Ohio EPA by statute or regulation, Ohio EPA's Site Coordinator's authority includes but is not limited to the following:

a. Directing the type, quantity and location of samples to be collected by Work Respondent pursuant to an approved Work Plan;

b. Collecting samples;

c. Observing, taking photographs, or otherwise recording information related to the implementation of these Orders, including the use of any mechanical or photographic device;

d. Directing that the Work stop whenever Ohio EPA's Site Coordinator determines that the activities at OU15 may create or exacerbate a threat to public health or safety, or threaten to cause or contribute to air or water pollution or soil contamination;

e. Conducting investigations and tests related to the implementation of these Orders;

f. Inspecting and copying records, operating logs, contracts and/or other documents related to the implementation of these Orders; and

g. Assessing Work Respondent's compliance with these Orders.

XII. PROGRESS REPORTS AND NOTICE

29. Unless otherwise directed or agreed to by Ohio EPA, Work Respondent shall submit a written progress report to the Ohio EPA by the tenth (10) day of every month. At a minimum, the progress reports shall include that information designated in Section 10 of the SOW. Monthly reports may not be used to propose modifications to approved plans; Work Respondent shall submit such requests to Ohio EPA in a separate written correspondence.

30. Progress reports (one copy only) shall be sent by e-mail. All other documents required to be submitted pursuant to these Orders to Ohio EPA shall be sent electronically to the designated Ohio EPA Site Coordinator, identified in accordance with Paragraph 25.

31. All written (including electronic) correspondence to Work Respondent shall be directed to the Work Respondent's Site Coordinator, identified in accordance with Paragraph 25.

32. A Party may designate an alternative contact name or address upon written notification to the other Party and in accordance with the Designated Site Coordinators Section of these Orders, as applicable.

XIII. REVIEW OF SUBMISSIONS

33. Ohio EPA shall review any work plan, report, or other item required to be submitted pursuant to these Orders.

34. Upon review, Ohio EPA may in its sole discretion, based on thorough consideration of all submittals: (a) approve the submission in whole or in part; (b) approve the submission with specified conditions; (c) modify or, modify and approve, the submission; (d) disapprove the submission in whole or in part; or (e) any combination of the above. The results of Ohio EPA's review shall be detailed in writing and shall identify any conditions, modifications and/or deficiencies. Excluded from Ohio EPA approval pursuant to this Section are the health and safety plan ("HASP") and progress reports.

35. In the event that Ohio EPA approves an initial submission, Work Respondent shall proceed to take such action as required by Ohio EPA. In the event that Ohio EPA approves with conditions or modification an initial submission, Work Respondent shall either (a) proceed to take such action as required by Ohio EPA, or (b) initiate the procedures for dispute resolution set forth in the Dispute Resolution Section of these Orders, within fourteen (14) days of receipt of Ohio EPA's written response to Work Respondent's submission. Work Respondent shall proceed to take any action required by an unmodified or unconditioned portion of the submission, as those portions are considered approved.

36. In the event that Ohio EPA disapproves an initial submission in whole or in part and notifies Work Respondent electronically or in writing of the deficiencies, Work Respondent shall within fourteen (14) days, or such longer period of time as specified by Ohio EPA in writing, correct the deficiencies, and/or incorporate the conditions, and submit a revised submission to Ohio EPA for approval. Revised submissions shall be accompanied by a letter indicating how and where each of Ohio EPA's comments were incorporated into the revised submission. To facilitate review of the revised submission, those portions of the document not affected by the Ohio EPA comments should remain unchanged. The letter accompanying the submission should indicate, however, any indirect changes necessitated by Ohio EPA's comments.

37. To the extent that Work Respondent disputes any of Ohio EPA's changes, additions, and/or deletions to an initial submission, Work Respondent shall initiate the procedures for dispute resolution set forth in the Dispute Resolution Section of these Orders, within fourteen (14) days after receipt of Ohio EPA's electronic or written notice of disapproval. Notwithstanding the disapproval, Work Respondent shall proceed to take any action required by a portion of the submission that is not specified as disapproved in the notice of disapproval.

38. In the event that Ohio EPA disapproves or modifies a revised submission, in whole or in part, and notifies Work Respondent in writing of the deficiencies, Work Respondent shall within fourteen (14) days, or such longer period of time as specified in writing by Ohio EPA, correct the deficiencies and incorporate all changes, additions, and/or deletions, and submit the revised submission to Ohio EPA for approval. If Work Respondent fails to submit a revised submission incorporating all changes, additions, modifications and/or deletions within fourteen (14) days, or such longer period of time as specified by Ohio EPA in writing, or alternatively fails to initiate dispute resolution pursuant to the Dispute Resolution Section of these Orders,

Work Respondent shall be considered in breach and/or violation of these Orders. If Work Respondent is in breach and/or violation of these Orders, Ohio EPA retains the right to perform any additional remediation, conduct a complete or partial RI or FS, conduct a complete or partial RD or RA; and/or enforce the terms of these Orders as provided in the Reservation of Rights Section of these Orders.

39. All work plans, reports, or other items required to be submitted to Ohio EPA under these Orders shall, upon approval by Ohio EPA, be deemed to be incorporated in and made an enforceable part of these Orders. In the event that Ohio EPA approves a portion of a work plan, report, or other item, the approved portion shall be deemed to be incorporated in and made an enforceable part of these Orders.

XIV. DISPUTE RESOLUTION

40. The Site Coordinators shall, whenever possible, operate by consensus.

41. In the event of disapproval, or an approval with condition(s) or modification(s) by Ohio EPA of a submission by Work Respondent, or a disagreement regarding the Work performed under these Orders, Work Respondent's Site Coordinators shall notify Ohio EPA's Site Coordinator in writing that Work Respondent wishes to invoke an informal dispute pursuant to this Section. The notification to invoke an informal dispute shall occur prior to the submission deadline.

42. The Parties shall have ten (10) days from the date of the electronic or written notice of the informal dispute is received by Ohio EPA's Site Coordinator to negotiate in good faith to resolve the dispute. This informal dispute resolution period may be extended by agreement of the Site Coordinators for up to twenty (20) additional days, or as otherwise agreed.

43. In the event that the dispute is not resolved during the informal dispute resolution period, Work Respondent's Site Coordinator shall notify Ohio EPA's Site Coordinator electronically or in writing by the end of the informal dispute resolution period that Work Respondent wishes to invoke a formal dispute pursuant to this Section. This notice shall include a brief description of the item(s) in dispute. Within twenty (20) days of receipt of the written notice invoking the formal dispute resolution procedure, the Site Coordinators shall exchange written positions, including technical rationale supporting their positions. The Site Coordinators shall have ten (10) days from the date they have exchanged written positions to negotiate in good faith to resolve the formal dispute. This formal dispute period may be extended by agreement of the Site Coordinators for up to twenty (20) additional days, or as otherwise agreed.

44. In the event the dispute is not resolved in the formal dispute resolution period, Work Respondent's Site Coordinator shall notify Ohio EPA's Site Coordinator in writing by the end of the formal dispute resolution period whether Work Respondent wishes to submit final written positions to a DERR Manager for review and resolution. The Site Coordinators shall have ten (10) days from the end of the formal dispute resolution period to submit their written positions. The DERR Chief will resolve the dispute based upon and consistent with these Orders, the SOW, the RD/RA Work Plan, and applicable or relevant and appropriate federal and state laws. The decision of the DERR Chief is considered final for the purposes of these Orders.

45. The pendency of a dispute under this Section shall extend only the time period for completion of the item(s) in dispute, except that upon mutual agreement of the Site Coordinators, any time period may be extended as is deemed appropriate under the

circumstances. Such agreement shall not be unreasonably withheld by Ohio EPA. Elements of the Work not affected by the dispute shall be completed in accordance with the applicable schedules and time frames.

46. To the extent Work Respondent disputes either the accuracy of Ohio EPA's request for reimbursement under the Reimbursement of Costs Section of these Orders or whether costs are inconsistent with the NCP, Work Respondent shall initiate the formal dispute provisions of the Dispute Resolution Section within fourteen (14) days after receipt of Ohio EPA's request for reimbursement of costs. Should Work Respondent dispute a portion of the response costs set forth in an itemized statement, but not all the costs, Work Respondent shall timely pay the uncontested portion pursuant to the provisions of the Reimbursement of Costs Section.

XV. UNAVOIDABLE DELAYS

47. Work Respondent shall cause all Work to be performed in accordance with applicable schedules and time frames set forth in these Orders or any approved work plan unless any such performance is prevented or delayed by an event that constitutes an unavoidable delay. For purposes of these Orders, an "unavoidable delay" shall mean an event beyond the control of Work Respondent that prevents or delays performance of any obligation required by these Orders and that could not be overcome by due diligence on the part of Work Respondent. Increased cost of compliance shall not be considered an event beyond the control of Work Respondent for the purposes of these Orders.

48. Work Respondent shall notify Ohio EPA electronically or in writing within ten (10) days after the occurrence of an event that Work Respondent contends is an unavoidable delay. Such written notification shall describe the anticipated length of the delay, the cause or causes of the delay, the measures taken and to be taken by Work Respondent to minimize the delay, and the timetable under which these measures will be implemented. Work Respondent shall have the burden of demonstrating that the event constitutes an unavoidable delay.

49. If Ohio EPA does not agree that the delay has been caused by an unavoidable delay, Ohio EPA will notify the Work Respondent in writing of that finding and of the noncompliance with these Orders. If Ohio EPA agrees that the delay is attributable to an unavoidable delay, Ohio EPA will notify Work Respondent in writing of the length of the extension for the performance of the obligations affected by the unavoidable delay.

XVI. REIMBURSEMENT OF COSTS

50. Ohio EPA has incurred and continues to incur Response Costs in connection with OU15. Work Respondent shall reimburse Ohio EPA for all Response Costs incurred for OU15 both prior to and after the Effective Date of these Orders.

51. Upon receipt of an itemized invoice for the Response Costs incurred prior to the Effective Date of these Orders, Work Respondent shall either (a) dispute the invoice in part or in its entirety by initiating the procedures for dispute resolution set forth in the Dispute Resolution Section of these Orders within fourteen (14) days after receipt of Ohio EPA's invoice, or (b) remit payment for all , or the undisputed part, of Ohio EPA's Response Costs incurred prior to the Effective Date of these Orders within thirty (30) days after receipt of the invoice. In the event that Work Respondent does not dispute the invoice or remit payment of Response Costs within sixty (60) days after receipt of such invoice, Work Respondent shall remit payment for the unpaid balance and the interest accrued of the unpaid balance. Interest

shall accrue beginning thirty (30) days from the date of the invoice until the date payment is remitted, and shall be calculated at the rate specified by ORC § 5703.47(B) or any subsequent rate adjustments.

52. For Response Costs incurred on or after the Effective Date of these Orders, Ohio EPA will submit to Work Respondent on an annual basis an itemized invoice of its Response Costs for the previous year; informational invoices will be provided upon request from Work Respondent. Upon receipt of such itemized invoice, Work Respondent shall either (a) dispute the invoice in part or in its entirety by initiating the procedures for dispute resolution set forth in the Dispute Resolution Section of these Orders within fourteen (14) days after receipt of Ohio EPA's invoice, or (b) remit payment for all, or the undisputed part, of Ohio EPA's Response Costs incurred prior to the Effective Date of these Orders within thirty (30) days after receipt of the invoice. In the event that Work Respondent does not dispute the invoice or remit payment of Response Costs within sixty (60) days after receipt of such invoice, Work Respondent shall remit payment for the unpaid balance and the interest accrued of the unpaid balance. Interest shall accrue beginning thirty (30) days from the date of the invoice until the date payment is remitted, and shall be calculated at the rate specified by ORC § 5703.47(B) or any subsequent rate adjustments.

53. Work Respondent shall remit payments to Ohio EPA pursuant to this Section as follows:

a. Payment shall be made by bank check payable to "Treasurer, State of Ohio / Hazardous Waste Special Cleanup Account" and shall be forwarded to Office of Fiscal Administration, Attn: Revenues Section, Ohio EPA, Lazarus Government Center, P.O. Box 1049, Columbus, Ohio 43216-1049;

b. A copy of the transmittal letter and check shall be sent to the Fiscal Officer, DERR, Ohio EPA, P.O. Box 1049, Columbus, Ohio 43216-1049, and to the Ohio EPA Site Coordinator; and

c. Each payment shall identify the name and address of the party making payment, the Site name (i.e., Diamond Shamrock Painesville Works Site OU15), and Ohio EPA's revenue number identified on the associated invoice.

XVII. ACCESS TO INFORMATION

54. Upon request, Work Respondent shall provide to Ohio EPA within fourteen (14) days, copies of all documents and information within its possession or control or that of its contractors or agents relating to events or conditions at OU15 including but not limited to manifests, reports, correspondence, or other documents or information related to the Work. This provision shall not be a limitation on any request for information to the Work Respondent by Ohio EPA made under state or federal law for information relating to events or conditions at OU15.

55. Work Respondent may assert a claim that documents or other information submitted to Ohio EPA pursuant to these Orders are confidential under the provisions of OAC 3745-50-30(A) or ORC § 6111.05(A). If no such claim of confidentiality accompanies the documents or other information when it is submitted to Ohio EPA, it may be made available to the public without notice to Work Respondent.

56. Work Respondent may assert that certain documents or other information are privileged under the attorney-client privilege or any other privilege recognized by state law. If Work Respondent makes such an assertion, Work Respondent shall provide Ohio EPA with the following: (1) the title of the document or information; (2) the date of the document or information; (3) the name and title of the author of the document or information; (4) the name and title of each addressee and recipient; (5) a general description of the contents of the document or information; and (6) the privilege being asserted by Work Respondent.

57. No claim of confidentiality shall be made with respect to any data, including but not limited to all laboratory, sampling, analytical, and monitoring data.

58. Work Respondent shall preserve for the duration of these Orders and for a minimum of ten (10) years after termination of these Orders, all documents and other information within its possession or control, or within the possession or control of its contractors or agents, which in any way relate to the Work notwithstanding any document retention policy to the contrary. Work Respondent may preserve such documents by microfiche or other electronic or photographic device. At the conclusion of this document retention period, Work Respondent shall notify Ohio EPA at least sixty (60) days prior to the destruction of these documents or other information; and upon request, shall deliver such documents and other information to Ohio EPA.

XVIII. PERIODIC REVIEW

59. Work Respondent shall conduct studies and investigations as reasonably requested by Ohio EPA in order to permit Ohio EPA to conduct reviews as to the effectiveness of the RA at least every three (3) years as described in section 121(c) of CERCLA and any applicable regulations.

60. If Ohio EPA determines that information received, in whole or in part, during a review conducted pursuant to the Periodic Review Section of these Orders indicates that the RA is not protective of public health and safety and the environment, Work Respondent shall undertake any further response actions Ohio EPA has determined are appropriate. Work Respondent shall submit a plan for such work to Ohio EPA for approval in accordance with the procedures set forth in the Review of Submissions Section of these Orders, within thirty (30) days of receiving a request from Ohio EPA to submit such a work plan.

61. Work Respondent may invoke the procedures in the Dispute Resolution Section with respect to any disputes relating to Ohio EPA's periodic review of the RA, including: (1) Ohio EPA's request for further studies and investigations; (2) Ohio EPA's determination that the RA is not protective of public health and safety and the environment; or (3) Ohio EPA's selection of further response actions.

XIX. MODIFICATIONS

62. These Orders may be modified by agreement of the Parties. Modifications shall be in writing, signed by the authorized representative of the Work Respondent and by the Director, and shall be effective on the date entered in the Journal of the Director of Ohio EPA.

XX. INDEMNITY

63. Respondents agree to indemnify, save, and hold harmless Ohio EPA from any and all claims or causes of action arising from, or related to, the implementation of these Orders or to events or conditions at OU15, caused by the negligent acts or omissions of Respondents, and its successors in interest. Said indemnification shall not apply to acts or omissions of the State

of Ohio, its employees, agents or assigns at, on, upon, or related to OU15 if said acts are negligent, performed outside the scope of employment or official responsibilities, or performed with malicious purpose, in bad faith, or in a wanton or reckless manner. Ohio EPA shall not be considered a party to and shall not be held liable under any contract entered into by Respondents in carrying out the activities pursuant to these Orders. Ohio EPA agrees to provide notice to Respondents within thirty (30) days after receipt of any claim that may be the subject of indemnity as provided in this Section, and to cooperate with Respondents in the defense of any such claim or action against Ohio EPA.

XXI. CONTRIBUTION PROTECTION AND AGREEMENT NOT TO REFER

64. With respect to matters addressed in these Orders, the Parties agree that these Orders constitute an administrative settlement for purposes of CERCLA sections 113(f)(2) and 113 (f)(3)(B), 42 U.S.C. § 9613(f)(2) and § 9613(f)(3)(B), pursuant to which Respondents have resolved their liability to the State, and that Respondents are entitled to contribution protection and contribution rights as of the Effective Date of these Orders as to any liable persons who are not parties to these Orders, as provided by CERCLA sections 113(f)(2) and (f)(3)(B), 42 U.S.C. § 9613(f)(2) and (f)(3)(B), provided that Respondents comply with these Orders. The "matters addressed" in these Orders are all investigative and remedial actions taken or to be taken and all response costs incurred or to be incurred by Ohio EPA or any other person with respect to OU15, including without limitation the Work and Response Costs under these Orders.

65. During the implementation of these Orders, and provided Respondents are considered by Ohio EPA to be in compliance with these Orders, Ohio EPA agrees not to refer Respondents to the Ohio Attorney General's Office for enforcement, or take administrative enforcement action against Respondents or their successors in interest liable under Ohio law for Work required under these Orders at OU15. Upon termination of these Orders pursuant to the Termination Section, Ohio EPA agrees to not refer Respondents to the Ohio Attorney General's Office for enforcement, or take administrative enforcement action against Respondents and their successors in interest liable under Ohio law for Work required under these Orders at OU15.

XXII. OTHER CLAIMS

66. Nothing in these Orders shall constitute or be construed as a release from any claim, cause of action, or demand in law or equity against any person, firm, partnership, or corporation not a Party to these Orders, for any liability arising from, or related to, events or conditions at OU15.

XXIII. RESERVATION OF RIGHTS

67. Ohio EPA reserves the right to seek legal and/or equitable relief to enforce the terms and conditions of these Orders, including penalties against Respondents for noncompliance with these Orders. Except as provided herein, Respondents reserve any rights they may have to raise any legal or equitable defense in any action brought by Ohio EPA to enforce the terms and conditions of these Orders.

68. Ohio EPA reserves the right to terminate these Orders and/or perform all or any portion of the Work or any other measures in the event that the requirements of these Orders are not

wholly complied with within the time frames required by these Orders provided that the Work at issue is not being disputed pursuant to the Dispute Resolution Section of these Orders.

69. Ohio EPA reserves the right to take any action, including but not limited to any enforcement action, action to recover costs, or action to recover damages to natural resources, pursuant to any available legal authority as a result of past, present, or future violations of state or federal laws or regulations or the common law, and/or as a result of events or conditions arising from, or related to, OU15. Work Respondent reserves its rights to defend any such enforcement action, action to recover costs, or action to recover damages to natural resources and to raise any counterclaim, affirmative defense, third party claim or cross claim which it may have with respect to these actions. Upon termination pursuant to the Termination Section of these Orders, Work Respondent shall have resolved its liability to Ohio EPA only for the Work performed pursuant to these Orders.

XXIV. TERMINATION

70. Respondents' obligations under these Orders shall terminate upon Ohio EPA's written approval of Work Respondent's written certification to Ohio EPA that all Work required to be performed under these Orders including payment of Response Costs has been completed. The Work Respondent's certification shall contain the following attestation: "I certify that the information contained in or accompanying this certification is true, accurate, and complete." This certification shall be submitted by Work Respondent to Ohio EPA and shall be signed by a responsible official of Work Respondent. The termination of Respondents' obligations under these Orders shall not terminate the Respondents' obligations under the Reservation of Rights, Access to Information, Indemnity, Other Claims, Contribution and Agreement Not to Refer, and Land Use and Conveyance of Title Sections of these Orders. Ohio EPA and Respondents shall review any written certifications for approval or disapproval and approve or disapprove such certification within forty-five (45) days of receipt.

XXV. WAIVER AND AGREEMENT

71. In order to resolve disputed claims, without admission of fact, violation, or liability, Respondents consent to the issuance of these Orders, and agree to comply with these Orders.

72. Respondents hereby waive the right to appeal the issuance, terms and conditions, and service of these Orders and Respondents hereby waive any and all rights that they may have to seek administrative or judicial review of these Orders either in law or equity.

73. Notwithstanding the waiver herein of Respondents' right to appeal or seek administrative or judicial review, Ohio EPA and Respondents agree if these Orders are appealed by any other party to the Environmental Review Appeals Commission, or any court, Respondents retain the right to intervene and participate in such appeal. In such event, Respondents shall continue to comply with these Orders notwithstanding such appeal and intervention unless these Orders are stayed, vacated or modified.

XXVI. EFFECTIVE DATE

74. The Effective Date is the date these Orders are entered in the Journal of the Director of Ohio EPA.

XXVII. SIGNATORY AUTHORITY

75. Each undersigned representative of a Party to these Orders certifies that he or she is fully authorized to enter into these Orders and to legally bind such Party to these Orders.

IT IS SO ORDERED AND AGREED:

OHIO ENVIRONMENTAL PROTECTION AGENCY

n

Laurie A. Stevenson, Director Ohio Environmental Protection Agency

5/6/19

Date

IT IS SO AGREED:

Occidental Chemical Corporation BY: ____ Signature

<u>JENSON - President</u> Printed Name & Title

Mariana Properties, Inc. BY: Signature

Date 3/18/2019 Date Date AndERSON - MESILEAT MICHAC

APPENDIX A

DECISION DOCUMENT

APPENDIX B

RD/RA SOW

APPENDIX C

LIST OF RELEVANT GUIDANCE DOCUMENTS

APPENDIX D

ENVIRONMENTAL CONVENANT TEMPLATE

APPENDIX E

SITE MAP

APPENDIX F

CHROMITE ORE PROCESSING RESIDUE AREA

APPENDIX A

Decision Document



DECISION DOCUMENT

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FOR THE REMEDIATION OF OPERABLE UNIT 15 DIAMOND SHAMROCK PAINESVILLE WORKS SITE PAINESVILLE TOWNSHIP, LAKE COUNTY, OHIO



Ohio Environmental Protection Agency Division of Environmental Response and Revitalization Northeast District Office June 2015

I certify this to be a true and accurate copy of the official documents as filed in the records of the Ohio Environmental Protection Agency.

Cissilier Date: 7-21-15

DECLARATION

SITE NAME AND LOCATION

Diamond Shamrock Painesville Works Site – Operable Unit 15 Fairport Nursery Road, Approximately 0.6 Mile West of East Street Painesville Township, Ohio

STATEMENT OF BASIS AND PURPOSE

This Decision Document presents the selected remedial action for Operable Unit 15 (OU15) of the Diamond Shamrock Painesville Works Site in Painesville Township, Lake County, Ohio, chosen in accordance with the policies of the Ohio Environmental Protection Agency, statutes and regulations of the State of Ohio, and the National Contingency Plan, 40 CFR Part 300.

ASSESSMENT OF THE SITE

Actual and threatened releases of hazardous substances at OU15, if not addressed by implementing the remedial action selected in the Decision Document, constitute a substantial threat to public health or safety and are causing or contributing to air or water pollution or soil contamination.

OU15 is part of the former Diamond Shamrock Painesville Works Site, which operated at this location from 1912 through 1977. Diamond Shamrock manufactured a variety of chemicals at the 1,100-acre Site. OU15 consisted of the former main manufacturing area where soda ash, baking soda, hydrochloric and sulfuric acids, and chlorinated compounds were manufactured. Diamond Shamrock also generated its own electricity from a coal-fired power plant located within OU15.

DESCRIPTION OF THE SELECTED REMEDY

The major components of the selected remedial alternative include: (1) remediation of areas containing chromium ore processing residue (COPR) through removal or capping and (2) establishment of an environmental covenant to ensure appropriate risk-based land use, limit ground water use, and prohibit construction below the applicable minimum points of compliance (POCs) across the OU.

STATUTORY DETERMINATIONS

The selected remedial action is protective of human health and the environment, complies with legally applicable state and federal requirements, is responsive to public participation and input and is cost-effective. The remedy uses permanent solutions to the maximum extent prasticable to reduce toxicity, mobility and volume of hazardous substances at OU15. The effectiveness of the remedy will be reviewed regularly.

Craig_W. Butler, Director

JUL	2	1	2015
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TABLE OF ACRONYMS

AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirements
BERA	Baseline Ecological Risk Assessment
BHHRA	Baseline Human Health Risk Assessment
CCR	Construction Completion Report
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Contaminant(s) of Concern
COPC	Contaminant of Potential Concern
COPR	Chromite Ore Processing Residue
DERR	Division of Environmental Response and Revitalization
DFFOs	Director's Final Findings and Orders
ERA	Ecological Risk Assessment
FS	Feasibility Study
HI	Hazard Index
HQ	Hazard Quotient
IA	Interim Action
IAWP	Interim Action Work Plan
MCL	Maximum Contaminant Level
NCP	National Contingency Plan
O&M	Operation and Maintenance
OMZA	Outside Mixing Zone Average
OU(s)	Operable Unit(s)
POC(s)	Point(s) of Compliance
PPM	Parts Per Million = mg/kg or mg/L
PRG	Preliminary Remediation Goal
PRP	Potentially Responsible Party
RA	Remedial Action
RAO(s)	Remedial Action Objective(s)
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RG	Remediation Goal
RI	Remedial Investigation
RMP	Risk Management Plan
TDS	Total Dissolved Solids
WQS	Water Quality Standards

1.0 EXECUTIVE SUMMARY

On September 27, 1995, Chemical Land Holdings, Inc., Maxus Energy Corporation, Occidental Chemical Corporation, Painesville Township Board of Trustees, Uniroyal Chemical Company, Village of Fairport Harbor, and the Painesville PRP Group entered into Director's Final Findings and Orders ("DFFOs") with Ohio EPA to investigate and develop remedial alternatives for the Diamond Shamrock Painesville Works Site (see Figure 1, Site Location Map), and anywhere contamination may have migrated. Chemical Land Holdings, Inc., Maxus Energy Corporation, Occidental Chemical Corporation, Painesville Township Board of Trustees, Village of Fairport Harbor, and the Painesville PRP Group are also subject to a U.S. District Court Judicial Consent Order ("Consent Order"), effective on October 4, 2005, which required the continued implementation of the DFFOs requirement to investigate contamination at the Diamond Shamrock Site, including OU15. This OU is subject to both the DFFOs and the Consent Order. Accordingly, the term "Orders" is used to refer to both the DFFOs and the Consent Order.

The Painesville PRP Group developed Phase I and Phase II Remedial Investigation (RI) Work Plans, pursuant to the Orders, to determine where contamination exists at the Site and at what concentrations. The Phase I RI Work Plan was approved in August 1997 and the Phase II RI Work Plan was approved in August 2000, to investigate the Site for potential contamination of soil, ground water, surface water and indoor air.

On July 25, 1999 and September 22, 2003, respectively, the Phase I and Phase II RI Reports were approved by Ohio EPA. These reports documented the existence of contamination within the Site boundaries which would require clean up. The primary contaminants of concern within OU15, prior to interim action (IA) activities discussed below, are presented in Table 2, Areas of Contamination within Operable Unit 15 (pre-interim action), of this Decision Document.

During the course of RI activities, the Diamond Shamrock Painesville Works Site was divided into 24 operable units (OUs). This decision document applies to Operable Unit 15 (OU15), which is located on the northern side of Fairport Nursery Road (see Figure 2, Operable Unit 15 Location Map).

On February 27, 2003, the Lake County Board of Commissioners and Lakeview Bluffs, LLC received a \$3 million grant from the State of Ohio to perform a voluntary interim action for OU15, which would upgrade the end use of OU15 from industrial land use, which would have been required under the existing Orders¹, to a mixture of commercial, recreational and residential land use. As part of the Interim Action Work Plan (IAWP), which was approved by Ohio EPA on November 30, 2004, a Baseline Human Health Risk Assessment (BHHRA) was prepared, which defined the concentrations of contamination within OU15 that could impact human health. A Baseline Ecological Risk Assessment (BERA) for potential impacts to the environment was not conducted for OU15, based on continual maintenance of the existing surface and planned redevelopment activities. The BHHRA determined that current and future health risks of this OU resulted from: direct contact with surface and sub-surface

¹ Since OU15 was zoned industrial, formerly contained industrial manufacturing facilities, and the property owner had no plans to use the property for anything other than industrial purposes. Ohio EPA would have only been able to require that the property be remediated to industrial standards.

contaminated soils, volatile emissions from soils and ground water, and direct contact with contaminated ground water.

Remedial activities specified in the IAWP were performed from 2004 through 2007 and included the excavation of contaminated soils and placement of clean soils to meet a minimum 2' point of compliance (POC) in commercial/recreational use areas and a minimum 4' POC in residential use areas. In excess of 280,000 cubic yards of clean clay soil and another 60,000 cubic yards of clean topsoil were placed within the boundaries of OU15 during these activities.

During and immediately following performance of the IA, additional sampling was performed within OU15. This included the confirmation of BIOSCREEN modeling results in Lake Erie and Grand River surface water and partial delineation of chromite ore processing residue (COPR) north of Fairport Nursery Road.

Contaminants of Potential Concern (COPCs) for Lake Erie surface water included antimony, cobalt, selenium and total dissolved solids (TDS). Cyanide and TDS were the only COPCs identified for Grand River surface water. Sampling performed in Lake Erie and the Grand River indicated neither TDS nor any of the metals listed above are reaching either water body in concentrations above the State of Ohio Water Quality Standards (WQS), Outside Mixing Zone Average (OMZA) for the Lake Erie basin.

During routine storm sewer installation activities performed outside of the scope of CORF and RI/FS activities, COPR was identified at depths greater than 8' below ground surface within OU15, north of Fairport Nursery Road. The COPR was a waste generated as part of chromium production activities within OU16 of the former Diamond Shamrock Painesville Works Site. The COPR contains significant levels of hexavalent chromium, a known human carcinogen, and has the rare property of being able to wick upwards through soils, rather than leaching downward. This requires COPR to be remediated, even when encountered at depths below the applicable POC. It was determined that additional work would be needed in the COPR Area of Concern (see Figure 5) as part of remedial design/remedial action (RD/RA) activities to identify the extent of the COPR within OU15 and either cap or remove the material.

Following completion of IA activities, a final Construction Certification Report (CCR) was submitted to Ohio EPA on September 7, 2007, summarizing the remedial work which was performed. In addition, the report contained a post-remedy risk assessment, providing an evaluation of current risks posed by contaminants remaining on OU15. Ohio EPA approved the CCR on October 10, 2007.

The post-remedy risk assessment determined that there were five (5) primary contaminants of concern (COCs) which remain in soils within OU15. These include: aluminum, dieldrin, hexavalent chromium, manganese, and vanadium. Additional details concerning the health risks associated with each primary COC are located in Appendix B, Primary Contaminants of Concern.

Based on this information, it was determined that remedial alternatives needed to be developed to address human health risks posed by OU15 soils. In October 2007, Ohio EPA

approved a Feasibility Study (FS) report, which identified potential remedial alternatives for OU15. As part of the FS, a number of Remedial Action Objectives (RAOs) for OU15 were developed to ensure protectiveness of human health and the environment.

A preferred plan was issued in May 2008, which presented a range of remedial alternatives for public consideration and comment. The alternatives evaluated in the preferred plan are included in Section 4.0 of this document.

On December 21, 2009, Ohio EPA issued a Director's Determination Report to the Ohio Department of Development to document that applicable risk-based standards had been met due to the remediation performed under the voluntary interim action and partially funded through the CORF. The report also explained that, while the property was currently in compliance with residential and commercial/recreational standards, additional remedial activities would be required to address potential future risk. These activities included establishment of an environmental covenant, and capping or removal of COPR in the southeastern corner of OU15.

Following issuance of the Preferred Plan, Tierra Solutions, Inc. requested permission to relocate material stockpiled during the OU15 slope re-grading work discussed above. The stockpile consisted of a mixture of soil and Solvay material (calcium carbonate fines). The stockpile was characterized and determined to meet residential risk-based standards and was moved to OU7 in July 2013.

All of the documents referenced above can be found in the public repositories identified in Section 8.0, Responsiveness Summary.

This Decision Document summarizes information on the range of remedial alternatives evaluated, identifies Ohio EPA's selected remedial alternative, and explains the reasons for selection of the remedial alternative. The Decision Document is based on the Ohio EPA-approved RI and FS reports completed by SECOR, Inc. and Hull & Associates, Inc., on behalf of Tierra Solutions, Inc.

Ohio EPA's selected remedial alternative should yield a permanent solution for risks associated with the contaminated media at OU15. The expectations for the selected alternative include:

- Reduction of human health risks to within acceptable limits, and protection of human health and the environment from exposure to COCs in soils and ground water (Figures 3 and 4), which are above acceptable limits.
- Short and long-term protection of public health and the environment.
- Compliance with applicable or relevant and appropriate requirements (ARARs).
- Cost-effectiveness and limitation of expenses to what is necessary to achieve the selected alternative expectations.

The major components of the selected remedial alternative include remediation of the COPR area identified in Figure 4 of this Decision Document, establishment of an Environmental Covenant (EC) to restrict property and ground water use, and establishment of a Risk Management Plan (RMP) for future construction activities which occur below the applicable 2' or 4' minimum point of compliance (POC).

Ohio EPA finds that these measures will protect public health and the environment by reducing risk to acceptable levels once the RAOs have been achieved.

2.0 SUMMARY OF OPERABLE UNIT CONDITIONS

2.1 Operable Unit History

The Diamond Shamrock Painesville Works Site ("Site") is an approximately 1,100 acre former chemical manufacturing facility located in a mixed industrial/residential area. The Site is situated in the northern portion of Lake County, within the municipalities of the city of Painesville, Painesville Township and the Village of Fairport Harbor. East Street borders the Site to the west, Elm Street to the south and Lake Erie to the north. The Site borders the former Uniroyal Chemical Company and Cleveland Electric Illuminating Company property to the east. The Grand River and Fairport Nursery Road bisect the Site from east to west (Figure 1, Diamond Shamrock Location Map).

In order to facilitate the RI/FS and RD/RA processes, the Site has been divided into 24 OUs – 21 land-based and 3 ground water-based OUs. OU15, which is approximately 99 acres in size, is located in the north-central portion of the Site between the Grand River and Lake Erie (Figure 2, Operable Unit 15 Location Map) and consists of Parcels 1B1, 1B2 and 5B1.

TABLE 1 OWNERS, OPERATORS AND/OR DISPOSERS				
Owners, Operators and/or Disposers	Property Usage	Period		
Diamond Alkali / Diamond Shamrock	Manufacturing of Soda Ash, sodium carbonate, magnesium oxide, sodium bicarbonate, sodium hydroxide, chlorinated chemicals, hydrochloric and sulfuric acids, electricity production, and salt solution mining.	1912 - 1976		
Standard Machine & Equipment Company 'SME)	Demolition of the main plant (Parcels 1B1 and 1B2, north of Fairport Nursery Road) and relocation of demolition debris to former hydroretention basin (Parcel 5B1).	1978 - 1996		

A list of owners, operators and/or disposers that may have contributed to the contamination within OU15 is shown in Table 1 Owners, Operators and/or Disposers.

plans to utilize it for commercial, recreational, and residential development. Descriptions of historical activities on the individual parcels are provided below:

Parcel 1B1

Parcel 1B1 is approximately 66 acres in size. It is bordered by Lake Erie and Parcel 1B2 to the north and Fairport Nursery Road and the Norfolk and Southern Railway (OU22) to the south. OU2 and OU6 border this parcel to the east and active commercial/industrial operations and residential structures border it to the west.

Parcel 1B1 is the former main manufacturing portion of the Diamond Shamrock Painesville Works. This area contained manufacturing facilities for soda products; chlorinated chemicals and acids; a power plant, which generated electricity for manufacturing operations; and salt solution mining wells. This parcel historically contained a large number of buildings which were demolished in the 1980s by SME. Their foundations were covered with soil and remain in place.

In addition to former production facilities, the initial soup pond or waste lake, used for liquid and sludge disposal from manufacturing activities, was located within Parcel 1B1. These wastes consisted primarily of limestone fines suspended in water, known as Solvay, which was produced in vast quantities during the manufacturing of soda ash within OU15.

Parcel 1B2

Parcel 1B2 is approximately 5 acres in size and is located on the north-central portion of the Site. The parcel is bordered by Lake Erie to the north and Parcel 1B1 to the east, west, and south.

This parcel historically contained the fresh water intake and pump house for the Diamond Shamrock manufacturing facility. The parcel was purchased by the Lake County Commissioners in 1977 as a backup intake location. In 1999 it was purchased by Tierra Solutions, Inc. and the intake was plugged and all structures demolished.

Parcel 5B1

Parcel 5B1 is approximately 28 acres in size and is located in the center of the Site. It is bordered by Fairport Nursery Road to the north, OU16 and OU20 to the east, OU7 to the west, and the Grand River to the south.

This parcel was historically known as the Hydroretention Basin. Waste water was pumped into this basin for additional settling prior to discharge into the Grand River. During OU15 demolition activities in the 1980s, building debris from Parcel 1B1 was placed within Parcel 5B1 and covered with soil.

Chemical Land Holdings, Inc., Maxus Energy Corporation, Occidental Chemical Corporation, Painesville Township Board of Trustees, Village of Fairport Harbor, and the Painesville PRP Chemical Land Holdings, Inc., Maxus Energy Corporation, Occidental Chemical Corporation, Painesville Township Board of Trustees, Village of Fairport Harbor, and the Painesville PRP Group are subject to the Orders, which require them to investigate contamination at the Site, including OU15.

2.2 Site Characteristics and Investigation

Pursuant to the 1995 DFFOs for the RI/FS, the Painesville PRP Group, on behalf of all of the signatories to the 1995 DFFOs, submitted Phase I and Phase II RI and FS reports, which were approved by Ohio EPA, DERR in 1999, 2003, and 2007, respectively. The RI/FS activities identified the nature and extent of contamination in surface and subsurface soils; ground water; surface water and sediments for the volatile and semi-volatile organic compounds, pesticides, PCBs, and metals; and as necessary, developed alternatives to address the contamination. The investigation also provided a description of site geology, topography, hydrogeology and other Site characteristics.

Geology at the Diamond Shamrock Painesville Works Site, including OU15, is complex. The subsurface geology consists of a mixture of non-native fill material (including large amounts of Solvay material within the former waste lakes/soup ponds), glacial tills, alluvial deposits, and shale bedrock. Ground water is present across the Site at varying depths. Ground water quality is poor and in the majority of areas yield is very poor, which limits the ability for its use for potable purposes. For these reasons, it was determined that ground water did not need to be evaluated for risk to human health, with the exception of direct contact by future construction workers. However, ground water was evaluated as a potential contributor of contamination to both the Grand River and Lake Erie.

No ground water supply wells are located within the immediate vicinity of the Site and the area is served by public water from Lake Erie. A ground water divide, located north of Fairport Nursery Road (within a portion of OU15), as well as the Grand River and Lake Erie, complicate ground water flow direction and contaminant transport across the Diamond Shamrock Site. One (1) jurisdictional wetland has been identified on the Site and is located within OU21.

In addition to the ground water divide, the presence of the Norfolk Southern railroad line (currently OU22), which transect the middle of the Site from east to west, and the former East Ohio Gas high-pressure transmission line (within OU15) complicated investigatory activities. The East Ohio Gas transmission line was relocated in 2008, allowing for the collection of subsurface samples and covering or removal of contaminated material.

During the majority of the investigation, the Site was zoned industrial, which matched the historical use of the Site. On February 27, 2003, the Lake County Board of Commissioners and Lakeview Bluffs, LLC received a \$3 million grant from the State of Ohio to perform a voluntary interim action for OU15, which would upgrade the end use of OU15 from industrial to a mixture of commercial, recreational and residential². The majority of the OUs at the Site, including OU15, have been re-zoned to accommodate these end uses. The property

² Since OU15 was zoned industrial, formerly contained industrial manufacturing facilities, and the property owner had no plans to use the property for anything other than industrial purposes, Ohio EPA would have only been able to require that the property be remediated to industrial standards.
surrounding the OU15 is a mixture of commercial/industrial/residential to the west and south, and industrial to the east (Lake Erie is located to the north).

In 2003, Hemisphere Corporation and the Lake County Commissioners received a \$3 million grant from the Clean Ohio Revitalization Fund (CORF) to "upgrade" the end use of OU15 to a combination of commercial, recreational and residential. A BHHRA was presented within the IAWP. This BHHRA was developed to estimate the chance of health problems occurring if no cleanup actions were taken within OU15. A BERA was not required, because OU15 is maintained (i.e., mowed), which eliminates habitat available to most ecological receptors. Please refer to the RI and FS reports and IAWP (including the BHHRA) for more detailed information. These reports, along with other Site-related materials, are located in the information repositories in the Fairport Harbor Public Library and Morley Library in Painesville. Information can also be obtained through the Diamond Shamrock Community Relations Team web site (www.dscrt.com) and in Ohio EPA's Northeast District Office.

Data from the Phase I and Phase II RI reports, prepared in 1999 and 2003 by SECOR International Incorporated on behalf of the Painesville PRP Group and the other signatories to the 1995 DFFOs, were used by Hull & Associates, Incorporated, to create the 2004 IAWP. The IAWP identified 19 areas with levels of contaminants at risk levels in excess of those permissible for the planned end use (Table 2, Areas of Contamination within OU15 (preinterim action), and Figure 3, Operable Unit 15 Sampling Locations – Pre-Interim Action). The majority of these areas were addressed as part of the IAWP implementation, as discussed below in Section 2.3.

TABLE 2, AREAS OF CONTAMINATION WITHIN OU15 (PRE-INTERIM ACTION)					
Area of Contamination	Location Size (ft ²)		Risk Exceeded For Risk Goal Type	Contaminants	
DC-1	NW Portion of Parcel 1B1	17,740	Modified Residential*	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Dibenzo(a,h)anthracene Aroclor-1248 Aroclor-1254	
DC-2	W Portion of Parcel 1B1	53,300	Modified Residential	Benzo(a)anthracene Benzo(a)pyrene Aroclor-1254 Aroclor-1260	
DC-3	NW Portion of Parcel 1B1	13,700	Modified Residential	Thallium	
DC-4	S Boundary of Parcels 1B1 and 1B2	8,650	Modified Residential	Aroclor-1254	
DC-5	SE Boundary of Parcels 1B1 and 1B2	15,500	Modified Residential	Mercury	
DC-6	NE Portion of Parcel 1B1	9,005	Modified Residential	Aroclor-1260	

Area of Contamination	Location	Size (ft ²)	Risk Exceeded For Risk Goal	Contaminants Arsenic		
DC-7	NE Portion of Parcel 1B1	35,836	Modified			
DC-8	S Portion of Parcel 1B1	20,637	Modified Residential	Aroclor-1260		
DC-9	N Portion of Parcel 5B1	26,081	Recreational	Arsenic		
IA-1	NW Portion of Parcel 1B1	20,000	Indoor Air	Carbon Tetrachloride		
IA-2	S Portion of Parcel 1B1	22,800	Indoor Air	Carbon Tetrachloride		
IA-3	N Portion of Parcel 1B1	14,811	Indoor Air	Chloroform		
IA-4 SW Portion of Parcel 1B1		11,000	Indoor Air	1,1-Dichloroethylene Carbon Tetrachloride Chloroform Trichloroethylene Perchloroethylene		
DC/IA-1	SE Portion of Parcel 1B1	315,500	Modified Residential and Indoor Air	Arsenic Mercury Vanadium Benzene Benzo(a)anthracene Benzo(a)pyrene Dibenzo(a,h)anthracene Carbon Tetrachloride Chloroform Vinyl Chloride Cyanide 1,2-Dichloroethane Trichloroethylene Perchloroethylene Aroclor-1248 Aroclor-1254		
DC/IA-2	E Portion of Parcel 1B1	14,200	Modified Residential and Indoor Air	Carbon Tetrachloride		
DC/IA-3	Central Portion of Parcel 1B1	ntral Portion Parcel 1B1 12,650 Nodified Residential and Indoor Air Aroclor-1		Benzene Carbon Tetrachloride Aroclor-1248 Aroclor-1254		
DC/IA-4	S Portion of Parcel 1B1	94,500	Modified Residential and Indoor Air	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Dibenzo(a,h)anthracene Carbon Tetrachloride Aroclor-1254		

TABLE 2, AREAS OF CONTAMINATION WITHIN OU15 (PRE-INTERIM ACTION)					
Area of Contamination	Location	Size (ft ²)	Risk Exceeded For Risk Goal Type	Contaminants	
DC/IA-5	NE Portion of Parcel 5B1	102,420	Recreational and Indoor Air	Aluminum Arsenic Chloroform	
DC/IA-6	SE Portion of Parcel 5B1	17,900	Recreational and Indoor Air	Arsenic Lead Thallium Perchloroethylene	

* Residential land use is considered "modified" due to the adjusted 4' minimum point of compliance.

2.3 Interim or Removal Actions Taken to Date

As previously mentioned, the Lake County Board of Commissioners and Lakeview Bluffs, LLC received a \$3 million grant from the State of Ohio's Clean Ohio Revitalization Fund (CORF) on February 27, 2003. The purpose of the grant was to assist the Site developer, Lakeview Bluffs, LLC, in upgrading the end use of the Site from industrial to a mixture of commercial, recreational and residential. The work was performed as a voluntary IA under the existing Orders.

The initial objective for clean-up was based on industrial use because of historical and proposed future uses of the Site. However, in February 2001, Chemical Land Holdings, Inc. (now known as Tierra Solutions, Inc.) entered into a 99-year lease agreement with Lakeview Bluffs, LLC, which changed the planned end use of the Site to a combination of commercial, recreational and residential. Under a voluntary IA, Chemical Land Holdings, Inc. (now Tierra Solutions, Inc.) paid to remediate the Site to industrial use and Lakeview Bluffs, Inc. used the CORF grant money in combination with other funding to upgrade the remediation to meet commercial, recreational and residential risk-based standards.

During the voluntary IA, 16 of the 19 areas of contamination listed in Table 2, Areas of Concern within OU15 (pre-interim action), were remediated through a combination of excavation and relocation or disposal of soils and placement of clean soils³. Commercial and recreational areas were required to meet a 2' minimum point of compliance (i.e., a minimum of 2' of clean soils must be present above area of contamination). Residential areas were required to meet a minimum 4' point of compliance.

Significant remedial and development-related work was performed along the Lake Erie shoreline, including grading activities to create a walking path and amphitheater area. Erosion control structures were installed along Lake Erie, within Parcels 1B1 and 1B2, to prevent further loss of shoreline.

³ COPR, which was discovered in the south-eastern portion of OU15 in 2007 during storm sewer installation activities, is not included in Table 2.

In 2007, during installation of a storm sewer, sub-surface COPR was identified within OU15. An IA was conducted to delineate this COPR area. Results revealed that COPR had been disposed in an area of at least 8,000 ft² (Figure 4, COPR Area of Concern). As previously discussed, COPR was a waste generated as part of chromium production activities at the former Diamond Shamrock manufacturing facility. COPR contains significant levels of hexavalent chromium, a known human carcinogen, and has the rare property of being able to wick upwards through soils, rather than leaching downward. Because of this property, COPR requires remediation on the Site, including OU15, even when encountered at depths below the applicable POC.

Following completion of IA activities, the Construction Certification Report (CCR) was submitted to Ohio EPA, which summarized the remedial work that was performed. The report contained a post-remedy risk assessment, providing an evaluation of remaining risks posed by contaminants on the Site. These risks are discussed in Section 2.4 of this Decision Document. The CCR was approved by Ohio EPA on October 10, 2007.

2.4 Summary of Site Risks

Remediation work performed during the voluntary IA was based on the BHHRA presented in the IAWP. As stated above, after the IA activities were completed, a CCR was submitted to Ohio EPA. This report documented, through a post-remedy risk assessment, that the majority of OU15 met commercial, recreational and/or residential use, as long as the minimum points of compliance and use limitations were enforced through an Environmental Covenant (EC).

The results from the RI demonstrated that soil contamination in four (4) areas of concern (AOCs) within OU15 posed, or potentially posed, unacceptable risks and/or hazards to human and/or ecological receptors sufficient to trigger the need for remedial actions (Figure 4, Soil/Indoor Air AOCs and Remedy Locations). The primary constituents of concern in these areas included aluminum, dieldrin, hexavalent chromium, manganese and vanadium. Based on additional excavation along the Lake Erie shoreline and a revision to the land use plan, three (3) of the four AOCs⁴ no longer pose unacceptable risk. The remaining AOC is the area of COPR contamination identified in Figure 5.

In addition to hexavalent chromium contamination within soils, it was determined that unacceptable post-interim action indoor air risk exists for future residents and recreational users in certain portions of OU15 (Figure 4, Soil/Indoor Air Areas of Concern and Remedy Locations). This risk can be eliminated through the establishment of an EC, which would prohibit construction of habitable structures in these areas, as well as prohibit the construction of basements and crawl spaces across OU15.

2.4.1 Risks to Human Health

The risk assessment for human health is an estimate of the likelihood of potential health problems occurring if no remedial actions were taken at a site. To estimate baseline risk, a four-step process is undertaken.

⁴ Three (3) of the AOCs are included in Table 2. The remaining AOC consists of the COPR area identified in 2007.

Step 1. Data Collection and Evaluation (of Contamination): The concentrations of contaminants at the site as well as any past scientific studies on the effects these contaminants have had on people are reviewed. Comparisons of site-specific concentrations of COCs and concentrations reported in past studies help determine which contaminants are most likely to pose the greatest threat to human health.

Step 2. Exposure Assessment: The different ways that people might be exposed to the COCs, the concentrations that people might be exposed to, and the potential frequency and duration of exposure are evaluated. A reasonable maximum exposure scenario is calculated, which portrays the highest level of human exposure that could reasonably be expected to occur.

Step 3. Toxicity Assessment (of Potential Health Dangers): The information from Step 2 is combined with data on the toxicity of each COC to assess potential health risks. Two types of risk are considered: excess lifetime cancer risk (ELCR) and non-cancer risk. The likelihood of any kind of cancer resulting from a site is expressed as a probability of 1 in 100,000, or 1×10^{-5} . In other words, for every 100,000 people that could be exposed, one extra case of cancer may occur as a result of exposure to site COCs. For non-cancer health effects, a hazard index (HI) or hazard quotient (HQ) is calculated (quotient refers to the effects of an individual COC, whereas index refers to the combined effects of all of the COCs). The key concept here is that a "threshold level" (measured as an HQ or HI of 1) exists below which non-cancer health effects are not expected to occur to exposed populations or individuals.

Step 4. Risk Characterization: A determination is made as to whether site risks are substantial enough to cause potential health problems for people at or near a site. The potential risks from the individual pathways (*e.g.*, inhalation, direct contact, ingestion, etc.), and individual chemicals as appropriate, are added together to determine the total cumulative risk to human health.

Human health risk assessments for OU15 and the Grand River/Lake Erie were prepared to evaluate potential impacts to human health posed by COCs in soils, sediments, ground water surface water, air, and fish for the following exposure pathways:

Soils:

Ingestion Dermal Contact Particulate Emissions to Outdoor Air Volatile Emissions to Indoor Air Volatile Emissions to Indoor Air

Ground Water:

Source of Contaminants to Grand River and Lake Erie Volatile Emissions to Indoor Air

Grand River Surface Water, Sediment and Fish:

Ingestion of Fish Ingestion of Surface Water Ingestion of Sediment Dermal Contact with Surface Water Dermal Contact with Sediment

Human health exposure to contaminants in ground water via ingestion was not determined, due to inability for ground water within the Diamond Shamrock Site, including OU15, to be used for potable purposes, due to low quality and yield. If Site-specific data were not available or were insufficient to modify standard default values, then the standard defaults provided in U.S. EPA guidance were used.

A previously discussed the BHHRA results were used to design the remedial activities completed under the voluntary IA. Following completion of the IA a post-remedy risk assessment was completed. A summary of the risk identified pre- and post-IA are provided below.

Pre- and post-interim action human health risks were calculated for OU15 receptors, which included the construction/excavation worker, golf course worker, long-term maintenance worker, child and adult engaging in recreational activities, and child and adult resident. These human health risks included exposure to Grand River surface water, sediment and fish, as applicable. Excess lifetime cancer risk (ELCR) and the non-cancer hazard index (HI) were determined for each of the receptors. As stated above, ELCR values which exceed 1x10⁻⁵ and HI values which exceed 1 trigger the need for remedial action.

Receptor*	ELCR (cancer)	HI (non- cancer)	Exceedences?	
Construction/Excavation Worker	5x10 ⁻⁵	10	Yes – Both	
Golf Course Worker	4.62×10 ⁻⁴	1.10	Yes - Both	
Long-Term Maintenance Worker	7.6x10 ⁻⁶	30	Yes – Both	
Adult-Recreational	7.6x10 ⁻⁵	0.92	Yes - ELCR	
Child-Recreational	1.7x10 ⁻⁴	7.9	Yes - Both	
Adult-Resident	5.4x10 ⁻²	33.4	Yes - Both	
Child-Resident	5.5x10 ⁻²	49.2	Yes - Both	

Cumulative Receptor Exposures – Pre-Interim Action

The Child-Resident and Child-Recreational receptors are the ones which provide the most protective estimate of risk. If the risks to the Child-Resident and Child-Recreational receptors are acceptable, then they are acceptable for all other receptors. Therefore, only the risks for the Child-Resident and Child-Recreational receptors were calculated as part of the post-IA risk assessment. These calculations took into account the minimum applicable points of compliance (POCs), which were established for OU15. The POC for residential receptors is 4' (i.e., a minimum of 4' of soils which meet residential risk must be maintained across the

surface of residential areas) and 2' for commercial and recreational areas (i.e., a minimum 2' of soils which meet recreational risk must be maintained across the surface of commercial and recreational areas).

Receptor	ELCR (cancer)	HI (non- cancer)	Exceedances?*	
Child-Recreational	8.8x10 ⁻⁷	0.21		
Child-Resident	2.2x10 ⁻⁶	0.72	No	

Cumulative Receptor Exposures – Post-Interim Action

*Assuming minimum applicable POCs have been established.

Although these risks and hazard levels do not indicate that there is significant potential risk to children and adults (and therefore other receptors) from direct contact with or inhalation of OU15-related contaminants, hexavalent chromium does remain within OU15 at depths below the applicable minimum POC. Should this hexavalent chromium migrate upwards into that POC in the future, both adults and children could be at risk. This potential warrants the remediation of hexavalent chromium to concentrations at or below the calculated Site-specific risk-based remediation goal of 467 mg/kg.

2.4.2 Risks to Ecological Receptors

During the Phase II RI, Ohio EPA determined that a Baseline Ecological Risk Assessment (BERA) was not necessary for OU15 due to the continual maintenance of the soil cover in this OU (i.e., mowing, dissuading groundhogs, etc.), as well as the planned future development activities. The Painesville PRP Group is required to conduct an Ecological Risk Assessment for OU15, should future use of the OU change to one which will support ecological receptors.

The BIOSCREEN modeling results presented in the June 2003, *Baseline Ecological Risk Assessment*, submitted by Hull & Associates on behalf of the Painesville PRP Group indicated that Total Dissolved Solids (TDS), antimony, cobalt, and selenium could potentially reach Lake Erie and the Grand River at levels in excess of the State of Ohio WQS, OMZA. Confirmatory sampling was performed to determine if contaminants were reaching Lake Erie and/or the Grand River in concentrations which would pose a risk to ecological receptors. The results were negative, indicating that contaminants were not reaching these water bodies via ground water at levels which violated State WQS. Therefore, there is no current risk posed to ecological receptors from ground water impacting either Lake Erie or the Grand River.

3.0 REMEDIAL ACTION OBJECTIVES

An FS, to define and analyze appropriate remedial alternatives, was completed with Ohio EPA oversight and was approved in October 2007.

As part of the RI/FS process, remedial action objectives (RAOs) were developed in accordance with Section 300.430 of the NCP, pursuant to the federal Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 42 U.S.C.

§9601 et seq., as amended, and U.S. EPA guidance (*i.e.*, RI/FS Guidance (EPA/540/G-89/004, and others). The RAOs are goals that a remedy should achieve in order to ensure protection of human health and the environment.

The RAOs for OU15 include those listed in Table 3 Remedial Action Objectives:

	TABLE 3 REMEDIAL ACTION OBJECTIVES				
Ground Water					
Human Health Risk	Prevent ingestion/direct contact of ground water across OU15 containing carcinogens in excess of a total excess lifetime cancer risk (for all contaminants) greater than 1x10 ⁻⁵ .				
Human Health Risk	Prevent ingestion/direct contact of ground water across OU15 containing non- carcinogens in excess of a HQ or HI greater than 1.				
Human Health Risk	Prevent inhalation in future structures of carcinogens (including 1,2-Dichloroethane, Benzene, Carbon Tetrachloride, Chloroform, Tetrachloroethene, Trichlorethene, and Vinyl Chloride) in vapors emanating from ground water in excess of a 1x10 ⁻⁵ excess lifetime cancer risk.				
Human Health Risk	Prevent inhalation in future site structures of non-carcinogens (including 1,1- Dichloroethene) in vapors emanating from ground water in excess of a HQ or HI of 1.				
	Soil				
Human Health Risk	Prevent ingestion/direct contact with soil located across OU15, below the applicable minimum points of compliance, containing carcinogens (including volatile and semi-volatile chemicals, pesticide, PCBs and metals) in excess of a total excess lifetime cancer risk greater than 1x10 ⁻⁵ .				
Human Health Risk	Prevent ingestion/direct contact with soil located across OU15, below the applicable minimum points of compliance, containing non-carcinogens (including volatile and semi-volatile chemicals, pesticide, PCBs and metals) in excess of a HQ or HI greater than 1.				
Human Health Risk	Prevent inhalation in future site structures of carcinogens (including 1,2- Dichloroethane, Benzene, Carbon Tetrachloride, Chloroform, Tetrachloroethene, Trichloroethene, and Vinyl Chloride) in vapors emanating from soil in excess of a 1x10 ⁻⁵ excess lifetime cancer risk.				
Human Health Risk	Prevent inhalation in future site structures of non-carcinogens (including 1,1- Dichloroethene) in vapors emanating from soil in excess of a HQ or HI of 1.				

OU-specific remediation goals were not developed as part of the BHHRA because a postremedy risk assessment was performed. The purpose of the post-remedy risk assessment was to document that OU15 met commercial/recreational and/or residential standards; however, four (4) areas of concern remained within OU15 (see Section 2.3, above). A Sitespecific remediation goal for hexavalent chromium of 467 mg/kg (ppm) was developed due to the presence of COPR within OU15. This goal is protective of the most sensitive receptor, the child resident.

4.0 SUMMARY OF REMEDIAL ALTERNATIVES

A total of three (3) remedial alternatives were considered in the FS, as identified in **Table 4 Summary of OU15 Remedial Alternatives**. A brief description of the major features of each of the remedial alternatives follows. More detailed information about these alternatives can be found in the FS report.

TABLE 4 SUMMARY OF OU15 REMEDIAL ALTERNATIVES							
Media	Alternative	Description of Remedial Alternative					
Soil							
	S1	No action					
	S2	EC restricting land use.					
	S3	EC restricting land use and delineation/remediation of COPR areas					
Ground Water							
	G1	No Action					
	G2	EC prohibiting use of ground water for potable and non-potable purposes, with the exception of environmental investigations.					

4.1 No Action Alternatives (S1 and G1)

The "no action alternatives" for soil and ground water have been included in a single section for efficiency. The NCP requires evaluation of a no action alternative to establish a baseline for the comparison of other remedial alternatives. Under this alternative, no remedial activities or monitoring are conducted at OU15 to prevent exposure to contaminated media.

4.2 Soil Alternatives

Alternative S2: ALT OU15-B

This alternative would rely on the establishment of an EC, which includes:

- Prohibition of residential development on portions of OU15 which do not meet residential risk-based standards and restrict those portions to commercial/recreational use with the applicable minimum 2' POC (see Figure 4 and Table 3);
- Establishment of a minimum 4' POC in those portions of OU15 designated for residential use (see Figure 4);
- Prohibition of excavation below the applicable minimum 2' POC in the areas of OU15 designated as commercial/recreational use and below the applicable minimum 4' POC in the areas of OU15 designated as residential land use (see Figure 4);
- Prohibition of construction of habitable structures at specific locations in OU15 (see Figure 4) where unacceptable risk exists to human health due to volatilization of contaminants into indoor air (see Table 3);
- Prohibition of the construction of sub-grade habitable structures (i.e., basements and/or crawl spaces) across the entirety of OU15;

- Prohibition of the extraction of ground water for potable or non-potable use within OU15, with the exception of environmental investigation, remediation and monitoring; and
- Establishment of annual reporting requirement describing compliance with the environmental covenant, including POCs.
- Prohibition of excavation by construction workers unless the excavation is performed in accordance with an Ohio EPA approved risk management plan (RMP), which would apply to soils beneath the approved points of compliance (POCs) that may be made available for direct contact during excavation activities, as well as potentially contaminated shallow ground water. This RMP would address health and safety precautions to be taken by workers excavating below the POCs, as well as how to manage potentially contaminated soils and materials.

Alternative S3: ALT OU15-C

In addition to the requirements outlined in Alternative S2, above, this remedial alternative also requires that areas within OU15 containing hexavalent chromium concentrations above the risk-based remedial goal of 467 mg/kg be delineated and remediated through either removal or capping in place, and the prohibition of any excavation in the area covered by an engineered cap or installed as part of COPR-remediation activities. An engineered cap would consist of a 12" base layer of compacted clay, followed by geotextile, geomembrane (40 ml synthetic liner), and another 12" of compacted clay, as was installed in Operable Unit 2 of the Diamond Shamrock Painesville Works Site (see Additional Work Work Plan for OU2 Chromium Impacted Soils Cover, Hull & Associates, November 22, 2006). The geomembrane would act as a capillary break to prevent future upward migration of hexavalent chromium into the applicable POC.

4.3 Ground Water Alternative G2: ALT OU15-B and ALT OU15-C

The ground water RAOs would be satisfied by the establishment of an EC, which includes:

- Prohibition of the extraction of ground water for potable and non-potable use, with the exception of environmental investigation, remediation and monitoring.
- Prohibition of construction of habitable structures at specific locations in OU15 (see Figure 4) where unacceptable risk exists to human health due to volatilization of contaminants from ground water to indoor air (see Section 3.0).

4.4 Cost Estimates and Time to Achieve RAOs

Alternative S1/G1 – ALT OU15-A

This baseline alternative has no associated costs, since no remedial activities, including the placement of use restrictions, would be performed. RAOs are not achieved under this alternative.

Alternative S2/G2 - ALT OU15-B

The estimates of cost and time to achieve RAOs for the EC/RMP remediation alternative, which would restrict property use and require the establishment of an RMP, are as follows:

Estimated Capital Cost	\$31,000.00
Estimated Annual Reporting Cost	\$3,000.00
Estimated Present Worth Cost	\$91,000.00
Estimated Construction Time	None
Estimated Time to Achieve RAOs	60 days

Alternative S3/G2 – ALT OU15-C

The estimates of cost and time to achieve RAOs for this combined EC/RMP/active remediation alternative, which would restrict property use, require the establishment of an RMP, and require delineation and remediation of COPR, are as follows:

Estimated Capital Cost	\$292,000.00
Estimated Annual Reporting Cost	\$5,000.00
Estimated Present Worth Cost	\$390,000.00
Estimated Construction Time	2 years
Estimated Time to Achieve RAOs	2 years

5.0 COMPARISON AND EVALUATION OF ALTERNATIVES

5.1 Evaluation Criteria

Ohio EPA considers eight (8) criteria, as outlined in the NCP, to evaluate the various remedial alternatives individually and compare them with each other in order to select a remedy. A more detailed analysis of the remedial alternatives can be found in the FS report. The eight (8) evaluation criteria, including the threshold, balancing and modifying criteria are shown below in **Table 5**, **Remedial Alternative Evaluation Criteria**.

TABLE 5 REMEDIAL ALTERNATIVE EVALUATION CRITERIA

Threshold Criteria (2)

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

Compliance with Applicable or Relevant and Appropriate Requirements (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.

Balancing Criteria (5)

Long-Term Effectiveness and Permanence – evaluates 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 the amount of contamination present, the ability of the contamination to move in the environment, and the use of treatment to reduce harmful effects of the principal contaminants.

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

Implementability – evaluates 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 of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.

Modifying Criterion (1)

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

Evaluation Criteria 1 and 2 are threshold criteria required for acceptance of an alternative. Any acceptable remedy must comply with both of these criteria. Evaluation Criteria 3 through 7 are the balancing criteria used to select the best remedial alternative(s) identified in the Preferred Plan. Evaluation Criteria 8, community acceptance, is evaluated through public comment on the alternatives received during the comment period.

5.2 Analysis of Evaluation Criteria

This section examines how each of the evaluation criteria is applied to each of the remedial alternatives listed in Section 4.0 and compares how the alternatives achieve the evaluation criteria.

Overall Protection of Human Health and the Environment

Evaluation of the overall protectiveness of the alternatives focuses on whether each alternative achieves adequate protection of human health and the environment and identifies how site risks posed through each pathway being addressed are eliminated, reduced or controlled by the alternative. This evaluation also includes consideration of whether the alternative poses any unacceptable short-term or cross-media impacts.

Soil Alternatives: Alternative S1 does not attempt to restrict contact with contaminated soils and therefore is not protective of human health and the environment. Alternative S2 is partially protective through implementation of an EC, which would eliminate direct contact with soils above the minimum applicable POCs. Alternative S3 fully complies with

this criterion since it requires an EC and remediation of the COPR AOC, through either removal, to a Site-specific risk-based hexavalent chromium concentration of 467 mg/kg or capping, both of which are protective of the child resident receptor.

Ground Water Alternatives: The same ground water alternative (G2) is proposed for use with each of the soil alternatives. The restriction of ground water use and restricting constructions in areas of the OU with potential impacts to indoor air from volatile contaminants in ground water through an EC is protective of human health.

Compliance with ARARs

Soil Alternatives: Alternative S1 does not comply with ARARs because it does not address current or future risks to human health and the environment. Alternative S2 does not fully comply with ARARs because, although it does require the establishment of and EC and RMP, it fails to address potential upward migration of hexavalent chromium into the applicable minimum POC, which could cause an exceedance of risk-based standards in the future. S3 fully complies with ARARs identified for OU15. The intent of the proposed cap is to prevent upward migration of hexavalent chromium into the minimum applicable 2' POC, thus satisfying relevant and appropriate requirements. S3 also meets the risk-based standards applied to the Site (cancer risk of 1E-5 and non-cancer risk (HI) of 1. The EC would be established in compliance with Ohio Revised Code (ORC) §§ 5301.80 through 5301.92.

Ground Water Alternatives: The ground water alternative (G2) also complies with the ARARs identified for OU15. Under the alternative, use of ground water would be restricted for potable and non-potable use, with the exception of environmental investigations, through an EC. The EC would be established in compliance with Ohio Revised Code (ORC) §§ 5301.80 through 5301.92.

Because the "no action alternatives" do not meet the two threshold criteria (overall protection of human health and the environment, and compliance with ARARs), they were eliminated from consideration under the remaining criteria.

Long-Term Effectiveness and Permanence

Soil Alternatives: Alternative S2 meets the requirements of long-term effectiveness and permanence due to the EC and RMP which would be established for the OU, but it does not address the potential for upward migration of hexavalent chromium into the applicable minimum POC. Alternative S3 fully meets the criterion of long-term effectiveness and permanence, since it addresses the establishment of an EC and RMP, in addition to remediating the COPR area through either removal or capping.

Ground Water Alternatives: The ground water alternative (G2) meets the long-term effectiveness and permanence criteria by restricting ground water usage through an EC. In addition, ground water yield and quality across the Site are low, limiting use for potable purposes and further solidifying the permanence of this alternative.

Reduction of Toxicity, Mobility or Volume by Treatment

Soil Alternatives: Alternative S2 does not result in a reduction of toxicity, mobility or volume by treatment. Alternative S3 will result in a reduction of mobility, if in-place capping

is used, since the material placed over the COPR will prevent upward mobility of the material through wicking processes.

Ground Water Alternatives: The ground water alternative (G2) does not result in a reduction of toxicity, mobility or volume by treatment, since it relies strictly on an EC to restrict ground water use.

Short-Term Effectiveness

Soil Alternatives: Alternatives S2 and S3 would become immediately effective upon recording of the EC. Additional remediation prescribed by Alternative S3 will take additional time to implement and could result in potential short term releases during implementation of this remedy.

Ground Water Alternatives: The ground water alternative (G2) would become effective immediately upon recording the EC.

Implementability

Soil Alternatives: Minimal obstacles to implementability exist for Alternatives S2 and S3. The current property owner is in agreement with placing an EC on OU15 to restrict use. They have placed ECs on other OUs within the Diamond Shamrock Painesville Works Site without difficulty. In addition, delineation, capping, excavation and transport of COPR within the Site, as would be required under Alternative S3, have already been performed without incident. The required permits to transport soils and wastes to and from the Site via public roadways has been obtained by the developer. If the COPR area is excavated and disposed off-site at a licensed disposal facility, TCLP sampling may be necessary. A site-wide storm water pollution prevention plan (SWPPP) is in place.

Ground Water Alternatives: Minimal obstacles also exist for implementation of the ground water alternative (G2). As stated above, the owner is in agreement with placing an EC on OU15, and has done so without difficulty in the past.

Cost

Soil Alternatives: The estimated present worth cost of Alternative S2 is less than that of Alternative S3. However, Alternative S2 does not provide the long-term permanence of Alternative S3, due to the addition of remedial activities in the COPR AOC. This long-term protection of human health and the environment warrants the additional expenditures associated with Alternative S3.

Ground Water Alternatives: The estimated present worth cost of the ground water alternative (G2) is incorporated into both Alternatives S2 and S3, since the ground water use limitations will be incorporated into the EC already required under both soil alternatives.

Community Acceptance

Ohio EPA received comments from interested parties at the public meeting held on July 31, 2008, at the Painesville Township Hall and during the public comment period, which ran between June 26, 2008 and August 8, 2008. Those comments and Ohio EPA's responses are included in Section 8.0, Responsiveness Summary, of this Decision Document.

5.3 Summary of Evaluation Criteria

A summary of the evaluation of the OU15 remedial alternatives is included in Table 6 Evaluation of OU15 Remedial Alternatives.

Remedial Alternatives	Threshold Criteria		Balancing Criteria				Modifying Criteria	
	1. Protects Humah Health & Environment	2. Compliance with ARARs	3. Long Term Éffectiveness	4. Reduces T, M and/or V by Treatment	5. Short Term Effectiveness	6. Implementable	7. Costs	8. Community Acceptance
Soil			94	ll		l al	mbdesupt or	
S1 (ALT OU15-A) "No Action"								
S2 (ALT OU15-B)								
S3 (ALT OU15-C)						-		
Ground Water								
G1								
G2								

6.0 OHIO EPA'S SELECTED ALTERNATIVE

Ohio EPA's selected remedial alternative for OU15 of the Diamond Shamrock Painesville Works Site is a combination of Soil Alternative S3 (ALT OU15-C), and Ground Water Alternative G2.

Based on information presently available, it is Ohio EPA's current judgment that the selected remedial alternative best satisfies the criteria defined in Table 6, Evaluation of OU15 Remedial Alternatives. The elements of the selected remedial alternative are as follows:

 Further delineation and remediation of the COPR area of concern (AOC) (see Figure 5) through either: (1) removal of the COPR and disposal in preconstructed cells within OU16 (see Figure 1)⁵; (2) removal of the COPR and disposal off-Site at a licensed solid waste or hazardous waste landfill, as appropriate; or (3) covering any portions of the AOC that exceed the Site-

⁵ Placement of COPR into pre-designed disposal cells within OU16 would be authorized through the RD/RA Order.

specific risk-based remedial goal (RBRG) for hexavalent chromium for the child resident receptor of 467 mg/kg (see Section 3.0), with an engineered cap, consisting of a 12" base layer of compacted clay, geotextile, 40 ml geomembrane and another 12" of compacted clay, to prevent the upward wicking of hexavalent chromium from the COPR AOC.

Performance Standards:

- o Options 1 & 2
 - The performance standard is met when COPR-contaminated soil (see Figure 5), delineated as part of future Ohio EPA-approved RA activities, have been removed and confirmatory sample analyses demonstrate that the remaining soil meets the acceptable levels referenced in the soil RAOs (*i.e.*, 467 mg/kg for hexavalent chromium) in Section 3.0.
 - The performance standard is met when confirmatory sampling, performed immediately following soil removal activities per an Ohio EPA-approved RA work plan, documents the presence of the applicable minimum POC (2' in commercial/recreational and 4' in residential use areas), including levels of hexavalent chromium below the acceptable soil RAO of 467 mg/kg (see Section 3.0), and passes an Ohio EPA inspection.
- o Option 3
 - The performance standard is met when an engineered cap and liner system is placed over COPR-contaminated soil (see Figure 5) delineated as part of the Ohio EPA-approved RA activities, per an Ohio EPA-approved work plan, and passes an Ohio EPA inspection.
- Establishment of an Environmental Covenant (EC) which would:
 - Prohibit residential development on portions of OU15 which do not meet residential risk-based standards, and restrict those portions to recreational use with the applicable 2' minimum POC (see Figure 4);
 - 2. Require establishment of a 4' minimum POC in those portions of OU15 designated for residential use (see Figure 4);
 - Prohibit excavation below the applicable minimum 2' POC in the areas of OU15 designated as recreational use and below the applicable minimum 4' POC in the areas of OU15 designated as residential land use (see Figure 4);

- Prohibit construction of habitable structures at specific locations within OU15 where unacceptable risk exists to human health due to volatilization of contaminants to indoor air (see Figure 4);
- 5. Prohibit the construction of sub-grade habitable structures (i.e., basements and/or crawl spaces) across the entirety of OU15;
- 6. Prohibit the extraction of ground water for potable or non-potable use within OU15, with the exception of environmental investigation, remediation, and monitoring;
- 7. Prohibit any excavation in the area (see Figure 5) covered by an engineered cap and liner system installed as part of COPR-remediation activities (as appropriate).
- 8. Prohibit all excavation by construction workers unless the excavation is performed in accordance with an Ohio EPA approved risk management plan (RMP).

Performance Standards:

- The performance standard is met when documentation that the environmental covenant, including the restrictions identified in Section 6.0, has been recorded in the Lake County Recorder's Office is provided to Ohio EPA.
- The performance standard is met when the restrictions identified in the environmental covenant are continually enforced, such that the RAOs (see Section 3.0) for the various media are met, until such institutional controls are no longer necessary.
- The performance standard is met when the property owner submits annual reports describing compliance with the environmental covenant.

7.0 Documentation of Significant Changes

The preferred alternative presented in the Preferred Plan for OU15 included remediation of three (3) impacted areas along the top of the Lake Erie bluff. Impacted Areas DC-4, DC-5, and DC-6 contained levels of contaminants in soils above acceptable risk-based standards for residential use. Following issuance of the Preferred Plan for OU15: (1) the East Ohio Gas high pressure line was relocated away from the Lake Erie bluff; (2) the bluff was then regraded to address erosion issues, which resulted in the removal of soils from Impacted Areas DC-4, DC-5 and DC-6; and (3) the Site developer revised the Site plan, which changed the end use of the northern portion of OU15 to commercial/recreational rather than residential. These activities eliminated the need for additional remediation of the three (3) impacted areas. Soils and Solvay material (calcium carbonate fines) from the slope grading work, which met residential use standards, were relocated to OU7 for use as fill.

In addition, Ohio EPA determined that it would be more appropriate to maintain the applicable minimum POCs across OU15 through an EC, rather than through an Operation and Maintenance (O&M) Agreement, as was proposed in the Preferred Plan for OU15. Under the EC, the property owner would be required to submit an annual report describing compliance with the environmental covenant, including POCs. Excavation below the applicable minimum POCs would be prohibited unless performed in accordance with an Ohio EPA-approved RMP, in order to protect workers and ensure appropriate management of contaminated soils, materials and ground water.

8.0 Responsiveness Summary

On July 31, 2008, Ohio EPA presented the Preferred Plan for OU3 and OU15 at a public information session and hearing at the Painesville Township Hall. Oral and written comments were accepted at this meeting and during the comment period which ran from June 26, 2008 through August 8, 2008.

No technical comments regarding the OU15 Preferred Plan were received during the public comment period. The two non-technical comments which applied to OU15 and the Diamond Shamrock Site in general are provided below:

Comment One:

"This was not a legal public hearing, because: information about OU3 and OU15 in the Local Public Document Rooms (LPDRs, in Morley Library and Fairport Library) was not kept up to date, and the required thirty day notice was not (?) given."

Response:

The OU3 and OU15 hearing was public noticed and carried out in accordance with Ohio's rules and regulations.

- Copies of the OU3 and OU15 Preferred Plan documents were provided directly to staff in both Morley Library and Fairport Library by Ohio EPA prior to issuance of the public notice.
- As required, Ohio EPA published a public notice at least 30 days prior to the public hearing. On June 30, 2008, a public notice appeared in The News Herald, which is the largest local newspaper of general circulation in the Painesville, Ohio area. This public notice announced the July 31, 2008 public information session and hearing and provided a brief Site history and summary of the preferred plans for both OU3 and OU15. The notice also was published in Ohio EPA's Weekly Review.

Comment Two:

"It is beyond our comprehension why anyone would build a home on the contaminated waste dump known as Diamond Shamrock. Will the Ohio EPA be held accountable for any and all health concerns that may occur if the plan is approved? Knowing the history of the Diamond Shamrock Site we believe the toxic truth needs to be known now and forever. In our opinion, the Ohio EPA has failed its mission to protect the health and safety of Middlefield Ohio residents (referencing the Middlefield contaminated toxic dumps) and we do not want this to happen again. Also, the moderator at the public hearing (limited public questions) at the question and answer segment at the July 31st meeting. Another illustration of the ineptitude of the Ohio EPA which was extremely improper."

Response:

 In order to fulfill requirements of the 1995 DFFOs and the 2005 Federal Judicial Consent Decree, the Painesville PRP Group, on behalf of all of the signatories to the 1995 Director's Final Findings and Orders (DFFOs), performed both baseline and post-remedy human health risk assessments. Under an approved Interim Action Work Plan (IAWP). Significant remediation took place on OU15 following approval of the Baseline Human Health Risk Assessment (BHHRA), including the removal of contaminated soil and placement of clean soils within the OU boundaries. However, in order to be protective of human health and the environment, the additional work outlined in this Decision Document is also required.

Upon completion of remediation under a future Remedial Design/Remedial Action (RD/RA) Order, OU15 will meet residential and commercial/recreational standards. Compliance with these risk-based standards will rely, in part, on an Environmental Covenant (EC) to restrict land and ground water use, as well as maintain minimum points of compliance (POCs) across OU15. The EC will contain an annual reporting requirement to ensure that the minimum applicable POCs are maintained.

- Ohio EPA's Diamond Shamrock Site files are available for review at the Ohio EPA Northeast District Office in Twinsburg. Ohio EPA also maintains record repositories at the Morley Public Library in Painesville and the Fairport Harbor Public Library.
- The Diamond Shamrock Site is located in Painesville Township, the City of Painesville, and the Village of Fairport Harbor, entirely within Lake County, Ohio. The Site has no connection to Ohio EPA-regulated sites in Middlefield, Geauga County, Ohio.
- Citizens attending the July 31, 2008, public meeting were given the opportunity to ask questions and submit comments concerning the Preferred Plan. There were no limits placed on the volume of comments submitted to the Agency during the public comment period, which ended on August 8, 2008.

All written comments received during the public comment period are available for review at Ohio EPA's Northeast District Office, located at 2110 East Aurora Road, Twinsburg, Ohio, and at the Site's public document repositories, located at the Morley Public Library (184 Phelps St., Painesville, Ohio) and the Fairport Harbor Public Library (335 Vine St., Fairport Harbor, Ohio). A stenographic record of the public hearing portion of the meeting is attached.

Appendix A Glossary of Terms

Applicable or Relevant and Appropriate Requirements (ARARs): Those rules that strictly apply to remedial activities at the site or those rules whose requirements would help achieve the remedial goals for the site.

Baseline Risk Assessment: An evaluation of the risks to humans and the environment posed by a site in the absence of any remedial action, which also determines the extent of cleanup needed to reduce potential risk levels to within acceptable ranges.

Carcinogen: A chemical that causes cancer.

CERCLA: Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, 42 U.S.C. 9601 et seq. A federal law that regulates cleanup of hazardous substances sites under the U.S. EPA Superfund Program.

Contaminants of Concern (COCs): Chemicals identified at the site that are present in concentrations that may be harmful to human health or the environment.

Decision Document: A statement issued by the Ohio EPA giving the director's selected remedy for a site and the reasons for its selection.

Ecological Receptor: Animals or plant life exposed or potentially exposed to chemicals released from a site.

Environmental Covenant: A servitude arising under an environmental response project that imposes activity and use limitations and that meets the requirements established in ORC Section 5301.82.

Exposure Pathway: Route by which a chemical is transported from the site to a human or ecological receptor.

Feasibility Study: A study conducted to ensure that appropriate remedial alternatives are developed and evaluated such that relevant information concerning the remedial action options can be presented to a decision-maker and an appropriate remedy can be selected.

Hazardous Substance: A chemical that may cause harm to humans or the environment.

Hazardous Waste: A waste product listed or defined by RCRA that may cause harm to humans or the environment.

Human Receptor: A person/population exposed to chemicals released at a site.

Imminent Threat: A high probability that exposure is occurring.

Monitoring Well: A well installed to collect ground water samples for the purpose of physical, chemical, or biological analyses to determine the amounts, types, and distribution of contaminants in ground water beneath a site.

NCP: National Oil and Hazardous Substances Pollution Contingency Plan, codified at 40 C.F.R. Part 300 (1990), as amended. A framework for remediation of hazardous substance sites specified in CERCLA.

Operation and maintenance (O&M): Long-term measures taken at a site, after the initial remedial actions, to assure that a remedy remains protective of human health and the environment.

Performance Standard: Measures by which Ohio EPA determines if RAOs are being met.

Preferred Plan: The plan that evaluates the preferred remedial alternative chosen by Ohio EPA to remediate the site in a manner that best satisfies the evaluation criteria.

Present Worth Cost: Estimated current cost, or value, of the future remedial costs to be expended, typically discounted at the current market rate. Provides a solid basis for comparing costs of each of the remedial alternatives.

RCRA: Resource Conservation and Recovery Act of 1976, as amended, 42 U.S.C. 6901 et seq. A federal law that regulates the handling of hazardous wastes.

Remedial Action Objectives: Specific remedial goals for reducing risks posed by the site.

Remedial Investigation: A study conducted to collect information necessary to adequately characterize the site for the purpose of developing and evaluating effective remedial alternatives.

Responsiveness Summary: A summary of all comments received concerning the Preferred Plan and Ohio EPA's response to the comments.

Risk-based Remedial Goal: Final cleanup levels identified in the Decision Document along with the RAOs and performance standards

Sediment: Topsoil, sand and minerals washed from the land into water, usually after rain or snow melt.

Water Quality Criteria: Chemical, physical and biological standards that define whether a body of surface water is unacceptably contaminated. These standards are intended to ensure that a body of water is safe for fishing, swimming and as a drinking water source. These standards can be found in OAC Chapter 3745-1.

Appendix B Primary Contaminants of Concern

A total of five (5) primary contaminants of concern (COCs) have been identified that pose the greatest potential risk to human health and the environment at OU15. Additional details on each primary COC (from the Agency for Toxic Substances and Disease Registry (ATSDR Toxicological Profiles) are provided below.

Aluminum is the most abundant metal in the earth's crust. It is always found combined with other elements such as oxygen, silicon, and fluorine. Aluminum as the metal is obtained from aluminum-containing minerals. Small amounts of aluminum can be found dissolved in water. Aluminum is used for beverage cans, pots and pans, airplanes, siding and roofing, and foil. Aluminum is often mixed with small amounts of other metals to form aluminum alloys, which are stronger and harder. breathe large amounts of aluminum dusts can have lung problems, such as coughing or abnormal chest X-rays. Some workers who breathe aluminum dusts or aluminum fumes have decreased performance in some tests that measure functions of the nervous system. Some people with kidney disease store a lot of aluminum in their bodies and sometimes develop bone or brain diseases which may be caused by the excess aluminum. The Department of Health and Human Services (DHHS) and the EPA have not evaluated the carcinogenic potential of aluminum in humans. Aluminum has not been shown to cause cancer in animals.

Dieldrin is an insecticide, with a similar chemical structure to aldrin. Aldrin quickly breaks down to dieldrin in the body and in the environment. Pure aldrin and dieldrin are white powders with a mild chemical odor. The less pure commercial powders have a tan color. Neither substance occurs naturally in the environment From the 1950s until 1970, aldrin and dieldrin were widely used pesticides for crops like corn and cotton. Because of concerns about damage to the environment and potentially to human health, EPA banned all uses of aldrin and dieldrin in 1974, except to control termites. In 1987, EPA banned all uses.

Hexavalent Chromium compounds are a large group of chemicals with varying chemical properties, uses, and workplace exposures. Their properties include corrosion-resistance, durability, and hardness. Workers may be exposed to airborne hexavalent chromium when these compounds are manufactured from other forms of chromium (e.g., the production of chromates from chromite ore); when products containing hexavalent chromium are used to manufacture other products (e.g., chromate-containing paints, electroplating); or when products containing other forms of chromium are used in processes that result in the formation of hexavalent chromium as a by-product (e.g., welding). Hexavalent chromium is a well-established carcinogen associated with lung, nasal, and sinus cancer. Some of the industries in which the largest numbers of workers are exposed to high concentrations of airborne Cr(VI) compounds include electroplating, welding, and chromate painting. Dermal exposure to hexavalent chromium can cause skin irritation, corrosion, ulcers, sensitization, and allergic contact dermatitis.

Manganese is a naturally occurring metal that is found in many types of rocks. Pure manganese is silver-colored, but does not occur naturally. It combines with other substances such as oxygen, sulfur, or chlorine. Manganese occurs naturally in most foods, may be added to some foods, and is needed to stay healthy. Manganese is used principally in steel production to improve hardness, stiffness, and strength. It may also be used as an additive in gasoline to improve the octane rating of the gas. Exposure to excess levels of manganese may occur from breathing air, particularly where manganese is used in manufacturing, and from drinking water and eating food. At high levels, it can cause damage to the brain. Exposure to high levels of manganese in air can also cause lung irritation and reproductive effects. U.S. EPA has concluded that existing scientific information cannot determine whether or not excess manganese can cause cancer.

Vanadium is a compound that occurs in nature as a white-to-gray metal, and is often found as crystals. Pure vanadium has no smell. It usually combines with other elements such as oxygen, sodium, sulfur, or chloride. Vanadium and vanadium compounds can be found in the earth's crust and in rocks, some iron ores, and crude petroleum deposits. Vanadium is mostly combined with other metals to make special metal mixtures called alloys. Vanadium in the form of vanadium oxide is a component in special kinds of steel that is used for automobile parts, springs, and ball bearings. Most of the vanadium used in the United States is used to make steel. Vanadium oxide is a yellow-orange powder, dark-gray flakes, or yellow crystals. Vanadium is also mixed with iron to make important parts for aircraft engines. Small amounts of vanadium can affect the cardiovascular, gastrointestinal, renal, reproductive and respiratory systems. Exposure to vanadium does not appear to cause cancer.

FIGURE 1 Diamond Shamrock Site Map



(Map modified from Bing Maps, www.bing.com, 2014)

FIGURE 2 Operable Unit 15 Location Map



FIGURE 3 Operable Unit 15 Sampling Locations (Pre-Interim Action)



FIGURE 4 Soil/Indoor Air Areas of Concern and Remedy Locations (Post-Interim Action)

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FIGURE 5 Chromite Ore Processing Residue (COPR) Area of Concern



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1 OHIO ENVIRONMENTAL PROTECTION AGENCY PUBLIC HEARING 2 3 4 5 In Re: Draft Preferred Plans for 6 Cleanup Operable Units 3 and 15 7 Diamond Shamrock Painesville Works : 8 . . 9 10 Transcript of proceedings before the 11 Ohio Environmental Protection Agency, taken at 12 Painesville Town Hall, 55 Nye Road, Painesville, 13 Ohio 44077, on Thursday, July 31, 2008, commencing 14 15 at 6:30 p.m. 16 17 18 APPEARANCES: 19 Darla Peelle, Ohio EPA Public Involvement Coordinator 20 Teri Heer, Ohio EPA, Site Coordinator 21 22 RECEIVED 23 24 SEP 1 1 2008 25 OHIO EPA NEDO

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l	MS. PEELLE: The purpose of this
2	public hearing is to accept comments on the
3	official record regarding two draft plans to
4	clean up operable units 3 and 15 two of 24
5	operable units or parcels comprising of the
6	1,100-acre Diamond Shamrock property in
7	Painesville, Ohio.
8	Operable Unit 3 is a 25-acre parcel on
9	the northeast corner of the property and is
10	adjacent to Lake Erie. Sampling throughout
11	the parcel found high concentrations of
12	polycyclic aromatic hydrocarbons, also known
13	as PAHs, in one location. Ohio EPA's
14	preferred cleanup plan calls for removing
15	these contaminated soils, covering with clean
16	soils to prevent direct contact and
17	restricting future use of the portions of
18	Operable Unit 3.
19	Operating Unit 15 is a 100-acre parcel
20	located in the center the property and borders
21	the Grand River and Lake Erie. An earlier
22	cleanup removed soils contaminated with
23	metals, volatile organic compounds and semi
24	volatile organic compounds; however, two areas
25	of contaminated soils remain. Ohio EPA's

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preferred plan proposes to excavate 1 contaminated soils, replace with clean soils 2 and place restrictions on future use. 3 Written and oral comments received as a 4 5 part of the official record are reviewed by Ohio EPA prior to a final action of the 6 7 Director. To be included in the official 8 record, written comments must be received by Ohio EPA by the close of business on 9 August 8, 2008. Comments received after this 10 date will not be considered as part of the 11 official record for this hearing but may be 12 13 reviewed as the opportunity arises. 14 Written comments can be filed with us this evening or submitted to Teri Heer, Site 15 Coordinator, Ohio EPA's Northwest District 16 office -- I'm sorry, Northeast -- 2110 East 17 Aurora Road, Twinsburg, Ohio 44087 or by 18 e-mail. This information also can be found in 19 the agenda and in the presentation. 20 21 It is important for you to know that all comments, whether received this evening or 22 provided in writing are given the same 23 24 consideration. 25 I ask that all exhibits referred to in

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Page 3

1	your testimony be submitted to us this evening
2	as part of the official record. This will
3	help us ensure the accuracy of your testimony
4	Questions and comments made at the
5	public hearing will be responded to in
6	responsiveness summary The Diment
7	taking into consideration the
8	of the program staff.
9	of the program starr and comments presented by
10	the public, may issue or deny these plans.
10	Once a final decision is made by the Director,
11	the decision, along with the responsiveness
12	summary, will be sent to the applicant, all
13	persons who have submitted comments and all
14	persons who have signed in for this evening's
15	meeting.
16	Final actions of the Director are
17	appealable to the Environmental Review Appeals
18	commission also known as ERAC; the board is
19	separate from Ohio EPA and reviews cases in
20	accordance with Ohio's environmental laws and
21	rules. Any ERAC decision is appealable to the
22	Franklin County Court of Appeals. Any order
23	of the Court of Appeals is appealable to the
24	Supreme Court of Ohio.
25	This evening, each individual may
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testify only once and speak for five minutes. 1 Ohio EPA representatives cannot respond to 2 comments or questions during the hearing; 3 hearings afford citizens an opportunity to 4 provide input. An Ohio EPA representative may 5 ask clarifying questions of speakers to ensure 6 7 that the record is as complete as possible. 8 If you have a question that was not asked or responded to during the information 9 session, please ask it on the record and it 10 will be addressed in writing in the 11 12 responsiveness summary. 13 Because of the size of the attendance 14 this evening, rather than fill out cards, I'm going to ask that if you wish to provide 15 testimony, raise your hand. I will call upon 16 17 you; when you are recognized, if you will stand toward the front of the room for the 18 stenographer's benefit, state your name, spell 19 it for the record and then proceed with your 20 21 testimony. 22 Does anyone wish to provide testimony? 23 MR. BIMBER: I have a draft version of my comments. 24 I wish to send you a 25 final version later by e-mail.

Page 5

1 MS. PEELLE: If you could state 2 and spell your name, sir. 3 MR. BIMBER: Sure. I'm Russell M. 4 Bimber. 5 MS. PEELLE: Spell your last name, Mr. Bimber. 6 7 MR. BIMBER: B-i-m-b-e-r. 8 MS. PEELLE: Thank you. 9 MR. BIMBER: A couple of pages from the back of my testimony, I have 10 attached, on this draft version an e-mail I 11 12 sent to a few people to try to encourage 13 attendance here. I was a research chemist for Diamond 14 15 Alkali and successor companies, Diamond Shamrock, SDS Biotech, and Ricerca for 40 16 years starting in 1952. I now live at 156 17 Kendal Drive, Oberlin, Ohio -- that's Kendal 18 in Oberlin. My e-mail address is 19 randcbim@junc.com My phone number is 20 21 (440) 774-6175. First, I would like to inform you that 22 they have copies of the DSCRT newsletters 23 here. The official document room on the 24 25 third-floor of Morley Public Library did not

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Page 6

1	have issues 11 and 12 of that newsletter and
2	they did not even have a copy of the public
3	notice of this meeting. And as I understand
4	it, it is required that you provide the public
5	notice, published in the local newspapers, 30
6	days in advance of any public meeting. I do
7	not believe this was done. The public
8	document room did not even have a copy of a
9	July 18th news release, which I found with
10	Mike Settles' name on it on the Ohio EPA web
11	site, and it was dated, July 18th. If it was
12	placed in any newspapers, it was probably some
13	time on or after that date, so it would seem
14	as though it is too early to be holding this
15	meeting. But anyway, I expect we will proceed
16	anyway.
17	If a legal notice was published. T
18	should have received a mailed copy because
19	I've repeatedly signed up to get any EPA
20	notices concerning Diamond, and I have had
21	significant involvement with the EPA's
22	litigation of Diamond for more than a decade
23	this included the 1998 appeal of the Ohio EPA
24	Director's Final Findings and Orders, DFFO. on

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the Painesville Works, that's Case Number EBR

43392, that stands for Environmental Board of 1 Review, which was before renaming to the 2 Environmental Review Appeals Commission, ERAC, 3 4 which they now use. 5 EBR Number 433921, that appeal was dismissed as being too late because I waited 6 7 for the Director's Final Findings and Orders to appear in the local public document room 8 and I had to keep insisting to Teri that it be 9 placed there, for a long time before I 10 achieved the placement in the local public 11 repositories. After that time, I think I 12 should have been allowed time from that date, 13 but I wasn't. I was too late. I mailed in 14 testimony on Operable Unit 6 for a public 15 hearing on July 7, 2005, which I could not 16 17 attend and, even though I was not a member of the DSCRT, I've attended several of their 18 19 meetings, even after moving at Oberlin. That's about 140 miles west -- excuse me 70, 20 21 140 round-trip. 22 The Diamond Shamrock Community 23 Relations Team Newsletter 12, citing this 24 meeting, was mailed to me postmarked July 11, 25 afternoon. The DSCRT web site, at that time,

had been completely revised and updated by the 1 time I got the newsletter. Now it includes 2 newsletter 12, Summer of 2008. Newsletter 11, 3 Fall of 2007, which I did not get, minutes of 4 DSCRT meetings and other interesting 5 6 information. 7 I checked the web site during the week ended June 28, and it had not been updated 8 9 since November, 2006. 10 Today, I checked Ohio EPA's web site and found an EPA news release about this 11 meeting, dated July 18. Isn't a 30-day notice 12 still required for public meetings? 13 Second. I think it is not proper to 14 consider Operable Unit 3, which surrounds 15 Operable Unit 10 on three sides, apart from 16 Operable Unit 10, because of the large amount 17 of toxic waste buried in Operable Unit 10. 18 Over 3,000,000 pounds of hazardous 19 chemicals, including more than 100,000 gallons 20 of Persistent Bio-accumulative, and Toxic 21 liquids in tanks of 10 to 18,000 gallons were 22 buried in Operable Unit 10. The chlorinated 23 solvents in these tanks are much denser than 24 water, well above the Lake and so close, they 25

1	could get into Lake Erie very guickly, perhaps	
2	moving through Operable Units 3 or 6.	
3	This process could be analogous to the	
4	horizontal flow of large wedge shaped pieces	
5	of earth, both east and west of Operable Unit	
6	10 that were flushed into Lake Erie more than	
7	a decade ago when water from melting snow on	
8	the top of the bluff was temporarily dammed by	
9	ice frozen on the north face of the bluff then	
10	broke loose. This left a lot of fine clay on	
11	top of the ice on the lake hundreds of feet	
12	from shore and a temporary sandy gravel beach	
13	10 to 25 feet wide, which a friend and I both	
14	walked on. It was a very long length of sandy	
15	gravel beach.	
16	MS. PEELLE: You have one minute	
17	Mr. Bimber.	
18	MR. BIMBER: Sure.	
19	MS. PEELLE: Thank you.	
20	You have one minute.	
21	MR. BIMBER: Okay. All right.	
22	I better skip on then. The last couple	
23	of pages I mention some references that could	
24	be useful to some of these other people here	
25	The important thing I wanted to say is	

I

I believe it is still possible to recover about 100,000 gallons of hazardous chlorinated solvents from Operable Unit 10 simply by pumping out whatever liquids remain in about 10 large tanks. If this were done, it would make the other hazardous wastes there, which might otherwise not be likely to migrate, much safer.

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The Persistent Bio-accumulative Toxic liquids in large tanks were impure chlorinated solvents; carbon tetrachloride, usually called Carbon Tet, hexachlorobenzene, known also as HCB, dissolved in Hexachlorobutadiene, HCBD. These and the chlorinated paraffins and chlorothalonil fungicide, which are major contaminants in this OP OU 10, are all known or suspected human carcinogens, in addition to damaging the liver and kidneys and showing other toxic properties.

The exact nature of these wastes was detailed extensively in a letter from John Licata of Diamond Shamrock to Ohio EPA in 1981 and then ODNR protested the existence of so many hazardous waste so close to the edge of the Lake in 1982 and that's what led to the

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Woodward Kline study of 1986. These documents 1 are all contained in Ohio EPA's Twinsburg 2 headquarters. People who want to view these 3 documents have to make an appointment to go 4 5 there and see them. 6 Portions of some of this information 7 that is most important, may be available, sort of hidden in these extensive documents, in the 8 local public document rooms. But if you make 9 an appointment to view certain records and can 10 identify what record you want to see, Ohio EPA 11 will dig them out and you can go there to view 12 13 them and copy what you need. 14 Thank you. 15 MS. PEELLE: Thank you, 16 Mr. Bimber. 17 Would someone else like to provide 18 testimony? 19 My son-in-law us an auctioneer and I usually say going once, going twice. 20 All right. If there are no further requests to 21 present testimony we will end the hearing. 22 Remember that written comments will be 23 accepted through the close of business on 24 August 8, 2008. Again, these can be sent to 25

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1	
1	Teri Heer listed at the address on the agenda.
2	Thank you for participating in Ohio
3	EPA's decision-making process. It was good to
4	see all of you here this evening. The time is
5	now 7:32 and this hearing is adjourned. Thank
6	you.
7	(Hearing concluded.)
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	Page
1	State of Ohio,
2	County of Cuyahoga.
3	
4	CERTIFICATE
5	This certifies that the foregoing is a true
6	and correct transcript of the proceedings had
7	before the State of Ohio, Environmental
8	Protection Agency, at the Painesville
9	Township Hall, on Thursday, July 31, 2008
10	commencing at 6:30 p.m.
11	
12	In Re:
13	Diamond Shamrock Draft Preferred Plans
14	To Clean up Operable Units 3 and 15
15	
16	
17	
18	$\overline{\mathcal{O}}$
19	COURT REPROTED
20	FINCUN-MANCINE COUDE DEDORTER
21	1801 East Ninth Street Suite 1720
22	Cleveland, Ohio 44114 (216) 696-2272
23	(216) 696-2275 FAX
24	

(216) 696-2272

PUBLIC NOTICE Ohio EPA Final Decision Document

On July 21, 2015 the Ohio Environmental Protection Agency (Ohio EPA) finalized a Decision Document identifying the selected alternative to remediate contamination at Operable Unit 15 of the Diamond Shamrock Painesville Works Site, located at 1897 Fairport Nursery Road, Painesville Township, Lake County, Ohio. A copy of the Ohio EPA's Decision Document to remediate the operable unit and related documents are available at the Ohio EPA Northeast District Office, 2110 E. Aurora Road, Twinsburg, Ohio 44081. The complete public notice including instructions for requesting information or appealing this final action may be obtained at: http://www.epa.state.oh.us/Actions.aspx or: Hearing Clerk, Ohio EPA, PO Box 1049, 50 W. Town St. Columbus, Ohio 43216. Ph.: 614-644-2129 email: HClerk@epa.state.oh.us.

Decision Document Narrative for Weekly Review and EPA Web Page

Lake County

PUBLIC NOTICE Ohio EPA Finalizes Decision Document

On July 21, 2015 the Ohio Environmental Protection Agency (Ohio EPA) finalized a Decision Document identifying the selected alternative to remediate contamination at Operable Unit 15 (OU15) of the Diamond Shamrock Painesville Works Site ("Site") located on Fairport Nursery Road, Painesville Township, Lake County, Ohio. OU15 is one of 24 operable units which make up the approximately 1100-acre former chemical manufacturing facility. Activities within OU15 included the manufacturing of soda products, chlorinated chemicals and acids, generation of electricity, and solution mining of salt. Contaminants within OU15 include aluminum, dieldrin, hexavalent chromium, manganese and vanadium. The selected alternative includes: delineation and removal or capping of an area contaminated with hexavalent chromium; restricting ground water use, construction of basements and crawl spaces, and excavations to follow an Ohio EPA-approved risk management plan, requiring a minimum of 2' of clean soil at the surface in areas used for commercial or recreational purposes and a minimum of 4' of clean soil at the surface in residential areas, and prohibiting construction of buildings in certain areas.

In May 2008, Ohio EPA issued a Preferred Plan that outlined Ohio EPA's preferred alternative to remediate contamination at the Site. A public meeting was held on July 31, 2008, during which public comments on the Preferred Plan were accepted. In addition, written comments on the Preferred Plan were accepted through August 8, 2008. The comments received by the Agency during the comment period are addressed in the Responsiveness Summary included in the Decision Document.

The effective date of this final action is July 21, 2015. You are hereby notified that this action of the Director is final and may be appealed to the Environmental Review Appeals Commission pursuant to Section 3745.04 of the Ohio Revised Code. The appeal must be in writing and set forth the action complained of and the grounds upon which the appeal is based. The appeal must be filed with the Commission within thirty (30) days after notice of the Director's action. The appeal must be accompanied by a filing fee of \$70.00 made payable to "Ohio Treasurer," which the Commission, in its discretion, may reduce if by affidavit it is demonstrated that payment of the full amount of the fee would cause extreme hardship. Notice of the filing of the appeal shall be filed with the Director within three (3) days of filing with the Commission. Ohio EPA requests that a copy of the appeal be served upon the Ohio Attorney General's Office,

Environmental Enforcement Section. An appeal may be filed with the Environmental Review Appeals Commission at the Environmental Review Appeals Commission, 77 South High Street, 17th Floor, Columbus, Ohio 43215.

A copy of the Decision Document has been provided to the Morley Library, located at 184 Phelps Street, Painesville, and Fairport Public Library, located at 335 Vine Street, Fairport Harbor. The Decision Document and related materials are available for review at Ohio EPA's northeast district office, located at 2110 East Aurora Road, Twinsburg, by calling (330) 963-1200 to set up an appointment.

APPENDIX B

RD/RA Sow

Painesville PRP Group c/o Glenn Springs Holdings, Inc. 5 Greenway Plaza, Suite 110 Houston, TX 77046 (713) 215-7622

August 21, 2018

Division of Emergency and Remedial Response Ohio Environmental Protection Agency Northeast District Office 2110 East Aurora Road Twinsburg, Ohio 44087

Attention: Mr. Regan Williams

Subject: Remedial Design and Remedial Action (RD/RA) Work Plan for Operable Unit 15 Former Diamond Shamrock Painesville Works Site, Painesville, Ohio

Dear Mr. Williams:

Attached is the revised RD/RA Work Plan for Operable Unit 15 (OU15) of the Former Diamond Shamrock Painesville Works Site. The work plan was revised by Haley & Aldrich based on discussions with Ohio EPA on August 10, 2018. A redline-strikeout showing the revisions is also attached.

The work plan is being submitted in anticipation of the signing of the director's final findings and orders for Remedial Design and Remedial Action at OU15. To accelerate the implementation of remedial actions at OU15, Glenn Springs is prepared to proceed with the proposed pre-design investigations upon receiving Ohio EPA's concurrence on the work plan.

If you have any questions or concerns, please contact Ms. Chris DeJarlais at (517) 625-4138.

Sincerely,

Rick Passmore

Site Coordinator

Enclosure (2)

cc: Mr. Lloyd Ross

ec: Mr. Sig Williams, Ohio EPA, regan.williams@epa.ohio.gov Mr. Ronald Shadrach, Ohio EPA, ronald.shadrach@epa.ohio.gov Ms. Chris DeJarlais, christina_dejarlais@oxy.com Bob Princic, Ohio EPA, bob.princic@epa.ohio.gov Rod Beals, Ohio EPA, rodney.Beals@epa.ohio.gov Emily Patchen, Ohio EPA, emily.patchen@epa.ohio.gov Clint White, Ohio EPA, clint.white@epa.ohio.gov Michael O'Callaghan, SLK, mocallaghan@slk-law.com



www.haleyaldrich.com

REMEDIAL DESIGN/REMEDIAL ACTION WORK PLAN OPERABLE UNIT 15 FORMER DIAMOND SHAMROCK PAINESVILLE WORKS SITE PAINESVILLE, OHIO

by Haley & Aldrich, Inc. Cleveland, Ohio

for Glenn Springs Holdings, Inc. Houston, Texas

File No. 129937 July 2018 Revised August 2018



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1. Introduction

On October 14, 2016, Ohio EPA's Division of Environmental Response and Revitalization issued proposed directors final findings and orders (DFFO) authorized under Chapters 3734 and 6111 of the Ohio Revised Code, requiring the commencement and completion of Remedial Design and Remedial Action (RD/RA) at Operable Unit (OU) 15 of the former Diamond Shamrock Painesville Works Site (Site). While the Final Order negotiations are not complete, this RD/RA Work Plan is proposed to accelerate the field activities in anticipation of the final orders.

The Site is located at 1897 Fairport Nursery Road, Painesville Township, Lake County, Ohio (Figure 1). OU15 is located within the north central portion of the Site with portions both north and south of Fairport Nursery Road, Painesville Township, Lake County, Ohio (Figure 2). OU15 is owned by Mariana Properties Inc., a wholly-owned subsidiary of Glenn Springs Holdings, Inc. (Glenn Springs). The proposed DFFO sets forth the responsibilities and obligations of Occidental Chemical Corporation (OxyChem) and Ohio EPA until the RD/RA is completed. Glenn Springs, an affiliate of OxyChem will manage the activities associated with the RD/RA for OU15.

The DFFO was proposed based on the presence of elevated concentrations of various contaminants, including hexavalent chromium, in soil that exceed applicable standards. The other contaminants have been addressed through interim measures including establishment of necessary soil cover and an environmental covenant is required to formalize the prohibitions on groundwater use, land use and soil management. This Remedial Design/Remedial Action Work Plan fulfills Task I and II of the requirements of the DFFO and associated Generic Scope of Work.



2. Background

2.1 PHYSICAL SETTING AND SITE HISTORY

OU15 is approximately 99-acres in size and is located in the north-central portion of the Site. The Site is approximately 1,100 acres and is located in northern Lake County, Ohio. The Site is bordered by industrial and vacant property to the east, residential and commercial/industrial properties to the west, Lake Erie to the north, and residential property to the south (Figure 1). The Grand River bisects the Site from east to west. The Site has been divided into 24 Operable Units (Figure 2).

The Site includes all known areas of manufacturing or other industrial use, areas of disposal, and other areas that are or may be contaminated. Diamond Shamrock began shutting down the Site in 1972, and the last Site operations ceased in 1977. Portions of the Site were sold to other entities, which performed a variety of commercial and industrial activities within its boundaries.

On July 25, 1999, Ohio EPA approved the Remedial Investigation (RI) Report for Phase I activities at the Site. These activities included the collection and analysis of soil, groundwater, surface water and sediment samples across the Site. On September 22, 2003 the Phase II RI Report was approved by Ohio EPA. The Phase I and Phase II RI Reports identified public health and environmental risks at the Site resulting from contaminated groundwater, soil, surface water, and sediment. The RI Reports characterized the nature and extent of the contaminants released at the Site and the potential risks to human health and safety and the environment.

The results from the RI demonstrated that soil contamination in four areas of concern (AOCs) within OU15 posed, or potentially posed, unacceptable risks and/or hazards to human and/or ecological receptors sufficient to trigger the need for remedial actions. Based on interim actions including excavation and cover and a revision to the land use plan, three of the four AOCs no longer pose unacceptable risks; the remaining AOC is the area of chromium ore processing residue (COPR) contamination (Figure 3).

In October 2007, Ohio EPA approved the Feasibility Study (FS) Report for OU15, which presented an array of remedial alternatives to address remaining contamination within the OU. In May 2008, Ohio EPA notified the public of its Preferred Plan for remediation of OU15 and solicited public comments. The Preferred Plan identifies and explains Ohio EPA's preferred alternative for the remedial action at OU15.

On July 31, 2008, Ohio EPA held a public meeting and hearing on the Preferred Plan. The public comment period ended on August 8, 2008. On July 21, 2015, Ohio EPA issued a Decision Document, which selected the remedy for the Site and included responses to the public comments in the form of a responsiveness summary.

2.2 SUMMARY OF OPERABLE UNIT CONDITIONS

OU15 is located in the north-central portion of the Site. Fairport Nursery Road (S.R. 585), which is oriented eastwest, bisects OU15. OU15 is bordered to the north by Lake Erie, to the east by OU2, OU6, OU16 and OU20, to the south by the Grand River, and to the west by OU7, OU12 and an off-Site commercial/residential area. OU15 currently consists of vacant land which has undergone interim remediation as described in the June 2007 *Construction Certification Report* for completion of interim actions activities at OU15.



It was determined that unacceptable post-interim action indoor air risk exists for future residents and recreational users in certain portions of OU15. This risk can be eliminated through the establishment of an environmental covenant, which would prohibit construction of habitable structures within OU15 without engineering controls or otherwise demonstration of acceptable conditions, as well as prohibit the construction of basements and crawl spaces across OU15. During the Phase II RI, Ohio EPA determined that a Baseline Ecological Risk Assessment (BERA) was not necessary for OU15 due to the continual maintenance of the soil cover, as well as the planned future development activities; groundwater modelling indicated no unacceptable ecological risk via groundwater to surface water discharge.

Generally, areas for future residential use within OU15 have a minimum of four feet of soils at the surface which meet residential risk-based standards, and areas for future commercial/recreational use have a minimum of two feet of soils at the surface which meet commercial/recreational risk-based standards. However, during the installation of a storm drain, suspected COPR, which contains hexavalent chromium was found in the southern portion of OU15 (Figures 3 and 4). Although the elevated hexavalent chromium concentrations are greater than four feet below ground surface, hexavalent chromium from COPR has been observed to migrate upwards through soil. The extent of hexavalent chromium at concentrations greater than the final remediation level (RL) of 467 mg/kg was estimated as shown on Figure 3. However, additional investigation (i.e., Pre-Design Study) will be conducted to verify the horizontal extent of chromium greater than the RL.

Generally, the subsurface geology beneath OU15 consists of a mixture of non-native fill material (including Solvay process material (Solvay residuals) within the former Settling Basin/Hydroretention Basin), glacial tills, alluvial deposits, and shale bedrock. Within the area of elevated chromium, the subsurface consists of soil fill over a slag and possible COPR. Solvay residual, presumably from Settling Basin 1, was encountered beneath the slag and possible COPR. Based on understanding of the Site history and geology, it is presumed silt and clay, and then bedrock, underlie the Solvay residual.

Due to the poor yield of groundwater at the Site, Ohio EPA has concurred with the Painesville PRP Group that potable use groundwater exposure pathways do not apply to the Former Diamond Shamrock Painesville Works Site. It should also be noted that groundwater beneath the Site is not of sufficient quality for potable use. Specifically, highly productive zones exist within the bedrock below the Site, but these zones primarily yield non-potable brine. Groundwater beneath the southern portion of OU15 migrates toward the Grand River and the groundwater beneath the northern portion migrates toward Lake Erie. Constituents in groundwater beneath OU15 were evaluated as part of the RI/FS and was determined not to pose unacceptable risk to construction workers or for potential migration to the Grand River and Lake Erie.

2.3 REMEDIAL ACTION OBJECTIVES AND REMEDIATION LEVELS

An FS to define and analyze appropriate remedial alternatives was completed with Ohio EPA oversight and was approved in October 2007. As part of the RI/FS process, Remedial Action Objectives (RAOs) were developed in accordance with the National Contingency Plan, pursuant to the federal Comprehensive Environmental Response, Compensation and Liability Act of 1980, and U.S. EPA guidance. The RAOs are goals that a remedy should achieve in order to ensure protection of human health and the environment.

Per the Decision Document, the RAOs for OU15 include those listed in Table 1 below.



Groundwater	
Human Health Risk	Prevent ingestion/direct contact of groundwater across OU15 containing carcinogens in excess of a total excess lifetime cancer risk (for all contaminants) greater than 1x10 ⁻⁵
Human Health Risk	Prevent ingestion/direct contact of groundwater across OU15 containing noncarcinogens in excess of a HQ or HI greater than 1.
Human Health Risk	Prevent inhalation in future structures of carcinogens (including 1,2- dichloroethane, benzene, carbon tetrachloride, chloroform, tetrachloroethene, trichlorethene, and vinyl chloride) in vapors emanating from groundwater in excess of a 1×10^{-5} excess lifetime cancer risk.
Human Health Risk	Prevent inhalation in future Site structures of non-carcinogens (including 1,1- dichloroethene) in vapors emanating from groundwater in excess of a HQ or HI of 1.
Soil	
Human Health Risk	Prevent ingestion/direct contact with soil located across OU15, below the applicable minimum points of compliance, containing carcinogens (including volatile and semi-volatile chemicals, pesticides, PCBs and metals) in excess of a total excess lifetime cancer risk greater than 1x10 ⁻⁵
Human Health Risk	Prevent ingestion/direct contact with soil located across OU15, below the applicable minimum points of compliance, containing non-carcinogens (including volatile and semi-volatile chemicals, pesticides, PCBs and metals) in excess of a HQ or HI greater than 1.
Human Health Risk	Prevent inhalation in future Site structures of carcinogens (including 1,2- dichloroethane, benzene, carbon tetrachloride, chloroform, tetrachloroethene, trichlorethene, and vinyl chloride) in vapors emanating from soil in excess of a 1x10 ⁻⁵ excess lifetime cancer risk.
luman Health Risk	Prevent inhalation in future Site structures of non-carcinogens (including 1,1- dichloroethene) in vapors emanating from soil in excess of a HQ or HI of 1.

Table 1. Remedial Action Objectives

A Site-specific Remediation Goal (RG) of 467 milligrams per kilogram (mg/kg) was established for hexavalent chromium for soil in the point of compliance for recreational use (zero to two feet) or requiring wicking barrier if greater than two feet below ground surface. Per the Decision Document, the remaining COCs and associated RGs, now termed final RLs, for OU15 are shown in Table 2 below.

Table 2. Remediation Levels

Medium	сос	RL (mg/kg)
Soils: Human Direct Contact	Hexavalent chromium	467



2.4 SELECTED REMEDIAL ALTERNATIVE AND PERFORMANCE STANDARDS

The selected remedial alternative, as described in the Decision Document, consists of the following:

- Further delineation and remediation of the suspected COPR AOC through either: (1) removal of the COPR and consolidation in pre-constructed cells within OU16, a COPR disposal/consolidation area, as approved in letters by U.S. EPA (8 January 2008) and Ohio EPA (23 January 2008); (2) removal of the COPR and disposal off-Site at a licensed solid waste or hazardous waste landfill, as appropriate; or (3) covering any portions of the AOC that exceed the Site-specific risk-based remedial goal for hexavalent chromium of 467 mg/kg, with an engineered cap, consisting of a 12-inch base layer of compacted clay, geotextile, 40-mil geomembrane and another 12 inches of compacted clay, to prevent the upward wicking of hexavalent chromium from the COPR.
- Establishment of an environmental covenant which would:
 - Prohibit residential development on portions of OU15 which do not meet residential riskbased standards, and restrict those portions to recreational use with the applicable two-foot minimum point of compliance (POC);
 - Require establishment of a four-foot minimum POC in those portions of OU15 designated for residential use;
 - Prohibit excavation below the applicable minimum two-foot POC in the areas of OU15 designated as recreational use and below the applicable minimum four-foot POC in the areas of OU15 designated as residential land use;
 - Prohibit construction of habitable structures at specific locations within OU15 where unacceptable risk exists to human health due to volatilization of contaminants to indoor air;
 - Prohibit the construction of sub-grade habitable structures (i.e., basements and/or crawl spaces) across the entirety of OU15;
 - Require maintenance of undeveloped portions of OU15 in a manner that would prevent the development of ecological habitat that could sustain potential important ecological receptors or otherwise demonstrate such potential exposures would be acceptable;
 - Prohibit the extraction of groundwater for potable or non-potable use within OU15, with the exception of environmental investigation, remediation, and monitoring;
 - Prohibit any excavation in the area covered by an engineered cap and liner system installed as part of COPR remediation activities (as appropriate); and
 - Prohibit all excavation by construction workers unless the excavation is performed in accordance with an Ohio EPA approved risk management plan (RMP).

For removal actions (options 1 and 2) of the selected remedy (delineation and remediation of the COPR area of concern): the performance standard is met when:

- COPR-contaminated soil, delineated as part of future Ohio EPA-approved RA activities, has been
 removed and confirmatory sample analyses demonstrate that the remaining soil meets the
 acceptable levels referenced in the soil RAOs (i.e., 467 mg/kg for hexavalent chromium); and
- Confirmatory sampling, performed immediately following soil removal activities per an Ohio EPA-approved RA work plan, documents the presence of the applicable minimum POC (two feet in commercial/recreational and four feet in residential use areas), including levels of hexavalent chromium below the acceptable soil RAO of 467 mg/kg, and passes an Ohio EPA inspection.



For the engineer cap action (option 3), the performance standard is met when an engineered cap and liner system is placed over COPR-contaminated soil, delineated as part of Ohio EPA-approved RA activities per an Ohio EPA-approved work plan, and passes an Ohio EPA inspection.

For the second listed component of the selected remedy (establishment of an environmental covenant):

- The performance standard is met when documentation that the environmental covenant, including the restrictions identified above, has been recorded in the Lake County Recorder's Office and is provided to Ohio EPA;
- The performance standard is met when the restrictions identified in the environmental covenant are continually enforced, such that the RAOs for the various media are met, until such institutional controls are no longer necessary; and
- The performance standard is met when the property owner submits annual reports describing compliance with the environmental covenant.



3. General Requirements

3.1 SITE ACCESS

The Site is owned by and under the control of the respondents therefore, no third-party access agreement is required.

3.2 REGULATORY COMPLIANCE PLAN

Based on the <u>final anticipated</u>-size of the remedial action, permits <u>for storm water management during</u> <u>construction may be required</u>. The design plans will define the anticipated size of the area of soil to be <u>disturbed and if storm water management permits</u> are required. Other permits are not anticipated to be required from federal, state, or local regulatory authorities to execute this Work Plan, including the pre-design study, remedial design, or remedial action.

An active railroad is present in OU22 south of the suspected COPR area. Glenn Springs will coordinate with the railroad company during execution of any work required within the railroad easement.



4. Pre-Design Studies Plan

Additional data regarding the extent of contamination are necessary before remedial design/remedial action can proceed, as described below.

4.1 FIELD SAMPLING PLAN

Consistent with anticipated DFFO requirements, the objective of the field sampling plan is to refine and verify the horizontal extent of hexavalent chromium contamination observed in soil at historical sampling locations (Figure 4). A number of samples, primarily within the upper portion of the Solvay residual exceeded the established RL of 467 mg/kg for hexavalent chromium.

The proposed scope of work includes collection of soil samples at 12 new locations (OU15-B101 through OU15-B112) as shown on Figure 4 and as indicated in Table 3. Discrete soil samples will be collected for laboratory analysis from each of these 12 locations as follows¹:

- From a depth of zero to two feet below ground surface;
- From midway between the ground surface and the top of slag/potential COPR (where observed);
- From potential COPR (where observed); and
- From Solvay material, if encountered.

Based on previous investigations, the terminal boring depth at each location is expected to be approximately two feet into the Solvay material (where observed) or reaching native non-filled soil, whichever is first. We anticipate the borings will extend approximately 30 feet below ground surface and will vary depending on the current surface topography. The sampling intervals were selected to provide characterization for the recreational point of compliance (zero to two feet), evaluate the soil above the slag or Solvay residual for proper management during construction, and to evaluate the chromium concentrations of the slag and Solvay residual. Field sampling procedures will be conducted in accordance with the Diamond Shamrock Painesville Works Site *Quality Assurance Project Plan* (QAPP) *for Remedial Design/Remedial Action and Supplemental Feasibility Study Sampling* (August 2007) and applicable addenda.

The approach described above will be executed in a dynamic manner that will depend upon field conditions. Additional soil samples may be collected from a given location and additional borings may be advanced beyond the horizontal limits of those currently proposed in order to complete the delineation. This approach in sampling execution may limit the number of rounds of investigation planning, execution, and data evaluation in support of achieving the proposed schedule and overall efficiency. Additional sampling and data collection will occur beyond that described herein if deemed necessary for the design. Ohio EPA will be consulted prior to any reduction to the pre-design investigation.

Material from the borings will be visually inspected and screened in the field using a PID equipped with an 11.7 eV lamp consistent with the methods described in the QAPP, and stratigraphy and other relevant observations will be recorded. If unexpected non-soil materials are encountered, a discrete

¹ Sample collection depths were selected in consideration of the data currently available, the required future twofoot POC for recreational use, and the selected remedy (excavation and/or capping).



sample of each material will be collected for laboratory analysis; analyses for such materials may be expanded beyond hexavalent chromium subject to discussion with Ohio EPA.

Upon completion of sampling, borings will be backfilled in accordance with the methods described in the QAPP. A licensed surveyor will obtain ground surface elevations and boring locations based on the Site coordinate system. The samples will be submitted to Eurofins Lancaster Laboratories and the analytical results will be validated in accordance with the QAPP.

4.2 HEALTH AND SAFETY PLAN

The work to be conducted for OU15 per the field sampling plan will be executed in accordance with the Health and Safety Plan (HASP) (July 2011) developed for the Site, which is incorporated herein by reference.

4.3 QUALITY ASSURANCE PROJECT PLAN (QAPP)

The work to be conducted for OU15 per the field sampling plan will be executed in accordance with the QAPP prepared for the Site. The QAPP and associated addenda are incorporated herein by reference.



5. Remedial Design Requirements

The remedial design procedures discussed below have been stipulated in accordance with the Generic Statement of Work (SOW) provided as Appendix B of the DFFO.

5.1 GENERAL REQUIREMENTS FOR PLANS AND SPECIFICATIONS

Construction plans, specifications and supporting plans to implement the remedial action will be prepared and submitted to Ohio EPA as defined in the Purpose and Description of the Remedial Action section of the Generic SOW, the Decision Document and/or the DFFO.

The construction plans and specifications will comply with the standards and requirements outlined below. All design documents will be clear, comprehensive and organized. Supporting data and documentation sufficient to define the functional aspects of the remedial action will be provided. The design documents will demonstrate that the remedial action will be capable of meeting all objectives of the Decision Document, including any performance standards as previously described.

The plans and specifications will include the following:

- Discussion of the design strategy and design basis including:
 - Compliance with requirements of the Decision Document and the DFFO and all applicable regulatory requirements
 - Minimization of environmental and public health impacts
- Discussion of the technical factors of importance including:
 - Use of currently accepted environmental control measures and technologies
 - The constructability of the design
 - Use of currently accepted construction practices and techniques
- Description of the assumptions made and detailed justification for those assumptions;
- Discussion of possible sources of error and possible operation and maintenance problems;
- Detailed drawings of the proposed design including, as appropriate:
 - Qualitative flow sheets
 - Quantitative flow sheets
- Tables listing equipment and specifications;
- Tables giving material and energy balances; and
- Appendices may include the following:
 - Sample calculations (one example presented and clearly explained for significant or unique calculations);
 - Derivation of equations essential to understanding the report; and
 - Results of laboratory tests, field tests and any additional studies.



5.2 DESIGN PHASES

The selected remedy for OU15 consists of excavation and/or capping (and an environmental covenant). Because the design and implementation of the remedy is not expected to be complex, and in the interest of efficiency and the proposed schedule, only two design phases are proposed (i.e., intermediate and pre-final design combined into final design).

5.2.1 Preliminary Design

A Preliminary Design, which reflects the design effort at approximately 30% completion, will be submitted to Ohio EPA for review and comment. At this stage of the design process, existing conditions at the Site that may influence the design and implementation of the selected RA will have been verified. The Preliminary Design will demonstrate that the basic technical requirements of the remedial action and any permits required have been addressed. The Preliminary Design will be reviewed to determine if the final design will provide an operable and usable RA that will be in compliance with all permitting requirements and response objectives. The Preliminary Design submittal will include the following elements, at a minimum, as applicable:

- Preliminary plans, drawings and sketches, including design calculations;
- Results of additional field sampling;
- Outline of design specifications;
- Expected long-term operation and monitoring requirements;
- Real estate and easement requirements;
- Preliminary construction schedule, including contracting strategy; and
- Revised cost estimate.

The supporting data and documentation necessary to define the functional aspects of the RA will be submitted with the Preliminary Design. The technical specifications will be outlined in a manner that anticipates the scope of the final specifications. Design calculations will be included with the Preliminary Design completed to the same degree as the design they support. Any revisions or amendments to the Preliminary Design required by Ohio EPA will be incorporated into the subsequent design phase.

The Preliminary Design will also include the Pre-Design Studies Report for the activities described in Section 4. The Pre-Design Studies report will include a summary of objectives, technical approach/methodology, significant observations/findings, conclusions, and recommendations, with sample analysis results provided in tabular and graphic format.

5.2.2 Final Design

Comments, if any, from Ohio EPA on the Preliminary design will be incorporated into the Final Design. The Final Design will include the following:

- Design Plans and Specifications
- Construction Quality Assurance Plan
- Performance Standard Verification Plan
- Risk Management Plan (which includes any operation and maintenance requirements)
- Remedial Action Implementation Plan
- Estimated Cost of the Remedial Action
- Health and Safety Plan



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The purpose and content of the above plans is described in the DFFO Generic SOW. As indicated in the Decision Document for OU15, Ohio EPA determined that it would be more appropriate to maintain the applicable minimum POCs across OU15 through an EC, rather than through an Operation and Maintenance Plan. The environmental covenant will include a requirement to submit an annual report describing compliance with the environmental covenant, including POCs. Excavation below the applicable minimum POCs would be prohibited unless performed in accordance with an Ohio EPA-approved Risk Management Plan noted above.

Corrections or changes will be made based on Ohio EPA comments on the Final Design submittals. The revised Final Design will then be submitted in its entirety to Ohio EPA for approval as the completed Final Design. Upon approval of the Site Coordinator, final corrections may be made by submitting corrected pages to the Final Design documents. The quality of the Final Design submittal will be commensurate to what could be in a bid package to invite contractors to submit bids for the construction project.

5.3 ESTIMATED COST OF THE REMEDIAL ACTION

The cost estimate developed in the Feasibility Study will be refined to reflect the preliminary and detailed plans and specifications being developed for the RA. The cost estimate will include both capital and operation and maintenance costs for the entire project. The final estimate will be based on the revised final approved plans and specifications. It will include any comments by Ohio EPA during the preliminary design review, and reflect current prices for labor, material and equipment.

5.4 REMEDIAL ACTION IMPLEMENTATION PLAN

As mentioned above, a Remedial Action Implementation Plan (RAIP) will be prepared and submitted with the Final Design. The RAIP will help coordinate implementation of the various components of the RA. It will include a schedule for the RA that identifies timing for initiation and completion of all critical path tasks. The RAIP will specifically identify dates for completion of the project and major interim milestones in conformance with the approved RD/RA Work Plan schedule. The RAIP is a management tool, which will address the following topics:

- Activities necessary to fully implement each of the components of the RA;
- How these activities will be coordinated to facilitate construction/implementation in accordance with the approved schedule;
- Potential major scheduling problems or delays, which may impact overall schedule;
- Lines of communication for discussing and resolving problems, should they arise; and
- Common and/or anticipated remedies to overcome potential problems and delays.

5.5 COMMUNITY RELATIONS SUPPORT

The Site has a Community Relations Program in place through the Diamond Shamrock Community Relations Team (DSCRT). Glenn Springs will cooperate and support Ohio EPA and DSCRT in community relations efforts.

6. Remedial Action Construction Requirements

Following approval of the Final Design submittal by Ohio EPA, the designed remedial action will be performed in accordance with the plans, specifications, Construction Quality Assurance Plan (CQAP), Performance Standard Verification Plan, Health and Safety Plan, Remedial Action Implementation Plan, Quality Assurance Project Plan, and Field Sampling Plan approved with the final design. Implementation will include the activities described below.

6.1 PRECONSTRUCTION INSPECTION AND CONFERENCE

A preconstruction inspection and conference will be conducted with Ohio EPA to accomplish the following:

- Review methods for documenting and reporting inspection data;
- Review methods for distributing and storing documents and reports;
- Review work area security and safety protocol;
- Discuss any appropriate modifications to the CQAP to ensure that Site-specific considerations are addressed. The CQAP will be submitted to Ohio EPA at this time, if it has not already been submitted;
- Introduce key construction contractor, engineering and project management personnel and review roles during construction activities;
- Conduct a Site walk-around to verify that the design criteria, plans, and specifications are understood and to review material and equipment storage locations.

The preconstruction inspection and conference will be held within 10 days of the award of the construction contract. The preconstruction inspection and conference will be documented by a designated person and minutes (Preconstruction Inspection and Conference Report) will be transmitted to all parties in attendance.

6.2 DESIGN CHANGES DURING CONSTRUCTION

During construction, unforeseen site conditions, changes in estimated quantities of required construction materials and other problems associated with the project may develop. Such changing conditions may require either major or minor changes to the approved Final Design. Certain design changes will require approval of Ohio EPA prior to implementation to ensure that the intent and scope of the remedial action is maintained. Changes which could alter the intent or scope of the RA may require a revision to the Decision Document and a public comment period. Examples of changes to the remedial design which require Ohio EPA written approval prior to implementation include:

- Those that involve the deletion or addition of a major component of the approved remedy (e.g., deleting any designed layer of a multi-layer cap);
- Any changes that may result in an increase of the exposure to chemicals of concern and/or risk to human health or the environment as compared to the goals for the completed remedial action as stated in the DFFO, the Generic SOW, the Decision Document, the RD/RA Work Plan, and the approved Final Design;
- Those that result in a significant delay in the completion of the RA;
- Any other changes that alter or are outside of the scope or intent of the approved remedial design.



Ohio EPA will be notified of other changes made during construction through routine communications and monthly progress reports.

6.3 REMEDIAL ACTION CONSTRUCTION COMPLETION AND ACCEPTANCE

As the construction of the remedial action nears completion, the following activities and reporting will be completed to ensure proper project completion, approval, closeout and transition to the operation and maintenance/monitoring phase.

6.3.1 Final Construction Conference and Inspection

Based on the nature of the selected remedy, and to promote efficiency and meet the proposed schedule, the Pre-final Construction Conference and Pre-final Inspection will be combined into the Final Construction Conference and Inspection. It is anticipated that Ohio EPA will have made interim inspections during work execution.

Within seven days of making a determination that construction is complete, written notification (Notification of Preliminary Completion of Construction/Final Inspection) will be provided to Ohio EPA and a final construction conference will be held with the construction contractor(s) to discuss procedures and requirements for project completion and closeout. Participants will include the Project Manager for Glenn Springs, the Site Coordinator for Ohio EPA, all contractors involved with construction of the remedial action and the remedial design agent (person(s) who designed the remedy), if requested.

A list of suggested items to be covered at the conference includes, but is not limited to the following:

- Final Risk Management Plan submission, if it has not been submitted already;
- Cleanup responsibilities;
- Demobilization activities; and
- Security requirements for project transfer.

Following the final construction conference, a final inspection of the project will be conducted. The final inspection will be led by Ohio EPA with assistance from Glenn Springs, if requested. The final inspection will consist of a walk-through inspection of the entire Site. The completed Site work will be inspected to determine whether the project is complete and consistent with the contract documents and the approved RD/RA Work Plan and approved Final Design. Any outstanding deficient or incomplete construction items should be identified and noted during the inspection. If any work scope items remain deficient or incomplete, the inspection will be considered a pre-final inspection requiring another final inspection and report.

6.3.2 Construction Completion Report and Certification

Upon satisfactory completion of the final inspection, a Construction Completion Report will be prepared and submitted to Ohio EPA within 30 days after the final inspection. The report will include the following elements:

- A brief description of any outstanding construction items from the final inspection and an indication that the items were satisfactorily resolved, if applicable;
- A synopsis of the work defined in the approved RD/RA Work Plan and the Final Design and certification that this work was performed;



- An explanation of any changes to the work defined in the approved RD/RA Work Plan and Final Design, including as-built drawings of the constructed RA facilities, and why the changes were necessary or beneficial for the project; and
- Certification that the constructed RA or component of the RA is operational and functional.

The Construction Completion Report will be reviewed by Ohio EPA. If Ohio EPA's review indicates that corrections or amendments to the report are necessary, comments will be provided. A revised report will be submitted, based on Ohio EPA comments, to Ohio EPA within 30 days of receipt of those comments. Upon determination by Ohio EPA that the report is acceptable, written notice of Ohio EPA's approval of the Construction Completion Report will be provided.

6.3.3 Community Relations Support

Support will be provided for Ohio EPA's community relations program and DSCRT during remedial action implementation as required.



7. Operation and Maintenance/Performance Monitoring

Performance monitoring and operation and maintenance procedures will be implemented, as required by the approved Performance Standard Verification Plan and approved Risk Management Plan, once it is demonstrated that the RA components are operational and functional. The approved Risk Management Plan will be incorporated into the environmental covenant for OU15.

7.1 COMPLETION OF REMEDIAL ACTION REPORT

At the completion of the remedial action, a Completion of Remedial Action Report will be prepared and submitted to Ohio EPA. The RA will be considered complete when the goals, performance standards and cleanup standards for the RA as stated in the Decision Document, the DFFO, the Generic SOW, the RD/RA Work Plan and the approved Final Design (including changes approved during construction) have been met. The report will document that the project is consistent with the design specifications, and that the RA was performed to meet or exceed all required goals, cleanup standards and performance standards. The report will include, but not be limited to the following elements:

- Synopsis of the remedial action and certification of the design and construction;
- Listing of the cleanup and performance standards as established in the Decision Document and the DFFO, and any amendments to those standards with an explanation for adopting the amendments;
- Summary and explanation of any changes to the approved plans and specifications. An
 explanation of why the changes were necessary will be included and, where necessary, Ohio EPA
 approval of the changes will be documented;
- Summary of operation of treatment systems including monitoring data, indicating that the remedial action met or exceeded the performance standards or cleanup criteria; and
- Explanation of any monitoring and maintenance activities to be undertaken at the Site in the future.


8. Reporting Requirements

8.1 MONTHLY PROGRESS REPORTS DURING REMEDIAL DESIGN AND REMEDIAL ACTION CONSTRUCTION

Monthly progress reports will be provided to Ohio EPA during the design and construction phases of the remedial action and will contain the information listed below.

- A description of the work performed during the reporting period and estimate of the percentage of the RD/RA completed;
- Summaries of all findings and sampling during the reporting period;
- Summaries of all changes made in the RD/RA during the reporting period, indicating consultation with Ohio EPA and approval by Ohio EPA of those changes, when necessary;
- Summaries of all contacts with representatives of the local community, public interest groups or government agencies during the reporting period;
- Summaries of all problems or potential problems encountered during the reporting period, including those which delay or threaten to delay completion of project milestones with respect to the approved work plan schedule or RAIP schedule;
- Summaries of actions taken and being taken to rectify problems;
- Summaries of actions taken to achieve and maintain cleanup standards and performance standards;
- Changes in personnel during the reporting period;
- Projected work for the next reporting period; and
- Inspection reports, sampling data, laboratory/monitoring data, etc.

8.2 SUMMARY OF REPORTS AND SUBMITTALS

A summary of the anticipated reporting requirements described in this RD/RA SOW is presented below:

- RD/RA Work Plan
 - Health and Safety Plan (incorporated existing)
 - Regulatory Compliance Plan
 - Pre-Design Studies Plan (incorporated in RD/RA Work Plan)
 - Quality Assurance Project Plan (incorporated existing)
 - Field Sampling Plan (incorporated existing)
- Monthly Progress Reports During Remedial Design
- Preliminary Design Documents
 - Pre-Design Studies Report (to be included with Preliminary Design Documents)
- Final Design Documents
 - Construction Quality Assurance Plan
 - Remedial Action Implementation Plan
 - Performance Standard Verification Plan
 - Risk Management Plan
 - Health and Safety Plan (incorporated existing)
- Preconstruction Inspection and Conference Report
- Monthly Progress Reports During Remedial Action
- Notification of Preliminary Completion of Construction/Final Inspection
- Final Construction Inspection and Conference Report

- Final Risk Management Plan
- Construction Completion Report
- Progress Reports During O&M/Performance Monitoring
- Completion of Remedial Action Report



9. Anticipated Schedule

The following presents the anticipated schedule for completion of major remedial design and remedial action milestones for OU15. The schedule is predicated on the assumption that the remedy will consist of excavation and/or capping of a relatively limited area of soil impacted only by hexavalent chromium.

TASK

APPROXIMATE DURATION

RD/RA WORKPLAN (including Pre-Design Work Plan)	
Ohio EPA review/comment	30 days
Final RD/RA Work Plan	15 - 30 davs
Ohio EPA review/approval	30 days
PRE-DESIGN STUDIES IMPLEMENTATION	
Field implementation, including receipt of all laboratory analyses	60-days after approval of Pre-Design Work Plan
REMEDIAL DESIGN	
Preliminary Design with Pre-Design Studies Report	45 days after pre-design study data available
Ohio EPA review/comment	30 days
Final Design	15 - 30days
Ohio EPA review/approval	30 days
REMEDIAL ACTION CONSTRUCTION	
Preconstruction Conference/Inspection	15-30 days after final design approval
Remedial Action Implementation	90 days after Preconstruction Conference
Final Construction Conference/Inspection	90 days after Preconstruction Conference
Draft Construction Completion Report and Certification	45 days after Final Inspection
Ohio EPA review/comment	30 days
Final Construction Completion Report and Certification	15 – 30 days
Ohio EPA review/approval	30 days

Based on the above, it is anticipated that the Final Construction Completion Report and Certification can be approved between 390 to 540 days after submittal of this work plan.



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REMEDIAL DESIGN/REMEDIAL ACTION WORK PLAN OPERABLE UNIT 15 FORMER DIAMOND SHAMROCK PAINESVILLE WORKS SITE PAINESVILLE, OHIO

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1. Introduction

On October 14, 2016, Ohio EPA's Division of Environmental Response and Revitalization issued proposed directors final findings and orders (DFFO) authorized under Chapters 3734 and 6111 of the Ohio Revised Code, requiring the commencement and completion of Remedial Design and Remedial Action (RD/RA) at Operable Unit (OU) 15 of the former Diamond Shamrock Painesville Works Site (Site). While the Final Order negotiations are not complete, this RD/RA Work Plan is proposed to accelerate the field activities in anticipation of the final orders.

The Site is located at 1897 Fairport Nursery Road, Painesville Township, Lake County, Ohio (Figure 1). OU15 is located within the north central portion of the Site with portions both north and south of Fairport Nursery Road, Painesville Township, Lake County, Ohio (Figure 2). OU15 is owned by Mariana Properties Inc., a wholly-owned subsidiary of Glenn Springs Holdings, Inc. (Glenn Springs). The proposed DFFO sets forth the responsibilities and obligations of Occidental Chemical Corporation (OxyChem) and Ohio EPA until the RD/RA is completed. Glenn Springs, an affiliate of OxyChem will manage the activities associated with the RD/RA for OU15.

The DFFO was proposed based on the presence of elevated concentrations of various contaminants, including hexavalent chromium, in soil that exceed applicable standards. The other contaminants have been addressed through interim measures including establishment of necessary soil cover and an environmental covenant is required to formalize the prohibitions on groundwater use, land use and soil management. This Remedial Design/Remedial Action Work Plan fulfills Task I and II of the requirements of the DFFO and associated Generic Scope of Work.



2. Background

2.1 PHYSICAL SETTING AND SITE HISTORY

OU15 is approximately 99-acres in size and is located in the north-central portion of the Site. The Site is approximately 1,100 acres and is located in northern Lake County, Ohio. The Site is bordered by industrial and vacant property to the east, residential and commercial/industrial properties to the west, Lake Erie to the north, and residential property to the south (Figure 1). The Grand River bisects the Site from east to west. The Site has been divided into 24 Operable Units (Figure 2).

The Site includes all known areas of manufacturing or other industrial use, areas of disposal, and other areas that are or may be contaminated. Diamond Shamrock began shutting down the Site in 1972, and the last Site operations ceased in 1977. Portions of the Site were sold to other entities, which performed a variety of commercial and industrial activities within its boundaries.

On July 25, 1999, Ohio EPA approved the Remedial Investigation (RI) Report for Phase I activities at the Site. These activities included the collection and analysis of soil, groundwater, surface water and sediment samples across the Site. On September 22, 2003 the Phase II RI Report was approved by Ohio EPA. The Phase I and Phase II RI Reports identified public health and environmental risks at the Site resulting from contaminated groundwater, soil, surface water, and sediment. The RI Reports characterized the nature and extent of the contaminants released at the Site and the potential risks to human health and safety and the environment.

The results from the RI demonstrated that soil contamination in four areas of concern (AOCs) within OU15 posed, or potentially posed, unacceptable risks and/or hazards to human and/or ecological receptors sufficient to trigger the need for remedial actions. Based on interim actions including excavation and cover and a revision to the land use plan, three of the four AOCs no longer pose unacceptable risks; the remaining AOC is the area of chromium ore processing residue (COPR) contamination (Figure 3).

In October 2007, Ohio EPA approved the Feasibility Study (FS) Report for OU15, which presented an array of remedial alternatives to address remaining contamination within the OU. In May 2008, Ohio EPA notified the public of its Preferred Plan for remediation of OU15 and solicited public comments. The Preferred Plan identifies and explains Ohio EPA's preferred alternative for the remedial action at OU15.

On July 31, 2008, Ohio EPA held a public meeting and hearing on the Preferred Plan. The public comment period ended on August 8, 2008. On July 21, 2015, Ohio EPA issued a Decision Document, which selected the remedy for the Site and included responses to the public comments in the form of a responsiveness summary.

2.2 SUMMARY OF OPERABLE UNIT CONDITIONS

OU15 is located in the north-central portion of the Site. Fairport Nursery Road (S.R. 585), which is oriented eastwest, bisects OU15. OU15 is bordered to the north by Lake Erie, to the east by OU2, OU6, OU16 and OU20, to the south by the Grand River, and to the west by OU7, OU12 and an off-Site commercial/residential area. OU15 currently consists of vacant land which has undergone interim remediation as described in the June 2007 *Construction Certification Report* for completion of interim actions activities at OU15.



It was determined that unacceptable post-interim action indoor air risk exists for future residents and recreational users in certain portions of OU15. This risk can be eliminated through the establishment of an environmental covenant, which would prohibit construction of habitable structures within OU15 without engineering controls or otherwise demonstration of acceptable conditions, as well as prohibit the construction of basements and crawl spaces across OU15. During the Phase II RI, Ohio EPA determined that a Baseline Ecological Risk Assessment (BERA) was not necessary for OU15 due to the continual maintenance of the soil cover, as well as the planned future development activities; groundwater modelling indicated no unacceptable ecological risk via groundwater to surface water discharge.

Generally, areas for future residential use within OU15 have a minimum of four feet of soils at the surface which meet residential risk-based standards, and areas for future commercial/recreational use have a minimum of two feet of soils at the surface which meet commercial/recreational risk-based standards. However, during the installation of a storm drain, suspected COPR, which contains hexavalent chromium was found in the southerm portion of OU15 (Figures 3 and 4). Although the elevated hexavalent chromium concentrations are greater than four feet below ground surface, hexavalent chromium from COPR has been observed to migrate upwards through soil. The extent of hexavalent chromium at concentrations greater than the final remediation level (RL) of 467 mg/kg was estimated as shown on Figure 3. However, additional investigation (i.e., Pre-Design Study) will be conducted to verify the horizontal extent of chromium greater than the RL.

Generally, the subsurface geology beneath OU15 consists of a mixture of non-native fill material (including Solvay process material (Solvay residuals) within the former Settling Basin/Hydroretention Basin), glacial tills, alluvial deposits, and shale bedrock. Within the area of elevated chromium, the subsurface consists of soil fill over a slag and possible COPR. Solvay residual, presumably from Settling Basin 1, was encountered beneath the slag and possible COPR. Based on understanding of the Site history and geology, it is presumed silt and clay, and then bedrock, underlie the Solvay residual.

Due to the poor yield of groundwater at the Site, Ohio EPA has concurred with the Painesville PRP Group that potable use groundwater exposure pathways do not apply to the Former Diamond Shamrock Painesville Works Site. It should also be noted that groundwater beneath the Site is not of sufficient quality for potable use. Specifically, highly productive zones exist within the bedrock below the Site, but these zones primarily yield non-potable brine. Groundwater beneath the southern portion of OU15 migrates toward the Grand River and the groundwater beneath the northern portion migrates toward Lake Erie. Constituents in groundwater beneath OU15 were evaluated as part of the RI/FS and was determined not to pose unacceptable risk to construction workers or for potential migration to the Grand River and Lake Erie.

2.3 REMEDIAL ACTION OBJECTIVES AND REMEDIATION LEVELS

An FS to define and analyze appropriate remedial alternatives was completed with Ohio EPA oversight and was approved in October 2007. As part of the RI/FS process, Remedial Action Objectives (RAOs) were developed in accordance with the National Contingency Plan, pursuant to the federal Comprehensive Environmental Response, Compensation and Liability Act of 1980, and U.S. EPA guidance. The RAOs are goals that a remedy should achieve in order to ensure protection of human health and the environment.

Per the Decision Document, the RAOs for OU15 include those listed in Table 1 below.



Table 1. Remedial Action Objectives

Groundwater	
Human Health Risk	Prevent ingestion/direct contact of groundwater across OU15 containing carcinogens in excess of a total excess lifetime cancer risk (for all contaminants) greater than 1x10 ⁻⁵
Human Health Risk	Prevent ingestion/direct contact of groundwater across OU15 containing noncarcinogens in excess of a HQ or HI greater than 1.
Human Health Risk	Prevent inhalation in future structures of carcinogens (including 1,2- dichloroethane, benzene, carbon tetrachloride, chloroform, tetrachloroethene, trichlorethene, and vinyl chloride) in vapors emanating from groundwater in excess of a 1×10^{-5} excess lifetime cancer risk.
Human Health Risk	Prevent inhalation in future Site structures of non-carcinogens (including 1,1- dichloroethene) in vapors emanating from groundwater in excess of a HQ or HI of 1.
Soil	
Human Health Risk	Prevent ingestion/direct contact with soil located across OU15, below the applicable minimum points of compliance, containing carcinogens (including volatile and semi-volatile chemicals, pesticides, PCBs and metals) in excess of a total excess lifetime cancer risk greater than 1x10 ⁻⁵
Human Health Risk	Prevent ingestion/direct contact with soil located across OU15, below the applicable minimum points of compliance, containing non-carcinogens (including volatile and semi-volatile chemicals, pesticides, PCBs and metals) in excess of a HQ or HI greater than 1.
Human Health Risk	Prevent inhalation in future Site structures of carcinogens (including 1,2- dichloroethane, benzene, carbon tetrachloride, chloroform, tetrachloroethene, trichlorethene, and vinyl chloride) in vapors emanating from soil in excess of a 1x10 ⁻⁵ excess lifetime cancer risk.
luman Health Risk	Prevent inhalation in future Site structures of non-carcinogens (including 1,1- dichloroethene) in vapors emanating from soil in excess of a HQ or HI of 1.

A Site-specific Remediation Goal (RG) of 467 milligrams per kilogram (mg/kg) was established for hexavalent chromium for soil in the point of compliance for recreational use (zero to two feet) or requiring wicking barrier if greater than two feet below ground surface. Per the Decision Document, the remaining COCs and associated RGs, now termed final RLs, for OU15 are shown in Table 2 below.

Table 2. Remediation Levels

Medium	сос	RL (mg/kg)
Soils: Human Direct Contact	Hexavalent chromium	467



2.4 SELECTED REMEDIAL ALTERNATIVE AND PERFORMANCE STANDARDS

The selected remedial alternative, as described in the Decision Document, consists of the following:

- Further delineation and remediation of the suspected COPR AOC through either: (1) removal of the COPR and consolidation within OU16, a COPR disposal/consolidation area, as approved in letters by U.S. EPA (8 January 2008) and Ohio EPA (23 January 2008); (2) removal of the COPR and disposal off-Site at a licensed solid waste or hazardous waste landfill, as appropriate; or (3) covering any portions of the AOC that exceed the Site-specific risk-based remedial goal for hexavalent chromium of 467 mg/kg, with an engineered cap, consisting of a 12-inch base layer of compacted clay, geotextile, 40-mil geomembrane and another 12 inches of compacted clay, to prevent the upward wicking of hexavalent chromium from the COPR.
- Establishment of an environmental covenant which would:
 - Prohibit residential development on portions of OU15 which do not meet residential riskbased standards, and restrict those portions to recreational use with the applicable two-foot minimum point of compliance (POC);
 - Require establishment of a four-foot minimum POC in those portions of OU15 designated for residential use;
 - Prohibit excavation below the applicable minimum two-foot POC in the areas of OU15 designated as recreational use and below the applicable minimum four-foot POC in the areas of OU15 designated as residential land use;
 - Prohibit construction of habitable structures at specific locations within OU15 where unacceptable risk exists to human health due to volatilization of contaminants to indoor air;
 - Prohibit the construction of sub-grade habitable structures (i.e., basements and/or crawl spaces) across the entirety of OU15;
 - Require maintenance of undeveloped portions of OU15 in a manner that would prevent the development of ecological habitat that could sustain potential important ecological receptors or otherwise demonstrate such potential exposures would be acceptable;
 - Prohibit the extraction of groundwater for potable or non-potable use within OU15, with the exception of environmental investigation, remediation, and monitoring;
 - Prohibit any excavation in the area covered by an engineered cap and liner system installed as part of COPR remediation activities (as appropriate); and
 - Prohibit all excavation by construction workers unless the excavation is performed in accordance with an Ohio EPA approved risk management plan (RMP).

For removal actions (options 1 and 2) of the selected remedy (delineation and remediation of the COPR area of concern): the performance standard is met when:

- COPR-contaminated soil, delineated as part of future Ohio EPA-approved RA activities, has been
 removed and confirmatory sample analyses demonstrate that the remaining soil meets the
 acceptable levels referenced in the soil RAOs (i.e., 467 mg/kg for hexavalent chromium); and
- Confirmatory sampling, performed immediately following soil removal activities per an Ohio EPA-approved RA work plan, documents the presence of the applicable minimum POC (two feet in commercial/recreational and four feet in residential use areas), including levels of hexavalent chromium below the acceptable soil RAO of 467 mg/kg, and passes an Ohio EPA inspection.



For the engineer cap action (option 3), the performance standard is met when an engineered cap and liner system is placed over COPR-contaminated soil, delineated as part of Ohio EPA-approved RA activities per an Ohio EPA-approved work plan, and passes an Ohio EPA inspection.

For the second listed component of the selected remedy (establishment of an environmental covenant):

- The performance standard is met when documentation that the environmental covenant, including the restrictions identified above, has been recorded in the Lake County Recorder's Office and is provided to Ohio EPA;
- The performance standard is met when the restrictions identified in the environmental covenant are continually enforced, such that the RAOs for the various media are met, until such institutional controls are no longer necessary; and
- The performance standard is met when the property owner submits annual reports describing compliance with the environmental covenant.



3. General Requirements

3.1 SITE ACCESS

The Site is owned by and under the control of the respondents therefore, no third-party access agreement is required.

3.2 REGULATORY COMPLIANCE PLAN

Based on the final size of the remedial action, permits for storm water management during construction may be required. The design plans will define the anticipated size of the area of soil to be disturbed and if storm water management permits are required. Other permits are not anticipated to be required from federal, state, or local regulatory authorities to execute this Work Plan, including the pre-design study, remedial design, or remedial action.

An active railroad is present in OU22 south of the suspected COPR area. Glenn Springs will coordinate with the railroad company during execution of any work required within the railroad easement.



4. Pre-Design Studies Plan

Additional data regarding the extent of contamination are necessary before remedial design/remedial action can proceed, as described below.

4.1 FIELD SAMPLING PLAN

Consistent with anticipated DFFO requirements, the objective of the field sampling plan is to refine and verify the horizontal extent of hexavalent chromium contamination observed in soil at historical sampling locations (Figure 4). A number of samples, primarily within the upper portion of the Solvay residual exceeded the established RL of 467 mg/kg for hexavalent chromium.

The proposed scope of work includes collection of soil samples at 12 new locations (OU15-B101 through OU15-B112) as shown on Figure 4 and as indicated in Table 3. Discrete soil samples will be collected for laboratory analysis from each of these 12 locations as follows¹:

- From a depth of zero to two feet below ground surface;
- From midway between the ground surface and the top of slag/potential COPR (where observed);
- From potential COPR (where observed); and
- From Solvay material, if encountered.

Based on previous investigations, the terminal boring depth at each location is expected to be approximately two feet into the Solvay material (where observed) or reaching native non-filled soil, whichever is first. We anticipate the borings will extend approximately 30 feet below ground surface and will vary depending on the current surface topography. The sampling intervals were selected to provide characterization for the recreational point of compliance (zero to two feet), evaluate the soil above the slag or Solvay residual for proper management during construction, and to evaluate the chromium concentrations of the slag and Solvay residual. Field sampling procedures will be conducted in accordance with the Diamond Shamrock Painesville Works Site *Quality Assurance Project Plan* (QAPP) *for Remedial Design/Remedial Action and Supplemental Feasibility Study Sampling* (August 2007) and applicable addenda.

The approach described above will be executed in a dynamic manner that will depend upon field conditions. Additional soil samples may be collected from a given location and additional borings may be advanced beyond the horizontal limits of those currently proposed in order to complete the delineation. This approach in sampling execution may limit the number of rounds of investigation planning, execution, and data evaluation in support of achieving the proposed schedule and overall efficiency. Additional sampling and data collection will occur beyond that described herein if deemed necessary for the design. Ohio EPA will be consulted prior to any reduction to the pre-design investigation.

Material from the borings will be visually inspected and screened in the field using a PID equipped with an 11.7 eV lamp consistent with the methods described in the QAPP, and stratigraphy and other relevant observations will be recorded. If unexpected non-soil materials are encountered, a discrete

¹ Sample collection depths were selected in consideration of the data currently available, the required future twofoot POC for recreational use, and the selected remedy (excavation and/or capping).



sample of each material will be collected for laboratory analysis; analyses for such materials may be expanded beyond hexavalent chromium subject to discussion with Ohio EPA.

Upon completion of sampling, borings will be backfilled in accordance with the methods described in the QAPP. A licensed surveyor will obtain ground surface elevations and boring locations based on the Site coordinate system. The samples will be submitted to Eurofins Lancaster Laboratories and the analytical results will be validated in accordance with the QAPP.

4.2 HEALTH AND SAFETY PLAN

The work to be conducted for OU15 per the field sampling plan will be executed in accordance with the Health and Safety Plan (HASP) (July 2011) developed for the Site, which is incorporated herein by reference.

4.3 QUALITY ASSURANCE PROJECT PLAN (QAPP)

The work to be conducted for OU15 per the field sampling plan will be executed in accordance with the QAPP prepared for the Site. The QAPP and associated addenda are incorporated herein by reference.



5. Remedial Design Requirements

The remedial design procedures discussed below have been stipulated in accordance with the Generic Statement of Work (SOW) provided as Appendix B of the DFFO.

5.1 GENERAL REQUIREMENTS FOR PLANS AND SPECIFICATIONS

Construction plans, specifications and supporting plans to implement the remedial action will be prepared and submitted to Ohio EPA as defined in the Purpose and Description of the Remedial Action section of the Generic SOW, the Decision Document and/or the DFFO.

The construction plans and specifications will comply with the standards and requirements outlined below. All design documents will be clear, comprehensive and organized. Supporting data and documentation sufficient to define the functional aspects of the remedial action will be provided. The design documents will demonstrate that the remedial action will be capable of meeting all objectives of the Decision Document, including any performance standards as previously described.

The plans and specifications will include the following:

- Discussion of the design strategy and design basis including:
 - Compliance with requirements of the Decision Document and the DFFO and all applicable regulatory requirements
 - Minimization of environmental and public health impacts
- Discussion of the technical factors of importance including:
 - Use of currently accepted environmental control measures and technologies
 - The constructability of the design
 - Use of currently accepted construction practices and techniques
- Description of the assumptions made and detailed justification for those assumptions;
- Discussion of possible sources of error and possible operation and maintenance problems;
- Detailed drawings of the proposed design including, as appropriate:
 - Qualitative flow sheets
 - Quantitative flow sheets
- Tables listing equipment and specifications;
- Tables giving material and energy balances; and
- Appendices may include the following:
 - Sample calculations (one example presented and clearly explained for significant or unique calculations);
 - Derivation of equations essential to understanding the report; and
 - Results of laboratory tests, field tests and any additional studies.



5.2 DESIGN PHASES

The selected remedy for OU15 consists of excavation and/or capping (and an environmental covenant). Because the design and implementation of the remedy is not expected to be complex, and in the interest of efficiency and the proposed schedule, only two design phases are proposed (i.e., intermediate and pre-final design combined into final design).

5.2.1 Preliminary Design

A Preliminary Design, which reflects the design effort at approximately 30% completion, will be submitted to Ohio EPA for review and comment. At this stage of the design process, existing conditions at the Site that may influence the design and implementation of the selected RA will have been verified. The Preliminary Design will demonstrate that the basic technical requirements of the remedial action and any permits required have been addressed. The Preliminary Design will be reviewed to determine if the final design will provide an operable and usable RA that will be in compliance with all permitting requirements and response objectives. The Preliminary Design submittal will include the following elements, at a minimum, as applicable:

- Preliminary plans, drawings and sketches, including design calculations;
- Results of additional field sampling;
- Outline of design specifications;
- Expected long-term operation and monitoring requirements;
- Real estate and easement requirements;
- Preliminary construction schedule, including contracting strategy; and
- Revised cost estimate.

The supporting data and documentation necessary to define the functional aspects of the RA will be submitted with the Preliminary Design. The technical specifications will be outlined in a manner that anticipates the scope of the final specifications. Design calculations will be included with the Preliminary Design completed to the same degree as the design they support. Any revisions or amendments to the Preliminary Design required by Ohio EPA will be incorporated into the subsequent design phase.

The Preliminary Design will also include the Pre-Design Studies Report for the activities described in Section 4. The Pre-Design Studies report will include a summary of objectives, technical approach/methodology, significant observations/findings, conclusions, and recommendations, with sample analysis results provided in tabular and graphic format.

5.2.2 Final Design

Comments, if any, from Ohio EPA on the Preliminary design will be incorporated into the Final Design. The Final Design will include the following:

- Design Plans and Specifications
- Construction Quality Assurance Plan
- Performance Standard Verification Plan
- Risk Management Plan (which includes any operation and maintenance requirements)
- Remedial Action Implementation Plan
- Estimated Cost of the Remedial Action
- Health and Safety Plan



The purpose and content of the above plans is described in the DFFO Generic SOW. As indicated in the Decision Document for OU15, Ohio EPA determined that it would be more appropriate to maintain the applicable minimum POCs across OU15 through an EC, rather than through an Operation and Maintenance Plan. The environmental covenant will include a requirement to submit an annual report describing compliance with the environmental covenant, including POCs. Excavation below the applicable minimum POCs would be prohibited unless performed in accordance with an Ohio EPA-approved Risk Management Plan noted above.

Corrections or changes will be made based on Ohio EPA comments on the Final Design submittals. The revised Final Design will then be submitted in its entirety to Ohio EPA for approval as the completed Final Design. Upon approval of the Site Coordinator, final corrections may be made by submitting corrected pages to the Final Design documents. The quality of the Final Design submittal will be commensurate to what could be in a bid package to invite contractors to submit bids for the construction project.

5.3 ESTIMATED COST OF THE REMEDIAL ACTION

The cost estimate developed in the Feasibility Study will be refined to reflect the preliminary and detailed plans and specifications being developed for the RA. The cost estimate will include both capital and operation and maintenance costs for the entire project. The final estimate will be based on the revised final approved plans and specifications. It will include any comments by Ohio EPA during the preliminary design review, and reflect current prices for labor, material and equipment.

5.4 REMEDIAL ACTION IMPLEMENTATION PLAN

As mentioned above, a Remedial Action Implementation Plan (RAIP) will be prepared and submitted with the Final Design. The RAIP will help coordinate implementation of the various components of the RA. It will include a schedule for the RA that identifies timing for initiation and completion of all critical path tasks. The RAIP will specifically identify dates for completion of the project and major interim milestones in conformance with the approved RD/RA Work Plan schedule. The RAIP is a management tool, which will address the following topics:

- Activities necessary to fully implement each of the components of the RA;
- How these activities will be coordinated to facilitate construction/implementation in accordance with the approved schedule;
- Potential major scheduling problems or delays, which may impact overall schedule;
- Lines of communication for discussing and resolving problems, should they arise; and
- Common and/or anticipated remedies to overcome potential problems and delays.

5.5 COMMUNITY RELATIONS SUPPORT

The Site has a Community Relations Program in place through the Diamond Shamrock Community Relations Team (DSCRT). Glenn Springs will cooperate and support Ohio EPA and DSCRT in community relations efforts.



6. Remedial Action Construction Requirements

Following approval of the Final Design submittal by Ohio EPA, the designed remedial action will be performed in accordance with the plans, specifications, Construction Quality Assurance Plan (CQAP), Performance Standard Verification Plan, Health and Safety Plan, Remedial Action Implementation Plan, Quality Assurance Project Plan, and Field Sampling Plan approved with the final design. Implementation will include the activities described below.

6.1 PRECONSTRUCTION INSPECTION AND CONFERENCE

A preconstruction inspection and conference will be conducted with Ohio EPA to accomplish the following:

- Review methods for documenting and reporting inspection data;
- Review methods for distributing and storing documents and reports;
- Review work area security and safety protocol;
- Discuss any appropriate modifications to the CQAP to ensure that Site-specific considerations are addressed. The CQAP will be submitted to Ohio EPA at this time, if it has not already been submitted;
- Introduce key construction contractor, engineering and project management personnel and review roles during construction activities;
- Conduct a Site walk-around to verify that the design criteria, plans, and specifications are understood and to review material and equipment storage locations.

The preconstruction inspection and conference will be held within 10 days of the award of the construction contract. The preconstruction inspection and conference will be documented by a designated person and minutes (Preconstruction Inspection and Conference Report) will be transmitted to all parties in attendance.

6.2 DESIGN CHANGES DURING CONSTRUCTION

During construction, unforeseen site conditions, changes in estimated quantities of required construction materials and other problems associated with the project may develop. Such changing conditions may require either major or minor changes to the approved Final Design. Certain design changes will require approval of Ohio EPA prior to implementation to ensure that the intent and scope of the remedial action is maintained. Changes which could alter the intent or scope of the RA may require a revision to the Decision Document and a public comment period. Examples of changes to the remedial design which require Ohio EPA written approval prior to implementation include:

- Those that involve the deletion or addition of a major component of the approved remedy (e.g., deleting any designed layer of a multi-layer cap);
- Any changes that may result in an increase of the exposure to chemicals of concern and/or risk to human health or the environment as compared to the goals for the completed remedial action as stated in the DFFO, the Generic SOW, the Decision Document, the RD/RA Work Plan, and the approved Final Design;
- Those that result in a significant delay in the completion of the RA;
- Any other changes that alter or are outside of the scope or intent of the approved remedial design.



Ohio EPA will be notified of other changes made during construction through routine communications and monthly progress reports.

6.3 REMEDIAL ACTION CONSTRUCTION COMPLETION AND ACCEPTANCE

As the construction of the remedial action nears completion, the following activities and reporting will be completed to ensure proper project completion, approval, closeout and transition to the operation and maintenance/monitoring phase.

6.3.1 Final Construction Conference and Inspection

Based on the nature of the selected remedy, and to promote efficiency and meet the proposed schedule, the Pre-final Construction Conference and Pre-final Inspection will be combined into the Final Construction Conference and Inspection. It is anticipated that Ohio EPA will have made interim inspections during work execution.

Within seven days of making a determination that construction is complete, written notification (Notification of Preliminary Completion of Construction/Final Inspection) will be provided to Ohio EPA and a final construction conference will be held with the construction contractor(s) to discuss procedures and requirements for project completion and closeout. Participants will include the Project Manager for Glenn Springs, the Site Coordinator for Ohio EPA, all contractors involved with construction of the remedial action and the remedial design agent (person(s) who designed the remedy), if requested.

A list of suggested items to be covered at the conference includes, but is not limited to the following:

- · Final Risk Management Plan submission, if it has not been submitted already;
- Cleanup responsibilities;
- Demobilization activities; and
- Security requirements for project transfer.

Following the final construction conference, a final inspection of the project will be conducted. The final inspection will be led by Ohio EPA with assistance from Glenn Springs, if requested. The final inspection will consist of a walk-through inspection of the entire Site. The completed Site work will be inspected to determine whether the project is complete and consistent with the contract documents and the approved RD/RA Work Plan and approved Final Design. Any outstanding deficient or incomplete construction items should be identified and noted during the inspection. If any work scope items remain deficient or incomplete, the inspection will be considered a pre-final inspection requiring another final inspection and report.

6.3.2 Construction Completion Report and Certification

Upon satisfactory completion of the final inspection, a Construction Completion Report will be prepared and submitted to Ohio EPA within 30 days after the final inspection. The report will include the following elements:

- A brief description of any outstanding construction items from the final inspection and an indication that the items were satisfactorily resolved, if applicable;
- A synopsis of the work defined in the approved RD/RA Work Plan and the Final Design and certification that this work was performed;



- An explanation of any changes to the work defined in the approved RD/RA Work Plan and Final Design, including as-built drawings of the constructed RA facilities, and why the changes were necessary or beneficial for the project; and
- Certification that the constructed RA or component of the RA is operational and functional.

The Construction Completion Report will be reviewed by Ohio EPA. If Ohio EPA's review indicates that corrections or amendments to the report are necessary, comments will be provided. A revised report will be submitted, based on Ohio EPA comments, to Ohio EPA within 30 days of receipt of those comments. Upon determination by Ohio EPA that the report is acceptable, written notice of Ohio EPA's approval of the Construction Completion Report will be provided.

6.3.3 Community Relations Support

Support will be provided for Ohio EPA's community relations program and DSCRT during remedial action implementation as required.



7. Operation and Maintenance/Performance Monitoring

Performance monitoring and operation and maintenance procedures will be implemented, as required by the approved Performance Standard Verification Plan and approved Risk Management Plan, once it is demonstrated that the RA components are operational and functional. The approved Risk Management Plan will be incorporated into the environmental covenant for OU15.

7.1 COMPLETION OF REMEDIAL ACTION REPORT

At the completion of the remedial action, a Completion of Remedial Action Report will be prepared and submitted to Ohio EPA. The RA will be considered complete when the goals, performance standards and cleanup standards for the RA as stated in the Decision Document, the DFFO, the Generic SOW, the RD/RA Work Plan and the approved Final Design (including changes approved during construction) have been met. The report will document that the project is consistent with the design specifications, and that the RA was performed to meet or exceed all required goals, cleanup standards and performance standards. The report will include, but not be limited to the following elements:

- Synopsis of the remedial action and certification of the design and construction;
- Listing of the cleanup and performance standards as established in the Decision Document and the DFFO, and any amendments to those standards with an explanation for adopting the amendments;
- Summary and explanation of any changes to the approved plans and specifications. An
 explanation of why the changes were necessary will be included and, where necessary, Ohio EPA
 approval of the changes will be documented;
- Summary of operation of treatment systems including monitoring data, indicating that the remedial action met or exceeded the performance standards or cleanup criteria; and
- Explanation of any monitoring and maintenance activities to be undertaken at the Site in the future.



8. Reporting Requirements

8.1 MONTHLY PROGRESS REPORTS DURING REMEDIAL DESIGN AND REMEDIAL ACTION CONSTRUCTION

Monthly progress reports will be provided to Ohio EPA during the design and construction phases of the remedial action and will contain the information listed below.

- A description of the work performed during the reporting period and estimate of the percentage of the RD/RA completed;
- Summaries of all findings and sampling during the reporting period;
- Summaries of all changes made in the RD/RA during the reporting period, indicating consultation with Ohio EPA and approval by Ohio EPA of those changes, when necessary;
- Summaries of all contacts with representatives of the local community, public interest groups or government agencies during the reporting period;
- Summaries of all problems or potential problems encountered during the reporting period, including those which delay or threaten to delay completion of project milestones with respect to the approved work plan schedule or RAIP schedule;
- Summaries of actions taken and being taken to rectify problems;
- Summaries of actions taken to achieve and maintain cleanup standards and performance standards;
- Changes in personnel during the reporting period;
- Projected work for the next reporting period; and
- Inspection reports, sampling data, laboratory/monitoring data, etc.

8.2 SUMMARY OF REPORTS AND SUBMITTALS

A summary of the anticipated reporting requirements described in this RD/RA SOW is presented below:

- RD/RA Work Plan
 - Health and Safety Plan (incorporated existing)
 - Regulatory Compliance Plan
 - Pre-Design Studies Plan (incorporated in RD/RA Work Plan)
 - Quality Assurance Project Plan (incorporated existing)
 - Field Sampling Plan (incorporated existing)
- Monthly Progress Reports During Remedial Design
- Preliminary Design Documents
 - Pre-Design Studies Report (to be included with Preliminary Design Documents)
- Final Design Documents
 - Construction Quality Assurance Plan
 - Remedial Action Implementation Plan
 - Performance Standard Verification Plan
 - Risk Management Plan
 - Health and Safety Plan (incorporated existing)
 - Preconstruction Inspection and Conference Report
- Monthly Progress Reports During Remedial Action
- Notification of Preliminary Completion of Construction/Final Inspection
- Final Construction Inspection and Conference Report



- Final Risk Management Plan
- Construction Completion Report
- Progress Reports During O&M/Performance Monitoring
- Completion of Remedial Action Report



9. Anticipated Schedule

The following presents the anticipated schedule for completion of major remedial design and remedial action milestones for OU15. The schedule is predicated on the assumption that the remedy will consist of excavation and/or capping of a relatively limited area of soil impacted only by hexavalent chromium.

TASK

APPROXIMATE DURATION

RD/RA WORKPLAN (including Pre-Design Work Plan)	
Ohio EPA review/comment	30 days
Final RD/RA Work Plan	15 - 30 days
Ohio EPA review/approval	30 days
PRE-DESIGN STUDIES IMPLEMENTATION	
Field implementation, including receipt of all laboratory analyses	60-days after approval of Pre-Design Work Plan
REMEDIAL DESIGN	
Preliminary Design with Pre-Design Studies Report	45 days after pre-design study data available
Ohio EPA review/comment	30 days
Final Design	15 - 30days
Ohio EPA review/approval	30 days
REMEDIAL ACTION CONSTRUCTION	
Preconstruction Conference/Inspection	15-30 days after final design approval
Remedial Action Implementation	90 days after Preconstruction Conference
Final Construction Conference/Inspection	90 days after Preconstruction Conference
Draft Construction Completion Report and Certification	45 days after Final Inspection
Ohio EPA review/comment	30 days
Final Construction Completion Report and Certification	15 - 30 days
Ohio EPA review/approval	30 days

Based on the above, it is anticipated that the Final Construction Completion Report and Certification can be approved between 390 to 540 days after submittal of this work plan.



TABLES

TABLE 3 PRE-DESIGN STUDIES SAMPLING AND ANALYSIS SUMMARY OPERABLE UNIT 15 FORMER DIAMOND SHAMROCK PAINESVILLE WORKS SITE PAINESVILLE, OHIO

Sample Location	Sample ID	Sample Depth	Hexavalent Chromium - 7199	Notes
OU15-B101	OU15-B101-MMDDYY-TIME	0 - 2 ft	1	
	OU15-B101-MMDDYY-TIME	Midway between ground surface and top of potential COPR (where present) - TBD	1	
	OU15-B101-MMDDYY-TIME	Depth of potential COPR - TBD	1	Sample of potential COPR, if presen
	OU15-B101-MMDDYY-TIME	Depth of Solvay - TBD	1	Sample of Solvay material, if presen
	OU15-B102-MMDDYY-TIME	0 - 2 ft	1	
OU15-B102	OU15-B102-MMDDYY-TIME	Midway between ground surface and top of potential COPR (where present) - TBD	1	
1	OU15-B102-MMDDYY-TIME	Depth of potential COPR - TBD	1	Sample of potential COPR, if present
	OU15-B102-MMDDYY-TIME	Depth of Solvay - TBD	1	Sample of Solvay material, if present
	OU15-B103-MMDDYY-TIME	0 - 2 ft	1	
OU15-B103	OU15-B103-MMDDYY-TIME	Midway between ground surface and top of potential COPR (where present) - TBD	1	
	OU15-B103-MMDDYY-TIME	Depth of potential COPR - TBD	1	Sample of potential COPR, if present
	OU15-B103-MMDDYY-TIME	Depth of Solvay - TBD	1	Sample of Solvay material, if present
	OU15-B104-MMDDYY-TIME	0 - 2 ft	1	
OU15-B104	OU15-B104-MMDDYY-TIME	Midway between ground surface and top of potential COPR (where present) - TBD	1	
	OU15-B104-MMDDYY-TIME	Depth of potential COPR - TBD	1	Sample of potential COPR, if present
	OU15-B104-MMDDYY-TIME	Depth of Solvay - TBD	1	Sample of Solvay material, if present
	OU15-B105-MMDDYY-TIME	0 - 2 ft	1	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
OU15-B105	OU15-B105-MMDDYY-TIME	Midway between ground surface and top of potential COPR (where present) - TBD	1	
	OU15-B105-MMDDYY-TIME	Depth of potential COPR - TBD	1	Sample of potential COPR, if present
	OU15-B105-MMDDYY-TIME	Depth of Solvay - TBD	1	Sample of Solvay material, if present
	OU15-B106-MMDDYY-TIME	0 - 2 ft	1	
OU15-B106	OU15-B106-MMDDYY-TIME	Midway between ground surface and top of potential COPR (where present) - TBD	1	
	OU15-B106-MMDDYY-TIME	Depth of potential COPR - TBD	1	Sample of potential COPR if present
	OU15-B106-MMDDYY-TIME	Depth of Solvay - TBD	1	Sample of Solvay material, if present
OU15-B107	OU15-B107-MMDDYY-TIME	0 - 2 ft	1	
	OU15-B107-MMDDYY-TIME	Midway between ground surface and top of potential COPR (where present) - TBD	1	
	OU15-B107-MMDDYY-TIME	Depth of potential COPR - TBD	1	Sample of potential COPR, if present
	OU15-B107-MMDDYY-TIME	Depth of Solvay - TBD	1	Sample of Solvay material, if present
	OU15-B108-MMDDYY-TIME	0 - 2 ft	1	
OU15-B108	OU15-B108-MMDDYY-TIME	Midway between ground surface and top of potential COPR (where present) - TBD	1	
	OU15-B108-MMDDYY-TIME	Depth of potential COPR - TBD	1 9	Sample of potential COPR if present

TABLE 3 PRE-DESIGN STUDIES SAMPLING AND ANALYSIS SUMMARY OPERABLE UNIT 15 FORMER DIAMOND SHAMROCK PAINESVILLE WORKS SITE PAINESVILLE, OHIO

Sample Location	Sample ID	Sample Depth	Hexavalent Chromium - 7199	Notes
	OU15-B109-MMDDYY-TIME	0 - 2 ft	1	
OU15-B109	OU15-B109-MMDDYY-TIME	Midway between ground surface and top of potential COPR (where present) - TBD	1	
1. C . N	OU15-B109-MMDDYY-TIME	Depth of potential COPR - TBD	1	Sample of potential COPR if present
	OU15-B109-MMDDYY-TIME	Depth of Solvay - TBD	1	Sample of Solvay material if present
	OU15-B110-MMDDYY-TIME	0 - 2 ft	1	Comple of Contry material, in present
OU15-B110	OU15-B110-MMDDYY-TIME	Midway between ground surface and top of potential COPR (where present) - TBD	1	
	OU15-B110-MMDDYY-TIME	Depth of potential COPR - TBD	1	Sample of potential COPR if present
	OU15-B110-MMDDYY-TIME	Depth of Solvay - TBD	1	Sample of Solvay material, if present
	OU15-B111-MMDDYY-TIME	0 - 2 ft	1	
OU15-B111	OU15-B111-MMDDYY-TIME	Midway between ground surface and top of potential COPR (where present) - TBD	1	
T T	OU15-B111-MMDDYY-TIME	Depth of potential COPR - TBD	1	Sample of potential COPR, if present
	OU15-B111-MMDDYY-TIME	Depth of Solvay - TBD	1	Sample of Solvay material, if present
	OU15-B112-MMDDYY-TIME	0 - 2 ft	1	
OU15-B112	OU15-B112-MMDDYY-TIME	Midway between ground surface and top of potential COPR (where present) - TBD	1	
	OU15-B112-MMDDYY-TIME	Depth of potential COPR - TBD	1	Sample of potential COPR, if present
	OU15-B112-MMDDYY-TIME	Depth of Solvay - TBD	1	Sample of Solvay material, if present
		Subtotal Samples	48	
		Field Duplicate	3	
		Matrix Spike/Matrix Spike Duplicate	3	
		Equipment Blank	3	
			9	
SAMPLE TOTAL			57	

Notes:

1. Discrete samples will be collected from each of the different materials (e.g., potential COPR, Solvay material) encountered within the sampling interval; soil samples will be composited within the interval specified.

2. QA/QC samples are collected at a frequency of 5% (or 1 in 20 samples). Each QA/QC sample set consists of a field duplicate, MS/MSD and an equipment blank. In addition, a trip blank is required with VOC soil and groundwater samples.

3. COPR - Chromium ore processing residue

4. TBD - To be determined.

5. Terminal boring depth will be approximately 2 feet into Solvay material is encountered or 30 feet, whichever is first.

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FIGURES









APPENDIX C

List of Relevant Guidance Documents

Ohio EPA Division of Environmental Response and Revitalization (DERR)

General Guidance Document and Reference List to Support Remedial Response Program Statements of Work and Orders

Purpose and Use

This document provides an evolving "working list" of primary guidance documents and references which may be added as needed to the core guidance lists established for RI/FS and RD/RA statements of work (SOW) and orders. This general list of guidance and references is periodically updated by Ohio EPA. Ohio EPA recognizes that some remedial response sites may have conditions or circumstances that are not fully addressed by the documents in this working list of general guidance documents and references. Accordingly, Remedial Response orders should be supported as necessary by current guidance, professional publications, research and U.S. EPA and Ohio EPA policy directives. For sites where activities are conducted in response to an administrative or judicial order, *the list of selected reference documents* will be attached to the order as an appendix and will govern the work conducted. Ohio EPA reserves the right to modify this list as needed to fully and appropriately address site conditions.

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Netland Delineation/Restoration and Steam Restoration	

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Analytical Methods & U.S. EPA Contract Laboratory Program

U.S. EPA & Other Guidance

<u>SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods;</u> Hazardous Waste Test Methods / SW-846 (<u>webpage</u>)

<u>Standard Methods for the Examination of Water and Waste Water</u>, American Public Health Association, 22nd Edition and updates (<u>webpage</u>); <u>updated table of standard</u> <u>methods approved under the Clean Water Act</u>, and <u>updated table of standard</u> <u>methods approved under the Safe Drinking Water Act</u>

U.S. EPA Drinking Water Analytical Methods, U.S. EPA webpage

<u>U.S. EPA Superfund Analytical Services / Contract Laboratory Program</u>, U.S. EPA webpage

<u>Compendium of Methods for Determination of Toxic Organic Compounds in</u> <u>Ambient Air</u>, 2nd Edition, U.S. EPA, EPA/625/R-96/010b, January 1999, and <u>Ambient Monitoring Technology Information Center</u>, Air Toxics – Monitoring <u>Methods</u>

Introduction to the Contract Laboratory Program, U.S. EPA, EPA 540-R-07-02, January 2007

<u>Contract Laboratory Program Guidance for Field Samplers</u>, U.S. EPA, EPA-540-R-014-013, October 2014

Applicable or Relevant and Appropriate Requirements (ARARs)

Ohio EPA Guidance

Ohio EPA Rules and Laws, webpage (as applicable for ARARs)

<u>ARARs Table, Ohio EPA DERR Remedial Response Program</u> (provides a generic list of ARARs that is updated periodically and subject to change)

<u>Use of Applicable or Relevant and Appropriate Requirements (ARARs) in the Ohio</u> <u>EPA Remedial Response Program</u>, U.S. EPA, DERR-00-RR-034, September 2003 (Draft)

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U.S. EPA & Other Guidance

Applicable or Relevant and Appropriate Requirements (ARARS), U.S. EPA

<u>CERCLA Compliance with Other Laws Manual, Interim Final (Part I)</u>, U.S. EPA, EPA/540/G-89/006, August 1988

<u>CERCLA Compliance with Other Laws Manual: Part II. Clean Act and Other</u> <u>Environmental Statutes and State Requirements</u>, U.S. EPA, EPA/540/G-89/009, August 1989

<u>CERCLA Compliance with Other Laws Manual, CERCLA Compliance with State</u> <u>Requirements</u>, U.S. EPA, EPA 9234.2-05/FS, December 1989

<u>Permits and Permit 'Equivalency' Processes for CERCLA On-site Response</u> <u>Actions</u>, U.S. EPA, OWSER 9355.7-03, February 1992

<u>Clarification of the Role of Applicable, or Relevant and Appropriate Requirements in</u> <u>Establishing Preliminary Remediation Goals Under CERCLA</u>, U.S. EPA, OSWER 9200.4-23, August 22, 1997

Attainment of Cleanup Goals (Statistical Assessment Methods)

U.S. EPA & Other Guidance

<u>Methods for Evaluating the Attainment of Cleanup Standards, Volume 1: Soils and</u> <u>Solid Media</u>, U.S. EPA, EPA 230/02-89-042, February 1989

<u>Methods for Evaluating the Attainment of Cleanup Standards, Volume 2: Ground</u> <u>Water</u>, U.S. EPA, EPA 230-R-92-014, July 1992

<u>Statistical Methods for Evaluating the Attainment of Cleanup Standards, Volume 3:</u> <u>Reference-Based Standards for Soils and Solid Media</u>, U.S. EPA, EPA 230-R-94-004, December 1992

<u>An Overview of Methods for Evaluating the Attainment of Cleanup Standards for</u> <u>Soils, Solid Media, and Ground water, EPA Volumes 1, 2, and 3</u>, prepared for U.S. EPA under Contract DE-AC06-76RLO 1830 by Pacific Northwest National Laboratory (U.S. DOE and Battelle), January 1996

Background Guidance

Ohio EPA Guidance

<u>Use of Background for Remedial Response Sites</u>, Technical Decision Compendium, Ohio EPA DERR, August 2009

U.S. EPA & Other Guidance

<u>Engineering Forum Issue: Determination of Background Concentrations of</u> <u>Inorganics in Soils and Sediments at Hazardous Waste Sites</u>, U.S. EPA, EPA/540/S-96/500, December 1995

<u>NAVFAC Guidance for Environmental Background Analysis, Volume I: Soil,</u> NFESC User's Guide, UG-2049-ENV, prepared by Battelle Memorial Institute, Earth Tech, Inc., and NewFields, Inc., April 2002

Role of Background in the CERCLA Cleanup Program, OSWER 9285.6-07P, April 2002

<u>Guidance for Comparing Background and Chemical Concentrations in Soil for</u> <u>CERCLA Sites</u>, U.S. EPA, EPA 540-R-01-003, September 2002

Statistical Software ProUCL 5.0.00 for Environmental Applications for Data Sets with and without Nondetect Observations, U.S. EPA; ProUCL Version 5.0.00 User Guide, U.S. EPA, EPA/600/R-07/041, September 2013; ProUCL Version 5.0.00 Technical Guide, U.S. EPA, EPA/600/R-07/041, September 2013

<u>Geochemical and Mineralogical Data for Soils of the Conterminous United States</u>, U.S. Geological Survey Data Series 801, 2013

Conceptual Site Models

Ohio EPA Guidance

Conceptual Site Models Guidance Document, Ohio EPA DERR, April 2015

U.S. EPA & Other Guidance

<u>Model Site Conceptual Model for RI/FS Baseline Risk Assessments of Human and</u> <u>Ecological Health</u>, U.S. EPA Region 8 Superfund Technical Guidance, SOP #8RA-05, December 1994

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<u>Environmental Cleanup Best Management Practices: Effective Use of the Project</u> <u>Life Cycle Conceptual Site Model</u>, U.S. EPA, EPA 542-F-11-011, July 2011

<u>Standard Guide for Developing Conceptual Site Models for Contaminated Sites</u>, ASTM E1689 – 95 (2014)

Data Quality Assessment, Data Verification, and Data Validation

Ohio EPA Guidance

<u>Tier I Data Validation Manual for the Ohio EPA Division of Environmental</u> <u>Response and Revitalization</u>, Ohio EPA DERR, March 2012

U.S. EPA & Other Guidance

<u>Guidance for Data Quality Assessment: Practical Methods for Data Analysis (EPA QA-G9, QA00 Update)</u>, U.S. EPA, EPA/600/R-96/084, July 2000

<u>Guidance on Environmental Data Verification and Data Validation (QA/G-8)</u>, U.S. EPA, EPA/240/R-02/004, November 2002

Data Quality Assessment: A Reviewer's Guide (QA/G-9R), U.S. EPA, EPA/240/B-06/002, February 2006

Data Quality Assessment: Statistical Tools for Practitioners (QA/G-9S), U.S. EPA, EPA/240/B-06/003, February 2006

<u>U.S. EPA Contract Laboratory Program National Functional Guidelines for</u> <u>Superfund Organic Methods Data Review (SOM01.2)</u>, U.S. EPA, EPA-540-R-08-01, June 2008

<u>Guidance for Labeling Externally Validated Laboratory Analytical Data for</u> <u>Superfund Use</u>, U.S. EPA, EPA-540-R-08-005, January 2009 and <u>OSWER</u> <u>Directive No. 9200.1-85</u>

<u>U.S. EPA Contract Laboratory Program National Functional Guidelines for</u> <u>Inorganic Superfund Data Review (ISM01.2)</u>, U.S. EPA, EPA 540-R-10-011, January 2010

<u>U.S. EPA Contract Laboratory Program National Functional Guidelines for</u> <u>Chlorinated Dioxin/Furan Data Review</u>, U.S. EPA, EPA-540-R-11-016, September 2011

<u>U.S. EPA National Functional Guidelines for Inorganic Superfund Data Review</u> (ISM02.2), U.S. EPA, EPA 540-R-013-001, August 2014

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<u>U.S. EPA National Functional Guidelines for Superfund Organic Methods Data</u> <u>Review (SOM02.2)</u>, U.S. EPA, EPA 540-R-014-002, August 2014

Data Quality Objectives

Ohio EPA Guidance

Data Quality Objectives Process Summary, DERR-00-DI-32, Ohio EPA DERR, January 2002

U.S. EPA & Other Guidance

Data Quality Objectives Process for Superfund, Interim Final Guidance, U.S. EPA, EPA540-R-93-071, September 1993

<u>Data Quality Objectives Process for Hazardous Waste Site Investigations, EPA</u> <u>QA/G-4HW Final</u>, U.S. EPA, EPA/600/R-00/007, January 2000

<u>Data Quality Objectives Decision Error Feasibility Trials Software (DEFT) – Users</u> <u>Guide, EPA QA/G-4D</u>, U.S. EPA, EPA/240/B-01/007, September 2001; DEFT software is available at <u>EPA Quality System Agency-wide Quality System</u> <u>Documents</u>

<u>Current Perspectives in Site Remediation and Monitoring: Clarifying DQO</u> <u>Terminology Usage to Support Modernization of Site Cleanup Practice</u>, U.S. EPA, EPA 542-R-01-014, October 2001

<u>Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA</u> <u>QA/G-4</u>, U.S. EPA, EPA/240/B-06/001, February 2006

<u>Systematic Planning: A Case Study for Hazardous Waste Site Investigations EPA</u> <u>QA/CS-1</u>, U.S. EPA, EPA/240/B-06/00, February 2006

<u>Systematic Planning: A Case Study of Particulate Matter Ambient Air Monitoring</u> <u>EPA QA/CS-2</u>, U.S. EPA, EPA/240/B-07/001, March 2007

Data Usability in Risk Assessment

U.S. EPA & Other Guidance

<u>Guidance for Data Usability in Risk Assessment (Part A)</u>, U.S. EPA Office of Emergency and Remedial Response, Publication 9285.7-09A, April 1992

<u>Guidance for Data Usability in Risk Assessment (Part B)</u>, U.S. EPA Office of Emergency and Remedial Response, Publication 9285.7-09B, May 1992

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Ecological Risk Assessment

Ohio EPA Guidance

Ecological Risk Assessment Guidance Document, Ohio EPA DERR, April 2008

U.S. EPA & Other Guidance

Ecological Soil Screening Level (Eco-SSL), U.S. EPA

ECOTOX Database, U.S. EPA

<u>Framework for Ecological Risk Assessment</u>, U.S. EPA, EPA/630/R-92/001, February 1992

<u>Wildlife Exposure Factors Handbook (Volumes I and II)</u>, U.S. EPA, EPA/600/R-93/187, December 1993

<u>Guidelines for Ecological Risk Assessment</u>, U.S. EPA, EPA/630/R-95/002F, April 1998

<u>Ecological Risk Assessment Guidance for Superfund: Process for Designing and</u> <u>Conducting Ecological Risk Assessments, Interim Final</u>, U.S. EPA, EPA 540-R-97/006, June 1997

<u>Issuance of Final Guidance: Ecological Risk Assessment and Risk Management</u> <u>Principles for Superfund Sites</u>, U.S. EPA, OSWER Directive 9285.7-28 P, October 1999

<u>Guidance for Developing Ecological Soil Screening Levels</u>, U.S. EPA, OSWER Directive 9285.7-55, February 2005

Federal Facilities, Munitions, and Explosives

U.S. EPA & Other Guidance

Cleanups at Federal Facilities, U.S. EPA webpage

<u>Uniform Federal Policy for Quality Assurance Project Plans – Evaluating, Assessing,</u> <u>and Documenting Environmental Data Collection and Use Programs, Part 1: UFP-</u> <u>QAPP Manual, Final,</u> Intergovernmental Data Quality Task Force, EPA: EPA-505-B-04-900A, DoD: DTIC ADA 427785, Version 1, March 2005

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<u>Workbook for Uniform Federal Policy for Quality Assurance Project Plans –</u> <u>Evaluating, Assessing, and Documenting Environmental Data Collection and Use</u> <u>Programs, Part 2A: UFP-QAPP Workbook, Final,</u> Intergovernmental Data Quality Task Force, EPA: EPA-505-B-04-900C, DoD: DTIC ADA 427486, Version 1, March 2005

<u>Uniform Federal Policy for Quality Assurance Project Plans: Part 2B, Quality</u> <u>Assurance/Quality Control Compendium: Minimum QA/QC Activities, Final,</u> Intergovernmental Data Quality Task Force, EPA: EPA-505-B-04-900B, DoD: DTIC ADA 426957, Version 1, March 2005

<u>Handbook on the Management of Munitions Response Actions, Interim Final</u>, U.S. EPA, OSWER, EPA 500-B-01-001, May 2005

<u>Munitions and Explosives of Concern Hazard Assessment Methodology, Interim,</u> U.S. EPA, U.S. Department of Defense and U.S. Department of the Interior, EPA: 505B08001, October 2008

<u>Quality Considerations for Munitions Response Projects</u>, The Interstate Technology & Regulatory Council Unexploded Ordnance Team, UXO-5, October 2008

<u>Program Management Manual for Military Munitions Response Program (MMRP)</u> <u>Active Installations: Information for Managing and Overseeing MMRP Projects at US</u> <u>Army Active Installations, Final</u>, U.S. Army Environmental Command, September 2009

<u>EPA Munitions Response Guidelines, Interim Final</u>, U.S. EPA, OWSER Directive 9200.1-101, July 2010

Geologic/Hydrogeologic Investigation and Modeling

Ohio EPA Guidance

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Updated 09/12/2016; NOTE: web links are not regularly maintained.

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APPENDIX D

Environmental Covenant Template

To be recorded with Deed Records - ORC § 317.08

ENVIRONMENTAL COVENANT

This Environmental Covenant is entered into by [name all Owners of the Property and Holders] and the Ohio Environmental Protection Agency ("Ohio EPA") pursuant to Ohio Revised Code ("ORC") §§ 5301.80 to 5301.92 for the purpose of subjecting the Property described herein ("the Property") to the activity and use limitations set forth herein.

This Environmental Covenant requires current and future Property owners to meet certain requirements, including, but not limited to:

- Comply with the activity and use limitations given by paragraph 5 that: [*Plain language summary of the activity and use limitations in paragraph 5*].
- Provide an annual compliance report to Ohio EPA by [*enter Day Month*] of each year, as required by paragraph 9, describing that the Property continues to be used in compliance with the activity and use limitations.
- Give notice to new property owners (also known as "transferees") upon conveyance, as required by paragraph 10, of the activity and use limitations and the recorded location of this Environmental Covenant.
- Notify Ohio EPA within 10 days of each conveyance, as required by paragraph 10, of the property that was conveyed and new owner's contact information.

WHEREAS, the Property is owned by [name of Owner], who resides or is located at [address or location of owner].

WHEREAS, the remedy for the Property includes the activity and use limitations set forth in this Environmental Covenant.

WHEREAS, the activity and use limitations protect against exposure to the [hazardous substances / petroleum / hazardous substances and petroleum] in [soil / ground water / soil and ground water, or describe other affected media] on or underlying the Property.

[WHEREAS, the Property is the subject to an operation and maintenance (O&M) agreement that provides for a central management entity to oversee engineering controls to maintain site protectiveness.]

Now therefore, [*name of each Owner and Holder other than Owner, if any*] and Ohio EPA agree to the following:

1. <u>Environmental Covenant</u>. This instrument is an environmental covenant developed and executed pursuant to ORC §§ 5301.80 to 5301.92.

2. <u>Property</u>. This Environmental Covenant concerns an approximately ______-acre tract of real property located at [*Address of Property*], in [*County*], Ohio, and more particularly described in [*Attachment #*] attached hereto and incorporated by reference herein ("Property").

3. <u>Owner</u>. This Property is owned by [Owner Name] ("Owner"), [with a place of business located] at [Address of Owner].

4. <u>Holder</u>. Pursuant to ORC § 5301.81, the holder of this Environmental Covenant ("Holder") is the Owner listed above [*and if applicable* [*Name of other Holder not the Owner*], [with place of business located] at [Address of other Holder]].

5. <u>Activity and Use Limitations</u>. As part of the remedial action described in the Decision Document, Owner[s] hereby impose[s] and agree[s] to comply with the following activity and use limitations: [Determine the activity and use limitations appropriate for the Property. Several types of restrictions may be appropriate as part of a remedial action, interim action, or closure plan where cleanup to an unrestricted land use is infeasible. These include: land use restrictions; ground water restrictions; disturbance restrictions; and construction restrictions. Each type of restriction must be considered on a site-specific basis to determine which restriction or combination of restrictions is suitable for the particular circumstances of the site or facility. Evaluate the possible use restrictions based on the nature of contamination, the type of affected media and the potential exposures. The restriction categories include: land use, ground water, disturbance and construction.

6. <u>Running with the Land</u>. This Environmental Covenant shall be binding upon the Owner, during the time that the Owner owns the Property or any portion thereof, and upon all assigns and successors in interest, including any Transferee, and shall run with the land, pursuant to ORC § 5301.85, subject to amendment or termination as set forth herein. The term "Transferee," as used in this Environmental Covenant, shall mean any future owner of any interest in the Property or any portion thereof, including, but not limited to, owners of an interest in fee simple, mortgagees, easement holders, and/or lessees.

7. <u>Compliance Enforcement</u>. Compliance with this Environmental Covenant may be enforced pursuant to ORC § 5301.91 and other applicable law. Failure to timely enforce compliance with this Environmental Covenant or the activity and use limitations contained herein by any party shall not bar subsequent enforcement by such party and shall not be deemed a waiver of the party's right to take action to enforce against any non-compliance. Nothing in this Environmental Covenant shall restrict the Director of Ohio EPA from exercising any authority under applicable law.

8. <u>Rights of Access</u>. Owner hereby grants to Ohio EPA's authorized representatives [*include, as applicable, name of local government and any Holders other than Owner, etc.; see ORC §§ 5301.82(A)(6) and 5301.91(A)*] the right of access to the Property for implementation or enforcement of this Environmental Covenant and shall require such access as a condition of any transfer of the Property or any portion thereof.

9. <u>Compliance Reporting</u>. Owner or Transferee, if applicable, shall annually submit to Ohio EPA [*include, as applicable, name of local government, any "Holders" other than Owner*] written documentation verifying that the activity and use limitations set forth herein remain in place and are being complied with. Documentation shall be due to Ohio EPA on July 1st of each year beginning the year after the effective date of this Environmental Covenant, unless otherwise directed by Ohio EPA.

10. <u>Notice upon Conveyance</u>. Each instrument hereafter conveying any interest in the Property or any portion thereof shall contain a notice of the activity and use limitations set forth in this Environmental Covenant, and provide the recorded location of this Environmental Covenant. The notice shall be substantially in the following form:

THE INTEREST CONVEYED HEREBY IS SUBJECT TO AN ENVIRONMENTAL COVENANT, RECORDED IN THE DEED OR OFFICIAL RECORDS OF [name of County Recorder's Office] ON ______, 201___, IN [DOCUMENT ____, or BOOK____, PAGE ____]. THE ENVIRONMENTAL COVENANT CONTAINS THE FOLLOWING ACTIVITY AND USE LIMITATIONS:

[List or summarize the type of activity and use limitations in Paragraph 5 of the environmental covenant (i.e., a limitation to commercial or industrial land uses, a prohibition on ground water extraction and use, and a limitation on building occupancy – remedy or demonstration obligation).]

Owner or Transferee, if applicable, shall notify Ohio EPA [and "Holders" other than the Owner, if any] within [ten (10)] days after each conveyance of an interest in the

Property or any portion thereof. The notice shall include the name, address, and telephone number of the Transferee, a copy of the deed or other documentation evidencing the conveyance, and a survey map that shows the boundaries of the property being transferred.

11. <u>Representations and Warranties</u>. Owner hereby represents and warrants to the other signatories hereto:

- A. that the Owner is the sole owner of the Property;
- B. that the Owner holds fee simple title to the Property and that the Owner conducted a current title search that shows that the Property [choose one: is subject to [or] is not subject to any] interests or encumbrances that conflict with the activity and use limitations set forth in this Environmental Covenant;

[If other interests or encumbrances on the Property conflict with the activity and use limitations set forth in this Environmental Covenant, add the following provision as a separate subparagraph:

To the extent that any other interests in or encumbrances on the Property conflict with the activity and use limitations set forth in this Environmental Covenant, the persons who own such interests or hold such encumbrances have agreed to subordinate such interests or encumbrances to the Environmental Covenant, pursuant to ORC § 5301.86, and the subordination agreement(s) (attached as [Attachment #] to this Environmental Covenant; [or] recorded at [name of County Recorder's Office].)]

- C. that the Owner has the power and authority to enter into this Environmental Covenant, to grant the rights and interests herein provided and to carry out all obligations hereunder;
- D. that this Environmental Covenant will not materially violate or contravene or constitute a material default under any other agreement, document or instrument to which Owner is a party or by which Owner may be bound or affected;

E. that the Owner has identified all other persons that own an interest in or hold an encumbrance on the Property, and, if applicable, notified such persons of the Owner's intention to enter into this Environmental Covenant.

12. <u>Amendment or Termination</u>. This Environmental Covenant may be amended or terminated by consent of all of the following: the Owner, or a Transferee, if applicable; ["Holders" other than Owner, if any;] and the Director of the Ohio EPA, pursuant to ORC §§ 5301.82 and 5301.90 and other applicable law. The term, "Amendment," as used in this Environmental Covenant, shall mean any changes to the Environmental Covenant, including the activity and use limitations set forth herein, or the elimination of one or more activity and use limitations so long as there is at least one limitation remaining. The term, "Termination," as used in this Environmental Covenant, shall mean and all other obligations under this Environmental Covenant.

This Environmental Covenant may be amended or terminated only by a written instrument duly executed by the Director of Ohio EPA and by the Owner or Transferee, if applicable, of the Property or any portion thereof [, and "Holders" or their assignees, if any]. Within thirty (30) days of signature by all requisite parties on any amendment or termination of this Environmental Covenant, the Owner or Transferee, if applicable, shall file such instrument for recording with the [name of County Recorder's Office], and shall provide a file- and date-stamped copy of the recorded instrument to Ohio EPA [and "Holders" or their assignees, if any].

13. <u>Severability</u>. If any provision of this Environmental Covenant is found to be unenforceable in any respect, the validity, legality, and enforceability of the remaining provisions shall not in any way be affected or impaired.

14. <u>Governing Law</u>. This Environmental Covenant shall be governed by and interpreted in accordance with the laws of the State of Ohio.

15. <u>Recordation</u>. Within [*thirty (30)*] days after the date of the final required signature, Owner shall file this Environmental Covenant for recording, in the same manner as a deed to the Property, with the [*name of County Recorder's Office*].

16. <u>Effective Date</u>. The effective date of this Environmental Covenant shall be the date upon which the fully executed Environmental Covenant has been recorded as a deed record for the Property with the [*name of County Recorder's Office*].

17. <u>Distribution of Environmental Covenant</u>. Owner shall distribute a file- and date-stamped copy of the recorded Environmental Covenant to: Ohio EPA [, *include name other parties to the Environmental Covenant, if any*] and [*include the appropriate governmental entity applicable to property: City / County / Township*].

18. <u>Notice</u>. Unless otherwise notified in writing by any party hereto or Ohio EPA, any document or communication required by this Environmental Covenant shall be submitted to:

As to Ohio EPA:

Ohio EPA – Central Office Division of Environmental Response and Revitalization 50 West Town Street Columbus, Ohio 43216 Attn.: DERR Records Management Officer

Or, send electronically to: records@epa.ohio.gov

And

Ohio EPA - [applicable district office] [District office address] Attn.: DERR Site Coordinator for [*Site Name*]

As to Owner:

[Name, title, or position] [Address]

[As to Holder:]

[Name, title, or position] [Address]

The undersigned represents and certifies that the undersigned is authorized to execute this Environmental Covenant.

[EC Template, August 2016]

IT IS SO AGREED:

[OWNER NAME]

Signature of Owner

Printed Name and Title

 State of ______)
 ______)

 County of ______)
 ______)

Before me, a notary public, in and for said county and state, personally appeared ______, a duly authorized representative of the Owner, who acknowledged to me the execution of the foregoing instrument on behalf of the Owner.

IN TESTIMONY WHEREOF, I have subscribed my name and affixed my official seal this ______ day of ______, 20__.

Notary Public

[EC Template, August 2016]

[HOLDER NAME]

Signature of Holder

Printed Name and Title

 State of ______)
)

 County of ______)
 ss:

Before me, a notary public, in and for said county and state, personally appeared ______, a duly authorized representative of the Holder, who acknowledged to me the execution of the foregoing instrument on behalf of the Holder.

IN TESTIMONY WHEREOF, I have subscribed my name and affixed my official seal this _____ day of _____, 201_.

Notary Public

[EC Template, August 2016]

Environmental Covenant Page 9

OHIO ENVIRONMENTAL PROTECTION AGENCY

Craig W. Butler, Director

State of Ohio)) ss: County of Franklin)

Before me, a notary public, in and for Franklin County, Ohio, personally appeared Craig W. Butler, the Director of Ohio EPA, who acknowledged to me that he did execute the foregoing instrument on behalf of Ohio EPA.

IN TESTIMONY WHEREOF, I have subscribed my name and affixed my official seal this _____ day of _____, 201_.

Notary Public

<u>APPENDIX E</u>

Site Map



APPENDIX F

Chromite Ore Processing Residue Area

