IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF OHIO
EASTERN DIVISION

UNITED STATES OF AMERICA
and

STATE OF OHIO, ex. rel. Michael DeWine, Ohio Attorney General
Plaintiffs,

v.

RUTGERS ORGANICS CORPORATION

Defendant.

CIVIL ACTION NO.

CONSENT DECREE

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I. BACKGROUND

1. The United States of America ("United States"), on behalf of the Administrator of the United States Environmental Protection Agency ("EPA"), and the Secretary of the United States Department of the Interior ("DOI"), and the State of Ohio, ex rel. Michael DeWine, Ohio Attorney General (the "State"), by and through the Attorney General of Ohio, on behalf of the Ohio Environmental Protection Agency ("Ohio EPA") (collectively the "Plaintiffs"):

a. Filed a complaint in this matter against Defendant Rutgers Organics Corporation ("Defendant" or "ROC") asserting claims under Sections 106 and 107 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended ("CERCLA"), 42 U.S.C. §§ 9606 and 9607, and Section 311(f) of the Federal Water Pollution Control Act (commonly referred to as the "Clean Water Act" ("CWA")), 33 U.S.C. 1321(f); and

b. Seeks, *inter alia*: (i) reimbursement of costs incurred by EPA and Ohio EPA not inconsistent with the National Contingency Plan, 40 C.F.R. Part 300 ("NCP") and the United States Department of Justice ("DOJ") in responding to the release and threat of release of hazardous substances by the Defendant at and from the Nease Chemical Superfund Site in Columbiana and Mahoning Counties, Ohio ("Site"), together with accrued interest; (ii) the performance of response actions by Defendant at the Site consistent with the NCP; and (iii) damages for injury to, destruction of, or loss of natural resources belonging to, managed by, held in trust by, controlled by, or appertaining to the United States and the State, resulting from releases of hazardous substances in the Assessment Area, including the reasonable costs of assessing such injury, destruction, or loss.

2. The Complaint alleges that Defendant is responsible for reimbursement of response costs and for the performance of response actions arising from the release of hazardous substances at the Site because Defendant (or its predecessors) is an owner or operator of one or more facilities from which such releases have occurred or was an owner or operator of one or more such facilities at the time hazardous substances were disposed at such facilities.

3. The Complaint further alleges that Defendant is liable for damages for injury to, destruction of, or loss of natural resources arising from the release of hazardous substances because the Defendant (or its predecessors) is an owner or operator of one or more facilities from which such releases have occurred or was an owner or operator of one or more such facilities at the time hazardous substances were disposed at such facilities.

4. The Defendant that has entered into this Consent Decree ("Settling Defendant") does not admit any liability to the United States or the State arising out of the transactions or occurrences alleged in the Complaint, nor does it acknowledge that the release or threatened release of hazardous substances at or from the Site and/or in the Assessment Area constitutes an imminent and substantial endangerment to the public health or welfare or the environment, or that any of its actions resulted in injury to natural resources.

5. In accordance with the National Contingency Plan ("NCP"), 40 C.F.R. Part 300, and CERCLA Section 121(f)(1)(F), 42 U.S.C. § 9621(f)(1)(F), EPA notified the State of negotiations with potentially responsible parties regarding the implementation of the remedial action for the Site, and EPA has provided the State with an opportunity to participate in such negotiations and be a party to this Consent Decree.

6. In accordance with CERCLA Section 122(j)(1), 42 U.S.C. § 9622(j)(1), EPA notified the Department of the Interior and Ohio EPA ("Trustees") of negotiations with potentially responsible parties regarding the release of hazardous substances that may have

resulted in injury to natural resources under Federal trusteeship, and encouraged the Trustees to participate in the negotiation of this Consent Decree.

II. SITE HISTORY/EPA RESPONSE ACTIONS AND TRUSTEE ASSESSMENT

A. Site History

7. From 1961 through 1973, the Nease Chemical Company manufactured a variety of chemical substances at the Site. Such substances included, but were not limited to, household cleaning compounds, fire retardants, pesticides (including Mirex), and chemical intermediates used in agricultural, pharmaceutical, and other chemical intensive products. In 1973, Nease Chemical Company ceased operations at the Site. In 1977, the Ruetgers Chemical Company acquired the Nease Chemical Company and formed the Ruetgers-Nease Chemical Company. Ruetgers-Nease Chemical Company later changed its name to Rutgers Organics Corporation.

B. EPA Response Actions/Implementation of CERCLA Remedial Provisions

8. Pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, EPA placed the Site on the National Priorities List ("NPL"), set forth at 40 C.F.R. Part 300, Appendix B, by publication in the Federal Register on September 8, 1983, 48 Fed. Reg. 40658.

9. In response to an alleged release or a substantial threat of a release of hazardous substances at or from the Site, ROC (at the time known as Ruetgers-Nease Chemical Company), Ohio EPA, and EPA signed an Administrative Order on Consent ("AOC") in January 1988 (effective February 26, 1988) requiring ROC to conduct a Remedial Investigation and Feasibility Study ("RI/FS") for the Site pursuant to 40 C.F.R. § 300.430.

10. EPA has divided the Site into three Operable Units (OUs): OU 1 includes a long-term removal action to mitigate the further migration of contamination; OU 2 includes the Former Nease Property, the areal extent of soil contamination adjacent to the Former Nease Property, and the areal extent of groundwater contamination; and OU 3 includes Feeder Creek

and the contaminated stretch of the Middle Fork Little Beaver Creek ("MFLBC") and its floodplains.

11. ROC completed the Remedial Investigation Report, Nease Site, Salem, Ohio ("RI") for the Site in June 1996, the Feasibility Study for Operable Unit 2, Nease Chemical Company, Salem, Ohio ("OU 2 FS") in February 2005, and the Feasibility Study for Operable Unit 3, Nease Chemical Company, Salem, Ohio ("OU 3 FS") in June 2008. In addition, in 2004, ROC completed the Endangerment Assessment for the Nease Chemical Company Salem, Ohio Site ("EA"), which includes the human health and ecological risk assessments for the Site.

12. Pursuant to Section 117 of CERCLA, 42 U.S.C. § 9617, EPA published notice of the completion of the OU 2 FS and of the proposed plan for remedial action for OU 2 in May 2005, and EPA published notice of the completion of the OU 3 FS and of the proposed plan for remedial action for OU 3 in July 2008, in a major local newspaper of general circulation. EPA provided an opportunity for written and oral comments from the public on the OU 2 and OU 3 proposed plans for remedial action. On June 22, 2005, EPA held a public meeting on the OU 2 proposed plan at the Salem Public Library in Salem, Ohio. On July 31, 2008, EPA held a public meeting on the OU 3 proposed plan at the Salem Public Library in Salem, Ohio. A copy of the transcripts of the public meetings for the OU 2 and OU 3 proposed plans is available to the public as part of the administrative record upon which the Regional Administrator, EPA Region 5 based the selection of the response action.

13. The decisions by EPA on the remedial actions to be implemented for OU 2 and OU 3 at the Site are embodied in a final Record of Decision ("ROD") for OU 2, executed on September 29, 2005 ("OU 2 ROD"), a final ROD for OU 3 executed on September 24, 2008 ("OU 3 ROD"), respectively, and an Explanation of Significant Differences ("ESD") for OU 2, issued on August 26, 2011 ("OU 2 ESD"), to all of which the State has given its concurrence.

The OU 2 ROD and OU 3 ROD each includes a responsiveness summary to the public comments. Notices of the RODs and the OU 2 ESD were published in accordance with Section 117(b) and (c) of CERCLA, 42 U.S.C. § 9617(b) and (c).

14. On May 10, 2006, EPA and ROC entered into an AOC requiring ROC to conduct the Remedial Design ("RD") for OU 2 ("OU 2 RD AOC"), and on June 30, 2009, EPA and ROC entered into an AOC requiring ROC to conduct the RD for OU 3 ("OU 3 RD AOC"). These AOCs were entered under authority of Sections 104, 106, 107, and 122 of CERCLA, 42 U.S.C. §§ 9604, 9606, 9607, and 9622.

15. Based on the information presently available to EPA, EPA believes that the Remedial Work will be properly and promptly conducted by the Settling Defendant if conducted in accordance with the requirements of this Consent Decree and its appendices.

16. Solely for the purposes of Section 113(j) of CERCLA, 42 U.S.C. § 9613(j), the remedy set forth by the OU 2 ROD, OU 3 ROD, and the OU 2 ESD, and the Remedial Work to be performed by the Settling Defendant shall constitute a response action taken or ordered by the President for which judicial review shall be limited to the administrative record.

C. Trustee Assessment/Regulatory Framework

17. The Trustees have determined that the natural resources affected or potentially affected by the release of the hazardous substances in the Assessment Area include: (1) floodplain soils, sediments, surface and ground water, and biological resources, such as aquatic/wetland and terrestrial plants; (2) benthic, aquatic, and terrestrial invertebrates; (3) fish; (4) migratory birds, including but not limited to waterfowl, and their supporting habitats; and (5) mammals.

18. The Trustees have determined that the primary pathways of hazardous substances to natural resources in the Assessment Area are: (1) migratory birds feeding at and near the

Assessment Area, through direct contact with contaminants in surface water and soils, and through their food chains; (2) fish and fish-eating birds in the MFLBC, through direct contact with contaminated sediments and through their food chains; (3) benthic organisms, which are important elements of the food chains supporting fish, fish-eating birds, and fish-eating mammals, through contact with contaminated surface water and sediments in Feeder Creek and contaminated sediments in the MFLBC; and (4) loss of ground water uses as the result of contamination.

19. DOI's Natural Resource Damage Assessment (NRDA) regulations state that injury to biological trust resources occurs when a hazardous substance: (1) causes the resource or its offspring to undergo an adverse change in viability; (2) exceeds action or tolerance levels established under Section 402 of the Food, Drug and Cosmetic Act , 21 U.S.C. § 342, in edible portions of organisms; or (3) exceeds levels for which a state health agency has issued an advisory limiting or banning consumption of such biological resource. 43 C.F.R. § 11.62(f). Injury to ground water trust resources occurs when a hazardous substance exceeds drinking water standards in water that was potable before the discharge or release. 43 C.F.R. § 11.62(c). Injury to surface water trust resources occurs when a hazardous substance exceeds water quality criteria established by Section 304(a)(1) of the CWA or by other federal and State laws or regulations that establish such criteria. 43 C.F.R. § 11.62(b).

20. In 1987, the Ohio Department of Health (ODH) issued a "do not eat fish" consumption advisory for all fish, based on Mirex contamination, for the MFLBC; the advisory was modified in 2003 and 2007 based on additional fish fillet data. Fish consumption advisories in 2007 included other contaminants, such as mercury and PCBs that are unrelated to the Site; however, Mirex was still detected in MFLBC above unrestricted consumption levels. In 1988, ODH issued a contact advisory warning against wading and swimming in the MFLBC. The

advisory was in place until February 2011, when it was rescinded after an additional evaluation was performed. Hazardous substances above the CWA and Ohio Water Quality standards have been detected in Feeder Creek. Releases of volatile organic compounds have contaminated ground water above drinking water standards, including the maximum contaminant levels.

21. CERCLA and CWA authorize trustees to act on behalf of the public to recover damages for injuries to, destruction of, or loss of natural resources resulting from the release of hazardous substances to the environment, and the reasonable cost of assessing such damages. 42 U.S.C. § 9607 and 33 U.S.C. § 1321(f). Trustees may recover damages for the costs of performing an assessment and for injuries to natural resources and their services from the time of the hazardous substance release, through the recovery period, until full restoration is achieved, or, if full restoration is not possible, for future losses, plus any increase in injuries that are a result of the response actions. 42 U.S.C. § 9607 and 43 C.F.R. § 11.15(a). Compensation (i.e., damages), at a minimum, must include the cost of restoring the injured natural resources and their provided services back to baseline. 43 C.F.R. § 11.80(b).

22. Trustees may also recover damages for the loss in services provided by the injured resources between the time of the release and the time the resources and the services those resources provided are fully returned to their baseline conditions. 43 C.F.R. § 11.83(c). Compensable value includes the value of lost public use of the services provided by the injured resources, plus lost nonuse values, such as existence and bequest values. *Id*.

23. Plaintiffs allege that, at the Assessment Area, the Trustees investigated potential injuries from the release of hazardous substances (including but not limited to Mirex, chlordecone (kepone), hexachlorocyclopentadiene, chlorinated ethenes, and chlorinated benzenes) and assessed potential restoration efforts. Mirex contamination has been detected in Feeder Creek and in approximately 36 river miles of the MFLBC. The contaminated ground

water plume at the Site renders a portion of the aquifers unusable as a source of potable water.

24. In accordance with CERCLA and its implementing regulations, the Trustees prepared a Draft Natural Resource Restoration Plan and Environmental Assessment ("Draft Restoration Plan"), dated March 5, 2015, that was subject to public notice and comment. The purpose of the Draft Restoration Plan was to inform the public about the affected environment and the restoration projects proposed to compensate for injuries identified by the Trustees caused by the releases to the natural resources and their services. The Trustees received comments on the Draft Restoration Plan. Public comments were considered and the Restoration Plan was finalized. A copy of the Final Restoration Plan is attached hereto and is incorporated herein by reference as Appendix D. Pursuant to this Consent Decree, Settling Defendant will implement the Restoration Projects described in Section X and Appendices D and H to this Consent Decree, which Projects have been determined by the Trustees to provide for the restoration or replacement of equivalent natural resources that were allegedly injured, destroyed, or lost as a result of the releases.

25. The United States, the State and the Settling Defendant (collectively, the "Parties" to this Consent Decree) recognize, and the Court by entering this Consent Decree finds, that this Consent Decree has been negotiated by the Parties in good faith, that implementation of this Consent Decree will avoid prolonged and complicated litigation among the Parties, and that this Consent Decree is fair, reasonable, consistent with applicable law, and in the public interest.

NOW, THEREFORE, before the taking of any testimony, without adjudication of any issue of fact or law, except as provided in Section III, and with the consent of the Parties, it is hereby Ordered, Adjudged, and Decreed:

III. JURISDICTION

26. This Court has jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §§ 1331 and 1345, and 42 U.S.C. §§ 9606, 9607, and 9613(b). This Court also has personal jurisdiction over the Settling Defendant. Venue lies in this district pursuant to Section 113(b) of CERCLA, 42 U.S.C. § 9613(b), and 28 U.S.C. § 1391(b) and (e), because the releases and injuries alleged in the Complaint occurred within this district, and a substantial part of the events giving rise to Plaintiffs' claims occurred in this district. For the purposes of this Consent Decree, or any action to enforce this Decree, Settling Defendant consents to this Court's jurisdiction over this Decree and any such action and over Settling Defendant as well as to venue in this district.

IV. PARTIES BOUND

27. This Consent Decree applies to and is binding upon the United States, the State, and upon Settling Defendant and its successors and assigns. Any change in ownership or corporate status of Settling Defendant including, but not limited to, any transfer of assets or real or personal property, shall in no way alter such Settling Defendant's responsibilities under this Consent Decree.

28. Settling Defendant shall provide a copy of this Consent Decree to each contractor hired to perform the Work required by this Consent Decree and to each person representing Settling Defendant with respect to the Site or the Work and shall condition all contracts entered into hereunder upon performance of the Work in conformity with the terms of this Consent Decree. Settling Defendant or its contractors shall provide written notice of the Consent Decree to all subcontractors hired to perform any portion of the Work required by this Consent Decree. Settling Defendant shall nonetheless be responsible for ensuring that its contractors and subcontractors perform the Work in accordance with the terms of this Consent Decree. With

regard to the activities undertaken pursuant to this Consent Decree, each contractor and subcontractor shall be deemed to be in a contractual relationship with Settling Defendant within the meaning of Section 107(b)(3) of CERCLA, 42 U.S.C. § 9607(b)(3).

V. DEFINITIONS

29. Unless otherwise expressly provided in this Consent Decree, terms used in this Consent Decree that are defined in CERCLA, the NCP, or the DOI NRDA Regulations, 43 C.F.R. Part 11, shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Consent Decree or its appendices, the following definitions shall apply solely for purposes of this Consent Decree:

"Assessment Area" shall mean the Former Nease Property, portions of the Former Crane-Deming Property, the underlying groundwater aquifers, Feeder Creek, portions of MFLBC, and supporting ecosystems, where the Trustees have determined that certain natural resources have been affected directly or indirectly by the release of hazardous substances from the former Nease Chemical facility. The Assessment Area serves as the geographic basis for the injury assessment, and is depicted on the map of the Assessment Area included in Appendix F.

"Assessment Costs" shall mean the reasonable direct and indirect costs incurred or to be incurred by the Trustees, as defined in 43 C.F.R. §11.15(a)(3), in assessing the natural resources the Trustees allege were injured, destroyed, or lost at or in connection with releases at or from the Former Nease Property, in identifying and planning Restoration Projects to compensate for such injuries and loss, and in the monitoring of the Restoration Projects contemplated by this Consent Decree. Such costs shall include reasonable administrative costs and other costs or expenses recoverable under 43 C.F.R. § 11.15(a)(3) which are incurred to provide for, carry out, or support the activities or responsibilities of the Trustees consistent with this Consent Decree, including their attorneys, in overseeing the implementation of the Restoration Projects. Past

Assessment Costs shall mean those Assessment Costs incurred as of March 18, 2016. Future Assessment Costs shall mean those Assessment Costs incurred after March 18, 2016.

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

"Consent Decree" shall mean this Consent Decree and all appendices attached hereto. In the event of conflict between this Consent Decree and any appendix, this Consent Decree shall control.

"Conservation Easement" shall mean a "Conservation Easement" as defined in Ohio Revised Code § 5301.67(A) that complies with Ohio Revised Code §§ 5301.68 – 5301.70.

"Conservation Trust" shall mean the trust established by ROC, as Grantor, and a Land Conservation Organization selected by Grantor, as Trust Grantee, whereby Grantor shall fund and Trust Grantee shall complete the conservation of Conserved Lands as required by this Consent Decree.

"Conserve" shall mean to preserve or protect natural resources pursuant to this Consent Decree through the use of Conservation Instruments as defined in Paragraph 76(a).

"Conserved Lands" shall mean those parcels of land that Settling Defendant is required to conserve in accordance with Section X, Performance of Restoration Projects, and includes "Priority Properties" and/or "Alternate Properties" as described in Section X, Subpart D.

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

"DOI" shall mean the United States Department of the Interior and any successor departments, agencies or instrumentalities of the United States.

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

"Effective Date" shall mean the date upon which this Consent Decree is entered by the Court as recorded on the Court docket, or, if the Court issues an order approving the Consent Decree, the date such order is recorded on the Court docket.

"Environmental Covenant" shall mean an "Environmental Covenant" as defined in Ohio Revised Code § 5301.80(D) that complies with Ohio Revised Code §§ 5301.80 - 5301.92.

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

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

"Feeder Creek" shall mean the small tributary to the Middle Fork of Little Beaver Creek that drains the Former Nease Property and Former Crane-Deming Property.

"Final OU 2 Remedial Design" or "Final OU 2 RD" shall mean the final plans and specifications for the OU 2 Remedial Action approved or modified by EPA pursuant to Section VII (Performance of the Remedial Design/Remedial Action) and Section XIV (Approval of Plans, Reports, and Other Deliverables) of this Consent Decree and the Remedial Statement of Work ("SOW").

"Final OU 3 Remedial Design" or "Final OU3 RD" shall mean the final plans and specifications of the OU 3 Remedial Action approved or modified by EPA pursuant to Section VII (Performance of the Remedial Design/Remedial Action) and Section XIV (Approval of Plans, Reports, and Other Deliverables) of this Consent Decree and the Remedial SOW.

"Former Crane-Deming Property" shall mean the facility and surrounding property adjacent to and east of the Former Nease Property, consisting of approximately 35 acres, which includes an existing manufacturing facility. ROC acquired the property from the Crane-Deming Company in late 1997, but continued to lease the property to the Crane-Deming Company. Until mid-2005, the Crane-Deming Company operated a pump manufacturing business within the building on the property. In 2006, ROC sold part of the former Crane-Deming property to the Columbiana County Port Authority, which in turn, leased the building and parking lot on the property to MAC Trailer Realty, Inc. MAC Trailer Realty, Inc., now owns part of the Former Crane-Deming Property, and conducts manufacturing on the property.

"Former Nease Property" shall mean the facility and surrounding property in Columbiana, Ohio that was owned and operated from 1961 until 1973 by the Nease Chemical Company as a chemical manufacturing plant producing specialty chemicals such as pesticides (including Mirex), fire retardants, household cleaning compounds and chemical intermediates used in agricultural, pharmaceutical, and other chemical products. The Former Nease Property lies adjacent to and west of the Former Crane-Deming Property, and includes former settling ponds once used by the Nease Chemical Company.

"Future Response Costs" shall mean all costs not inconsistent with the NCP, including, but not limited to, direct and indirect costs, that the United States and/or State incurs in reviewing or developing plans, reports and other items pursuant to this Consent Decree, in overseeing implementation of the Remedial Work, or otherwise implementing, overseeing, or enforcing this Consent Decree, including, but not limited to, payroll costs, contractor costs, travel costs, laboratory costs, the costs incurred pursuant to Subsection VI.D (Notice to Successors-in-Title and Transfers of Real Property) in Section VI (Statement of Purpose/General Provisions Section), Sections VIII (Remedy Review), XI (Remedial Access and Institutional Controls)

(including, but not limited to, the cost of attorney time and any monies paid to secure access and/or to secure, implement, monitor, maintain or enforce Institutional Controls including the amount of just compensation), XVIII (Emergency Response), Paragraph 112 (Access to Financial Assurance), and Section XXXV (Community Involvement). Future Response Costs shall also include all Interim Response Costs. Future Response costs shall not include those costs incurred by the United States that Settling Defendant has paid in accordance with the OU 2 RD AOC or OU 3 RD AOC, or those costs incurred by the State that the Settling Defendant has paid in accordance with Ohio EPA's Final Findings and Orders for Cost Recovery dated October 26, 2006 for OU 2 and March 2, 2010 for OU 3, or the Ohio EPA's Administrative Findings and Orders for Cost Recovery entered into pursuant to Paragraph 131(e) of this Consent Decree.

"FWS" shall mean the U.S. Fish and Wildlife Service of the United States Department of the Interior, and its successor departments, agencies, or instrumentalities.

"Institutional Controls" or "ICs" shall mean Remedial Proprietary Controls and state or local laws, regulations, ordinances, zoning restrictions, or other governmental controls or notices that: (a) limit land, water, and/or resource use to minimize the potential for human exposure to Waste Material at or in connection with the Site; (b) limit land, water, and/or resource use to implement, ensure non-interference with, or ensure the protectiveness of the Remedial Action; and/or (c) provide information intended to modify or guide human behavior at or in connection with the Site.

"Institutional Control Implementation and Assurance Plan" or "ICIAP" shall mean the plan for implementing, maintaining, monitoring, and reporting on the Institutional Controls set forth in the OU 2 ROD and OU 2 ESD, prepared in accordance with the Remedial SOW.

"Interest" shall mean interest at the rate specified for interest on investments of the EPA Hazardous Substance Superfund established by 26 U.S.C. § 9507, compounded annually on

October 1 of each year, in accordance with 42 U.S.C. § 9607(a). The applicable rate of interest shall be the rate in effect at the time the interest accrues. The rate of interest is subject to change on October 1 of each year.

"Interim Response Costs" shall mean all costs, including, but not limited to, direct and indirect costs not inconsistent with the NCP (a) paid by the EPA and/or State in connection with the Site between March 18, 2016 and the Effective Date; (b) paid by the Department of Justice in connection with the Site between March 18, 2016 and the Effective Date; or (c) incurred prior to the Effective Date but paid after that date.

"Lodging Date" means the date on which this Consent Decree is lodged with the Court.

"MFLBC" shall mean Middle Fork of Little Beaver Creek.

"Natural Resources" shall mean land, wildlife, biota, air, surface water, ground water drinking water supplies, and other such resources, belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States and/or the State.

"Natural Resource Damages" shall mean compensation for injury to, destruction of, or loss of, Natural Resources resulting from or relating to releases of hazardous substances in, or which have migrated into, the Assessment Area, as set forth in Section 107(a)(4)(C) of CERCLA, 42 U.S.C. § 9607(a)(4)(C). Natural Resource Damages includes Assessment Costs incurred by the Trustees in assessing such injury, destruction, or loss arising from or relating to such releases, and each of the categories of damages described in 43 C.F.R. § 11.15.

"Nease Chemical Special Account" shall mean the special account, within the EPA Hazardous Substance Superfund, established for the Site by EPA pursuant to Section 122(b)(3) of CERCLA, 42 U.S.C. § 9622(b)(3).

"National Contingency Plan" or "NCP" shall mean the National Oil and Hazardous

Substances Pollution Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. § 300, and any amendments thereto.

"NRDAR Fund" shall mean DOI's Natural Resource Damage Assessment and Restoration Fund, established pursuant to 43 U.S.C. § 1474b and 1474b-1.

"NZVI" shall mean nanoscale zero-valent iron, as described in the OU 2 ROD.

"Ohio EPA" shall mean the Ohio Environmental Protection Agency and any successor departments or agencies of the State.

"OU 2" shall mean Operable Unit 2 of the Site as specified by the OU 2 ROD.

"OU 2 Explanation of Significant Differences" or "OU 2 ESD" shall mean the EPA Explanation of Significant Differences signed by Richard Karl, Director Superfund Division, EPA Region 5, on August 26, 2011, that alters the remedy selected in the OU 2 ROD and is included as Appendix C.

"OU 2 Remedial Action" shall mean all activities the Settling Defendant is required to perform under this Consent Decree to implement the OU 2 ROD and OU 2 ESD in accordance with the Remedial SOW, the Final OU 2 Remedial Design, the OU 2 Remedial Action Work Plan, and other plans approved by EPA, including Pre-Achievement O&M and implementation of Institutional Controls, until the Performance Standards for OU 2 are met, and excluding performance of the Remedial Design, Post-Achievement O&M and the activities required under Section XXX (Retention of Records) of this Consent Decree.

"OU 2 Remedial Action Work Plan" shall mean the document developed pursuant to Section VII (Performance of the Remedial Design/Remedial Action) of this Consent Decree and the Remedial SOW and approved by EPA, and any modifications thereto.

"OU 2 Remedial Design" or "OU 2 RD" shall mean those activities to be undertaken by Settling Defendant to develop the final plans and specifications for the OU 2 Remedial Action

pursuant to the OU 2 Remedial Design AOC, Section VII (Performance of the Remedial Design/Remedial Action) of this Consent Decree, and the Remedial SOW.

"OU 2 Remedial Design AOC" or "OU 2 RD AOC" shall mean the Administrative Settlement Agreement and Order on Consent for Remedial Design entered into by EPA and ROC on May 10, 2006, which requires ROC to undertake remedial design activities to develop the final plans and specifications for the Remedial Action for OU 2.

"OU 2 Remedial Operation & Maintenance Plan" or "OU 2 Remedial O&M Plan" shall mean the document developed pursuant to Section VII (Performance of the Remedial Design/Remedial Action) of this Consent Decree and the Remedial SOW and approved by EPA, and any modifications thereto.

"OU 2 ROD" shall mean the EPA Record of Decision relating to OU 2 of the Site, and all attachments thereto that the Director, Superfund Division, EPA Region 5, or his/her delegate, signed on September 29, 2005. The OU 2 ROD is attached as Appendix A.

"OU 3" shall mean Operable Unit 3 of the Site as specified by the OU 3 ROD.

"OU 3 Remedial Action" shall mean all activities the Settling Defendant is required to perform under the Consent Decree to implement the OU 3 ROD in accordance with the Remedial SOW, the Final OU 3 Remedial Design, the OU 3 Remedial Action Work Plan, and other plans approved by EPA, including Pre-Achievement O&M and implementation of Institutional Controls, until the Performance Standards are met, and excluding performance of the Remedial Design, Post-Achievement O&M and the activities required under Section XXX (Retention of Records) of this Consent Decree.

"OU 3 Remedial Action Work Plan" shall mean the document developed pursuant to Section VII (Performance of the Remedial Design/Remedial Action) of this Consent Decree and the Remedial SOW and approved by EPA, and any modifications thereto.

"OU 3 Remedial Design" or "OU 3 RD" shall mean those activities to be undertaken by Settling Defendant to develop the final plans and specifications for the OU 3 Remedial Action pursuant to the OU 3 RD AOC, Section VII (Performance of the Remedial Design/Remedial Action) of this Consent Decree, and the Remedial SOW.

"OU 3 Remedial Design AOC" or "OU 3 RD AOC" shall mean the Administrative Settlement Agreement and Order on Consent for Remedial Design entered into by EPA and ROC on June 30, 2009, which requires ROC to undertake remedial design activities to develop the final plans and specifications for the Remedial Action for OU 3.

"OU 3 Remedial Operation & Maintenance Plan" or "OU 3 Remedial O&M Plan" shall mean the document developed pursuant to Section VII (Performance of the Remedial Design/Remedial Action) of this Consent Decree and the Remedial SOW and approved by EPA, and any modifications thereto.

"OU 3 ROD" shall mean the EPA Record of Decision relating to OU 3 of the Site, and all attachments thereto that the Director, Superfund Division, EPA Region 5, or his/her delegate, signed on September 24, 2008. The OU 3 ROD is attached at Appendix B.

"Paragraph" shall mean a portion of this Consent Decree identified by an Arabic numeral or an upper or lower case letter.

"Parties" shall mean the United States, the State and the Settling Defendant.

"Past Response Costs" shall mean all costs, including, but not limited to, direct and indirect costs not inconsistent with the NCP that the EPA and/or State paid at or in connection with the Site through March 18, 2016, and that the Department of Justice paid through March 18, 2016. Past Response Costs do not include costs that have been specifically billed to and paid fully by Settling Defendant under previous administrative settlement agreements.

"Performance Standards" shall mean the cleanup standards and other measures of

achievement of the goals of the Remedial Action, set forth in the OU 2 ROD, OU 3 ROD, the OU 2 ESD, the Remedial SOW, the Final OU 2 Remedial Design, and the Final OU 3 Remedial Design, the OU 2 Remedial Action Work Plan, the OU 3 Remedial Action Work Plan, and any modified standards established pursuant to this Consent Decree.

"Plaintiffs" shall mean the United States and the State.

"Pre-Achievement O&M" shall mean all operation and maintenance activities required for the Remedial Action to achieve Performance Standards, as provided under the Remedial Operation and Maintenance Plan approved or developed by EPA pursuant to Section VII (Performance of the Remedial Design/Remedial Action) and Section XIV (Approval of Plans, Reports, and Other Deliverables) of this Consent Decree and the Remedial SOW, and maintenance, monitoring, and enforcement of Institutional Controls as provided in the ICIAP, until Performance Standards are met.

"Post-Achievement O&M" shall mean all activities required to maintain the effectiveness of the Remedial Action after Performance Standards are met, as required under the Remedial Operation and Maintenance Plan approved or developed by EPA pursuant to Section VII (Performance of the Remedial Design/Remedial Action) and Section XIV (Approval of Plans, Reports, and Other Deliverables) of this Consent Decree and the Remedial SOW, and maintenance, monitoring, and enforcement of Institutional Controls after Performance Standards are met, as provided in the ICIAP.

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

"Remedial Action" shall mean all activities the Settling Defendant is required to perform under this Consent Decree to implement the OU 2 ROD, OU 3 ROD, and OU 2 ESD in accordance with the Remedial SOW, the Final OU 2 Remedial Design, the Final OU 3 Remedial

Design, the OU 2 Remedial Action Work Plan, the OU 3 Remedial Action Work Plan, and other plans approved by EPA, including Pre-Achievement O&M and implementation of Institutional Controls, until the Performance Standards are met, and excluding performance of the Remedial Design, Post-Achievement O&M and the activities required under Section XXX (Retention of Records) of this Consent Decree. With respect to Section VIII (Remedy Review) of this Consent Decree, "Remedial Action" shall mean as that term is defined under Section 101(24) of CERCLA, 42 U.S.C. § 9601(24).

"Remedial Design" or "RD" shall mean those activities to be undertaken by Settling Defendant to develop the final plans and specifications for the Remedial Action pursuant to the OU 2 RD AOC, OU 3 RD AOC, Section VII (Performance of the Remedial Design/Remedial Action) of this Consent Decree and the Remedial SOW.

"Remedial Operation and Maintenance" or "Remedial O&M" shall mean all activities required to maintain the effectiveness of the Remedial Action as required under the OU 2 or OU 3 Remedial O&M Plan approved or developed by EPA pursuant to Section VII (Performance of the Remedial Design/Remedial Action) of this Consent Decree and the Remedial SOW.

"Remedial Proprietary Controls" shall mean easements or Institutional Controls running with the land that (a) limit land, water or resource use and/or provide access rights and (b) are created pursuant to common law or Ohio statutory law by an instrument that is recorded by the owner in the appropriate land records office. Notwithstanding the foregoing, Remedial Proprietary Controls do not include a Conservation Easement or Environmental Covenant established as part of the Restoration Work under this Consent Decree**.**

"Remedial Statement of Work" or "Remedial SOW" shall mean the statement of work for implementation of the Remedial Design, the Remedial Action, and Remedial O&M at the Site, attached as Appendix E to this Consent Decree, and any modifications made in accordance

with this Consent Decree.

"Remedial Work" shall mean all activities and obligations Settling Defendant is required to perform under this Consent Decree pertaining to implementation and maintenance of EPA's selected remedy for the Site.

"ROC" shall mean Rutgers Organics Corporation, a corporation organized and existing under the laws of the State of Pennsylvania.

"Restoration Completion Report" shall mean a final report submitted to the Trustees at the completion of the construction/implementation of each of the restoration projects. Restoration Completion Report shall include the components outlined in the Restoration SOW (Appendix H) and detailed in the Trustee-approved Restoration Work Plan.

"Restoration Plan" shall mean the Natural Resource Restoration Plan & Environmental Assessment for the Nease Chemical Facility, attached as Appendix D.

"Restoration Projects" shall mean those restoration projects described in Section X of this Consent Decree and in the Restoration SOW attached as Appendix H.

"Restoration Properties" shall mean the real property described in Section X of this Consent Decree and in the Restoration SOW attached as Appendix H.

"Restoration Statement of Work" or "Restoration SOW" shall mean the statement of work for Restoration Projects, attached as Appendix H to this Consent Decree.

"Restoration Work" shall mean all activities and obligations Settling Defendant is required to perform under this Consent Decree pertaining to construction/implementation of the Restoration Projects.

"Restoration Work Plan" shall mean a work plan providing detailed descriptions of activities proposed to be undertaken on the Restoration Properties consistent with the Restoration Plan and Restoration SOW to restore, replace or acquire the equivalent of natural resources that

the Trustees allege are injured as a result of releases of hazardous substances into or within the Assessment Area, together with proposed schedules for implementation of such activities.

"Section" shall mean a portion of this Consent Decree identified by a Roman numeral.

"Settling Defendant" shall mean ROC.

"Site" shall mean the Nease Chemical Superfund Site, located in Columbiana and Mahoning Counties, Ohio, which is depicted generally on the maps attached at Appendix F. The Site includes the Former Nease Property, portions of the Former Crane-Deming Property, areas where groundwater is contaminated, and areas affected by soil gas emanating from contaminated groundwater (comprising OU 2); Feeder Creek and portions of the MFLBC and floodplains (comprising OU 3); and nearby areas necessary for the implementation of the response actions.

"S/S/S" shall mean soil mixing/stripping, stabilization and solidification, as described in the OU 2 ROD.

"State" or "State of Ohio" shall mean the State of Ohio, on behalf of Ohio EPA.

"Supervising Contractor" shall mean the principal contractor(s) retained by the Settling Defendant to supervise and direct the implementation of the Work under this Consent Decree.

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

"Trustees" shall mean DOI and the State through Ohio EPA.

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

"Waste Material" shall mean (a) any "hazardous substance" under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); (b) any pollutant or contaminant under Section 101(33) of

CERCLA, 42 U.S.C. § 9601(33); and (c) any "solid waste" under Section 1004(27) of RCRA, 42 U.S.C. § 6903(27).

"Work" shall mean all activities and obligations Settling Defendant is required to perform under this Consent Decree pertaining to implementation and maintenance of EPA's selected remedy and the performance of all Restoration Projects. The activities required under Section XXX (Retention of Records) shall not be considered Work.

VI. STATEMENT OF PURPOSE/GENERAL PROVISIONS

A. Objectives of the Parties

30. The mutual objectives of the Parties in entering into this Consent Decree are:

a. To protect public health or welfare or the environment at the Site by the design and implementation of response actions at the Site by the Settling Defendant, to pay response costs of the United States not inconsistent with the NCP, and to resolve the response action claims of the United States and the State against Settling Defendant as provided in this Consent Decree;

b. To provide for the restoration of Natural Resources allegedly injured, destroyed, or lost as a result of releases of hazardous substances from or at the Site through implementation of the Restoration Projects described in Section X of this Consent Decree and in Appendix H;

c. To reimburse recoverable Assessment Costs and certain other costs consistent with this Consent Decree incurred by the Trustees, as provided herein;

d. To resolve potential liability of the Settling Defendant with respect to Natural Resource Damages as provided herein; and

e. To avoid costly and time-consuming litigation.

B. Commitments by Settling Defendant

31. As set forth more fully in Section VII hereof, Settling Defendant shall finance and perform the Remedial Work in accordance with the OU 2 ROD, the OU 3 ROD, the OU 2 ESD, the Final OU 2 Remedial Design, the Final OU 3 Remedial Design, the Remedial SOW, and all work plans and other plans, standards, specifications, and schedules set forth in this Consent Decree or developed by Settling Defendant and approved by EPA pursuant to this Consent Decree. Settling Defendant shall also pay the United States for Past and Future Response Costs as provided in Section XIX (Payment of Response Costs) of this Consent Decree. Pursuant to Paragraph 131(d) below, the State's claim for reimbursement of Past and Future Response costs is being resolved through the State's administrative orders for the Site, known as the Director's Final Findings and Orders ("DFFOs") for Cost Recovery, entered into between the State and ROC on August 4, 2016.

32. As set forth more fully in Section X (Performance of Restoration Projects), Settling Defendant shall finance and perform the Restoration Projects consistent with the goal of the Restoration Plan and in accordance with the Restoration Work Plan(s), the Alternate Properties Screening Criteria, the Restoration SOW, and all work plans and other plans, standards, specifications, and schedules set forth in this Consent Decree or developed by Settling Defendant and approved by the Trustees pursuant to this Consent Decree. Settling Defendant shall also pay the recoverable past and future Assessment Costs as provided in Section XX (Payment for Assessment Costs) of this Consent Decree.

33. All activities undertaken by Settling Defendant pursuant to this Consent Decree shall be performed in accordance with the requirements of all applicable federal and state laws and regulations. Settling Defendant must also comply with all applicable or relevant and appropriate requirements of all federal and state environmental laws as set forth in the OU 2 ROD, OU 3 ROD, the OU 2 ESD and the Remedial SOW. The activities conducted by Settling

Defendant pursuant to this Consent Decree, if approved by EPA, shall be deemed to be consistent with the NCP.

C. Permits

34. As provided in Section 121(e) of CERCLA, 42 U.S.C. § 9621(e), and Section 300.400(e) of the NCP, no permit shall be required for any portion of the Remedial Work conducted entirely on-Site (i.e., within the areal extent of contamination or in very close proximity to the contamination and necessary for implementation of the Remedial Work). Where any portion of the Remedial Work that is not on-Site requires a federal or state permit or approval, Settling Defendant shall submit timely and complete applications and take all other actions necessary to obtain all such permits or approvals.

35. This Consent Decree is not, and shall not be construed to be, a permit issued pursuant to any federal or state statute or regulation.

D. Notice to Successors-in-Title and Transfers of Real Property

36. For any real property owned or controlled by Settling Defendant located at the Site, Settling Defendant shall, within 30 days after the Effective Date, submit to EPA for review and approval a proposed notice to be filed with the land records office that provides a description of the real property and provides notice to all successors-in-title that the real property is part of the Site, that EPA has selected a remedy for the Site, and that potentially responsible parties have entered into a Consent Decree requiring implementation of the remedy. The notice also shall describe the land use restrictions, if any, set forth in Section XI (Remedial Access and Institutional Controls) and shall identify the United States District Court in which the Consent Decree was filed, the name and civil action number of this case, and the date the Consent Decree was entered by the Court. Settling Defendant shall record the notice within ten days of EPA's approval of the notice. Settling Defendant shall provide EPA with a certified copy of the

recorded notice within ten days of recording such notice.

37. Settling Defendant shall, at least 60 days prior to any Transfer of real property located at the Site owned by Settling Defendant, give written notice: (1) to the transferee regarding the Consent Decree and any Institutional Controls regarding the real property; and (2) to EPA and the State regarding the proposed Transfer, including the name and address of the transferee and the date on which the transferee was notified of the Consent Decree and any Institutional Controls.

38. Settling Defendant may Transfer any real property located at the Site only if: (1) any Remedial Proprietary Controls required by Section XI (Remedial Access and Institutional Controls) have been recorded with respect to the real property; or (2) Settling Defendant has obtained an agreement from the transferee, enforceable by the Settling Defendant and the United States, to (a) allow access and restrict land/water use, pursuant to Paragraph 81.a(i) and (ii); (b) record any Remedial Proprietary Controls on the real property, pursuant to Paragraph 81.a(iii); and (c) subordinate its rights to any such Remedial Proprietary Controls, pursuant to Paragraph 81.a(iii), and EPA has approved in writing the agreement pursuant to Paragraph 81.b. If, after a Transfer of the real property, the transferee fails to comply with the agreement provided for in Paragraph 81.a, Settling Defendant shall take all reasonable steps to obtain the transferee's compliance with such agreement. At the request of Settling Defendant, the United States may seek the transferee's compliance with the agreement and/or assist Settling Defendant in obtaining compliance with the agreement. Settling Defendant shall reimburse the United States under Section XIX (Payment of Response Costs) for all costs incurred, direct and indirect, by the United States in assisting Settling Defendant under the preceding sentence, including, but not limited to, the cost of attorney time.

39. In the event of any Transfer by Settling Defendant of real property located at the

Site, unless the United States otherwise consents in writing, Settling Defendant shall continue to comply with its obligations under the Consent Decree to provide and/or secure access; implement, maintain, monitor, and report on Institutional Controls; and abide by such Institutional Controls.

VII. PERFORMANCE OF THE REMEDIAL DESIGN/REMEDIAL ACTION

40. Selection of Supervising Contractor. All aspects of the Remedial Work to be performed by Settling Defendant pursuant to this Section, Sections VIII (Remedy Review), IX (Remedial Quality Assurance, Sampling and Data Analysis), XI (Remedial Access and Institutional Controls), and XVIII (Emergency Response) shall be under the direction and supervision of the Supervising Contractor. Settling Defendant has selected and, after reasonable opportunity for review and comment by the State, EPA has issued an authorization to proceed regarding hiring of the following person and/or firm as Supervising Contractor: Golder Associates Inc., 200 Century Parkway, Suite C, Mt. Laurel, New Jersey USA 08054. If at any time hereafter Settling Defendant proposes to change this Supervising Contractor, Settling Defendant shall give such notice to EPA and the State and must obtain an authorization to proceed from EPA, after a reasonable opportunity for review and comment by the State, before the new Supervising Contractor performs, directs, or supervises any Remedial Work under this Consent Decree. Settling Defendant shall demonstrate that the proposed replacement contractor has a quality assurance system that complies with ANSI/ASQC E4-1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995), by submitting a copy of the proposed contractor's Quality Management Plan ("QMP"). The QMP should be prepared in accordance with "EPA Requirements for Quality Management Plans (QA/R-2)" (EPA/240/B-01/002, March 2001, reissued May 2006) or equivalent documentation as determined by EPA.

EPA will issue a notice of disapproval or an authorization to proceed regarding hiring of the proposed replacement contractor.

41. If EPA disapproves a proposed replacement Supervising Contractor, EPA will notify Settling Defendant in writing. Settling Defendant shall submit to EPA and the State a list of contractors, including the qualifications of each contractor that would be acceptable to it within 30 days after receipt of EPA's disapproval of the contractor previously proposed. EPA will provide written notice of the names of any contractor(s) that it disapproves and an authorization to proceed with respect to any of the other contractors. Settling Defendant may select any contractor from that list that is not disapproved and shall notify EPA and the State of the name of the contractor selected within 21 days of EPA's authorization to proceed.

42. If EPA fails to provide written notice of its authorization to proceed or disapproval as provided in this Paragraph and this failure prevents Settling Defendant from meeting one or more deadlines in a plan approved by EPA pursuant to this Consent Decree, Settling Defendant may seek relief under Section XXII (Force Majeure).

43. OU 2 Remedial Design.

a. Settling Defendant shall complete a Final OU 2 Remedial Design in accordance with the Remedial SOW and all EPA-approved deliverables required by or specified under the Remedial SOW. Settling Defendant shall submit to EPA and the State for review and approval pursuant to Section XIV (Approval of Plans, Reports, and Other Deliverables) all plans, reports, and other deliverables required under the Remedial SOW for OU 2 Remedial Design, in accordance with the schedule provided in the Remedial SOW.

b. As of the Effective Date of this Consent Decree, the OU 2 Remedial Design shall be subject to this Consent Decree in lieu of the OU 2 RD AOC**,** and EPA shall

submit to Settling Defendant a notice terminating the OU2 RD AOC as of the Effective Date. Settling Defendant shall maintain the financial security it established pursuant to Paragraph 100 of the OU 2 RD AOC until it has established the performance guarantee required pursuant to Paragraph 109 of this Consent Decree.

44. OU 2 Remedial Action

a. Within 60 days after EPA's approval or modification of the Final OU 2 Remedial Design, Settling Defendant shall submit to EPA and the State a work plan for the performance of the Remedial Action for OU 2 at the Site ("OU 2 Remedial Action Work Plan"). The OU 2 Remedial Action Work Plan shall provide for construction and implementation of the remedy set forth in the OU 2 ROD and the OU 2 ESD and achievement of the Performance Standards, in accordance with this Consent Decree, the OU 2 ROD, the OU 2 ESD, the Remedial SOW, and the design plans and specifications of the Final OU 2 RD. The OU 2 Remedial Action Work Plan shall include all the elements required under the Remedial SOW. Upon its approval or modification by EPA in accordance with the Approval of Plans, Reports and Other Deliverables section of this Consent Decree, the OU 2 Remedial Action Work Plan shall be incorporated into and enforceable under this Consent Decree.

b. At the same time as it submits the OU 2 Remedial Action Work Plan pursuant to subparagraph 44a. of this Consent Decree, Settling Defendant shall submit to EPA and the State a Health and Safety Plan for field activities required by the OU 2 Remedial Action Work Plan which conforms to the applicable Occupational Safety and Health Administration and EPA requirements

including, but not limited to, 29 C.F.R. § 1910.120.

c. Upon approval or modification of the OU 2 Remedial Action Work Plan by EPA in accordance with Section XIV (Approval of Plans, Reports, and Other Deliverables) of this Consent Decree, Settling Defendant shall implement the activities required under the OU 2 Remedial Action Work Plan. Settling Defendant shall submit to EPA and the State all reports and other deliverables required under the approved OU 2 Remedial Action Work Plan in accordance with the approved schedule for review and approval pursuant to Section XIV (Approval of Plans, Reports and Other Deliverables). Unless otherwise directed by EPA, Settling Defendant shall not commence physical Remedial Action activities at the Site prior to approval of the Remedial Action Work Plan.

d. The OU 2 Remedial Action Work Plan shall include a schedule for review and approval of the OU 2 Remedial O&M Plan, and Settling Defendant shall prepare and submit the OU 2 Remedial O&M Plan in accordance with the approved schedule under the OU 2 Remedial Action Work Plan. The OU 2 Remedial O&M Plan shall provide for all the activities required to maintain the effectiveness of the Remedial Action for OU 2, in accordance with this Consent Decree, the OU 2 ROD, the OU 2 ESD, the Remedial SOW, and the design plans and specifications of the Final OU 2 RD. The OU 2 Remedial O&M Plan shall include all of the elements required under the Remedial SOW. Upon its approval or modification by EPA in accordance with Section XIV (Approval of Plans, Reports and Other Deliverables), the OU 2 Remedial O&M Work Plan shall be incorporated into and enforceable under this Consent Decree.

45. OU 3 Remedial Design.

a. Settling Defendant shall complete a Final OU 3 Remedial Design in accordance with the Remedial SOW and all EPA-approved deliverables required by or specified under the Remedial SOW. Settling Defendant shall submit to EPA and the State for review and approval pursuant to Section XIV (Approval of Plans, Reports, and Other Deliverables), all plans, reports, and other deliverables required under the Remedial SOW for OU 3 Remedial Design, in accordance with the schedule provided in the Remedial SOW.

b. As of the Effective Date of this Consent Decree, the OU 3 Remedial Design shall be subject to this Consent Decree in lieu of the OU 3 RD AOC**,** and EPA shall submit to Settling Defendant a notice terminating the OU3 RD AOC as of the Effective Date. Settling Defendant shall maintain the financial security it established pursuant to Paragraph 100 of the OU 3 RD AOC until it has established the performance guarantee required pursuant to Paragraph 109 of this Consent Decree.

46. OU 3 Remedial Action.

a. Within 60 days after EPA's approval or modification of the Final OU 3 Remedial Design, Settling Defendant shall submit to EPA and the State a work plan for the performance of the Remedial Action for OU 3 at the Site ("OU 3 Remedial Action Work Plan"). The OU 3 Remedial Action Work Plan shall provide for construction and implementation of the remedy set forth in the OU 3 ROD and achievement of the Performance Standards, in accordance with this Consent Decree, the OU 3 ROD, the Remedial SOW, and the design plans and specifications developed in accordance with the Final OU 3 Remedial Design. The OU 3 Remedial Action Work Plan shall include all of the elements required

under the Remedial SOW and shall be integrated with the OU 2 Remedial Action Work Plan as appropriate. Upon its approval or modification by EPA in accordance with Section XIV (Approval of Plans, Reports, and Other Deliverables), the OU 3 Remedial Action Work Plan shall be incorporated into and enforceable under this Consent Decree.

b. At the same time as it submits the OU 3 Remedial Action Work Plan pursuant to subparagraph a., Settling Defendant shall submit to EPA and the State a Health and Safety Plan for field activities required by the OU 3 Remedial Action Work Plan which conforms to the applicable Occupational Safety and Health Administration and EPA requirements including, but not limited to, 29 C.F.R. § 1910.120.

c. Upon approval or modification of the OU 3 Remedial Action Work Plan by EPA in accordance with Section XIV (Approval of Plans, Reports, and Other Deliverables), Settling Defendant shall implement the activities required under the OU 3 Remedial Action Work Plan. Settling Defendant shall submit to EPA and the State all reports and other deliverables required under the approved OU 3 Remedial Action Work Plan in accordance with the approved schedule for review and approval pursuant to Section XIV (Approval of Plans, Reports, and Other Deliverables). Unless otherwise directed by EPA, Settling Defendant shall not commence physical Remedial Action activities at the Site prior to approval of the Remedial Action Work Plan.

d. The OU 3 Remedial Action Work Plan shall include a schedule for review and approval of an OU 3 Remedial O&M Plan, and Settling Defendant shall prepare and submit the OU 3 Remedial O&M Plan in accordance with the approved

schedule under the OU 3 Remedial Action Work Plan. The OU 3 Remedial O&M Plan shall provide for all the activities required to maintain the effectiveness of the Remedial Action for OU 3, in accordance with this Consent Decree, the OU 3 ROD, the Remedial SOW, and the design plans and specifications of the Final OU 3 RD. The OU 3 Remedial O&M Plan shall include all of the elements required under the Remedial SOW and shall be integrated with the OU 2 Remedial O&M Plan as appropriate. Upon its approval or modification by EPA in accordance with Section XIV (Approval of Plans, Reports and Other Deliverables), the OU 3 Remedial O&M Work Plan shall be incorporated into and enforceable under this Consent Decree.

47. Settling Defendant shall continue to implement the Remedial Action and Remedial O&M until the Performance Standards are achieved. Settling Defendant shall implement Remedial O&M for so long thereafter as is required by this Consent Decree.

48. Institutional Control Implementation and Assurance Plan. Within 30 days after EPA's approval or modification of the Final OU 2 Remedial Design**,** Settling Defendant shall submit for approval an ICIAP to implement the Institutional Controls set forth in the OU 2 ROD, OU 2 ESD, and this Consent Decree, in accordance with the Remedial SOW. Upon approval or modification by EPA pursuant to Section XIV (Approval of Plans, Reports, and Other Deliverables), the ICIAP shall be incorporated into and enforceable under this Consent Decree.

49. Modification of Remedial SOW or Related Work Plans. If EPA determines that it is necessary to modify the Remedial Work specified in the Remedial SOW and/or in work plans developed pursuant to the Remedial SOW to achieve and maintain the Performance Standards or to carry out and maintain the effectiveness of the remedy set forth in the OU 2 ROD, OU 3 ROD, and OU 2 ESD, and such modification is consistent with applicable sections of the NCP and the

scope of the remedy set forth in the OU 2 ROD, OU 3 ROD, and OU 2 ESD, then EPA may issue such modification in writing and shall notify Settling Defendant of such modification. For the purposes of this Paragraph and Sections XVII.B (Completion of the Remedial Action) and XVII.C (Completion of the Remedial Work) only, the scope of the remedy set forth in the OU 2 ROD, OU 3 ROD, and OU 2 ESD is as set forth in Sections 9.2 (pages 43-46) and 12.2 (pages 55-56) of the OU 2 ROD; Sections 9.2 (pages 46-49) and 12.2 (pages 55-57) of the OU 3 ROD; and the Section "Description of Significant Differences" (pages 13-15) of the OU 2 ESD.

50. If Settling Defendant objects to the modification it may, within 30 days after EPA's notification, seek dispute resolution under Paragraph 156 (Record Review).

51. The Remedial SOW and/or related work plans shall be modified: (1) in accordance with the modification issued by EPA; or (2) if Settling Defendant invokes dispute resolution, in accordance with the final resolution of the dispute. The modification shall be incorporated into and enforceable under this Consent Decree, and Settling Defendant shall implement all Work required by such modification. Settling Defendant shall incorporate the modification into the Final OU 2 Remedial Design, OU 2 Remedial Action Work Plan, Final OU 3 Remedial Design, or OU 3 Remedial Action Work Plan under Paragraph 43, 44, 45, or 46, as appropriate.

52. Nothing in this Section shall be construed to limit EPA's authority to require performance of further response actions as otherwise provided in this Consent Decree.

53. Nothing in this Consent Decree, the Remedial SOW, or any work plans approved or modified pursuant to this Consent Decree constitutes a warranty or representation of any kind by Plaintiffs that compliance with the work requirements set forth in the Remedial SOW and the work plans will achieve the Performance Standards.

54. Off-Site Shipment of Waste Material. Settling Defendant may ship Waste Material from the Site to an off-Site facility only if it verifies, prior to any shipment, that the off-Site

facility is operating in compliance with the requirements of Section 121(d)(3) of CERCLA, 42 U.S.C. § 9621(d)(3), and 40 C.F.R. § 300.440, by obtaining a determination from EPA that the proposed receiving facility is operating in compliance with 42 U.S.C. § 9621(d)(3) and 40 C.F.R. § 300.440.

55. Settling Defendant may ship Waste Material from the Site to an out-of-state waste management facility only if, prior to any shipment, it provides written notice to the appropriate state environmental official in the receiving facility's state and to the EPA Project Coordinator. This notice requirement shall not apply to any off-Site shipments when the total quantity of all such shipments will not exceed ten cubic yards. The written notice shall include the following information, if available: (1) the name and location of the receiving facility; (2) the type and quantity of Waste Material to be shipped; (3) the schedule for the shipment; and (4) the method of transportation. Settling Defendant also shall notify the state environmental official referenced above and the EPA Project Coordinator of any major changes in the shipment plan, such as a decision to ship the Waste Material to a different out-of-state facility. Settling Defendant shall provide the written notice after the award of the contract for Remedial Action construction and before the Waste Material is shipped.

VIII. REMEDY REVIEW

56. Periodic Review. Settling Defendant shall conduct any studies that EPA requests in order to permit EPA to conduct reviews of whether the Remedial Action is protective of human health and the environment at least every five years as required by Section 121(c) of CERCLA, 42 U.S.C. § 9621(c), and any applicable regulations.

57. EPA Selection of Further Response Actions. If EPA, in consultation with the State, determines, at any time, that the Remedial Action is not protective of human health and the environment, EPA may select further response actions for the Site in accordance with the

requirements of CERCLA and the NCP.

58. Opportunity to Comment. Settling Defendant and, if required by Section 113(k)(2) or 117 of CERCLA, 42 U.S.C. §§ 9613(k)(2) or 9617, the public, will be provided with an opportunity to comment on any further response actions proposed by EPA as a result of the review conducted pursuant to Section 121(c) of CERCLA, 42 U.S.C. § 9621(c), and to submit written comments for the record during the comment period.

59. Settling Defendant's Obligation to Perform Further Response Actions. If EPA selects further response actions relating to the Site, EPA may require Settling Defendant to perform such further response actions, but only to the extent that the reopener conditions in Paragraph 176 or Paragraph 177 (United States' Pre- and Post-Certification Reservations) are satisfied. Settling Defendant may invoke the procedures set forth in Section XXIII (Dispute Resolution) to dispute (a) EPA's determination that the reopener conditions of Paragraph 176 or Paragraph 177 are satisfied, (b) EPA's determination that the Remedial Action is not protective of human health and the environment, or (c) EPA's selection of the further response actions. Disputes pertaining to whether the Remedial Action is protective or to EPA's selection of further response actions shall be resolved pursuant to Paragraph 156 (Record Review).

60. Submission of Plans. If Settling Defendant is required to perform further response actions pursuant to Paragraph 59, it shall submit a plan for such response action to EPA and the State for approval in accordance with the procedures of Section VII (Performance of the Remedial Design/Remedial Action). Settling Defendant shall implement the approved plan in accordance with this Consent Decree.

IX. REMEDIAL QUALITY ASSURANCE, SAMPLING, AND DATA ANALYSIS

61. Settling Defendant shall use quality assurance, quality control, and chain of custody procedures for all treatability, design, compliance and monitoring samples in accordance with

"EPA Requirements for Quality Assurance Project Plans (QA/R5)" (EPA/240/B-01/003, March 2001 reissued May 2006), "Guidance for Quality Assurance Project Plans (QA/G-5)" (EPA/240/R-02/009, December 2002), and subsequent amendments to such guidelines upon notification by EPA to Settling Defendant of such amendment. Amended guidelines shall apply only to procedures conducted after such notification.

62. Prior to the commencement of any monitoring project under this Consent Decree, Settling Defendant shall develop and/or update a site-specific Quality Assurance Project Plan ("QAPP") for EPA approval, after a reasonable opportunity for review and comment by the State, that is consistent with the SOW, the NCP, and applicable EPA guidance documents. If relevant to the proceeding, the Parties agree that validated sampling data generated in accordance with the QAPP(s) and reviewed and approved by EPA shall be admissible as evidence, without objection, in any proceeding under this Consent Decree. Settling Defendant shall ensure that EPA and the State personnel and their authorized representatives are allowed access at reasonable times to all laboratories utilized by Settling Defendant in implementing this Consent Decree. In addition, Settling Defendant shall ensure that such laboratories shall analyze all samples submitted by EPA pursuant to the QAPP for quality assurance monitoring. Settling Defendant shall ensure that the laboratories they utilize for the analysis of samples taken pursuant to this Consent Decree perform all analyses according to accepted EPA methods. Accepted EPA methods consist of those methods that are documented in the "USEPA Contract Laboratory Program (CLP) Statement of Work for Inorganic Analysis, ILM05.4," and the "USEPA Contract Laboratory Program Statement of Work for Organic Analysis, SOM01.2," and any amendments made thereto during the course of the implementation of this Consent Decree; however, upon approval by EPA, after opportunity for review and comment by the State, Settling Defendant may use other analytical methods that are as stringent as or more stringent than the

EPA CLP-approved methods. Settling Defendant shall ensure that all laboratories it uses for analysis of samples taken pursuant to this Consent Decree participate in an EPA or EPA-equivalent quality assurance/quality control ("QA/QC") program. Settling Defendant shall use only laboratories that have a documented Quality System that complies with ANSI/ASQC E4-1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995), and "EPA Requirements for Quality Management Plans (QA/R-2)" (EPA/240/B-01/002, March 2001, reissued May 2006) or equivalent documentation as determined by EPA. EPA may consider laboratories accredited under the National Environmental Laboratory Accreditation Program ("NELAP") as meeting the Quality System requirements. Settling Defendant shall ensure that all field methodologies utilized in collecting samples for subsequent analysis pursuant to this Consent Decree are conducted in accordance with the procedures set forth in the QAPP approved by EPA.

63. Upon request, Settling Defendant shall allow split or duplicate samples to be taken by EPA and the State or their authorized representatives. Settling Defendant shall notify EPA and the State not less than 15 days in advance of any sample collection activity unless shorter notice is agreed to by EPA. In addition, EPA and the State shall have the right to take any additional samples that EPA or the State deem necessary. Upon request, EPA and the State shall allow Settling Defendant to take split or duplicate samples of any samples they take as part of the Plaintiffs' oversight of Settling Defendant's implementation of the Work.

64. Settling Defendant shall submit to EPA and the State electronic copies (hard copies to be provided upon request) of the results of all sampling and/or tests or other data obtained or generated by or on behalf of Settling Defendant with respect to the Site and/or the implementation of this Consent Decree unless EPA agrees otherwise.

65. Notwithstanding any provision of this Consent Decree, the United States and the State retain all of their information gathering and inspection authorities and rights, including enforcement actions related thereto, under CERCLA, RCRA, Ohio Revised Code Chapters 6111 and 3734, and any other applicable federal or state statutes or regulations.

X. PERFORMANCE OF RESTORATION PROJECTS

A. General

66. The Settling Defendant shall finance and, as specified in more detail below, commence and complete performance of the Restoration Projects in accordance with the provisions set forth below in this Section. Such projects should also be in accordance with 43 C.F.R. Part 11, including the factors identified in 43 C.F.R. § 11.82(d). Any work proposed for a Conserved Land shall be technically feasible and in compliance with applicable federal, state, and local laws and regulations.

67. Restoration Work Plan. The Settling Defendant shall, within 60 days after the Effective Date of this Consent Decree, develop and submit to the Trustees for approval in accordance with the Restoration Statement of Work (Appendix H) and the provisions of Section XIV (Approval of Plans, Reports, and Other Deliverables), Restoration Work Plans providing detailed descriptions of activities proposed to be undertaken on the Lisbon Dam and the Conserved Lands to restore, replace, rehabilitate or acquire the equivalent of natural resources that the Trustees allege were injured as a result of releases of hazardous substances into or within the Assessment Area, together with proposed schedules for implementation of such activities. The Restoration Work Plans shall be consistent with the Restoration Plan attached as Appendix D and the Restoration SOW attached as Appendix H.

68. Upon approval of each Restoration Work Plan submitted pursuant to Paragraph 67 above, Settling Defendant shall implement the Restoration Projects described in such approved

Restoration Work Plan, in accordance with the terms and schedules therein, subject to Settling Defendant's right to contest the Trustees' disapproval with respect to any schedule or other item in such Work Plan in accordance with Paragraph 156 (Record Review). All such work shall be performed consistent with this Consent Decree, the Restoration SOW, and the Restoration Work Plan.

B. Lisbon Dam Removal Restoration Project

69. The Trustees have determined that the habitat in the MFLBC will be enhanced by the removal of the Lisbon Dam, at River Mile ("RM") 12.5 of the MFLBC. The removal of the dam and the accompanying restoration activities of 3 acres of adjacent riparian habitat are expected to significantly aid in the establishment of a diverse and varied aquatic community upstream of the Lisbon Dam as well as enhanced recreational opportunities for the local community. The Parties anticipate that removing the dam will likely extend the reach of exceptional warm water habitat of the MFLBC.

70. In accordance with the Restoration Work Plan and the Restoration SOW, the Settling Defendant shall complete the removal of the Lisbon Dam and accompanying restoration no later than five years from the Effective Date of this Consent Decree. If necessary, the five year period may be extended for a reasonable time period with the Trustees' written approval.

71. The Settling Defendant will use best efforts to obtain property access agreements from landowners adjacent to and along the Lisbon Dam reach. "Best efforts" includes the payment of reasonable sums of money to obtain access.

72. Notwithstanding the foregoing, if Settling Defendant fails to complete the removal of the Lisbon Dam due to a force majeure event, Settling Defendant shall propose for Trustee review and approval an alternative project (or projects) of comparable restoration value, and, following Trustee approval of such project(s), shall implement the alternative project(s).

C. Selection of Supervising Contractor for Lisbon Dam Removal

73. All aspects of the Lisbon Dam removal restoration project to be performed by Settling Defendant shall be under the direction and supervision of the Supervising Contractor. Settling Defendant's selection of Golder Associates Inc., 200 Century Parkway, Suite C, Mt. Laurel, New Jersey USA 08054 has been approved by the Trustees. If at any time hereafter Settling Defendant proposes to change this Supervising Contractor, Settling Defendant shall give such notice to the Trustees and must obtain an authorization to proceed from the Trustees before the new Supervising Contractor performs, directs, or supervises any aspect of the Lisbon Dam Removal Restoration Project under this Consent Decree.

74. If the Trustees disapprove of a proposed replacement Supervising Contractor, the Trustees will notify Settling Defendant in writing. Settling Defendant shall submit to the Trustees a list of contractors including the qualifications of each contractor that would be acceptable to them within 30 days after receipt of the Trustees' disapproval of the contractor previously proposed. The Trustees will provide written notice of the names of any contractor(s) that they disapprove and authorization to proceed with respect to any of the other contractors. Settling Defendant may select any contractor from that list that is not disapproved and shall notify the Trustees of the name of the contractor selected within 21 days of the Trustees' authorization to proceed.

75. If the Trustees fail to provide written notice of their authorization to proceed or disapproval as provided in this subsection and this failure prevents Settling Defendant from meeting one or more deadlines in the Restoration Work Plan, Settling Defendant may seek relief under Section XXII (Force Majeure).

D. Conserved Lands

76. General

a. Within 60 days after approval of the Restoration Work Plan, Settling Defendant shall fund the "ROC Conservation Trust" in the amount of $366,000. The Trust assets shall be utilized by a land conservation organization as Grantee of the Trust (the "Trust Grantee"), as identified in the approved Restoration Work Plan, to complete the conservation of Conserved Lands in the form of a Conservation Easement ("CE") or an Environmental Covenant ("EC") (collectively the "Conservation Instruments") or, in the alternative, General Warranty Deeds in the event that property owners whose lands are to be conserved deed their properties over to the Trust Grantee in addition to placing Conservation Instruments on the properties. Conservation Instrument Templates are attached as Appendix I. The Conserved Lands shall include those certain parcels of land described below in Paragraph 77 as Priority Properties and/or Alternate Properties described in subpart d below. The entire amount of the Trust funds will be used to acquire Conserved Lands in the Little Beaver Creek watershed and City of Salem drinking water source area, and to fund Trust Grantee's reasonable fees for managing the Conservation Trust and obtaining the Conservation Easements. Grantee of funds will maximize acreage conserved. If the Restoration Work Plan, approved by the Trustees, requires a transfer of any Conserved Lands to Trust Grantee, Settling Defendant shall ensure that the Conserved Lands be transferred to the Trust Grantee.

b. At least 30 days prior to Trust Grantee acquiring an interest in any Conserved Lands, Settling Defendant shall submit to the Trustees for approval: i) draft Conservation Instruments relating to the Conserved Lands that are to be

conserved by the Trust Grantee using the ROC Conservation Trust in accordance with this Consent Decree; and ii) a description of all interests in such Conserved Lands that would not be subject to the Environmental Covenant under Ohio Revised Code Section 5301.86(A), absent a subordination agreement. Each draft Conservation Instrument shall be consistent with and in substantially the same form as the respective Conservation Instruments Templates attached as Appendix I. Within 30 days after approval of any draft Conservation Instrument and signature by the Trust Grantee, Settling Defendant shall present the Conservation Instrument to Trustees for signature. Settling Defendant shall be held responsible under this Consent Decree for any violation or breach of an EC or CE.

c. Conserved Lands must not include any land with:

   i. known or suspected releases of hazardous substances or hazardous wastes; or

   ii. easements, rights of entry, interests, or other encumbrances that are inconsistent with the restoration goals described in the Restoration Plan, unless such rights, interests, or encumbrances are subordinated and/or the Trustees agree in writing that the property can be considered.

d. Settling Defendant shall give priority to conserving the Priority Properties. If some or all of the Priority Properties cannot be conserved, then the Settling Defendant shall conserve Alternate Properties for the balance of the required minimum number of 153 acres of Conserved Lands. These Alternate Properties shall meet the Alternate Properties Screening Criteria identified in Appendix K.

e. The Trust Grantee will select the type of the Conservation Instrument that optimizes the use of Trust money consistent with the templates provided in Appendix I. To ensure the suitable environmental condition of the real estate,

Settling Defendant shall consult with the Trustees prior to approving the selection of any Conserved Lands.

f. Access to the Conserved Lands shall be negotiated by the Parties and governed by the Conservation Instruments.

77. Priority Properties. The Priority Properties are:

a. Riparian and forested land at dairy farms at RM 35 and RM 33.3 of the MFLBC (estimated acreage 72 acres);

b. Egypt swamp riparian land (estimated acreage 18 acres);

c. Riparian and forested land near RM 31 of the MFLBC (estimated acreage 20 acres);

d. Properties that will protect the water resources of the City of Salem, that fall within the City's Source Water Protection Areas for ground water and surface water, as depicted in the map attached to Appendix K (estimated acreage 40 acres);

e. Three (3) acres of riparian habitat adjacent to the Lisbon, Ohio dam located at Willow Grove Park; and

f. Seven (7) acres of existing wetlands and adjacent habitat in the northwest section of the Former Nease Property.

78. The Settling Defendant shall complete the acquisition of the Conserved Lands no later than five years from the Effective Date of this Consent Decree, which may be extended, if necessary, for a reasonable time period with the Trustees' written approval.

79. All Conservation Instruments on the Conserved Lands shall run with the land in perpetuity unless otherwise agreed to by the Trustees. Each Conservation Instrument shall provide that DOI and the State, or their designees, as Trustees for the injured natural resources

benefitted by the Conserved Lands, have third-party rights of enforcement with regard to the Conserved Lands. Settling Defendant shall cause the Conservation Instruments to be recorded in the County Recorder's office of the County in which the conserved land is situated and shall provide file-stamped copies to the Trustees within 60 days of recording.

XI. REMEDIAL ACCESS AND INSTITUTIONAL CONTROLS

A. Access to Remedial Properties

80. If the Site, or any other real property where access or land/water use restrictions are needed, is owned or controlled by the Settling Defendant:

a. Settling Defendant shall, commencing on the date of lodging of the Consent Decree, provide the United States, the State, and their representatives, contractors, and subcontractors, with access at all reasonable times to the Site, or such other real property, to conduct any activity regarding the Consent Decree including, but not limited to, the following activities: (1) monitoring the Remedial Work; (2) verifying any data or information submitted to the United States or the State; (3) conducting investigations regarding contamination at or near the Site; (4) obtaining samples; (5) assessing the need for, planning, or implementing additional response actions at or near the Site; (6) assessing implementation of quality assurance and quality control practices as defined in the approved CQAP; (7) implementing the Remedial Work pursuant to the conditions set forth in Paragraph 178 (Remedial Work Takeover); (8) inspecting and copying records, operating logs, contracts, or other documents maintained or generated by Settling Defendant or its agents, consistent with Section XXIX (Access to Information); (9) assessing Settling Defendant's compliance with the Consent Decree; (10) determining whether the Site or other real property is being

used in a manner that is prohibited or restricted, or that may need to be prohibited or restricted under the Consent Decree; and (11) implementing, monitoring, maintaining, reporting on, and enforcing any Institutional Controls and the requirements of the ICIAP.

b. Commencing on the date of lodging of the Consent Decree, Settling Defendant shall not use the Site, or such other real property, in any manner that EPA determines will pose an unacceptable risk to human health or to the environment due to exposure of Waste Material or interfere with or adversely affect the implementation, integrity, or protectiveness of the Remedial Action or Remedial O&M. The restrictions shall include, but not be limited to: maintain fences and signs that secure the Site; prevent digging or disturbance of the soil caps at the Former Nease Property; maintain the soil caps at the Site and compliance with all aspects of the OU 2 and OU 3 Remedial O&M Plans or any other plan developed under the Remedial SOW, in accordance with the OU 2 ROD, OU 3 ROD, OU 2 ESD, and this Consent Decree; prohibit drilling and use of groundwater unless and until all Performance Standards are met; prohibit residential use of Site areas that have contaminants remaining at levels that do not allow unrestricted use or unlimited access; prohibit use of groundwater where a contamination plume has emanated from the Site unless and until all Performance Standards are met; prohibit construction over areas where a vapor intrusion pathway may occur unless such construction is outfitted with adequate mitigation measures for the vapors; and comply with the Soil Management Plan (as described in the Statement of Work Section II.A.5.g.) and groundwater restrictions on and off the Former Nease Property where DNAPL and other

contaminants of concern have been released to the soil and groundwater.

c. Settling Defendant shall:

i. Execute and record in the appropriate land records office Remedial Proprietary Controls that: (i) grant a right of access to conduct any activity regarding the Consent Decree including, but not limited to, those activities listed in Paragraph 80.a; and (ii) grant the right to enforce the land/water use restrictions set forth in Paragraph 80.b including, but not limited to, the specific restrictions listed therein and any land/water use restrictions listed in the ICIAP, as further specified in this subparagraph c.

ii. The Remedial Proprietary Controls shall be granted to one or more of the following persons, as approved by EPA: (i) the United States, on behalf of EPA, and its representatives, (ii) the State and its representatives, (iii) Settling Defendant and its representatives, and/or other appropriate grantees. If any Remedial Proprietary Controls are granted to Settling Defendant pursuant to this Paragraph 80, then Settling Defendant shall monitor, maintain, report on, and enforce such Remedial Proprietary Controls.

iii. In accordance with the schedule set forth in the ICIAP, submit to EPA for review and approval regarding such real property: (i) draft Remedial Proprietary Controls, in substantially the form attached hereto as Appendix G-1, that are enforceable under Ohio law; and (ii) a current title insurance commitment or other evidence of title acceptable to EPA, that shows title to the land affected by the Remedial Proprietary Controls to be free and clear of all prior liens and encumbrances (except when EPA waives the release or subordination of such prior liens or encumbrances or when, despite best

efforts, Settling Defendant is unable to obtain release or subordination of such prior liens or encumbrances).

iv. Within 30 days after EPA's approval and acceptance of the Remedial Proprietary Controls and the title evidence, update the title search and, if it is determined that nothing has occurred since the effective date of the title insurance commitment, or other title evidence, to affect the title adversely, record the Remedial Proprietary Controls with the appropriate land records office.

v. Within 30 days after recording the Remedial Proprietary Controls, Settling Defendant shall provide EPA and the State with a final title insurance policy, or other final evidence of title acceptable to EPA, and a certified copy of the original recorded Remedial Proprietary Controls showing the clerk's recording stamps. If the Remedial Proprietary Controls are to be conveyed to the United States, the Remedial Proprietary Controls and title evidence (including final title evidence) shall be prepared in accordance with the U.S. Department of Justice Title Standards 2001, and approval of the sufficiency of title shall be obtained as required by 40 U.S.C. § 3111.

B. Institutional Controls on Remedial Properties

81. If the Site, or any other real property where access and/or land/water use restrictions is needed, is owned or controlled by persons other than the Settling Defendant:

a. Settling Defendant shall use best efforts to secure from such persons:

i. An agreement to provide access thereto for the United States, the State, and Settling Defendant, their representatives, contractors, and subcontractors, to conduct any activity regarding the Consent Decree including, but not limited

to, those activities listed in Paragraph 80.a.;

ii. An agreement, enforceable by Settling Defendant and the United States, to refrain from using the Site, or such other real property, in any manner that EPA determines will pose an unacceptable risk to human health or to the environment due to exposure to Waste Material or interfere with or adversely affect the implementation, integrity, or protectiveness of the Remedial Action or Remedial O&M. The agreement shall include, but not be limited to the land/water use restrictions listed in Paragraph 80.b.; and

iii. The execution and recordation in the appropriate land records office of Remedial Proprietary Controls, that (i) grant a right of access to conduct any activity regarding the Consent Decree including, but not limited to, those activities listed in Paragraph 80.a., and (ii) grant the right to enforce the land/water use restrictions set forth in Paragraph 80.b., including, but not limited to, the specific restrictions listed therein and any land/water use restrictions listed in the ICIAP. The Remedial Proprietary Controls shall be granted to: (i) the United States, on behalf of EPA, and its representatives, (ii) the State and its representatives, and (iii) Settling Defendant and its representatives, and/or (iv) other appropriate grantees. The Remedial Proprietary Controls, other than those granted to the United States and/or the State as applicable, shall include a designation that EPA and/or the State, as applicable, is a third party beneficiary, allowing EPA and/or the State, as applicable, to maintain the right to enforce the Remedial Proprietary Controls without acquiring an interest in real property. If any Remedial Proprietary Controls are granted to Settling Defendant pursuant to this

Paragraph 81, then Settling Defendant shall monitor, report on, and enforce such Remedial Proprietary Controls.

b. In accordance with the schedule set forth in the ICIAP, Settling Defendant shall submit to EPA for review and approval, with a copy to the State, with respect to such property: (i) draft Remedial Proprietary Controls, in substantially the form attached hereto as Appendix G-2, that are enforceable under state law; and (ii) a current title insurance commitment, or other evidence of title acceptable to EPA, that shows title to the land affected by the Remedial Proprietary Controls to be free and clear of all prior liens and encumbrances, except when EPA waives the release or subordination of such prior liens or encumbrances or when, despite best efforts, Settling Defendant is unable to obtain release or subordination of such prior liens or encumbrances.

c. Within 30 days of EPA's approval and acceptance of the Remedial Proprietary Controls and the title evidence, Settling Defendant shall update the title search and, if it is determined that nothing has occurred since the effective date of the title insurance commitment, or other title evidence, to affect the title adversely, record the Remedial Proprietary Controls with the appropriate land records office. Within 30 days after the recording of the Remedial Proprietary Controls, Settling Defendant shall provide EPA and the State with a final title insurance policy, or other final evidence of title acceptable to EPA, and a certified copy of the original recorded Remedial Proprietary Controls showing the clerk's recording stamps. If the Remedial Proprietary Controls are to be conveyed to the United States, the Remedial Proprietary Controls and title evidence (including final title evidence) shall be prepared in accordance with the U.S. Department of

Justice Title Standards 2001, and approval of the sufficiency of title shall be obtained as required by 40 U.S.C. § 3111.

82. For purposes of Paragraphs 80 and 81, "best efforts" includes the payment of reasonable sums of money to obtain access, an agreement to restrict land/water use, Remedial Proprietary Controls, and/or an agreement to release or subordinate a prior lien or encumbrance. If, within 60 days of EPA's approval of the ICIAP, Settling Defendant has not: (a) obtained agreements to provide access, restrict land/water use or record Remedial Proprietary Controls, as required by Paragraphs 81.a.; or (b) obtained, pursuant to Paragraph 80.c.ii. or 81.b., agreements from the holders of prior liens or encumbrances to release or subordinate such liens or encumbrances to the Remedial Proprietary Controls, Settling Defendant shall promptly notify the United States in writing, and shall include in that notification a summary of the steps that Settling Defendant has taken to attempt to comply with Paragraph 80 or 81. The United States may, as it deems appropriate, assist Settling Defendant in obtaining access, agreements to restrict land/water use, Remedial Proprietary Controls, or the release or subordination of a prior lien or encumbrance. Settling Defendant shall reimburse the United States under Section XIX (Payment of Response Costs) for all costs incurred, direct or indirect, by the United States in obtaining such access, agreements to restrict land/water use, Remedial Proprietary Controls, and/or the release/subordination of prior liens or encumbrances including the cost of attorney time and the amount of monetary consideration paid or just compensation.

83. If EPA determines that Institutional Controls in the form of state or local laws, regulations, ordinances, zoning restrictions, or other governmental controls are needed at or in connection with the Site, Settling Defendant shall cooperate with EPA's and the State's efforts to secure and ensure compliance with such governmental controls.

84. Notwithstanding any provision of the Consent Decree, the United States and the

State retain all of their access authorities and rights, as well as all of their rights to require Institutional Controls, including enforcement authorities related thereto, under CERCLA, RCRA, and any other applicable statute or regulations.

XII. REMEDIAL REPORTING REQUIREMENTS

85. In addition to any other requirement of this Consent Decree, Settling Defendant shall submit to EPA and Ohio EPA two copies (one copy to each agency) of written monthly progress reports of all Remedial Action(s) that: (a) describe the actions that have been taken toward achieving compliance with this Consent Decree during the previous month; (b) include a summary of all results of sampling and tests and all other data received or generated by Settling Defendant or its contractors or agents in the previous month; (c) identify all plans, reports, and other deliverables required by this Consent Decree completed and submitted during the previous month; (d) describe all actions, including, but not limited to, data collection and implementation of work plans, which are scheduled for the next six weeks and provide other information relating to the progress of construction, including, but not limited to, critical path diagrams, Gantt charts and Pert charts; (e) include information regarding percentage of completion, unresolved delays encountered or anticipated that may affect the future schedule for implementation of the Remedial Work, and a description of efforts made to mitigate those delays or anticipated delays; (f) include any modifications to the work plans or other schedules that Settling Defendant has proposed to EPA or that have been approved by EPA; and (g) describe all activities undertaken in support of the Community Involvement Plan during the previous month and those to be undertaken in the next six weeks. Settling Defendant shall submit these progress reports to EPA and the Ohio EPA by the tenth day of every month following the lodging of this Consent Decree. Following certification of Remedial Action Construction Completion pursuant to Section XVII.A., Settling Defendant may request that EPA reduce the frequency with which Settling

Defendant must submit these progress reports. If requested by EPA, Settling Defendant shall also provide briefings for EPA and/or Ohio EPA to discuss the progress of the Remedial Work.

86. Settling Defendant shall notify EPA and Ohio EPA of any change in the schedule described in the monthly progress report for the performance of any activity, including, but not limited to, data collection and implementation of work plans, no later than seven days prior to the performance of the activity.

87. Upon the occurrence of any event during performance of the Remedial Work that Settling Defendant is required to report pursuant to Section 103 of CERCLA, 42 U.S.C. § 9603, Section 304 of the Emergency Planning and Community Right-to-Know Act ("EPCRA"), 42 U.S.C. § 11004, Ohio Administrative Code § 3750.25 and Ohio Revised Code § 3750.06. Settling Defendant shall within 24 hours of the onset of such event orally notify the EPA Project Coordinator or the Alternate EPA Project Coordinator (in the event of the unavailability of the EPA Project Coordinator) and the Ohio EPA Project Coordinator or the Alternate Ohio EPA Project Coordinator, or, in the event that neither the EPA Project Coordinator nor Alternate EPA Project Coordinator is available, the Emergency Response Section, Region 5, United States Environmental Protection Agency and Ohio EPA's Spill Hotline at 1-800-282-9378. These reporting requirements are in addition to the reporting required by CERCLA Section 103 or EPCRA Section 304, Ohio Administrative Code § 3750.25 and Ohio Revised Code § 3750.06.

88. Within 20 days after the onset of such an event, Settling Defendant shall furnish to EPA and the State a written report, signed by Settling Defendant's Project Coordinator, setting forth the events that occurred and the measures taken, and to be taken, in response thereto. Within 30 days after the conclusion of such an event, Settling Defendant shall submit a report setting forth all actions taken in response thereto.

89. Settling Defendant shall submit electronic copies of all plans, reports, data, and

other deliverables required by the Remedial SOW, the OU 2 Remedial Action Work Plan, the OU 3 Remedial Action Work Plan, the OU 2 Remedial O&M Plan, the OU 3 Remedial O&M Plan, the ICIAP, or any other approved plans to EPA in accordance with the schedules set forth in such plans. Settling Defendant shall simultaneously submit electronic copies of all such plans, reports, data, and other deliverables to the State. Upon request by EPA, Settling Defendant shall submit hard copies of all or any portions of any deliverables Settling Defendant is required to submit pursuant to the provisions of the Consent Decree.

90. All reports and other documents submitted by Settling Defendant to EPA (other than the monthly progress reports referred to above) that purport to document Settling Defendant's compliance with the terms of this Consent Decree shall be signed by an authorized representative of Settling Defendant. The reports and other documents referred to in this and similar paragraphs may be signed by Settling Defendant's Project Coordinator so long as Settling Defendant provides EPA with documentation that the Project Coordinator is an authorized representative of Settling Defendant.

XIII. RESTORATION REPORTING REQUIREMENTS

91. In addition to any other requirement of this Consent Decree, Settling Defendant shall submit to the Trustees two copies (one copy to each agency) of written monthly progress reports of all Restoration Projects that, in addition to information required under Section VI of the Restoration SOW: (a) describe the actions that have been taken toward achieving compliance with the Restoration Work of this Consent Decree during the previous month; (b) include a summary of any results of sampling and tests and all other data received or generated by Settling Defendant or its contractors or agents in the previous month; (c) identify all plans, reports, and other deliverables required by the Restoration Work of this Consent Decree completed and submitted during the previous month; (d) describe all actions, including, but not limited to, any

data collection and implementation of work plans, which are scheduled for the next six weeks and provide other information relating to the progress; (e) include information regarding percentage of completion, unresolved delays encountered or anticipated that may affect the future schedule for implementation of the Restoration Projects, and a description of efforts made to mitigate those delays or anticipated delays; and (f) include any modifications to the work plans or other schedules that Settling Defendant has proposed to the Trustees or that have been approved by the Trustees. Following the Effective Date of this Consent Decree until the date that the Trustees notify Settling Defendant pursuant to Section XVII (Certification of Completion) (unless the due date or reporting frequency is modified or the requirement is waived by the Trustees), Settling Defendant shall submit these progress reports to the Trustees by the tenth day of every month while the dam removal project is underway. Once the dam removal project has been completed and the Restoration Completion Report for that project has been submitted to the Trustees, progress reports shall be submitted on a quarterly basis unless Conserved Lands are being considered for conservation, in which case monthly reports shall continue to be submitted. Such monthly reports, however, need only include a brief description of the properties' value from a natural resource restoration standpoint, a brief summary of the ecological habitat and restoration activities, if any, and any documents related or pertaining to Conservation Instruments. If requested by the Trustees, Settling Defendant shall also provide briefings for the Trustees to discuss the progress of the Restoration Projects.

92. Settling Defendant shall notify the Trustees of any change in the schedule described in the monthly progress report for the performance of any activity, including, but not limited to, any data collection and implementation of work plans, no later than seven days prior to the performance of the activity.

93. Settling Defendant shall submit three copies of all plans, reports, any data, and

other deliverables required by the Restoration Work Plans, or any other approved plans to the Trustees in accordance with the schedules set forth in such plans. Upon request by Settling Defendant and approval by the Trustees, Settling Defendant shall submit in electronic form all or any portions of any deliverables Settling Defendant is required to submit pursuant to the provisions of the Consent Decree.

94. All reports and other documents submitted by Settling Defendant to the Trustees (other than the monthly progress reports referred to above) that purport to document Settling Defendant's compliance with the terms of this Consent Decree shall be signed by an authorized representative of the Settling Defendant.

XIV. APPROVAL OF PLANS, REPORTS, AND OTHER DELIVERABLES

A. EPA Approvals

95. Initial Submissions.

a. After review of any Remedial Work plan, report, or other deliverable that is required to be submitted for approval pursuant to this Consent Decree, EPA, after reasonable opportunity for review and comment by the State, shall: (1) approve, in whole or in part, the submission; (2) approve the submission upon specified conditions; (3) disapprove, in whole or in part, the submission; or (4) any combination of the foregoing.

b. EPA also may modify the initial submission to cure deficiencies in the submission if: (1) EPA determines that disapproving the submission and awaiting a resubmission would cause substantial disruption to the Remedial Work; or (2) previous submission(s) have been disapproved due to material defects and the deficiencies in the initial submission under consideration indicate a bad faith lack of effort to submit an acceptable plan, report, or deliverable.

96. Resubmissions. Upon receipt of a notice of disapproval under Paragraph 95.a. (3) or (4), or if required by a notice of approval upon specified conditions under Paragraph 95.a. (2), Settling Defendant shall, within 30 days or such longer time as approved by EPA in such notice, correct the deficiencies and resubmit the plan, report, or other deliverable for approval, with a copy to the State. After review of the resubmitted plan, report, or other deliverable, EPA may: (a) approve, in whole or in part, the resubmission; (b) approve the resubmission upon specified conditions; (c) modify the resubmission; (d) disapprove, in whole or in part, the resubmission, requiring Settling Defendant to correct the deficiencies; or (e) any combination of the foregoing.

97. Material Defects. If a resubmitted plan, report, or other deliverable contains a material defect, and the resubmitted plan, report, or other deliverable is disapproved or modified by EPA under Paragraph 96 due to such material defect, then the material defect shall constitute a lack of compliance for purposes of Paragraph 159. The provisions of Section XXIII (Dispute Resolution) and XXIV (Stipulated Penalties) shall govern the accrual and payment of any stipulated penalties regarding Settling Defendant's submissions under this Section.

98. Implementation. Upon approval, approval upon conditions, or modification by EPA under Paragraph 95 (Initial Submissions) or Paragraph 96 (Resubmissions), of any plan, report, or other deliverable, or any portion thereof: (a) such plan, report, or other deliverable, or portion thereof, shall be incorporated into and enforceable under the Consent Decree; and (b) Settling Defendant shall take action required by such plan, report, or other deliverable, or portion thereof, subject only to its right to invoke the Dispute Resolution procedures set forth in Section XXIII (Dispute Resolution) with respect to the modifications or conditions made by EPA. The implementation of any non-deficient portion of a plan, report, or other deliverable submitted or resubmitted under Paragraphs 95 or 96 shall not relieve Settling Defendant of any liability for stipulated penalties under Section XXIV (Stipulated Penalties).

B. Trustee Approvals

99. Initial Submissions.

a. After review of any Restoration Work plan, report, or other deliverable that is required to be submitted for approval pursuant to this Consent Decree, the Trustees shall: (1) approve, in whole or in part, the submission; (2) approve the submission upon specified conditions; (3) disapprove, in whole or in part, the submission; or (4) any combination of the foregoing.

b. The Trustees also may modify the initial submission to cure deficiencies in the submission if: (1) the Trustees determine that disapproving the submission and awaiting a resubmission would cause substantial disruption to the Restoration Work; or (2) previous submission(s) have been disapproved due to material defects and the deficiencies in the initial submission under consideration indicate a bad faith lack of effort to submit an acceptable plan, report, or deliverable.

100. Following approval or, approval upon conditions, or modification by the Trustees of any submittal pursuant to Paragraph 99, the Settling Defendant shall proceed to take any action required by the submittal, as approved or modified by the Trustees, subject only to any right of Settling Defendant to contest such disapproval or modification under Section XXIII (Dispute Resolution).

101. Resubmission.

a. Upon receipt of a notice of disapproval pursuant to Paragraph 99.a(3) or (4), the Settling Defendant shall, within 30 days or such longer time as approved by the Trustees, correct the deficiencies and resubmit the report, or other item for approval.

b. Notwithstanding the receipt of a notice of disapproval of any submission pursuant to Paragraph 99.a(3) or (4), the Settling Defendant shall proceed, at the direction of the Trustees, to take any action required by any non-deficient portion of the submission. Implementation of any non-deficient portion of a submission shall not relieve the Settling Defendant of any liability for stipulated penalties under Section XXIV (Stipulated Penalties).

102. In the event that a resubmitted submission, or portion thereof, is disapproved by the Trustees, the Trustees may again require the Settling Defendant to correct the deficiencies, in accordance with Paragraph 101. Trustees also retain the right to modify or develop the resubmitted submission. The Settling Defendant shall implement any submission as modified or developed by the Trustees, subject only to the right of the Settling Defendant to invoke the procedures set forth in Section XXIII (Dispute Resolution).

103. If upon resubmission, a report or item is disapproved or modified by the Trustees due to a material defect, the Settling Defendant shall be deemed to have failed to submit such report, or item timely and adequately unless the Settling Defendant invokes the dispute resolution procedures set forth in Section XXIII (Dispute Resolution) and the Trustees' action is overturned pursuant to that Section. The provisions of Section XXIII (Dispute Resolution) and Section XXIV (Stipulated Penalties) shall govern the implementation of the Restoration Work Plan and Restoration Projects and accrual and payment of any stipulated penalties during Dispute Resolution. If the Trustees' disapproval or modification is upheld, stipulated penalties shall accrue for such violation from the date on which the initial submission was originally required, as provided in Section XXIV (Stipulated Penalties).

104. All items required to be submitted to Trustees for approval under this Consent Decree shall, upon approval or modification by the Trustees, be enforceable under this Consent

Decree. In the event the Trustees approve or modify a portion of a report, or other item required to be submitted to the Trustees under this Consent Decree, the approved or modified portion shall be enforceable under this Consent Decree.

XV. PROJECT COORDINATORS

A. Remedial Project Coordinators

105. Within 20 days after lodging this Consent Decree, Settling Defendant and EPA will notify each other and the State, in writing, of the name, address, telephone number, and email address of their respective designated Remedial Project Coordinators and Alternate Remedial Project Coordinators. If a Remedial Project Coordinator or Alternate Remedial Project Coordinator initially designated is changed, the identity of the successor will be given to the other Parties at least five working days before the change occurs, unless impracticable, but in no event later than the actual day the change is made. Settling Defendant's Remedial Project Coordinator shall be subject to disapproval by EPA and shall have the technical expertise sufficient to adequately oversee all aspects of the Remedial Work. Settling Defendant's Remedial Project Coordinator shall not be an attorney for Settling Defendant in this matter. He or she may assign other representatives, including other contractors, to serve as a Site representative for oversight of performance of daily operations during remedial activities.

106. EPA may designate other representatives, including, but not limited to, EPA employees, and federal contractors and consultants, to observe and monitor the progress of any activity undertaken pursuant to this Consent Decree. EPA's Remedial Project Coordinator and Alternate Remedial Project Coordinator shall have the authority lawfully vested in a Remedial Project Manager ("RPM") and an On-Scene Coordinator ("OSC") by the NCP, 40 C.F.R. § 300. In addition, EPA's Remedial Project Coordinator or Alternate Remedial Project Coordinator shall have authority, consistent with the NCP, to halt any Remedial Work required by the

Consent Decree and to take any necessary response action when he or she determines that conditions at the Site constitute an emergency situation or may present an immediate threat to public health or welfare or the environment due to release or threatened release of Waste Material.

B. Restoration Project Coordinators

107. Within 20 days after lodging this Consent Decree, Settling Defendant and Trustees will notify each other, in writing, of the name, address, telephone number and email address of their respective designated Restoration Project Coordinators and Alternate Restoration Project Coordinators. If a Restoration Project Coordinator or Alternate Restoration Project Coordinator initially designated is changed, the identity of the successor will be given to the other Parties at least five working days before the change occurs, unless impracticable, but in no event later than the actual day the change is made. Settling Defendant's Restoration Project Coordinator shall be subject to disapproval by the Trustees and shall have the technical expertise to adequately oversee all aspects of the Restoration Work. He or she may assign other representatives, including other contractors, to serve as a representative for oversight of performance of daily operations during the restoration.

108. The Trustees may designate other representatives, including but not limited to DOI or State employees, and Trustees' contractors and consultants, to observe and monitor the progress of any activity undertaken pursuant to this Consent Decree.

XVI. REMEDIAL PERFORMANCE GUARANTEE

109. To ensure the full and final completion of the Remedial Work, Settling Defendant shall establish and maintain a performance guarantee, in the amount of $13.45 million. The performance guarantee must be established within 30 days of the Effective Date of the Consent Decree. The performance guarantee, which must be satisfactory in form and substance to EPA,

shall be in the form of one or more of the following mechanisms:

a. One or more irrevocable letters of credit, payable to or at the direction of EPA, that is issued by one or more financial institution(s) (1) that has the authority to issue letters of credit and (2) whose letter-of-credit operations are regulated and examined by a federal or state agency; or

b. A trust fund established for the benefit of EPA that is administered by a trustee (1) that has the authority to act as a trustee and (2) whose trust operations are regulated and examined by a federal or state agency.

110. Settling Defendant has selected, and EPA has found satisfactory, as an initial performance guarantee letter-of-credit pursuant to Paragraph 109, in the form attached hereto at Appendix J. Within 30 days after the Effective Date, Settling Defendant shall execute or otherwise finalize all instruments or other documents required in order to make the selected performance guarantee(s) legally binding in a form substantially identical to the documents attached hereto at Appendix J, and such performance guarantee(s) shall thereupon be fully effective. Within 45 days after the Effective Date, Settling Defendant shall submit copies of all executed and/or otherwise finalized instruments or other documents required in order to make the selected performance guarantee(s) legally binding to the EPA Regional Financial Management Officer in accordance with Section XXXI (Notices and Submissions) of this Consent Decree, with a copy to Cynthia Mack-Smeltzer, Region 5 Financial Assurance Specialist, U.S. EPA Region 5, Resource Management Division, 77 W. Jackson Boulevard (MF-10J), Chicago, Illinois 60604, and to the United States and EPA and the State as specified in Section XXXI.

111. In the event that EPA determines that a performance guarantee provided by Settling Defendant pursuant to this Section is inadequate or otherwise no longer satisfies the

requirements set forth in this Section, whether due to an increase in the estimated cost of completing the Remedial Work or for any other reason, or in the event that Settling Defendant becomes aware of information indicating that a performance guarantee provided pursuant to this Section is inadequate or otherwise no longer satisfies the requirements set forth in this Section, whether due to an increase in the estimated cost of completing the Remedial Work or for any other reason, Settling Defendant, within 30 days after receipt of notice of EPA's determination or, as the case may be, within 30 days after Settling Defendant becomes aware of such information, shall obtain and present to EPA for approval a proposal for a revised or alternative form of performance guarantee listed in Paragraph 109 that satisfies all requirements set forth in this Section XVI (Remedial Performance Guarantee); provided, however, that if Settling Defendant cannot obtain such revised or alternative form of performance guarantee within such 30-day period, and thereafter diligently proceeds to obtain the same, EPA shall extend such period for such time as is reasonably necessary for Settling Defendant in the exercise of due diligence to obtain such revised or alternative form of performance guarantee, such additional period not to exceed 60 days. On day 30, Settling Defendant shall provide to EPA a status report on its efforts to obtain the revised or alternative form of guarantee. In seeking approval for a revised or alternative form of performance guarantee, Settling Defendant shall follow the procedures set forth in Paragraph114.b. Settling Defendant’s inability to post a performance guarantee for completion of the Remedial Work shall in no way excuse performance of any other requirements of the Consent Decree, including, without limitation, the obligation of Settling Defendant to complete the Remedial Work in strict accordance with the terms of the Consent Decree. Notwithstanding the above, Settling Defendant will not be subject to an increase in the performance guarantee related to O&M costs prior to completion of Remedial Action Construction as defined in Paragraph 116.

112. Access to Financial Assurance.

a. The commencement of any Remedial Work Takeover pursuant to Paragraph 178 shall trigger EPA's right to receive the benefit of any performance guarantee(s) provided pursuant to Paragraph 109, and at such time EPA shall have immediate access to resources guaranteed under any such performance guarantee(s), whether in cash or in kind, as needed to continue and complete the Remedial Work assumed by EPA under the Remedial Work Takeover.

b. If, upon issuance of a notice of implementation of a Remedial Work Takeover under Paragraph 177, EPA is unable for any reason to promptly secure the resources guaranteed under any such performance guarantee(s) provided pursuant to Paragraph 109, whether in cash or in kind, necessary to continue and complete the Remedial Work assumed by EPA under the Remedial Work Takeover, then EPA may demand an amount, as determined by EPA, sufficient to cover the cost of the remaining Remedial Work to be performed. Settling Defendant, shall, within 60 days of such demand, pay the amount demanded as directed by EPA.

c. Any amounts required to be paid under this Paragraph 112 shall be paid to EPA to facilitate completion of the Work. Settling Defendant shall deposit the funds demanded under this paragraph into a special account within the EPA Hazardous Substance Superfund or such other account as EPA may specify.

d. If EPA invokes this paragraph and Settling Defendant deposits the funds in accordance with Paragraph 112(c) above, then EPA may not recover performance guarantee funds equivalent to the amount deposited by Settling Defendant in accordance with Paragraph 112(c) above, and Settling Defendant

may reduce its performance guarantee by this amount. EPA reserves its right to recover any amount of the performance guarantee funds that remain in excess of the amount that Settling Defendant deposits in accordance with Paragraph 112 (c) above.

e. If at any time EPA is notified by the issuer of a performance guarantee that such issuer intends to cancel the performance guarantee mechanism it has issued, then, unless Settling Defendant provides a substitute performance guarantee mechanism in accordance with this Section XVI (Remedial Performance Guarantee) no later than 30 days prior to the impending cancellation date, EPA shall be entitled (as of and after the date that is 30 days prior to the impending cancellation) to draw fully on the funds guaranteed under the then-existing performance guarantee.

f. All EPA Remedial Work Takeover costs not reimbursed under this Paragraph shall be reimbursed as Future Response Costs under Section XIX (Payments for Response Costs) subject to Settling Defendant's right to invoke dispute resolution pursuant to Sections XIX (Payments for Response Costs) and XXIII (Dispute Resolution).

113. Reduction of Amount of Performance Guarantee. If Settling Defendant believes that the estimated cost of completing the Remedial Work has diminished below the amount of performance guarantee established pursuant to Paragraph 109, Settling Defendant may, on any anniversary date of entry of this Consent Decree, or at any other time agreed to by the Parties, petition EPA in writing to request a reduction in the amount of the performance guarantee provided pursuant to this Section so that the amount of the performance guarantee being maintained is not less than the estimated cost of completing all remaining Remedial Work.

Settling Defendant shall submit a written proposal for such reduction to EPA that shall specify, at a minimum, the estimated cost of completing the Remedial Work and the basis upon which such cost was calculated. In seeking approval for a reduction in the amount of the performance guarantee, Settling Defendant shall follow the procedures set forth in Paragraph 114.b for requesting a revised or alternative form of performance guarantee, except as specifically provided in this Paragraph. EPA will notify Settling Defendant in writing of its decision to approve or disapprove Settling Defendant's proposal for a reduction in the amount of the performance guarantee, either to the amount set forth in Settling Defendant's written proposal or to some other amount as selected by EPA. After receiving EPA's written decision, Settling Defendant may reduce the amount of the performance guarantee in accordance with and to the extent permitted by such written decision and shall submit copies of all executed and/or otherwise finalized instruments or other documents required to make the selected performance guarantee(s) legally binding in accordance with Paragraph 114.b. In the event of a dispute, Settling Defendant may reduce the amount of the performance guarantee required hereunder only in accordance with a final administrative or judicial decision resolving such dispute pursuant to Section XXIII (Dispute Resolution). No change to the form or terms of any performance guarantee provided under this Section, other than a reduction in amount, is authorized except as provided in Paragraphs 111 or 114.b.

114. Change of Form of Performance Guarantee.

a. If, after the Effective Date, Settling Defendant desires to change the form or terms of any performance guarantee(s) provided pursuant to this Section, Settling Defendant may, on any anniversary date of the Effective Date, or at any other time agreed to by the Parties, petition EPA in writing to request a change in the

form or the terms of the performance guarantee provided hereunder. The submission of such proposed revised or alternative performance guarantee shall be as provided in Paragraph 114.b. Any decision made by EPA on a petition submitted under Paragraph 114.b shall be made in EPA's sole and unreviewable discretion, and such decision shall not be subject to challenge by Settling Defendant pursuant to the dispute resolution provisions of this Consent Decree or in any other forum.

b. Settling Defendant shall submit a written proposal for a revised or alternative performance guarantee to EPA that shall specify, at a minimum, the estimated cost of completing the Remedial Work, the basis upon which such cost was calculated, and the proposed revised performance guarantee, including all proposed instruments or other documents required in order to make the proposed performance guarantee legally binding. The proposed revised or alternative performance guarantee must satisfy all requirements set forth or incorporated by reference in this Section XVI (Remedial Performance Guarantee). Settling Defendant shall submit such proposed revised or alternative performance guarantee to the EPA Regional Financial Management Officer in accordance with Section XXXI (Notices and Submissions), with a copy to Cynthia Mack-Smeltzer, Region 5 Financial Assurance Specialist, U.S. EPA Region 5, Resource Management Division, 77 W. Jackson Boulevard (MF-10J), Chicago, Illinois 60604 and the State. EPA will notify Settling Defendant in writing of its decision to accept or reject a revised or alternative performance guarantee submitted pursuant to this subparagraph. Within ten days after receiving a written decision approving the proposed revised or alternative performance

guarantee, Settling Defendant shall execute and/or otherwise finalize all instruments or other documents required to make the selected performance guarantee(s) legally binding in a form substantially identical to the documents submitted to EPA as part of the proposal, and such performance guarantee(s) shall thereupon be fully effective. Settling Defendant shall submit all executed and/or otherwise finalized instruments or other documents required to make the selected performance guarantee(s) legally binding to the EPA Regional Financial Management Officer within 30 days after receiving a written decision approving the proposed revised or alternative Performance Guarantee in accordance with Section XXXI (Notices and Submissions) of this Consent Decree, with a copy to Cynthia Mack-Smeltzer, Region 5 Financial Assurance Specialist, U.S. EPA Region 5, Resource Management Division, 77 W. Jackson Boulevard (MF-10J), Chicago, Illinois 60604 and to the United States, EPA, and the State as specified in Section XXXI (Notices and Submissions).

115. Release of Performance Guarantee. Settling Defendant shall not release, cancel, or discontinue any performance guarantee provided pursuant to this Section except as provided in this Paragraph. If Settling Defendant receives written notice from EPA in accordance with Paragraph 124 hereof that the Remedial Work has been fully and finally completed in accordance with the terms of this Consent Decree, or if EPA otherwise so notifies Settling Defendant in writing, Settling Defendant may thereafter release, cancel, or discontinue the performance guarantee provided pursuant to this Section. In the event of a dispute, Settling Defendant may release, cancel, or discontinue the performance guarantee required hereunder only in accordance with a final administrative or judicial decision resolving such dispute pursuant to Section XXIII (Dispute Resolution).

XVII. CERTIFICATION OF COMPLETION

A. Remedial Action Construction Completion

116. For purposes of this Section XVII.A., "Remedial Action Construction" means the construction and operation of a system to achieve Performance Standards, including the performance of all activities necessary for the system to function properly and as designed.

117. As specified in Section IV.C.4 of the attached Remedial SOW, within 60 days of a successful final inspection, the Settling Defendant shall submit a Completion of Construction Report including as-built drawings signed and stamped by a professional engineer. If EPA determines that Remedial Action Construction is not complete, EPA shall so notify the Settling Defendant. EPA's notice must include a description of, and schedule for, the activities that the Settling Defendant must perform to complete Remedial Action Construction. EPA's notice may include a schedule for completion of such activities or may require the Settling Defendant to submit a proposed schedule for EPA approval. The Settling Defendant shall perform all activities described in the EPA notice in accordance with the schedule.

118. If EPA determines, based on the initial or any subsequent Completion of Construction Report, that Remedial Action Construction is complete, EPA shall so notify the Settling Defendant.

B. Completion of the Remedial Action

119. Within 90 days after Settling Defendant concludes that the Remedial Action has been fully performed and the Performance Standards have been achieved, Settling Defendant shall schedule and conduct a pre-certification inspection to be attended by Settling Defendant, EPA, and the State. If, after the pre-certification inspection, Settling Defendant still believes that the Remedial Action has been fully performed and the Performance Standards have been achieved, it shall submit a written report requesting certification to EPA for approval, with a

copy to the State, pursuant to Section XIV (Approval of Plans, Reports, and Other Deliverables) within 30 days after the inspection. In the report, a registered professional engineer and Settling Defendant's Project Coordinator shall state that the Remedial Action has been completed in full satisfaction of the requirements of the Consent Decree. The report shall contain the following statement, signed by a responsible corporate official of Settling Defendant:

> I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

120. If, after completion of the pre-certification inspection and receipt and review of the written report, EPA, after reasonable opportunity for review and comment by the State, determines that the Remedial Action or any portion thereof has not been completed in accordance with this Consent Decree or that the Performance Standards have not been achieved, EPA will notify Settling Defendant in writing, with a copy to the State, of the activities that must be undertaken by Settling Defendant pursuant to this Consent Decree to complete the Remedial Action and achieve the Performance Standards, provided, however, that EPA may only require Settling Defendant to perform such activities pursuant to this Paragraph to the extent that such activities are consistent with the "scope of the remedy set forth in the OU 2 ROD, OU 3 ROD, and OU 2 ESD," as that term is defined in Paragraph 49. EPA will set forth in the notice a schedule for performance of such activities consistent with the Consent Decree and the Remedial SOW or require Settling Defendant to submit a schedule to EPA for approval pursuant to Section XIV (Approval of Plans, Reports, and Other Deliverables). Settling Defendant shall perform all activities described in the notice in accordance with the specifications and schedules established

pursuant to this Paragraph, subject to its right to invoke the dispute resolution procedures set forth in Section XXIII (Dispute Resolution).

121. If EPA concludes, based on the initial or any subsequent report requesting Certification of Completion of the Remedial Action and after a reasonable opportunity for review and comment by the State, that the Remedial Action has been performed in accordance with this Consent Decree and that the Performance Standards have been achieved, EPA will so certify in writing to Settling Defendant. This certification shall constitute the Certification of Completion of the Remedial Action for purposes of this Consent Decree, including, but not limited to, Section XXV (Covenants by Plaintiffs). Certification of Completion of the Remedial Action shall not affect Settling Defendant's remaining obligations under this Consent Decree.

C. Completion of the Remedial Work

122. Within 90 days after Settling Defendant concludes that all phases of the Remedial Work, other than any remaining activities required under Section VIII (Remedy Review), have been fully performed, Settling Defendant shall schedule and conduct a pre-certification inspection to be attended by Settling Defendant, EPA, and the State. If, after the pre-certification inspection, Settling Defendant still believes that the Remedial Work has been fully performed, Settling Defendant shall submit a written report by a registered professional engineer stating that the Remedial Work has been completed in full satisfaction of the requirements of this Consent Decree. The report shall contain the statement set forth in Paragraph 119 signed by a responsible corporate official of Settling Defendant.

123. If, after review of the written report, EPA, after reasonable opportunity to review and comment by the State, determines that any portion of the Remedial Work has not been completed in accordance with this Consent Decree, EPA will notify Settling Defendant in writing of the activities that must be undertaken by Settling Defendant pursuant to this Consent

Decree to complete the Remedial Work, provided, however, that EPA may only require Settling Defendant to perform such activities pursuant to this Paragraph to the extent that such activities are consistent with the "scope of the remedy set forth in the OU 2 ROD, OU 3 ROD, and OU 2 ESD" as that term is defined in Paragraph 49. EPA will set forth in the notice a schedule for performance of such activities consistent with the Consent Decree and the SOW or require the Settling Defendant to submit a schedule to EPA for approval pursuant to Section XIV (Approval of Plans, Reports, and Other Deliverables). Settling Defendant shall perform all activities described in the notice in accordance with the specifications and schedules established therein, subject to its right to invoke the dispute resolution procedures set forth in Section XXIII (Dispute Resolution).

124. If EPA concludes, based on the initial or any subsequent request for Certification of Completion of the Remedial Work by Settling Defendant and after a reasonable opportunity for review and comment by the State, that the Remedial Work has been performed in accordance with this Consent Decree, EPA will so notify the Settling Defendant in writing.

125. If the Settling Defendant concludes that it has completed all phases of the Remedial Work at the same time it concludes that the Remedial Action has been fully performed, then the Settling Defendant may petition EPA to combine the submission of the Completion of Remedial Action Report and the Completion of Work Report. The decision whether the Settling Defendant may combine the submissions is within EPA's discretion. If EPA allows the Settling Defendant to combine the submissions, the combined report will be required to contain all of the elements required by Sections IV.C.4.b. and IV.C.4.c. of the Remedial SOW, attached as Appendix E. EPA will review the submission according to the standards set forth in Paragraphs 123 and 124 of this Consent Decree.

D. <u>Completion of the Restoration Projects</u>

126. Within 90 days after the Settling Defendant concludes that all of the Restoration Projects in each Restoration Work Plan have been fully performed, the Settling Defendant shall schedule and conduct an inspection to be attended by the Settling Defendant and the Trustees. If, after the inspection, the Settling Defendant still believes that the Restoration Projects have been fully performed, the Settling Defendant shall submit to the Trustees a Restoration Completion Report. The Restoration Completion Report shall comply with the Restoration Work Plans and Restoration SOW and state that the Restoration Projects have been completed in full satisfaction of the requirements of this Consent Decree. The report(s) shall contain the following statement, signed by a responsible corporate official of the Settling Defendant:

> To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

127. If, after review of the written report(s), the Trustees determine that any portion of the Restoration Projects addressed therein has not been completed in accordance with this Consent Decree, the Trustees shall notify the Settling Defendant in writing of the activities that must be undertaken by the Settling Defendant pursuant to this Consent Decree to complete the Restoration Projects, provided, however, that the Trustees may require the Settling Defendant to perform such activities pursuant to this Paragraph only to the extent that such activities are consistent with the Restoration Work Plan. The Trustees will set forth in the notice a schedule for performance of such activities consistent with the Consent Decree. The Settling Defendant shall perform all activities described in the notice in accordance with the specifications and schedules established therein, subject to its right to invoke the dispute resolution procedures set forth in Section XXIII (Dispute Resolution).

128. If the Trustees conclude based on the initial or any subsequent report(s) by Settling

Defendant that a Restoration Project has been performed in accordance with this Consent Decree, the Trustees will so notify the Settling Defendant in writing. If and when the Trustees conclude that all Restoration Projects have been performed in accordance with this Consent Decree, then full restoration, for the purposes of this Consent Decree only, has been achieved for the Site, subject to Paragraph 180.

XVIII. EMERGENCY RESPONSE

129. If any action or occurrence during the performance of the Remedial Work causes or threatens a release of Waste Material from the Site that constitutes an emergency situation or may present an immediate threat to public health or welfare or the environment, Settling Defendant shall, subject to Paragraph 130, immediately take all appropriate action to prevent, abate, or minimize such release or threat of release, and shall immediately notify the EPA's Project Coordinator, or, if the Project Coordinator is unavailable, EPA's Alternate Project Coordinator and the Ohio EPA Project Coordinator or the Alternate Ohio EPA Project Coordinator. If neither of these persons is available, the Settling Defendant shall notify the Regional Duty Officer, EPA Region 5 Emergency Response Branch 24-hour telephone number at 312-353-2318 and Ohio EPA's Spill Hotline at 1-800-282-9378. Settling Defendant shall take such actions in consultation with EPA's Project Coordinator or other available authorized EPA officer and in accordance with all applicable provisions of the Health and Safety Plans, the Contingency Plans, and any other applicable plans or documents developed pursuant to the Remedial SOW. In the event that Settling Defendant fails to take appropriate response action as required by this Section, and EPA takes such action instead, Settling Defendant shall reimburse EPA all costs of the response action under Section XIX (Payment of Response Costs).

130. Subject to Section XXV (Covenants by Plaintiffs), nothing in the preceding Paragraph or in this Consent Decree shall be deemed to limit any authority of the United States

and/or the State (a) to take all appropriate action to protect human health and the environment or to prevent, abate, respond to, or minimize an actual or threatened release of Waste Material on, at, or from the Site, or (b) to direct or order such action, or seek an order from the Court, to protect human health and the environment or to prevent, abate, respond to, or minimize an actual or threatened release of Waste Material on, at, or from the Site.

XIX. PAYMENT OF RESPONSE COSTS

131. Settling Defendant shall pay to EPA, Department of Justice and the State all Past and Future Response Costs not inconsistent with the NCP.

a. Within 45 days after the Effective Date, Settling Defendant shall pay to EPA $394,870 [$315,990 in EPA past costs and $78,880 in DOJ past costs] in payment for Past Response Costs. Payment shall be made in accordance with Paragraph 132 (Payment Instructions).

b. On an annual basis, EPA will send Settling Defendant a bill requiring payment that includes an Itemized Cost Summary that includes Future Response Costs incurred by EPA, including costs of its contractors, and a U.S. DOJ-prepared cost summary that reflects costs incurred by DOJ and its contractors, if any. Settling Defendant shall make all payments within 45 days after Settling Defendant's receipt of each bill requiring payment, except as otherwise provided in Paragraph 133, in accordance with Paragraph 132 (Payment Instructions).

c. The total amount to be paid by Setting Defendant pursuant to Paragraph 131.a and b. shall be deposited by EPA in the Nease Chemical Special Account to be retained and used to conduct or finance response actions at or in connection with the Site, or to be transferred by EPA to the EPA Hazardous Substance Superfund.

d. Recovery and payment of the State's Past and Future Response Costs shall be governed by the State's DFFOs for Cost Recovery for the Site, entered into between the State and ROC on August 4, 2016.

132. Payment Instructions. All payments to EPA required elsewhere in this Consent Decree to be made in accordance with this Paragraph 132 shall be made as follows:

a. If the payment amount demanded in the bill is more than $10,000, payment shall be made to EPA by Electronic Funds Transfer ("EFT"), the Automated Clearinghouse ("ACH") for receiving U.S. currency, or payment through the U.S. Department of Treasury website (www.pay.gov), in accordance with the current procedures available to Settling Defendant from U.S. EPA Region 5. Payment shall be accompanied by a statement identifying the name and address of the party making the payment, EPA Hazardous Substance Superfund, Nease Chemical Special Account, EPA Site ID Number 05A3, and DOJ Case Number (90-11-2-608/2).

b. If the amount demanded in the bill is $10,000 or less, Settling Defendant may, in lieu of the procedures in Paragraph 132.a., make the required payment by a certified or cashier's check or checks made payable to "EPA Hazardous Substance Superfund, Nease Chemical Special Account" referencing the name and address of the party making the payment, EPA Site ID Number 05A3, and DOJ Case No. 90-11-2-608/2. Settling Defendant shall send the check(s) to: United States Environmental Protection Agency, Superfund Payments, Cincinnati Finance Center, P.O. Box 979076, St. Louis, MO 63197-9000.

c. At the time of payment, Settling Defendant shall send notice that payment has been made to the United States, to EPA and to the Regional Financial

Management Officer and, in addition, to the EPA Cincinnati Finance Office by email at acctsreceivable.cinwd@epa.gov, or by mail at 26 Martin Luther King Drive, Cincinnati, Ohio 45268, in accordance with Section XXXI (Notices and Submissions).

133. Settling Defendant may contest any Future Response Costs billed under Paragraph 131.b if it determines that EPA has made a mathematical error or included a cost item that is not within the definition of Future Response Costs, or if it believes EPA incurred excess costs as a direct result of an EPA action that was inconsistent with a specific provision or provisions of the NCP. Such objection shall be made in writing within 30 days after receipt of the bill and must be sent to the United States pursuant to Section XXXI (Notices and Submissions). Any such objection shall specifically identify the contested Future Response Costs and the basis for objection.

134. In the event of an objection, Settling Defendant shall pay all uncontested Future Response Costs to the United States within 45 days of Settling Defendant's receipt of the bill requiring payment. Simultaneously, Settling Defendant shall establish, in a duly chartered bank or trust company, an interest-bearing escrow account that is insured by the Federal Deposit Insurance Corporation ("FDIC"), and remit to that escrow account funds equivalent to the amount of the contested Future Response Costs. Settling Defendant shall send to the United States, as provided in Section XXXI (Notices and Submissions), a copy of the transmittal letter and check paying the uncontested Future Response Costs, and a copy of the correspondence that establishes and funds the escrow account, including, but not limited to, information containing the identity of the bank and bank account under which the escrow account is established as well as a bank statement showing the initial balance of the escrow account. Simultaneously with establishment of the escrow account, Settling Defendant shall initiate the Dispute Resolution

procedures in Section XXIII (Dispute Resolution).

135. If the United States prevails in the dispute, Settling Defendant shall pay the sums due (with accrued interest) to the United States within ten days after resolution of the dispute. If Settling Defendant prevails concerning any aspect of the contested costs, Settling Defendant shall pay that portion of the costs (plus associated accrued interest) for which it did not prevail to the United States within five days after the resolution of the dispute. Settling Defendant shall be disbursed any balance of the escrow account. All payments to the United States under this Paragraph shall be made in accordance with Paragraph 132 (Payment Instructions). The dispute resolution procedures set forth in this Paragraph in conjunction with the procedures set forth in Section XXIII (Dispute Resolution) shall be the exclusive mechanisms for resolving disputes regarding Settling Defendant's obligation to reimburse the United States for its Future Response Costs.

136. Interest. In the event that any payment for Future Response Costs required under this Section is not made by the date required, Settling Defendant shall pay Interest on the unpaid balance. The Interest on Future Response Costs shall begin to accrue on the date of the bill. The Interest shall accrue through the date of Settling Defendant's payment. Payments of Interest made under this Paragraph shall be in addition to such other remedies or sanctions available to Plaintiffs by virtue of Settling Defendant's failure to make timely payments under this Section including, but not limited to, payment of stipulated penalties pursuant to Paragraph 160.

XX. PAYMENT OF ASSESSMENT COSTS

137. Payments to United States by Settling Defendant.

a. Within 45 days after the Effective Date of this Consent Decree, Settling Defendant shall pay to the United States $195,000 in reimbursement of DOI's Past Assessment Costs.

b. Payment shall be made to the United States, by FedWire Electronic Funds Transfer ("EFT") to the U.S. Department of Justice account in accordance with current EFT procedures, referencing DOJ Case Number 90-11-3-608/1. Payment shall be made in accordance with instructions provided to the Settling Defendant by the Financial Litigation Unit of the United States Attorney's Office for the Northern District of Ohio following lodging of the Consent Decree. Any payments received by the Department of Justice after 4:00 p.m. (Eastern Time) will be credited on the next business day.

138. Payment to State of Ohio by Settling Defendant. Within 45 days after the Effective Date, Settling Defendant shall pay $375,680 to the State of Ohio in reimbursement of the State of Ohio's Past Assessment Costs. The payment shall be made in the form of an Electronic Funds Transfer according to payment instructions provided by Ohio EPA following lodging of the Consent Decree. A copy of the Electronic Funds Transfer transmittal shall be sent to: Steven Snyder or his successor, DERR Fiscal Officer, Ohio EPA, P.O. Box 1049, Columbus, Ohio 43216-1049; and to Scott Hainer, Paralegal, or his successor at the Office of the Attorney General of Ohio, Environmental Enforcement Section, 30 East Broad Street, 25th Floor, Columbus, Ohio 43215.

139. Notice of Payment. Upon making payments required under this Section, the Settling Defendant making the payment shall send notice to the Chief, Environmental Enforcement Section, U.S. Department of Justice; the Department of the Interior, Restoration Fund Manager; the Department of the Interior, Office of the Solicitor, and, as to the State of Ohio, the Fiscal Officer, DERR Ohio EPA, and Chief, Environmental Enforcement Section, Ohio Attorney General's Office, in accordance with Section XXXI (Notices and Submissions).

140. In the event that Settling Defendant does not make any payment required by this

Section XX (Payment of Assessment Costs) when due, Settling Defendant shall pay Interest on the unpaid balance commencing on the payment due date and accruing through the date of full payment. All payments required pursuant to this Paragraph shall be made in the same manner and directed to the same funds or accounts as specified in Paragraphs 137 and 138. Any payments required by this Paragraph shall be in addition to any other remedies provided by this Consent Decree for failure to make timely payments required under this Section.

141. Settling Defendant shall pay for the cost of the Trustees' Future Assessment Costs, including the cost of oversight of the Restoration Projects. Settling Defendant shall reimburse the Federal Trustee for its reasonable Future Assessment Costs within 60 (sixty) days of receipt of a cost summary of the Federal Trustee's actual costs and expenses, and shall reimburse the State Trustee for its reasonable Future Assessment Costs within 60 (sixty) days of receipt of a cost summary of the State Trustees actual costs and expenses. Each cost summary shall provide the hours worked by each Trustee representative and detail any expenses incurred. Such Future Assessment Costs will be billed once per year for the Trustees, and shall be paid in the same manner as described in Paragraphs 137 and 138 above. Settling Defendant shall be responsible for determining the appropriate wiring instructions in order to make the required payments to DOI and the State. In the event that payments required by this Paragraph are not made within sixty (60) days of Settling Defendant's receipt of the cost summary, Settling Defendant shall pay Interest on the unpaid balance. Interest shall accrue commencing on the sixty-first (61st) day after Settling Defendant's receipt of the cost summary and shall continue to accrue through the date of payment.

XXI. INDEMNIFICATION AND INSURANCE

A. Settling Defendant's Indemnification of the United States

142. The United States does not assume any liability by entering into this Consent

Decree or by virtue of any designation of Settling Defendant as DOI's and EPA's authorized representatives under Section 104(e) of CERCLA, 42 U.S.C. § 9604(e). Settling Defendant shall indemnify, save and hold harmless the United States and its officials, agents, employees, contractors, subcontractors, and representatives for or from any and all claims or causes of action arising from, or on account of, negligent or other wrongful acts or omissions of Settling Defendant, its officers, directors, employees, agents, contractors, subcontractors, and any persons acting on its behalf or under its control, in carrying out activities pursuant to this Consent Decree, including, but not limited to, any claims arising from any designation of Settling Defendant as DOI's and EPA's authorized representatives under Section 104(e) of CERCLA. Further, Settling Defendant agrees to pay the United States all costs it incurs including, but not limited to, attorneys' fees and other expenses of litigation and settlement arising from, or on account of, claims made against the United States based on negligent or other wrongful acts or omissions of Settling Defendant, its officers, directors, employees, agents, contractors, subcontractors, and any persons acting on its behalf or under its control, in carrying out activities pursuant to this Consent Decree. The United States shall not be held out as a party to any contract entered into by or on behalf of Settling Defendant in carrying out activities pursuant to this Consent Decree. Neither Settling Defendant nor any such contractor shall be considered an agent of the United States.

143. The United States shall give Settling Defendant notice of any claim for which the United States plans to seek indemnification pursuant to Paragraph 142, and shall consult with Settling Defendant prior to settling such claim.

144. Settling Defendant covenants not to sue and agrees not to assert any claims or causes of action against the United States for damages or reimbursement or for set-off of any payments made or to be made to the United States, arising from or on account of any contract,

agreement, or arrangement between Settling Defendant and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays. In addition, Settling Defendant shall indemnify and hold harmless the United States with respect to any and all claims for damages or reimbursement arising from or on account of any contract, agreement, or arrangement between Settling Defendant and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays.

145. No later than 30 days after lodging of this Consent Decree, Settling Defendant shall secure, and shall maintain until the first anniversary after issuance of EPA's Certification of Completion of the Remedial Action pursuant to Paragraph 121 of Section XVII (Certification of Completion), commercial general liability insurance with limits of two million dollars, for any one occurrence, and automobile liability insurance with limits of two million dollars, combined single limit, naming the United States as an additional insured with respect to all liability arising out of the activities by or on behalf of Settling Defendant pursuant to this Consent Decree. In addition, for the duration of this Consent Decree, Settling Defendant shall satisfy, or shall ensure that its contractors or subcontractors satisfy, all applicable laws and regulations regarding the provision of worker's compensation insurance for all persons performing the Work on behalf of Settling Defendant in furtherance of this Consent Decree. Prior to commencement of the Work under this Consent Decree, Settling Defendant shall provide to EPA and the Trustees certificates of such insurance, and, if requested, a copy of each insurance policy. Settling Defendant shall resubmit such certificates and, if requested, copies of policies each year on the anniversary of the Effective Date. If Settling Defendant demonstrates by evidence satisfactory to EPA and Trustees that any contractor or subcontractor maintains insurance equivalent to that described above, or insurance covering the same risks but in a lesser amount, then, with respect to that contractor or subcontractor, Settling Defendant needs only to provide that portion of the insurance described

above which is not maintained by the contractor or subcontractor.

B. Settling Defendant's Indemnification of the State

146. The State does not assume any liability by entering into this Consent Decree or by virtue of any designation of Settling Defendant as the State's authorized representative to carry out the Restoration Projects. Settling Defendant shall indemnify, save and hold harmless the State and its officials, agents, employees, contractors, subcontractors, and representatives for or from any and all claims or causes of action arising from, or on account of, negligent or other wrongful acts or omissions of Settling Defendant, its officers, directors, employees, agents, contractors, subcontractors, and any persons acting on its behalf or under its control, in carrying out activities pursuant to this Consent Decree, including, but not limited to, any claims arising from any designation of Settling Defendant as the State's authorized representative to carry out the Restoration Projects. Further, the Settling Defendant agrees to pay the State all costs it incurs including, but not limited to, attorney's fees and other expenses of litigation and settlement arising from, or on account of, claims made against the State based on negligent or other wrongful acts or omissions of Settling Defendant, its officers, directors, employees, agents, contractors, subcontractors, and any persons acting on its behalf or under its control, in carrying out activities pursuant to this Consent Decree. The State shall not be held out as a party to any contract entered into by or on behalf of Settling Defendant in carrying out activities pursuant to this Consent Decree. Neither Settling Defendant nor any such contractor shall be considered an agent of the State.

147. The State shall give Settling Defendant notice of any claim for which the State plans to seek indemnification pursuant to Paragraph 146, and shall consult with Settling Defendant prior to settling such claim.

148. Settling Defendant covenants not to sue and agrees not to assert any claims or

causes of action against the State for damages or reimbursement or for set-off of any payments made or to be made to the State, arising from or on account of any contract, agreement, or arrangement between Settling Defendant and any person for performance of Restoration Projects on or relating to the Site, including, but not limited to, claims on account of construction delays. In addition, Settling Defendant shall indemnify and hold harmless the State with respect to any and all claims for damages or reimbursement arising from or on account of any contract, agreement, or arrangement between Settling Defendant and any person for performance of Restoration Projects on or relating to the Site, including, but not limited to, claims on account of construction delays.

XXII. FORCE MAJEURE

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

150. If any event occurs or has occurred that may delay the performance of any obligation under this Consent Decree for which Settling Defendant intends or may intend to assert a claim of force majeure, Settling Defendant shall notify orally EPA's Project Coordinator or the Trustees' Project Coordinator, as applicable, or, in the absence of EPA's or the Trustees'

Project Coordinator, EPA's or the Trustees' Alternate Project Coordinator or, in the event the designated representatives are unavailable, the Director of the Superfund Division, EPA Region 5, the Director of the FWS, Region 3, and Ohio EPA, DERR Assessment, Remediation and Corrective Action (ACRA) Manager within two business days of when Settling Defendant first knew that the event might cause a delay. Within 14 days thereafter, Settling Defendant shall provide in writing to EPA and/or the Trustees, as applicable, an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; Settling Defendant's rationale for attributing such delay to a force majeure; and a statement as to whether, in the opinion of Settling Defendant, such event may cause or contribute to an endangerment to public health or welfare, or the environment. Settling Defendant shall include with any notice all available documentation supporting its claim that the delay was attributable to a force majeure. Settling Defendant shall be deemed to know of any circumstance of which Settling Defendant, any entity controlled by Settling Defendant, or Settling Defendant's contractors knew or should have known. Failure to comply with the above requirements regarding a force majeure event shall preclude Settling Defendant from asserting any claim of force majeure regarding that event, provided, however, that if EPA and/or the Trustees, despite the late notice, are able to assess to their satisfaction whether the event is a force majeure under Paragraph 149, EPA and/or the Trustees may, in their unreviewable discretion, excuse in writing Settling Defendant's failure to submit timely notices under this Paragraph.

151. If EPA, after a reasonable opportunity for review and comment by the State, and/or the Trustees (as applicable) agrees that the delay or anticipated delay is attributable to a force majeure, the time for performance of the obligations under this Consent Decree that are affected

by the force majeure will be extended by EPA, after a reasonable opportunity for review and comment by the State, and/or the Trustees (as applicable) for such time as is necessary to complete those obligations. An extension of the time for performance of the obligations affected by the force majeure shall not, of itself, extend the time for performance of any other obligation. If EPA, after a reasonable opportunity for review and comment by the State, and/or the Trustees (as applicable) do not agree that the delay or anticipated delay has been or will be caused by a force majeure, EPA and/or the Trustees, as applicable, will notify Settling Defendant in writing of their decision. If EPA, after a reasonable opportunity for review and comment by the State, and/or the Trustees (as applicable) agree that the delay is attributable to a force majeure event, the EPA and/or the Trustees, as applicable, will notify Settling Defendant in writing of the length of the extension, if any, for performance of the obligations affected by the force majeure.

152. If Settling Defendant elects to invoke the dispute resolution procedures set forth in Section XXIII (Dispute Resolution), it shall do so no later than 15 days after receipt of the notice from the Trustees and/or EPA, as applicable. In any such proceeding, Settling Defendant shall have the burden of demonstrating by a preponderance of the evidence that the delay or anticipated delay has been or will be caused by a force majeure event, that the duration of the delay or the extension sought was or will be warranted under the circumstances, that best efforts were exercised to avoid and mitigate the effects of the delay, and that Settling Defendant complied with the requirements of Paragraphs 150 and 151, above. If Settling Defendant carries this burden, the delay at issue shall be deemed not to be a violation by Settling Defendant of the affected obligation of this Consent Decree identified to the Trustees and/or EPA, as applicable, and the Court.

XXIII. DISPUTE RESOLUTION

153. Unless otherwise expressly provided for in this Consent Decree, the dispute

resolution procedures of this Section shall be the exclusive mechanism to resolve disputes regarding this Consent Decree. However, the procedures set forth in this Section shall not apply to actions by the United States and/or the State to enforce obligations of Settling Defendant that have not been disputed in accordance with this Section.

154. Any dispute regarding this Consent Decree shall in the first instance be the subject of informal negotiations between the parties to the dispute. The period for informal negotiations shall not exceed 30 days from the time the dispute arises, unless it is modified by written agreement of the parties to the dispute. The dispute shall be considered to have arisen when Settling Defendant contesting the action or determination of EPA and/or the Trustees sends a written Notice of Dispute in accordance with this Section.

155. Statements of Position.

a. In the event that the Parties cannot resolve a dispute by informal negotiations under Paragraph 154, then the position advanced by EPA and/or the Trustees, as applicable, shall be considered binding unless, within 30 days after the conclusion of the informal negotiation period, Settling Defendant invokes the formal dispute resolution procedures of this Section by serving on EPA and/or the Trustees, as applicable, a written Statement of Position on the matter in dispute, including, but not limited to, any factual data, analysis or opinion supporting that position and any supporting documentation relied upon by Settling Defendant. The Statement of Position shall specify Settling Defendant's position as to whether formal dispute resolution should proceed under Paragraph 156 (Record Review) or Paragraph 157.

b. Within 30 days after receipt of Settling Defendant's Statement of Position, EPA and/or the Trustees, as applicable, will serve on Settling Defendant their

Statement of Position, including, but not limited to, any factual data, analysis, or opinion supporting that position and all supporting documentation relied upon by EPA and/or the Trustees. The Statement of Position advanced by EPA and/or the Trustees, as applicable, shall include a statement as to whether formal dispute resolution should proceed under Paragraph 156 (Record Review) or 157. Within 15 days after Settling Defendant's receipt of the Statement of Position advanced by EPA and/or the Trustees, Settling Defendant may submit a Reply.

c. If there is a disagreement between EPA and/or the Trustees, as applicable, and Settling Defendant as to whether dispute resolution should proceed under Paragraph 156 (Record Review) or 157, the parties to the dispute shall follow the procedures set forth in the paragraph determined to be applicable by EPA and/or the Trustees. However, if Settling Defendant ultimately appeals to the Court to resolve the dispute, the Court shall determine which paragraph is applicable in accordance with the standards of applicability set forth in Paragraphs 156 (Record Review) and 157.

156. Record Review. Formal dispute resolution for disputes pertaining to the selection or adequacy of any response action, or any restoration action and all other disputes that are accorded review on the administrative record under applicable principles of administrative law shall be conducted pursuant to the procedures set forth in this Paragraph. For purposes of this Paragraph, the adequacy of any response action or Restoration Project includes, without limitation, the adequacy or appropriateness of plans, procedures to implement plans, or any other items requiring approval by EPA or the Trustees (as applicable) under this Consent Decree, and the adequacy of the performance of response actions or restoration actions taken pursuant to this Consent Decree. Nothing in this Consent Decree shall be construed to allow any dispute by

Settling Defendant regarding the validity of the provisions of the OU 2 ROD, OU 3 ROD, and OU 2 ESD, or the Restoration Plan.

a. An administrative record of the dispute shall be maintained by EPA as to EPA's selected response action and by Ohio EPA as to any restoration actions, and shall contain all statements of position, including supporting documentation, submitted pursuant to this Section. Where appropriate, EPA and the Trustees may allow submission of supplemental statements of position by the parties to the dispute.

b. As to disputes pertaining to the response action, the Director of the Superfund Division, EPA Region 5, will issue a final administrative decision resolving the dispute based on the administrative record described in Paragraph 156.a. This decision shall be binding upon Settling Defendant, subject only to the right to seek judicial review pursuant to Paragraph 156.d.

c. As to disputes pertaining to restoration actions, the Regional Director of FWS and the Ohio EPA, DERR ARCA Manager or their designees will jointly issue a final administrative decision resolving the dispute based on the administrative record described in Paragraph 156.a. This decision shall be binding upon the Settling Defendant, subject only to the right to seek judicial review pursuant to Paragraph 156.d.

d. Any administrative decision made by EPA or the Trustees pursuant to Paragraph 156.c and d shall be reviewable by this Court, provided that a motion for judicial review of the decision is filed by Settling Defendant with the Court and served on all Parties within ten days after receipt of the administrative decision. The motion shall include a description of the matter in dispute, the efforts made by

the Parties to resolve it, the relief requested, and the schedule, if any, within which the dispute must be resolved to ensure orderly implementation of this Consent Decree. EPA and the Trustees may file a response to Settling Defendant's motion.

e. In proceedings on any dispute governed by this Paragraph, Settling Defendant shall have the burden of demonstrating that the decision of the Superfund Division Director, the Regional Director of FWS, and/or Ohio EPA DERR ARCA Manager is arbitrary and capricious or otherwise not in accordance with law. Judicial review of such decision shall be on the administrative record compiled pursuant to Paragraph 156.a.

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

a. Following receipt of Settling Defendant's Statement of Position submitted pursuant to Paragraph 155.a, the Director of the Superfund Division, EPA Region 5, the Regional Director of FWS and the Ohio EPA DERR ARCA Manager as applicable, will issue a final decision resolving the dispute; such decision shall be binding on Settling Defendant unless, within ten days after receipt of the decision, Settling Defendant files with the Court and serves on the Parties a motion for judicial review of the decision setting forth the matter in dispute, the efforts made by the Parties to resolve it, the relief requested, and the schedule, if any, within which the dispute must be resolved to ensure orderly implementation of the Consent Decree. EPA and the Trustees may file a

response to Settling Defendant's motion.

b. Notwithstanding Paragraph 16 (CERCLA Section 113(j), 42 U.S.C. § 9613(j), Record Review of OU 2 ROD, OU 3 ROD, OU 2 ESD and Work), judicial review of any dispute governed by this Paragraph shall be governed by applicable principles of law.

158. The invocation of formal dispute resolution procedures under this Section shall not extend, postpone, or affect in any way any obligation of Settling Defendant under this Consent Decree, not directly in dispute, unless EPA and/or the Trustees, as applicable, or the Court agrees otherwise. Stipulated penalties with respect to the disputed matter shall continue to accrue but payment shall be stayed pending resolution of the dispute as provided in Paragraph 166. Notwithstanding the stay of payment, stipulated penalties shall accrue from the first day of noncompliance with any applicable provision of this Consent Decree. In the event that Settling Defendant does not prevail on the disputed issue, stipulated penalties shall be assessed and paid as provided in Section XXIV (Stipulated Penalties). If Settling Defendant prevails, the stipulated penalties shall not be assessed and shall no longer be applicable.

XXIV. STIPULATED PENALTIES

159. Settling Defendant shall be liable for stipulated penalties in the amounts set forth in Paragraphs 160 and 161 to the United States and the State for failure to comply with the requirements of this Consent Decree specified below, unless excused under Section XXII (Force Majeure). "Compliance" by Settling Defendant shall include completion of all payments and activities under this Consent Decree or any plan, report, or other deliverable required or approved under this Consent Decree, in accordance with all applicable requirements of law, this Consent Decree, the Remedial SOW, the Restoration SOW, the OU 2 and OU 3 Remedial

Action Work Plans, the Remedial O&M Plans, the ICIAP, the Restoration Work Plan and any plans, reports, or other deliverables required or approved under this Consent Decree and within the specified time schedules established by and approved under this Consent Decree.

160. Stipulated Penalty Amounts – Work (Including Payments and Excluding Plans, Reports, and Other Deliverables).

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

Penalty Per Violation Per Day	Period of Noncompliance
$500	1st through 14th day
$1,000	15th through 30th day
$3,000	31st day and beyond

b. Compliance Milestones.

i. Payment of Past and Future Response Costs.

ii. Establishment of escrow accounts in the event of disputes.

iii. Performance of a Remedial Work obligation specified under this Consent Decree, the Remedial SOW, the Final OU 2 RD, the Final OU 3 RD, the ICIAP, the OU 2 Remedial Work Plan, the OU 3 Remedial Work Plan, the OU 2 Remedial O&M Plan, the OU 3 Remedial O&M Plan, and any approved or modified reports, plans, specifications, schedules, and attachments under such work plans, or any other approved or modified reports, plans, specifications, schedules, and attachments under this Consent Decree.

c. The following stipulated penalties shall accrue per violation per day for each failure to establish and fund the ROC Conservation Trust in accordance with Paragraph 76:

Penalty Per Violation Per Day	Period of Noncompliance
$1,000	1st through 14th day
$1,500	15th through 30th day
$3,000	31st day and beyond

d. The following stipulated penalties shall accrue per violation per day for each failure to implement any approved Restoration Work Plan in accordance with Section X.A:

Penalty Per Violation Per Day	Period of Noncompliance
$500	1st through 14th day
$1,000	15th through 30th day
$2,750	31st day and beyond

e. The following stipulated penalties shall accrue per violation per day for each failure to make any payment of Past and Future Assessment Costs:

Penalty Per Violation Per Day	Period of Noncompliance
$500	1st through 14th day
$1,000	15th through 30th day
$2,750	31st day and beyond

161. Stipulated Penalty Amounts – Plans, Reports, and other Deliverables.

The following stipulated penalties shall accrue per violation per day for failure to submit timely or adequate reports or other plans or deliverables pursuant to this Consent Decree, the Remedial SOW, the ICIAP, the Final OU 2 RD, the Final OU 3 RD, the ICIAP, the OU 2 Remedial Work Plan, the OU 3 Remedial Work Plan, the OU 2 Remedial O&M Plan, the OU 3

Remedial O&M Plan, the Restoration Plan, the Restoration Work Plan and any approved or modified reports, plans, specifications, schedules, and attachments under such work plans, or any other approved or modified reports, plans, specifications, schedules, and attachments under this Consent Decree:

Penalty Per Violation Per Day	Period of Noncompliance
$1000	1st through 14th day
$ 1500	15th through 30th day
$ 3,500	31st day and beyond

162. In the event that EPA or the Trustees assume performance of a portion or all of the Settling Defendants' Remedial Action or Restoration Projects obligations pursuant to Paragraph 177 (Remedial Work Takeover), Settling Defendant shall be liable for a stipulated penalty in the amount of $1,500,000. Stipulated penalties under this Paragraph are in addition to the remedies available under Paragraphs 112 (Funding for Remedial Work Takeover) and 178 (Remedial Work Takeover).

163. All stipulated penalties shall begin to accrue on the day after the complete performance is due or the day a violation occurs, and shall continue to accrue through the final day of the correction of the noncompliance or completion of the activity. However, stipulated penalties shall not accrue: (a) with respect to a deficient submission under Section XIV (Approval of Plans, Reports, and Other Deliverables), during the period, if any, beginning on the 31st day after EPA's or the Trustees' receipt of such submission until the date that EPA or the Trustees notify Settling Defendant of any deficiency; (b) with respect to a decision by the Director of the Superfund Division, EPA Region 5, the Regional Director of FWS and the Ohio EPA DERR ARCA Manager, as applicable, under Paragraph 156.b. or 157.a. of Section XXIII (Dispute Resolution), during the period, if any, beginning on the 21st day after the date that

Settling Defendant's reply to EPA's or the Trustees' Statement of Position is received until the date that the Director of the Superfund Division, the Regional Director of FWS and the Ohio EPA DERR ARCA Manager as applicable, issues a final decision regarding such dispute; or (c) with respect to judicial review by this Court of any dispute under Section XXIII (Dispute Resolution), during the period, if any, beginning on the 31st day after the Court's receipt of the final submission regarding the dispute until the date that the Court issues a final decision regarding such dispute. Nothing in this Consent Decree shall prevent the simultaneous accrual of separate stipulated penalties for separate violations of this Consent Decree.

164. Following EPA's or the Trustees' determination that Settling Defendant has failed to comply with a requirement of this Consent Decree, EPA or the Trustees may give Settling Defendant written notification of the same and describe the noncompliance. EPA and the Trustees may send Settling Defendant a written demand for the payment of the stipulated penalties. However, stipulated penalties shall accrue as provided in the preceding Paragraph regardless of whether EPA or the Trustees have notified Settling Defendant of a violation.

165. All stipulated penalties accruing under this Section shall be due and payable within 30 days after Settling Defendant's receipt from EPA or the Trustees of a demand for payment of the stipulated penalties, unless Settling Defendant invokes the Dispute Resolution procedures under Section XXIV (Dispute Resolution) within the 30-day period. For any stipulated penalties due to the Trustees, Settling Defendant shall pay one-half of the stipulated penalty amount to the United States, and one-half of the stipulated penalty amount to the State as specified in Paragraphs 137.b and 138. All payments to the United States and the State under this Section shall indicate that the payment is for stipulated penalties, and shall be made in accordance with Sections XIX (Payment of Response Costs) and XX (Payment of Assessment Costs).

166. Stipulated penalties shall continue to accrue as provided in Paragraph 163 during

any dispute resolution period, but need not be paid until the following:

a. If the dispute is resolved by agreement of the Parties or by a decision of EPA or the Trustees that is not appealed to this Court, accrued stipulated penalties determined to be owed shall be paid to EPA or the Trustees within 15 days after the agreement or the receipt of the decision or order by EPA or the Trustees, as applicable;

b. If the dispute is appealed to this Court and the EPA and the Trustees prevail in whole or in part, Settling Defendant shall pay all accrued stipulated penalties determined by the Court to be owed to EPA and the Trustees within 60 days after receipt of the Court's decision or order, except as provided in Paragraph 166.c.

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

167. If Settling Defendant fails to pay stipulated penalties when due, Settling Defendant shall pay Interest on the unpaid stipulated penalties as follows: (a) if Settling Defendant has timely invoked dispute resolution such that the obligation to pay stipulated penalties has been stayed pending the outcome of dispute resolution, Interest shall accrue from the date stipulated penalties are due pursuant to Paragraph 165 until the date of payment; and (b) if Settling

Defendant fails to timely invoke dispute resolution, Interest shall accrue from the date of demand under Paragraph 165 until the date of payment. If Settling Defendant fails to pay stipulated penalties and Interest when due, the United States and/or the State may institute proceedings to collect the penalties and Interest.

168. The payment of stipulated penalties and Interest, if any, shall not alter in any way Settling Defendant's obligation to complete the performance of the Work required under the Consent Decree.

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

170. Notwithstanding any other provision of this Section, the United States and the State may, in their unreviewable discretion, waive any portion of stipulated penalties that have accrued pursuant to this Consent Decree.

XXV. COVENANTS BY PLAINTIFFS

A. Covenants by the United States

171. In consideration of the actions that will be performed and the payments that will be made by Settling Defendant under this Consent Decree, and except as specifically provided in Paragraphs 176 and 177 (United States' Pre- and Post-Certification Reservations), and 175 (Plaintiffs' General Reservations of Rights), the United States covenants not to sue or to take

administrative action against Settling Defendant: (1) pursuant to Sections 106 and 107(a) of CERCLA relating to the Site; and (2) for Natural Resource Damages pursuant to Section 107(a)(4)(C) of CERCLA, 42 U.S.C. § 9607 (a)(4)(C), Section 311(f)(4) and (5) of the CWA, 33 U.S.C. §§ 1321(f)(4) and (5).

172. Except with respect to future liability, these covenants shall take effect upon the Effective Date of this Consent Decree. With respect to future liability, these covenants shall take effect upon Certification of Completion of Remedial Action by EPA pursuant to Paragraph 121 of Section XVII (Certification of Completion) and Certification of Completion of the Restoration Work Plan by the Trustees pursuant to Paragraph 128 of Section XVII (Certification of Completion). These covenants are conditioned upon the satisfactory performance by Settling Defendant of its obligations under this Consent Decree. These covenants extend only to Settling Defendant and do not extend to any other person.

B. Covenants by the State of Ohio

173. In consideration of the actions that will be performed and the payments that will be made by Settling Defendant under this Consent Decree, and except as specifically provided in 175 (Plaintiffs' General Reservations of Rights) and Paragraphs 180 and 181 (Plaintiffs' Reservation of Rights Regarding Natural Resource Damages), the State covenants not to sue or to take administrative action against Settling Defendant for Natural Resource Damages pursuant to Section 107(a)(4)(C) of CERCLA, 42 U.S.C. § 9607 (a)(4)(C), Section 311(f)(4) and (5) of the CWA, 33 U.S.C. §§ 1321(f)(4) and (5), or state law.

174. Except with respect to future liability, these covenants shall take effect upon the Effective Date of this Consent Decree. With respect to future liability, these covenants shall take effect upon Certification of Completion of the Restoration Projects by the Trustees pursuant to Paragraph 128 of Section XVII (Certification of Completion). These covenants are conditioned

upon the satisfactory performance by Settling Defendant of its obligations under this Consent Decree. These covenants extend only to Settling Defendant and do not extend to any other person.

XXVI. RESERVATION OF RIGHTS BY PLAINTIFFS

A. Plaintiffs' General Reservation of Rights

175. The covenants set forth in Section XXV (Covenants by Plaintiffs) do not pertain to any matters other than those expressly specified in Paragraphs 171 and 173, above. The United States and the State reserve, and this Consent Decree is without prejudice to, all rights against Settling Defendant with respect to:

a. liability for failure by the Settling Defendant to meet a requirement of this Consent Decree;

b. liability arising from the past, present, or future disposal, release, or threat of release of Waste Material outside of the Site;

c. liability based on ownership of the Site by Settling Defendant when such ownership commences after signature of this Consent Decree by Settling Defendant;

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

e. liability based on Settling Defendant's transportation, treatment, storage, or disposal, or arrangement for transportation, treatment, storage, or disposal of hazardous substances at or in connection with the Site and/or Assessment Area, other than as required for implementation of the Work, or otherwise ordered by

EPA or the Trustees, after signature of this Consent Decree;

f. liability for any other natural resource damages that are not within the definition of Natural Resource Damages;

g. liability for any injury to, or destruction or loss of, Natural Resources resulting from implementation of the Restoration Projects;

h. liability for violations of federal or state law which occur during or after implementation of the Work;

i. liability of any person arising from any injury to Natural Resources resulting from any release or disposal of hazardous substances by Settling Defendant after the Lodging Date of this Consent Decree but not including any liability arising from further migration of previously released hazardous substance addressed under this Consent Decree; and

j. criminal liability.

B. **United States' Reservation of Rights as to the Remedial Action**

176. United States' Pre-Certification Reservations. Notwithstanding any other provision of this Consent Decree, the United States reserves, and this Consent Decree is without prejudice to, the right to institute proceedings in this action or in a new action, and/or to issue an administrative order seeking to compel Settling Defendant to perform further response actions relating to the Site and/or pay the United States for additional costs of response if:

a. prior to Certification of Completion of the Remedial Action

i. conditions at the Site, previously unknown to EPA, are discovered; or

ii. information, previously unknown to EPA, is received, in whole or in part; and

b. EPA determines that these previously unknown conditions or information together with any other relevant information indicate that the Remedial Action is not protective of human health or the environment.

177. United States' Post-Certification Reservations. Notwithstanding any other provision of this Consent Decree, the United States reserves, and this Consent Decree is without prejudice to, the right to institute proceedings in this action or in a new action, or to issue an administrative order seeking to compel Settling Defendant to perform further response actions relating to the Site and/or pay the United States for additional costs of response if:

a. Subsequent to Certification of Completion of the Remedial Action:

i. conditions at the Site, previously unknown to EPA, are discovered; or

ii. information, previously unknown to EPA, is received, in whole or in part; and

b. EPA determines that these previously unknown conditions or this information together with other relevant information indicate that the Remedial Action is not protective of human health or the environment. For purposes of Paragraph 176 (United States' Pre-Certification Reservations), the information and the conditions known to EPA will include only that information and those conditions known to EPA as of the date the ESD was signed and set forth in the OU 2 ROD, OU 3 ROD, OU 2 ESD and the administrative record supporting the OU 2 ROD, OU 3 ROD, and OU 2 ESD. For purposes of Paragraph 177 (United States' Post-Certification Reservations), the information and the conditions known to EPA shall include only that information and those conditions known to EPA as of the date of Certification of Completion of the Remedial Action and set forth in the OU 2 ROD, OU 3 ROD, and OU 2 ESD, the administrative record

supporting the OU 2 ROD, OU 3 ROD, and OU 2 ESD, the post-ROD administrative record, or in any information received by EPA pursuant to the requirements of this Consent Decree prior to Certification of Completion of the Remedial Action.

178. Remedial Work Takeover.

a. In the event EPA determines that Settling Defendant has (1) ceased implementation of any portion of the Remedial Work, or (2) is seriously or repeatedly deficient or late in its performance of the Remedial Work, or (3) is implementing the Remedial Work in a manner that may cause an endangerment to human health or the environment, EPA may issue a written notice ("Remedial Work Takeover Notice") to Settling Defendant. Any Remedial Work Takeover Notice issued by EPA will specify the grounds upon which such notice was issued and will provide Settling Defendant a period of 20 days within which to remedy the circumstances giving rise to EPA's issuance of such notice.

b. If, after expiration of the 20 day notice period specified in Paragraph 178.a, Settling Defendant has not remedied to EPA's satisfaction the circumstances giving rise to EPA's issuance of the relevant Remedial Work Takeover Notice, EPA may at any time thereafter assume the performance of all or any portion(s) of the Remedial Work as EPA deems necessary ("Remedial Work Takeover"). EPA will notify Settling Defendant in writing (which writing may be electronic) if EPA determines that implementation of a Remedial Work Takeover is warranted under this Paragraph 178.b. Funding of Remedial Work Takeover costs is addressed under Paragraph 112.

c. Settling Defendant may invoke the procedures set forth in Paragraph 155

(Record Review) to dispute EPA's implementation of a Remedial Work Takeover under Paragraph 178.b. However, notwithstanding Settling Defendant's invocation of such dispute resolution procedures, and during the pendency of any such dispute, EPA may in its sole discretion commence and continue a Remedial Work Takeover under Paragraph 178.b until the earlier of (1) the date that Settling Defendant remedies, to EPA's satisfaction, the circumstances giving rise to EPA's issuance of the relevant Remedial Work Takeover Notice, or (2) the date that a final decision is rendered in accordance with Paragraph 156 (Record Review) requiring EPA to terminate such Remedial Work Takeover.

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

C. Plaintiffs' Reservation of Rights Regarding Natural Resource Damages

180. Notwithstanding any other provision of this Consent Decree, the United States and the State reserve the right to institute proceedings against Settling Defendant in this action or in a new action seeking recovery of Natural Resource Damages, including costs of damages assessments, based on: (i) conditions, including but not limited to the release of hazardous substances at or from the Assessment Area, previously unknown to the Trustees, that are discovered after the Lodging Date, and that cause or contribute to new or additional injuries to, losses of, or destruction of Natural Resources, or new or additional service losses ("Unknown Conditions"); or (ii) information concerning the release of hazardous substances or the resulting injuries to Natural Resources, previously unknown to the Trustees, that is received, in whole or in part, after the Lodging Date and that, together with any other relevant information, indicates that there are new or additional injuries to, losses of or destruction of Natural Resources, or new

or additional service losses ("New Information").

181. The failure of the Trustees to insist upon strict and prompt performance of the Restoration SOW and the Restoration Work Plan shall not operate as a waiver of any requirement of this Consent Decree or of the Trustees' right to insist on prompt compliance in the future with such provision, and shall not prevent a subsequent action by the Trustees to enforce such a provision.

XXVII. COVENANTS BY SETTLING DEFENDANT

182. Covenant Not to Sue by Settling Defendant. Subject to the reservations in Paragraph 183, Settling Defendant covenants not to sue and agrees not to assert any claims or causes of action against the United States or the State or their employees, representatives or contractors with respect to the Site and this Consent Decree, including, but not limited to:

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

b. any claims under CERCLA Section 107 or 113, RCRA Section 7002(a), 42 U.S.C. § 6972(a), or state law regarding the Site and this Consent Decree, or any claims arising out of response actions at or in connection with the Site, including any claim under the United States Constitution, the Tucker Act, 28 U.S.C. § 1491, the Equal Access to Justice Act, 28 U.S.C. § 2412, or at common law.

c. Any claims relating to NRD, including but not limited to claims for reimbursement of any payment for NRD, pursuant to Sections 107 and 113 of CERCLA, 42 U.S.C. §§ 9607 and 9613; Section 311 of the CWA, 33 U.S.C. §§ 1321; or state law.

183. Except as provided in Paragraph 190 (Res Judicata and Other Defenses), the

covenants in this Section shall not apply if the United States and/or the State bring(s) a cause of action or issues an order pursuant to any of the reservations in Section XXVI (Reservation of Rights by Plaintiffs), other than in Paragraphs 175.a (claims for failure to meet a requirement of the Consent Decree), 175.h (violations of federal/state law during or after implementation of the Work), and 175.j (criminal liability), but only to the extent that Settling Defendant's claims arise from the same response action, response costs, or damages that the United States and/or the State is seeking pursuant to the applicable reservation.

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

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

XXVIII. EFFECT OF SETTLEMENT; CONTRIBUTION PROTECTION

186. The Parties agree, and by entering this Consent Decree this Court finds, that Settling Defendant is entitled, as of the Effective Date of the Consent Decree, to protection from

contribution actions or claims as provided by CERCLA Section 113(f)(2), 42 U.S.C. § 9613(f)(2), or other federal law, for matters addressed in this Consent Decree. The "matters addressed" in this Consent Decree are: (1) all response actions taken or to be taken by the United States and the State and all response costs incurred or to be incurred by the United States, at or in connection with the Site; and (2) Natural Resource Damages, including all restoration actions taken or to be taken, and all Assessment Costs incurred or to be incurred at or in connection with the Site by the Trustees or any other person, provided, however, that if the United States and/or the State exercises rights against Settling Defendant under the reservations in Section XXVI (Reservation of Rights by Plaintiffs), other than in Paragraphs 175.a (claims for failure to meet a requirement of this Consent Decree), 175.h (violations of federal/state law during or after implementation of the Work required under the Consent Decree), or 175.j (criminal liability), the "matters addressed" in this Consent Decree will no longer include those response costs, response actions, restoration actions, or Assessment Costs that are within the scope of the exercised reservation.

187. Each of the Parties expressly reserves any and all rights including, but not limited to, pursuant to Section 113 of CERCLA, 42 U.S.C. § 9613, defenses, claims, demands, and causes of action that each Party may have with respect to any matter, transaction, or occurrence relating in any way to the Site against any person not a Party hereto. Nothing in this Consent Decree diminishes the right of the United States or the State, pursuant to Section 113(f)(2) and (3) of CERCLA, 42 U.S.C. §§ 9613(f)(2)-(3), to pursue any such person to obtain additional response costs or response action and to enter into settlements that give rise to contribution protection pursuant to Section 113(f)(2).

188. Settling Defendant shall, with respect to any suit or claim brought by it for matters related to this Consent Decree, notify the United States, with a copy to the State, in writing no

later than 60 days prior to the initiation of such suit or claim.

189. Settling Defendant shall, with respect to any suit or claim brought against it for matters related to this Consent Decree, notify in writing the United States, with a copy to the State, within ten days after service of the complaint on it. In addition, Settling Defendant shall notify the United States, with a copy to the State, within ten days after service or receipt of any Motion for Summary Judgment and within ten days of receipt of any order from a court setting a case for trial.

190. Res Judicata and Other Defenses. In any subsequent administrative or judicial proceeding initiated by the United States and/or the State for injunctive relief, recovery of response costs, natural resource damages, recovery of assessment costs, or other appropriate relief relating to the Site, Settling Defendant shall not assert, and may not maintain, any defense or claim based upon the principles of waiver, res judicata, collateral estoppel, issue preclusion, claim-splitting, or other defenses based upon any contention that the claims raised by the United States and/or the State in the subsequent proceeding were or should have been brought in the instant case; provided, however, that nothing in this Paragraph affects the enforceability of the covenants not to sue set forth in Section XXV (Covenants by Plaintiffs).

XXIX. ACCESS TO INFORMATION

191. Settling Defendant shall provide to EPA, Ohio EPA in its capacity as support agency with respect to the Remedial Work, and the Trustees, upon request, copies of all records, reports, documents and other information (including records, reports, documents, and other information in electronic form) (hereinafter referred to as "Records") within its possession or control or that of its contractors or agents relating to activities at the Site or to the implementation of this Consent Decree, including, but not limited to, sampling, analysis, chain of

custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information regarding the Remedial Work. Settling Defendant shall also make available to EPA, Ohio EPA in its capacity as support agency with respect to the Remedial Work, and the Trustees, for purposes of investigation, information gathering, or testimony, its employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Remedial Work. Settling Defendant shall also make available to Plaintiffs its employees, agents, or representatives with knowledge of relevant facts concerning its compliance with this Consent Decree.

192. Business Confidential, Trade Secret and Privileged Documents.

a. Settling Defendant may assert business confidentiality claims covering part or all of the Records submitted to EPA under this Consent Decree to the extent permitted by and in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), and 40 C.F.R. § 2 with respect to Records submitted to the EPA. Records determined to be confidential by EPA will be afforded the protection specified in 40 C.F.R. § 2, Subpart B. If no claim of confidentiality accompanies Records when they are submitted to EPA, or if EPA has notified Settling Defendant that the Records are not confidential under the standards of Section 104(e)(7) of CERCLA or 40 C.F.R. § 2, Subpart B, the public may be given access to such Records without further notice to Settling Defendant.

b. Settling Defendant may assert trade secret claims covering part or all of the Records submitted to Ohio EPA under this Consent Decree to the extent permitted by and in accordance with Ohio statutes and rules. Records determined to be confidential by Ohio EPA will be afforded the protection specified in the applicable Ohio statutes and rules, subject to any order of a court

of competent jurisdiction. If no claim of confidentiality accompanies Records when they are submitted to Ohio EPA, or if Ohio EPA has notified Settling Defendant that the Records are not confidential under the standards of Ohio statutes and rules, the public may be given access to such Records without further notice to Settling Defendant. Settling Defendant shall segregate and clearly identify all Records submitted under this Settlement Agreement for which Settling Defendant asserts trade secret claims.

c. Settling Defendant may assert that certain Records are privileged under the attorney-client privilege or any other privilege recognized by federal law. If Settling Defendant asserts such a privilege in lieu of providing Records, it shall provide the Plaintiffs with the following: (1) the title of the Record; (2) the date of the Record; (3) the name, title, affiliation (e.g., company or firm), and address of the author of the Record; (4) the name and title of each addressee and recipient; (5) a description of the contents of the Record; and (6) the privilege asserted by Settling Defendant. If a claim of privilege applies only to a portion of a Record, the Record shall be provided to the United States in redacted form to mask the privileged portion only. Settling Defendant shall retain all Records that they claim to be privileged until the United States has had a reasonable opportunity to dispute the privilege claim and any such dispute has been resolved in Settling Defendant's favor.

d. Settling Defendant may assert certain Records submitted to Ohio EPA are privileged under the attorney-client privilege or any other privilege recognized by applicable Ohio statutes and rules. If Settling Defendant asserts such a privilege in lieu of providing certain Records, it shall provide Ohio EPA with the

following: a) the title of the Record; b) the date of the Record; c) the name and title of the author of the Record; d) the name and title of each addressee and recipient; e) a description of the contents of the Record; and f) the privilege asserted by Settling Defendant.

e. No Records created or generated pursuant to the requirements of this Consent Decree shall be withheld from the United States or the State on the grounds that they are privileged or confidential.

193. No claim of confidentiality or privilege shall be made with respect to any data, including, but not limited to, all sampling, analytical, monitoring, hydrogeologic, scientific, chemical, or engineering data, or the portion of any other Record that evidences conditions at or around the Site.

XXX. RETENTION OF RECORDS

194. Until ten years after Settling Defendant's receipt of EPA's and the Trustees' notifications pursuant to Paragraphs 124 and 128 (Completion of the Work), Settling Defendant shall preserve and retain all non-identical copies of Records (including Records in electronic form) now in its possession or control or that come into its possession or control that relate in any manner to its liability or the liability of any other person under CERCLA with respect to the Site. Settling Defendant must also retain, and instruct its contractors and agents to preserve, for the same period of time specified above all non-identical copies of the last draft or final version of any Records (including Records in electronic form) now in its possession or control or that come into its possession or control that relate in any manner to the performance of the Work, provided, however, that Settling Defendant (and its contractors and agents) must retain, in addition, copies of all data generated during the performance of the Work and not contained in the aforementioned Records required to be retained. Each of the above record retention

requirements shall apply regardless of any corporate retention policy to the contrary.

195. At the conclusion of this record retention period, Settling Defendant shall notify the United States and the State at least 90 days prior to the destruction of any such Records, and, upon request by the United States or the State, Settling Defendant shall deliver any such Records to the United States or the State, at the address provided by the United States or the State.

196. Settling Defendant certifies that, to the best of its knowledge and belief, after thorough inquiry, it has not altered, mutilated, discarded, destroyed or otherwise disposed of any Records (other than identical copies) relating to its potential liability regarding the Site since the earlier of notification of potential liability by the United States or the State or the filing of suit against it regarding the Site and that it has fully complied with any and all EPA and/or Trustee requests for information regarding the Site pursuant to Sections 104(e) and 122(e) of CERCLA, 42 U.S.C. §§ 9604(e) and 9622(e), and Section 3007 of RCRA, 42 U.S.C. § 6927.

XXXI. NOTICES AND SUBMISSIONS

197. Whenever, under the terms of this Consent Decree, written notice is required to be given or a report or other document is required to be sent by one Party to another, it shall be directed to the individuals at the addresses specified below, unless those individuals or their successors give notice of a change to the other Parties in writing. All notices and submissions shall be considered effective upon receipt, unless otherwise provided. Written notice as specified in this Section shall constitute complete satisfaction of any written notice requirement of the Consent Decree with respect to the United States, EPA, DOI, the State, and Settling Defendant, respectively.

As to the United States:

U.S. DOJ - By U.S. Postal Service:
Chief, Environmental Enforcement Section
Environment and Natural Resources Division

U.S. Department of Justice
P.O. Box 7611
Washington, D.C. 20044-7611
Re: DJ # 90-11-2-608

U.S. DOJ- By Overnight Courier:
Chief, Environmental Enforcement Section
Environment and Natural Resources Division
U.S. Department of Justice
ENRD Mailroom (Room 2121)
601 D Street NW
Re: DJ # 90-11-2-608
Washington, DC 20004

As to EPA:

Douglas Ballotti
Acting Director, Superfund Division
EPA Region 5 (S-6J)
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

Dion Novak
EPA Project Manager
EPA Region 5 (S-6J)
77 West Jackson Boulevard
Chicago, Illinois 60604-3590
novak.dion@epa.gov

Christopher Grubb
Assistant Regional Counsel
U.S. EPA Region 5 (C-14J)
77 W. Jackson Blvd.
Chicago, IL 60604
grubb.christopher@epa.gov

As to the U.S. EPA Regional Financial Management Officer:

Regional Financial Management Officer
Comptroller's Office
EPA Region 5 (MF-10J)
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

As to the Department of the Interior:

U.S. Department of the Interior

Natural Resource Damage Assessment and Restoration Program
Attn: Restoration Fund Manager
1849 C Street, NW
Mailstop 3548 MIB
Washington, DC 20240

Kimberly Gilmore
U.S. Department of the Interior\ Office of the Solicitor
Three Parkway Center, Suite 385
Pittsburgh, PA 15220

Daniel Everson
Field Supervisor
U.S. Fish & Wildlife Service
Ohio Ecological Services Field Office
4625 Morse Road, Suite 104
Columbus, OH 43230

As to the State of Ohio:

Sheila Abraham, Project Coordinator/ES-3
Ohio EPA, Division of Environmental Response & Revitalization
Northeast District Office
2110 East Aurora Road
Twinsburg, Ohio 44087

Fiscal Officer
Division of Environmental Response & Revitalization
Ohio EPA
P.O. Box 1049
Columbus, Ohio 43216-1049

Chief
Environmental Enforcement Section
Ohio Attorney General's Office
30 East Broad Street - 25th Floor
Columbus, Ohio 43215

As to the Settling Defendant:

Dr. Rainer Domalski
President & CEO
Ruetgers Organics Corporation
2151 E. College Avenue
State College, PA 16801

Heidi B. Friedman
Thompson Hine LLP

3900 Key Center
127 Public Square
Cleveland, Ohio 44114

Settling Defendant's Project Coordinator
Dr. Rainer Domalski
President & CEO
Ruetgers Organics Corporation
2151 E. College Avenue
State College, PA 16801

XXXII. RETENTION OF JURISDICTION

198. This Court retains jurisdiction over both the subject matter of this Consent Decree and Settling Defendant for the duration of the performance of the terms and provisions of this Consent Decree for the purpose of enabling any of the Parties to apply to the Court at any time for such further order, direction, and relief as may be necessary or appropriate for the construction or modification of this Consent Decree, or to effectuate or enforce compliance with its terms, or to resolve disputes in accordance with Section XXIV (Dispute Resolution).

XXXIII. APPENDICES

199. The following appendices are attached to and incorporated into this Consent Decree:

APPENDIX A:	OU 2 RECORD OF DECISION
APPENDIX B:	OU 3 RECORD OF DECISION
APPENDIX C:	OU 2 EXPLANATION OF SIGNIFICANT DIFFERENCES
APPENDIX D:	NATURAL RESOURCE RESTORATION PLAN
APPENDIX E:	REMEDIAL STATEMENT OF WORK
APPENDIX F:	MAPS OF SITE AND ASSESSMENT AREA
APPENDIX G-1:	REMEDIAL PROPRIETARY CONTROLS FOR ROC-OWNED PROPERTY

APPENDIX G-2:	REMEDIAL PROPRIETARY CONTROLS FOR PROPERTY NOT OWNED BY ROC
APPENDIX H:	RESTORATION STATEMENT OF WORK
APPENDIX I:	CONSERVATION INSTRUMENTS TEMPLATES
APPENDIX J:	REMEDIAL PERFORMANCE GUARANTEE
APPENDIX K:	ALTERNATE PROPERTIES SCREENING CRITERIA

XXXIV. EFFECTIVE DATE

200. The Effective Date shall be the date upon which this Consent Decree is entered by the Court as recorded on the Court docket, or, if the Court instead issues an order approving this Consent Decree, the date such order is recorded on the Court docket; provided, however, that Settling Defendant shall be bound upon lodging of this Consent Decree to comply with the obligations specified in this Consent Decree as accruing upon the Lodging Date.

XXXV. COMMUNITY INVOLVEMENT

201. If requested by EPA, Settling Defendant shall participate in community involvement activities pursuant to the community involvement plan to be developed by EPA. EPA will determine the appropriate role for Settling Defendant under the Plan. Settling Defendant shall also cooperate with EPA and the State in providing information regarding the Work to the public. As requested by EPA or the State, Settling Defendant shall participate in the preparation of such information for dissemination to the public and in public meetings that may be held or sponsored by EPA or the State to explain activities at or relating to the Site. Costs incurred by the United States under this Section, including the costs of any technical assistance grant under Section 117(e) of CERCLA, 42 U.S.C. § 9617(e), shall be considered Future Response Costs that Settling Defendant shall pay pursuant to Section XIX (Payment of Response Costs).

XXXVI. MODIFICATION

202. Except as provided in Paragraph 49 (Modification of Remedial SOW or Related Work Plans), material modifications to this Consent Decree, including the Remedial SOW or Restoration Work Plan, shall be in writing, signed by the United States, the State, and Settling Defendant, and shall be effective upon approval by the Court. Except as provided in Paragraph 49, non-material modifications to this Consent Decree, including the Remedial SOW and Restoration Work Plan, shall be in writing, shall be signed by duly authorized representatives of the United States and Settling Defendant, but shall not take effect until filed with the Court.

203. A modification to the Remedial SOW shall be considered material if it fundamentally alters the basic features of the selected remedy within the meaning of 40 C.F.R. § 300.435(c)(2)(B)(ii). Before providing its approval to any modification to the Remedial SOW, the United States will provide the State with a reasonable opportunity to review and comment on the proposed modification.

204. A modification to the Restoration Work Plan shall be considered material if it fundamentally alters the basic features of the Restoration Work Plan. Before providing approval to any modification to the Restoration Work Plan, the Trustees will provide the public with a reasonable opportunity to review and comment on the proposed modification.

205. Nothing in this Consent Decree shall be deemed to alter the Court's power to enforce, supervise, or approve modifications to this Consent Decree.

XXXVII. LODGING AND OPPORTUNITY FOR PUBLIC COMMENT

206. This Consent Decree shall be lodged with the Court for a period of not less than 30 days for public notice and comment in accordance with 28 C.F.R. § 50.7. The United States and the State reserve the right to withdraw or withhold their consent if the comments regarding the Consent Decree disclose facts or considerations that indicate that the Consent Decree is

inappropriate, improper, or inadequate. Settling Defendant consents to the entry of this Consent Decree without further notice.

207. The provisions of this Consent Decree are not severable. The Parties' consent hereto is conditioned upon the entry of the Consent Decree in its entirety without modification, addition, or deletion except as agreed to by the Parties. If for any reason the Court should decline to approve this Consent Decree in the form presented, this agreement is voidable at the sole discretion of any Party and the terms of the agreement may not be used as evidence in any litigation between the Parties.

XXXVIII. SIGNATORIES/SERVICE

208. The undersigned representatives of Settling Defendant, the State and the Assistant Attorney General for the Environment and Natural Resources Division of the Department of Justice each certifies that he or she is fully authorized to enter into the terms and conditions of this Consent Decree and to execute and legally bind such Party to this document.

209. Settling Defendant agrees not to oppose entry of this Consent Decree by this Court or to challenge any provision of this Consent Decree unless the United States or State has notified the Settling Defendant in writing that it no longer supports entry of the Consent Decree.

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

XXXIX. FINAL JUDGMENT

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

212. Upon entry of this Consent Decree by the Court, this Consent Decree shall constitute a final judgment between the United States, the State, and Settling Defendant. The Court finds that there is no just reason for delay and therefore enters this judgment as a final judgment under Fed. R. Civ. P. 54 and 58.

SO ORDERED THIS __ DAY OF _____, 20__.

_____

United States District Judge

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States, et al.,v. Rütgers Organics Corporation, relating to the Nease Chemical Superfund Site.

FOR THE UNITED STATES OF AMERICA

s/ John C. Cruden
JOHN C. CRUDEN
Assistant Attorney General
Environment and Natural Resources Division

s/ Arnold S. Rosenthal
ARNOLD S. ROSENTHAL
Senior Attorney
Environmental Enforcement Section
Environment and Natural Resources Division
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THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States, et al.,v. Rütgers Organics Corporation, relating to the Nease Chemical Superfund Site.

CAROLE S. RENDONE
United States Attorney
Assistant United States Attorney
Northern District of Ohio
U.S. Department of Justice

s/ Steven J. Paffilas
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216-622-3698
Fax 216-522-2404

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States, et al.,v. Rütgers Organics Corporation, relating to the Nease Chemical Superfund Site.

s/ Douglas Ballotti (per consent of parties)
DOUGLAS BALLOTTI
Acting Director, Superfund Division Region 5
U.S. Environmental Protection Agency
77 West Jackson Boulevard
Chicago, IL 60604

s/ Mark J. Palermo (per consent of parties)
MARK J. PALERMO
Associate Regional Counsel
s/ Christopher Grubb (per consent of parties)
CHRISTOPHER GRUBB
Assistant Regional Counsel
U.S. Environmental Protection Agency
Region 5
Office of Regional Counsel (C-14J)
77 West Jackson Boulevard
Chicago, IL 60604

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States, et al.,v. Rütgers Organics Corporation, relating to the Nease Chemical Superfund Site.

FOR THE STATE OF OHIO

MICHAEL DEWINE
OHIO ATTORNEY GENERAL

s/ Timothy J. Kern (per consent of parties)
TIMOTHY J. KERN
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THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States, et al.,v. Rütgers Organics Corporation, relating to the Nease Chemical Superfund Site.

FOR RUTGERS ORGANICS CORPORATION

s/ Rainer Domalski (per consent of parties)

Name (print):
RAINER DOMALSKI

Title:

President and CEO

Address:

2151 E. College Avenue
State College, PA 16801

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

Name (print):
HEIDI FRIEDMAN

Title:

Partner, Thompson Hine

Address:

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3900 Key Center
Cleveland, OH 44114

Ph. Number: 216-566-5559

United States v. Rutgers Organics Corporation (N.D. Ohio)

Consent Decree
Appendix A

Operable Unit 2 Record of Decision

Nease Chemical Site
Operable Unit Two

Columbiana County, Ohio

Record of Decision

United States
Environmental Protection Agency

Region 5

September 2005

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TABLES

FIGURES

Unless otherwise noted, Tables and Figures are found following the Decision Summary.

APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

AOC	administrative order on consent
ARAR	applicable or relevant and appropriate requirement
ATSDR	Agency for Toxic Substances and Disease Registry
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIP	Community Involvement Plan
COC	contaminant of concern
COPC	chemical of potential concern
CSF	cancer slope factor
CSM	conceptual site model
1,2-DCA	1,2-dichloroethane
1,2-DCE	1,2,-dichloroethene
DNAPL	dense non-aqueous phase liquid
EA	Endangerment Assessment
EPA	Environmental Protection Agency
FDA	Food and Drug Administration
FS	feasibility study
HEAST	Health Effects Assessment Summary Tables
IRIS	Integrated Risk Information System
LCS	leachate collection system
LOAEL	lowest observed adverse effect level
MCL	maximum contaminant level
MFLBC	Middle Fork of Little Beaver Creek
mg/kg	milligrams per kilogram
MKS	Middle Kittaning Sandstone
MSL	mean sea level
NAPL	non-aqueous phase liquid
NCP	National Contingency Plan
NOAEL	no observed adverse effect level
NPL	National Priorities List
NZVI	nanoscale zero-valent iron
ODA	Ohio Department of Agriculture
ODH	Ohio Department of Health
ODNR	Ohio Department of Natural Resources
OU	Operable Unit
PCE	perchloroethene
PDI	pre-design investigation
ppm	part per million
RAGS	Risk Assessment Guidance for Superfund
RAO	remedial action objective
RD/RA	remedial design/remedial action
RfC	reference concentration

RfD	reference dose
RI	remedial investigation
RI/FS	remedial investigation/feasibility study
RME	reasonable maximum exposure
ROC	Rutgers Organics Corporation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
S/S/S	soil mixing/stripping, stabilization and solidification
SVOCs	semi-volatile organic compounds
TBC	to be considered
1,1,2,2-TCA	1,1,2,2-trichloroethane
TCE	trichloroethene
ug/kg	microgram per kilgram
U.S. EPA	United States Environmental Protection Agency
VOCs	volatile organic compounds

This Record of Decision (ROD) documents the remedy selected for Operable Unit 2 (OU 2) at the Nease Chemical Site in Columbiana County, Ohio. The ROD is organized in two sections: Part I contains the *Declaration* for the ROD and Part II contains the *Decision Summary*. The *Responsiveness Summary* is included as Appendix A.

PART I: DECLARATION

This section summarizes the information presented in the ROD and includes the authorizing signature of the United States Environmental Protection Agency (U.S. EPA) Region 5 Superfund Division Director.

Site Name and Location

The Nease Chemical Superfund Site (CERCLIS # OHD980610018) is located in Columbiana County, Ohio, about two and one-half miles northwest of the town of Salem. The Site consists of three Operable Units (OUs). OU 1 consists of non-time critical removal actions that were constructed in the mid-1990s. The removal actions included installation and maintenance of surface water and sediment control structures and construction and operation of two shallow groundwater collection systems. OU 3 addresses Feeder Creek and the Middle Fork of Little Beaver Creek, which receive flow from the Site, and will be addressed in a separate, later U.S. EPA action. OU 3 extends into Mahoning County. OU 2, the subject of this ROD, addresses soils, source areas, and groundwater contamination on the Site. A key feature of OU 2 are five former ponds that were used for chemical process waste, and which have been backfilled. Former Ponds 1 and 2 retain especially high levels of contaminants. Both the overburden (shallow) and bedrock (deep) groundwater have become contaminated.

Statement of Basis and Purpose

This decision document presents the selected remedy for OU 2 of the Nease Chemical Site. The remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Contingency Plan (NCP). Information used to select the remedy is contained in the Administrative Record file for the Site. The Administrative Record file is available for review at the U.S. EPA Region 5 Records Center, 77 West Jackson Boulevard, Chicago, Illinois, and at the Salem Public Library, 821 E. State St., Salem, Ohio. Information about the Site can also be found at the Lepper Library in Lisbon, Ohio.

Assessment of the Site

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

Description of Selected Remedy

The Nease Chemical Site is being addressed as three OUs under the framework set forth in CERCLA. Therefore, the selected remedy specified in this ROD will serve as the final action for OU 2, but will not serve as the final remedy for the entire Site. The selected remedy specifies response actions that will address chemically-contaminated soils, source areas, and groundwater at the Site. U.S. EPA believes the response actions outlined in this ROD, if properly implemented, will protect human health and the environment.

The selected remedy consists of treatment for former Ponds 1 and 2, shallow groundwater, and deep ground water; and clean cover for the less contaminated remaining former ponds and soil. The NCP establishes the expectation that U.S. EPA will use treatment to address the principal threats posed by a site whenever practicable. This OU's principal threats of continued contamination to groundwater include the highly contaminated soils, fill and sludge in former Ponds 1 and 2, and non-aqueous phase liquids (NAPL) in the core of the groundwater plumes. Technologies selected in this ROD are designed to remediate the wastes in Ponds 1 and 2 and groundwater and remove these principal threats.

The major components of the selected remedy include:

- Ponds 1 and 2 will be treated in-situ by soil mixing/stripping, stabilization and solidification (S/S/S). This treatment technology will strip volatile chemicals from the waste and fill in Ponds 1 and 2 through soil mixing with concurrent air injection. After stripping, reagents will be mixed with the soil and residual contamination to stabilize the Pond 1 and 2 areas and reduce mobility of the remaining contaminants. During all phases of treatment the vapors will be captured in a shroud covering the work area, and treated to meet emission standards.

- The remaining ponds and soil (including drainage ditch soil) will be contained using either an impermeable geosynthetic membrane covered with clean soil, or only clean soil. An estimated 11 acres will be covered with the combined impermeable membrane/soil cap. Most of this area would be to the west of the Conrail tracks and would include the treated Ponds 1 and 2, Pond 7, Exclusion Areas A and B (former waste dumping areas which were addressed previously as part of OU 1), and the soil areas around them to provide a continuous cover. The impermeable cap would also cover a small area east of the rail tracks. The goals of the combination cap are to prevent direct contact and to reduce rainwater infiltration, which will limit the volume of shallow groundwater to be treated. Other areas, such as Ponds 3 and 4, and soils that exceed the remediation goal of 1,000 ug/kg of mirex in surface soil will be covered with clean soil to prevent contact.

- Shallow groundwater on the eastern side of the OU will be captured in a new collection trench, pumped above ground and treated ex-situ in a new or modified treatment plant. It is anticipated that this trench will be constructed to the east of the Conrail track, downgradient of Ponds 1 and 2 and the Exclusion Areas. Depending on the results of a pre-design investigation (PDI), the system design may be modified to allow in-situ, staged treatment within the trench through a series of cells that could include an iron permeable reactive barrier, accelerated biodegradation and activated carbon.

- Deep groundwater and the southern area plume will be treated by injection of nanoscale zero-valent iron (NZVI) into the most contaminated part of the plume (near Ponds 1 and 2). NZVI is a relatively new technology that involves the injection of a slurry of ultra-small iron particles which are expected to remain suspended for some time and flow with the groundwater (including into bedrock fractures). The iron particles provide a reactive surface area and breakdown of the groundwater contaminants occurs through an oxidation-reduction reaction. NZVI treatment may be followed by accelerated biological treatment if monitoring during the first few rounds of NZVI injections indicates the design performance standards might not be met by NZVI alone. Monitoring of natural attenuation will occur to ensure remediation of the far downgradient portion of the plume.

- Institutional controls will be required for the Site. For OU 2, it is anticipated that institutional controls will be needed for each of the former pond areas and areas with surface soil mirex contamination where a cover is required. These areas will have contaminants remaining at levels that do not allow unrestricted use or unlimited access. Also, it is anticipated that institutional controls will be needed to control use of groundwater until cleanup is complete.

- Treatability tests will be necessary for the groundwater treatment by NZVI and for the treatment of waste in Ponds 1 and 2 by S/S/S. A PDI will be necessary before the remedial design can be finalized.

- Long-term operation, monitoring and maintenance will be required.

Statutory Determinations

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to this remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment technologies (or resource recovery) to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because this remedy will result in hazardous substances, pollutants or contaminants remaining on-site at levels greater than those that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be protective of human health and the environment.

Data Certification Checklist

The following information is included in the Decision Summary section (Part II) of this ROD. Additional information can be found in the Administrative Record file for this Site.

- Contaminants of concern and their respective concentrations (Section 5);
- Baseline risk represented by the contaminants of concern (Section 7);
- Cleanup levels established for contaminants of concern and the basis for these levels (Section 8);
- How source materials constituting principal threats are addressed (Section 11);
- Current and reasonably anticipated future land use assumptions used in the baseline risk assessment and ROD (Sections 6 and 7);
- Potential land use that will be available at the Site as a result of the selected remedy (Section 12);
- Estimated total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected (Sections 9 and 12); and
- Key factors that led to selecting the remedy (Sections 10 and 12).

Support Agency Acceptance

Although the State of Ohio has not yet provided a concurrence letter for this ROD, the State has indicated that it intends to concur with the selection of Alternative B for OU 2 of the Nease Site. The State of Ohio's concurrence letter will be added to the Administrative Record upon receipt.

Authorizing Signature

Richard C. Karl, Director
Superfund Division
United States Environmental Protection Agency, Region 5

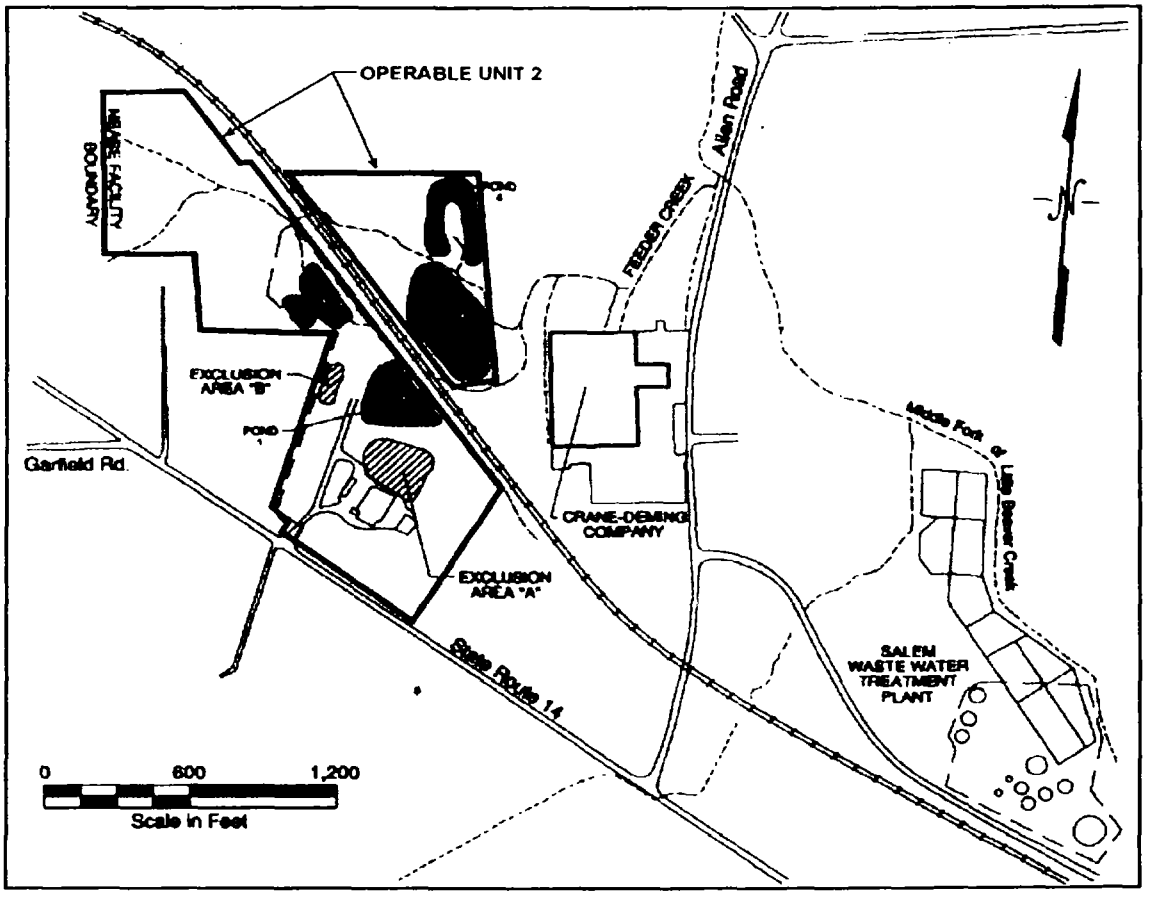
9/29/05
Date

PART II: DECISION SUMMARY

1.0 Site Name, Location and Brief Description

The Nease Chemical Superfund Site (CERCLIS # OHD980610018) is located in Columbiana County, Ohio. The former Nease Chemical plant is two and a half miles northwest of Salem, Ohio and approximately one-quarter mile northwest of the intersection of State Route 14 and Allen Road. The facility is located in a rural area with light-industrial and residential properties. It is bounded by small light-industrial operations along Allen Road to the east and northeast, residential homes along State Route 14, and wooded areas and pasture lands to the north. Conrail railroad tracks traverse the facility. The Salem Wastewater Treatment Plant is situated approximately 2,400 feet east of the facility.

Figure 1: Site Location Map



Runoff migrates to the main surface water body in the area, the Middle Fork of Little Beaver Creek (MFLBC). The MFLBC is located about 1,800 feet east of the facility. The MFLBC originates upstream of the facility in Salem, Ohio, and receives surface runoff from the facility via the Feeder Creek tributary system. From Salem, the MFLBC flows north for about five miles, turns and flows eastward and then southeastward through Libson, Ohio, and eventually joins other tributaries to form Little Beaver Creek. Little Beaver Creek flows into the Ohio River near East Liverpool, Ohio.

Figure 1 shows some of the important features of Operable Unit 2 (OU 2). The heavy line labeled "Operable Unit 2" surrounds the property boundary of the former Nease Chemical Company. This area covers about 44 acres. Five former wastewater treatment ponds (Ponds 1, 2, 3, 4, and 7), Exclusion Areas A and B, and contaminated soil will be addressed in this Record of Decision (ROD), as well as some areas on the west side of the Crane-Deming building where shallow groundwater seeps to the surface. While not shown on Figure 1, contaminated groundwater is located under the Nease facility and migrates towards the east, beneath the building labeled "Crane-Deming Company" and will also be addressed as part of this ROD. Rutgers Organics Corporation (ROC) currently owns both the former Nease property and the former Crane-Deming property. The former Crane-Deming property is about 35 acres.

The Nease Site[1] was added to the NPL on September 30, 1983. ROC began a remedial investigation/feasibility study (RI/FS) at the Site in 1988. Both U.S. EPA and Ohio EPA have provided oversight of ROC's work under a 1988 Administrative Order on Consent (AOC). ROC completed the *Remedial Investigation Report, Nease Site, Salem, Ohio* (RI) for the Site in 1996 and the *Feasibility Study for Operable Unit 2, Nease Chemical Company, Salem, Ohio* (FS) in 2005. In addition, in 2004, ROC completed the *Endangerment Assessment for the Nease Chemical Company Salem, Ohio Site* (EA), which includes the human health and ecological risk assessments. U.S. EPA anticipates that the pre-design investigation (PDI), treatability studies, and design of the remedy selected in this ROD will be implemented by ROC under an AOC. Further, U.S. EPA anticipates that, upon completion of the design, implementation of the remedy selected in this ROD will be carried out by ROC under a federal consent decree.

2.0 Site History and Enforcement Activities

2.1 Source of Contamination

From 1961 until 1973, a portion of the Site was owned and operated by the Nease Chemical Company as a chemical manufacturing plant producing specialty chemicals such as pesticides,

[1]The NCP defines a Site as "the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for implementation of the response action." For the purposes of this Record of Decision, the Site includes: the former Nease facility, portions of the former Crane-Deming facility, and the underlying areas where groundwater is contaminated (comprising OU 2); Feeder Creek and portions of MFLBC (comprising OU 3); and nearby areas necessary for the implementation of the response actions. Figure 1 does not show the full extent of the MFLBC, which extends into Mahoning County.

fire retardants, household cleaning compounds and chemical intermediates used in agricultural, pharmaceutical and other chemical products. Products and chemical intermediates were manufactured in batch processes, and raw materials and finished products were stored in warehouses, bulk storage, and tanks. Some wastes from the plant processes were put into 55-gallon drums, which were buried on-site (particularly in Exclusion Area A). Five unlined ponds (designated Ponds 1, 2, 3, 4 and 7) were used for the treatment and storage of acidic plant wastes or lime slurries from the neutralization of acidic wastes. These ponds were constructed so that the base of the ponds are below the water table.

After settling in the ponds, neutralized liquids were discharged to the Salem Wastewater Treatment Plant from the late 1960s to 1973. Following notification by Ohio EPA of wastewater violations, Nease Chemical Company agreed in a Consent Judgment in 1973 to discontinue manufacturing operations at the facility until such time as it obtained a new wastewater permit from Ohio EPA. Instead, Nease decided to close the facility. Nease neutralized and removed water in the various ponds to the Salem Wastewater Treatment Plant and filled/graded the ponds by December 31, 1975. Only Pond 1 retains any standing water. In addition, Nease removed the majority of buildings and manufacturing equipment during decommissioning activities. Only one building remains at the former manufacturing facility, which currently houses the groundwater treatment system.

Although drums, some contaminated soil, and liquids in Ponds 2, 3, 4, and 7 have been removed, chemical contamination remains in the surface soil and in the soil/fill within the ponds. These remaining chemicals continue to act as a source of groundwater contamination, especially the waste in Ponds 1 and 2. Runoff from OU 2 and shallow groundwater discharge has carried contaminants into Feeder Creek and then on to the MFLBC.

2.2 Previous Investigations

2.2.1 Field Investigations

ROC began environmental investigations at the facility and surrounding areas in 1982 at the request of Ohio EPA. This investigation included soil borings at the chemical facility, shallow and deep groundwater monitoring wells in the overburden and bedrock, magnetic surveys to identify possible buried drums, and collection of samples of surface water, soil and sediment to characterize conditions on and adjacent to the facility. Additional monitoring wells were installed by ROC between 1983 and 1986. Several rounds of groundwater samples have been collected between 1982 and 2003. Soil samples were collected during remediation activities in 1983 in Exclusion Areas A and B, and the ponds. Additional soil borings were drilled in 1985 and 1986 east of the facility.

Sediment fish and surface water samples were collected from the MFLBC at various times between 1983 and 1987 by ROC, U.S. EPA, and Ohio EPA. A sampling program for the MFLBC was conducted between 1990 and 1995, which included analysis of samples collected from surface water, stream sediment, floodplain soil, and fish tissue at locations along the

MFLBC from upstream of the facility to near East Liverpool, Ohio. A sediment sampling study was conducted in Feeder Creek in 1995. Additional samples were taken by ROC or Ohio EPA in the MFLBC in 1997, 1999 and 2001. Between 1982 and 1991, Ohio EPA periodically sampled residential water supply wells in the vicinity of the facility and in the floodplain of the MFLBC.

In July 1987, Ohio EPA shared preliminary results of its data from fish in the MFLBC, which reported mirex detected in fish specimens for a distance of at least 12 miles downstream from the facility (for further discussion of mirex, see Sections 5.5.1 and 7.1.3 below). In October 1987, the Ohio Department of Health (ODH) issued a fish consumption advisory for the MFLBC between Allen Road in Salem and the State Route 11 bridge near Elkton, Ohio due to mirex. In March 1988, ODH expanded the advisory to include warnings against wading and swimming. ODH began posting signs along the MFLBC during the summer of 1988.

During the period when the fish consumption and contact advisories were first issued in 1987, the Ohio Department of Agriculture (ODA) raised the possibility that Grade A dairy herds that watered in the MFLBC might be ingesting mirex. In August 1987, ODH tested milk supplies from two farms and detected mirex (at below Food and Drug Administration (FDA) actionable levels) in several samples. In 1987 through 1989, ROC worked with the farmers to provide alternate water sources and restrict access of livestock to the creek and potentially contaminated floodplain soil by fencing. Since 1990, ODA milk sampling has not detected mirex. In 1988 and 1989, ODA also tested meat from two herds that had access to the MFLBC. Mirex was detected above the FDA action level in seven out of eighteen samples. Testing in 1990, after access of livestock to the creek was restricted, did not detect mirex. In 1990, ODH and the Ohio Department of Natural Resources (ODNR) took samples of blood and fat from racoons and opossums along the MFLBC.

2.2.2 ODH Health Assesments

In 1990 and 1996, ODH conducted public health assessments trying to target people around the Nease Site that were most likely to have been exposed to site-related contaminants, specifically mirex. Individuals most likely to have been exposed to mirex were surveyed and a subset of respondents was sampled for blood levels of mirex. Mirex was detected in the blood of 14 of 42 area residents sampled in 1990 (levels ranging from 0.25 to 2.2 ppb), and in 8 of 177 area residents sampled in the 1996 study (levels ranging from 0.29 to 2.69 ppb).

1990 ODH Study: On October 4, 1990, ODH issued a report of a study that included resident blood sampling results and an analysis of potential exposure pathways to mirex associated with the MFLBC. The study included some former Nease employees. ODH concluded:

> "We found strong evidence that some people living near the Nease Superfund site and MFLBC have acquired body burdens of mirex released from the site or acquired while working there. However, most people who reported activities that could have resulted in uptake of mirex in their serum.

Having mirex in the blood was associated with two activities: 1) consuming animal products from animals probably contaminated with mirex and 2) work at the Nease chemical plant.

In the group participating in this study, fishing, contact with contaminated stream sediment and soil, and eating gardens (sic) products grown in possibly contaminated soil were not associated with the presence of mirex in serum. Only two of the fourteen people with mirex in their serum did not report exposure to either contaminated food products or occupational exposure, but did report a variety of other activities which may have lead to their uptake of mirex.

This study does not provide any evidence of widespread human uptake of mirex in people living in the vicinity of the site or MFLBC. The total number of samples was not large and the selection of people was biased toward participation by people who we thought would be most likely to have taken up mirex.

The mirex levels in this study population were slightly lower or much lower than in all groups reported in published account (sic) to have any amount of mirex in their serum. Most reported exposures were in people who were probably exposed to mirex applied widely in large amounts to kill fire ants in the southern United States or who ate mirex contaminated fish from Lake Ontario ..."

1996 ODH Study: In December 1996, ODH in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR) issued the results of a larger study. While the study did not include children under seven years of age, the study looked at a much larger group than the 1990 study. ODH concluded:

"At this time ODH will not recommend further health study of the general population in the vicinity of MFLBC. This decision is based on the fact that a large portion of the study participants reported no potential exposure pathways. Among those who did report potential exposure pathways, very few had detectable levels of mirex in the blood. For these reasons, we do not believe there has been widespread exposure to mirex in this community... Results indicate the general population living near the Middlefork of Little Beaver Creek does not show evidence of widespread exposure to Mirex. However, the pilot study did show an association of mirex detection and employment at Nease... ODH should continue to post advisories and make the community aware of the advisories... Most participants responding to the questionnaires indicated that they knew of the advisories and had curtailed activities advised against. One of the reasons for the low detection of mirex in the general population may be prudent risk management on the part of the community members as a result of these advisories."

2.2.3 ATSDR Public Health Assessment

In February 1997, ATSDR issued a public health assessment based on sampling data for the MFLBC, including 1991 sediment data, 1987-91 floodplain soil data, 1991 fish samples, 1990 racoon and opossum blood and fat samples, and 1987-91 milk data. Based on its review,

ATSDR concluded the "contamination of MFLBC (associated with the Nease Chemical site) represents a public health hazard, because of past exposure and the possibility of future exposures."

2.3 Previous Response Actions

In 1983 ROC voluntarily implemented various steps including the removal of drums and associated affected soils. A total of 115 drums were removed from Exclusion Area A. Additionally, more than 9,500 cubic yards of contaminated soil were removed from Exclusion Areas A and B, Pond 1, and a nearby ditch. The soil and drums were disposed at an off-site hazardous waste landfill. At the same time efforts were made to control contaminated sediment from leaving the Site. The efforts included seeding of Pond 2, installation of fabric barriers across drainage swales and ditches, installation of rock dams, and hay-bale barriers.

In late 1991, ROC instituted further stabilization measures to reduce potential off-site transport of contaminants. Additional surface water diversion measures, berms and sediment control structures were constructed.

Under an agreement with U.S. EPA, starting in 1993 ROC took measures to control leachate releases and seeps. To reduce potential discharge of shallow groundwater to the ground surface, a collection trench and aggregate drain downgradient from Exclusion Area A and Ponds 1 and 2 (leachate collection system - called "LCS-1") and a collection drain and recovery well immediately downgradient of Pond 2 (LCS-2) were constructed. Shallow groundwater from LCS-1 is presently pumped to the on-site treatment plant. Shallow groundwater collected from LCS-2 is transported off-site for treatment and disposal (due to high metals levels). Since the start of operations, over 20 million gallons of highly contaminated shallow groundwater have been captured and treated. In addition, water in Pond 1 is periodically pumped out and treated to prevent runoff. These interim remedial measures are shown on Figure 2. The Administrative Record contains additional documentation concerning the interim remedial measures taken (See also Section 4.1 below).

2.4 Enforcement Activities

On December 30, 1977, the assets of Nease Chemical Company (including the non-operational Salem facility) were acquired and the company merged with Ruetgers Chemicals, Inc. to form Ruetgers-Nease Chemical Company, Inc. (now known as Rutgers Organics Corporation or "ROC"). ROC has never operated at the Site. Since 1982, ROC has cooperated with Ohio EPA and U.S. EPA to address the Site.

In January 1988, an AOC was signed by ROC, Ohio EPA and U.S. EPA, which required ROC to conduct a RI/FS. The RI/FS work described in this ROD was conducted by ROC under the terms of the 1988 AOC, with oversight by U.S. EPA and Ohio EPA. In November of 1993, ROC and U.S. EPA entered into an AOC calling for specific removal activities to address all leachate releases and seeps (See Sections 2.3 and 4.1 for more information on the removal activities).

3.0 Community Participation

The Proposed Plan for OU 2 of the Nease Site was made available to the public for comment on May 23, 2005. Copies of the Proposed Plan and the final RI, FS, and EA reports (as well as other supporting documents) were placed in the local Information Repositories located at the Salem Public Library and the Lepper Library in Lisbon, Ohio. Documents are also available at Ohio EPA's office in Twinsburg, Ohio. Copies of the Proposed Plan were mailed to approximately 1,000 interested persons on U.S. EPA's community involvement mailing list for the Site. Copies of all documents supporting the remedy outlined in the Proposed Plan are located in the Administrative Record file for the Site, located at the U.S. EPA Records Center, 77 West Jackson Boulevard, Chicago, Illinois and the Salem Public Library, 821 E. State St., Salem, Ohio.

The public comment period was intended to run for thirty days, from June 1 through June 30, 2005. However, upon request, the comment period was extended until July 8, 2005. U.S. EPA held a public meeting at the Salem Public Library on June 22, 2005, to present the Proposed Plan and approximately 35 people attended. The notice announcing the public meeting and the availability of the Proposed Plan was published in the *Salem News* on May 25, 2005, and in the *Lisbon Morning Journal* on May 28, 2005. A press release was issued on May 31, 2005, to alert media in Salem, Lisbon, and Youngstown about issuance of the proposed plan and the start of the public comment period. Representatives of U.S. EPA and Ohio EPA were present at the public meeting, as were representatives of ROC, to answer questions regarding the proposed remedy. Responses to comments received during the public comment period (including comments received at the public meeting) are included in the Responsiveness Summary which is Appendix A of this ROD. These comments were considered prior to selection of the final remedy for OU 2 at the Nease Chemical Site.

In addition to the public involvement activities noted above, U.S. EPA mailed out fact sheets in April 1990, July 1992, November 1992, January 1994, September 1995, March 1996, November 1996, and December 2004. Additional public meetings were held on February 3, 1988, July 14, 1992, and February 10, 1994. These fact sheets and meetings were used to inform the public about Site progress, discuss concerns about mirex toxicity and health effects, and discuss the interim cleanup actions. U.S. EPA also developed a Community Involvement Plan (CIP) when RI/FS activities began at the Site in 1988, and the CIP was updated in 1996. The mailing list was revised in 2004 to add additional community members and to ensure that it was up to date.

4.0 Scope and Role of Response Action and Operable Units

As with many Superfund sites, the problems at the Nease Chemical Site are complex. As a result, U.S. EPA has organized the work into three OUs:

- OU 1: Long-term Removal Action;
- OU 2: Soils, Source Areas, and Groundwater; and
- OU 3: Feeder Creek and MFLBC.

This ROD is the first of two planned RODs for the Nease Chemical Site, and is intended to be the only ROD for OU 2. Because the Nease Chemical Site is being addressed as multiple OUs under the framework set forth in CERCLA, the selected remedy specified in this ROD will not serve as the final action for the entire Site. A subsequent ROD will be necessary for OU 3.

4.1 Operable Unit 1

Long-term Removal Action: As discussed in Section 2.3 of this ROD, there were interim response actions conducted by ROC under a 1993 AOC with U.S. EPA. The removal actions that were conducted under that AOC have been called "OU 1." These actions included measures to control leachate releases and seeps. Two shallow groundwater collection systems (LCS-1 and LCS-2) were constructed downgradient of Ponds 1 and 2 and Exclusion Area A. These systems are presently in operation and contaminated groundwater is either pumped to the on-site treatment system or transported off-site for treatment and disposal. Since the start of operations, over 20 million gallons of highly contaminated shallow groundwater have been captured and treated. In addition, surface water and sediment control measures were constructed, including berms, sediment outlet control structures, fabric barriers in Feeder Creek, and runoff diversions. These interim remedial measures are shown on Figure 2.

Because the response actions in OU 1 were taken using removal authorities, U.S. EPA has issued no ROD for OU 1, and no ROD is planned. This ROD for OU 2 will largely incorporate the elements of OU 1, or will supercede them. The actions selected in this OU 2 ROD for shallow groundwater will address the functions of the existing shallow groundwater collection systems. The final design for the shallow groundwater system will either incorporate LCS 1 and/or 2, or will replace them. The response actions in this OU 2 ROD that address source areas and soils will mitigate the need for runoff control and the final design will provide for management of surface water flow. Only the OU 1 measures that relate to sediments in Feeder Creek and the MFLBC will not be addressed by the OU 2 ROD. Those OU 1 measures will continue until the final remedy for OU 3 is selected.

4.2 Operable Unit 2

Soils, Source Areas, and Groundwater: The second OU, the subject of this ROD, addresses the contaminated soils, actual or potential source areas, and groundwater. The source of the contamination is discussed more fully in Section 2.1 of this ROD. The contaminants at OU 2 of the Nease Site originated from production processes at the Nease Chemical Company from 1961 to 1973. Products and waste materials were stored and/or disposed on the facility. Upon closure of the plant, contaminants remained in unlined ponds that had been filled in, buried in drums, and in soil that had become contaminated. The chemicals in the unlined ponds and contaminated soil leached to the overburden (shallow) and bedrock (deep) groundwater.

Some historic suspected source areas in OU 2 are described briefly below. Over time, numerous investigations focused on these source areas and several interim response actions were conducted

to address some of the worst materials (See Sections 2 and 4.1 above). The degree and extent of contamination in OU 2 is discussed in Section 5.6, including the current state of these source areas, and the more widespread soil and groundwater contamination.

4.2.1 Exclusion Areas

The soil areas known as Exclusion Area A and B were identified as suspected source areas (and are shown on Figure 1). Exclusion Area A, about 1.3 acres in size, was an area where chemicals and waste were handled during production. As part of the previous response actions discussed in Section 2.3, about 115 buried drums and 5,500 cubic yards of contaminated soil were removed from the area. Exclusion Area B is a small area of about 0.25 acres, where historically there was limited vegetation. As part of the previous response actions, about 700 cubic yards of contaminated soil were removed from the area.

4.2.2 Wastewater Neutralization Ponds

During operations, Nease used a series of five unlined wastewater neutralization ponds. It is believed that wastewater was first discharged to former Pond 1, neutralized, and then conveyed to former Pond 2. After a period of settlement, neutralized wastes were pumped from former Pond 2, neutralized further if necessary, and then pumped to former Ponds 3, 4, or 7 for final settlement of solids. The nomenclature of the ponds is believed to be related to the degree of neutralization required/accomplished. There is no evidence of the existence of a former pond 5 or 6. Former Pond 1 is the smallest of the five former neutralization ponds, and (although partially filled in) is the only former pond that still retains water throughout the year. The other ponds were filled with soil and/or lime (with varying degrees of soil stability) and have become vegetated over time. As part of the previous response actions, about 2,790 cubic yards of contaminated soil were removed from Pond 1.

4.3 Operable Unit 3

Feeder Creek and MFLBC: Runoff and shallow groundwater discharge has carried contaminants into Feeder Creek and on into MFLBC. The old Nease facility is hilly and drainage flowed through ditches and intermittent streams into Feeder Creek in the northeast portion of the facility. From there, water and sediment migrates to MFLBC, located about 1,800 feet east of the facility. The MFLBC originates upstream of the facility in Salem, Ohio, and flows north for about five miles, turns and flows eastward and then southeastward through Libson, Ohio, and eventually joins other tributaries to form Little Beaver Creek, which discharges to the Ohio River.

Section 2.3 of this ROD discusses some interim actions that have been taken to mitigate contaminant migration into Feeder Creek and the MFLBC. Section 2.2 discusses fish consumption and contact advisories that were put in place as a result of ODH's public health assessments, as well as measures taken to restrict access of livestock to contaminants in the creek. U.S. EPA and Ohio EPA are currently working with ODH to use the findings of the human health risk assessment in the EA to review the existing use restriction advisories. The

agencies are also working with ROC to get additional data in the MFLBC as part of the RI/FS for OU 3.

The actions to remediate OU 2 that will result from this ROD will constitute source control actions for OU 3. A subsequent ROD will be written for OU 3.

5.0 Operable Unit Characteristics

5.1 Conceptual Site Model for OU 2

The conceptual site model (CSM) provides an understanding of the Site based on the sources of the contaminants of concern, potential transport pathways and environmental receptors. Figure 3 pictorially depicts a simplified CSM for OU 2 of the Nease Site. Based on the nature and extent of the contamination and the fate and transport mechanisms described in the RI, FS, and EA Reports, the CSM includes the following components:

- Chemical contaminants from operations in the 1960s and early 1970s at the Nease Chemical plant were released to the environment. Wastewater was stored in five unlined ponds. Drums were disposed on-site. It is likely that spills occurred.

- Over time, runoff and/or spills spread contamination to the OU 2 soils. Some interim cleanup actions were conducted to remove buried drums and the most highly contaminated soil. However, surface soil over portions of the old Nease facility remains contaminated.

- Upon closure of the plant, Nease filled in most of the old wastewater ponds, but chemical contamination remained in the waste sludge/fill and underlying soil. Ponds 1 and 2 contain especially high levels of contaminants.

- Contaminants remaining in the former ponds (especially Ponds 1 and 2) migrate to the shallow groundwater underlying the source areas. From the shallow groundwater contaminants migrate to the deep groundwater. The deep groundwater contains areas where DNAPL[2] is found and this DNAPL may be acting as a continuing source of contamination to the groundwater.

- Groundwater contamination is highest near the source areas and flows in a predominately easterly direction towards the MFLBC. Contaminated groundwater does not appear to discharge to the MFLBC.

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[2] A dense non-aqueous phase liquid (DNAPL) is a liquid that is denser than water and does not dissolve or mix easily in water (it is immiscible). In the presence of water it forms a separate phase from the water and can be a long-term source of groundwater contamination. Many chlorinated solvents are DNAPLs. DNAPLs are often difficult to locate and remediate.

- The primary contaminants of concern (COCs) are mirex in soil and VOCs in groundwater.

For risk assessment purposes, the conceptual site model for the human health risk assessment used to illustrate contaminant distribution, release mechanisms, potential exposure pathways and migration routes, and potentially-exposed populations is depicted in Figure 4.

5.2 Operable Unit Overview

OU 2 of the Nease Chemical Site is located is located in Columbiana County, Ohio, about two and one-half miles northwest of the town of Salem. The old Nease plant has the approximate geographic coordinates 40° 54.9'N and 80° 53.5'W. The OU is located in a rural area with light-industrial and residential properties. It is bounded by small light-industrial operations along Allen Road to the east and northeast, residential homes along State Route 14, and wooded areas and pasture lands to the north. Conrail railroad tracks traverse the facility from the northwest towards the southeast, and the tracks are in active use. The only building remaining on the old facility is located in the southeast, and houses the groundwater treatment system. Figure 1 shows the location of the Nease Chemical Site and a layout of the major features of OU 2.

The land elevation in the central portion of the OU is approximately 1,200 feet above mean sea level (ft. MSL). From here, the land slopes gently southwestward to State Route 14 and northeastward to the Conrail tracks at about elevation 1,180 ft. MSL. Across the Conrail tracks the land slopes steeply further to the east-northeast where it flattens in the area surrounding the Crane-Deming building and the Feeder Creek drainage system at an elevation of about 1,160 ft. MSL. Historic topographic maps indicate that the current steep slope and the Crane-Deming seep may be a result of cutting into the natural hillside during construction of the Crane-Deming building. Surface water drains from the property along the Feeder Creek system and the Route 14 drainage ditch.

The geology at OU 2 can generally be described as consisting of glacial till overburden deposits of the Kent Moraine lying above various sedimentary bedrock units consisting of, in descending order, the Washingtonville Shale (and associated coal seam and underclay) and the Middle Kittanning Sandstone (MKS). Deeper bedrock units beneath the MKS appear to be hydraulically isolated by the Columbiana Shale. The glacial till has a predominantly silty clay character and is interspersed with locally discreet zones of sandier material. Glacial till in the vicinity of the former ponds and the Exclusion Areas ranges from a few feet to about 39 feet, with the average till thickness of about 20 feet.

The bedrock surface is highest in the western portion of the OU, and generally slopes steeply away from the facility in an east-northeastern direction towards the MFLBC. The upper portion of the Washingtonville Shale unit is weathered, highly fractured and thinly bedded. The deeper portions of the shale are less fractured. The Washingtonville Shale appears to have been eroded east of the Conrail tracks where the MKS unit is the uppermost bedrock unit. The erosional

contact between the Washingtonville Shale and the MKS appears to be near the Crane-Deming building. The MKS consists of a fine to medium grain and cross-bedded sandstone. The general dip is to the east-northeast. The MKS is characterized by fractures comprised of bedding plane partings interspersed with vertical joints. The thickness of the MKS at OU 2 ranges from 21 to 53 feet. No outcrops of bedrock are present, although bedrock is found within a few feet of the ground surface east of the Conrail tracks where the overburden had been excavated for construction of the Crane-Deming building.

In broad terms, the hydrogeological units consist of the shallow (overburden) and deep (MKS bedrock) units. The units are separated by transition bedrock (Washingtonville Shale and associated coal seam and underclay). The transition bedrock, while having low permeability in some areas, does not provide a complete aquitard and contamination has moved from the overburden to the MKS. Groundwater within the overburden follows two flow regimes: the primary flow to the east-northeast towards the MFLBC; and a second, less significant flow in the southern part of the Site towards the south-southeast (See Figure 5). Horizontal hydraulic gradients are steep in the overburden (about 0.04 - 0.06 ft/ft). Velocity in the overburden ranges from 1 - 30 ft/yr. Depth to groundwater is a few feet to about nine feet below ground surface.

Groundwater flow within the MKS is predominantly eastward and occurs primarily through the bedding plane partings (See Figure 6). As flow within the bedrock approaches the MFLBC, it encounters overburden that has filled an eroded glacial valley. Groundwater flows into the MFLBC valley from the south, east, west and below and significant dilution of Site groundwater occurs. Regional flow within the MFLBC valley is northerly. As a result of the increased flow and direction change, deep Site groundwater does not appear to discharge to the MFLBC. Velocity in the bedrock unit is about 65 ft/yr. Figure 7 shows the conceptual hydrogeologic setting and transport pathways.

5.3 Sampling Strategy

A work plan that presented the scope of work for the RI was approved by the agencies on March 28, 1990, and work was initiated on April 16, 1990. All RI investigation activities were conducted by ROC under the supervision of U.S. EPA and Ohio EPA. Field investigation activities conducted as part of the RI included:

- Air monitoring;
- Geophysical investigations (electromagnetic conductivity surveys, seismic survey, soil gas survey);
- Monitoring well drilling and installation;
- Soil borings and samples;
- Test pit soil sampling;
- Pond borings;
- Groundwater sampling;
- DNAPL investigation;
- Aquifer testing;

- Soil hydraulic conductivity testing;
- Residential well survey; and
- Topographic mapping and surveying.

In addition, a sampling program for MFLBC, the main water body receiving runoff from the facility, was completed in 1990. This program included the analysis of samples from surface water, stream sediment, floodplain soil, and fish tissue at locations along the MFLBC. In October 1993, an ecological habitat inventory and stream survey was conducted along the MFLBC riparian corridor. The results of these RI activities are described in the RI report dated January 1996.

5.4 Source of Contamination

As discussed in Section 2.1 of this ROD, the contaminants at OU 2 of the Nease Site originated from production processes at the former Nease Chemical Company. From 1961 to 1973, products, chemical intermediates, and waste materials were stored and/or disposed on site. Upon closure of the plant, contaminants remained on-site in unlined, filled ponds, buried in drums, and in soil. The chemicals in the unlined ponds and contaminated soil leached to the overburden (shallow) and bedrock (deep) groundwater. Runoff from the facility and shallow groundwater discharge carried contaminants into drainage ditches, Feeder Creek and then on to the MFLBC, including areas of sediments and floodplains.

Although drums, some contaminated soil, and liquids in Ponds 2, 3, 4, and 7 have been removed from the Site, chemical contamination remains in the surface soil and in the soil/fill within the ponds. These remaining chemicals continue to act as a source of groundwater contamination, especially waste found in Ponds 1 and 2. Additionally, DNAPL in the aquifer may act as a continuing source of contamination to the groundwater.

5.5 Types of Contaminants and Affected Media

Since the Nease Site housed an old chemical manufacturing facility that operated in an era before there was much regulation, or sound environmental management of waste, it is not surprising that there is a large array of chemical contaminants found in several media. At the Site, air, surface water, groundwater, sediment, and soil were analyzed for a variety of contaminants. The investigations found 155 chemicals detected at least once in the sampled media.[3] The EA carefully evaluated which of these chemicals and affected media were most important in driving potential risk at the Site. These findings are summarized in Section 7 of this ROD, but extensive evaluation is found in the EA. This ROD focuses on the types of contaminants and affected media that are most important in OU 2, which are summarized below.

[3] The RI and EA were substantially complete before the Site was separated into Operable Units. This ROD attempts to focus on OU 2. However, at times it was difficult to separate the prior information. Certain media (e.g., surface water and sediment) are much more important in OU 3.

5.5.1 Mirex

Mirex, a chlorinated hydrocarbon, is a primary contaminant of concern (COC) at the Nease Chemical Site. Mirex is an odorless, white, crystalline solid. It was used in pesticide formulations, and was especially common in the southern United States, where it was frequently applied to control fire ants. It was also used as a flame retardant in products such as plastics, rubber, paint, paper and electrical goods. Mirex is a very uncommon COC at Superfund sites, and has been identified at only a few other sites. Mirex was manufactured at the Nease Site.

Mirex was banned in the United States in 1978. Like other chlorinated pesticides, it breaks down very slowly in the environment and can persist for years. Its breakdown product, photomirex, is also toxic and persistent. See Section 7.1.3 below for more discussion concerning the toxicity of mirex and photomirex. Mirex is highly sorptive and has a very low solubility (approximately 1 ug/L). These physical properties mean that mirex is likely to bind to particulate matter (especially fines and organic material) and is unlikely to travel in a dissolved state in water. Mirex can bioaccumulate in biota in the food chain.

Mirex has been found in several media at the Nease Site. Some of the media that are most affected by mirex contamination will be addressed in OU 3 (sediments, floodplain soil and consequent bioaccumulation). Within OU 2, mirex is commonly found in surface soil and in the waste materials within the former ponds (especially Ponds 1 and 2). Mirex has been detected in some groundwater samples near Ponds 1 and 2, although some of the results may be associated with particulate matter. The extent of mirex contamination is discussed in Section 5.6. Pesticides in groundwater are discussed more fully in the FS.

5.5.2 Volatile Organic Compounds

Volatile organic compounds (VOCs) are a class of chemicals that are commonly found within OU 2 at the Nease Site. VOCs are found in groundwater, soils and source areas - particularly Ponds 1 and 2. The extent of VOC contamination is discussed in Section 5.6 . VOCs are found in groundwater and within the wastes of Ponds 1 and 2 as dense non-aqueous phase liquid (DNAPL), as well as in the dissolved state.

There is a large array of VOCs that have been found at the Site in several media. More detail on all of the chemicals found in each media can be found in the EA. The constituents that comprise much of the bedrock groundwater plume include the chlorinated ethene class of compounds: perchloroethene (PCE); trichloroethene (TCE); and the daughter products 1,2,-dichloroethene (1,2-DCE); and vinyl chloride. Other VOCs that significantly contribute to potential risk include: 1,1,2,2'-trichloroethane (1,1,2,2-TCA); 1,2-dichloroethane (1,2-DCA); benzene; and chlorobenzene. Most of the discussion in this ROD will focus on total VOCs. However, individual VOCs, and classes of VOCs and their respective degradation chains are discussed in detail in the FS.

5.6 Extent of Contamination

This section presents a summary of the results associated with the RI conducted at the Site. A full description of the RI activities and sampling results is contained in the January 1996 *Remedial Investigation Report*. Additional descriptions of the extent of contamination at the Site are found in the EA, FS and other documents which are included in the Administrative Record for the Site. The investigations found 155 chemicals detected at least once in the sampled media. This summary discussion will focus on the chemicals that are most important in creating potential risk in OU 2.

5.6.1 Wastewater Neutralization Ponds

During operations, Nease used a series of five unlined wastewater neutralization ponds. It is believed that wastewater was first discharged to former Pond 1, neutralized, and then conveyed to former Pond 2, and from there pumped to former Ponds 3, 4, or 7. Each of the ponds has been filled with soil and, except for a small portion of Pond 1, they no longer contain water. Table 1 shows information about the organic mass, mass in the underlying till, fill thickness and volume and other physical and chemical characteristics for the former ponds. The discussion here will summarize information from the RI about chemical contamination.

Ponds 1 and 2

Due to their close proximity and similar use, former Ponds 1 and 2 are addressed as a single area. Combined, former Ponds 1 and 2 cover approximately 1.5 acres. Groundwater is encountered 3 to 8 feet below the ground surface at Ponds 1 and 2, and the groundwater permeates some of the waste and fill (See Figure 8). The ponds contain about 24,000 cubic yards of waste and fill, and about 25,000 cubic yards of underlying contaminated soil. Total VOCs detected in the fill and underlying soil ranged up to 53,519 mg/kg, with PCE as the primary VOC in the till deposits (PCE up to 38,000 mg/kg). Total semi-volatile organic compounds (SVOCs) ranged up to 10,924 mg/kg, with diphenyl sulphone and 1,2,-dichlorobenzene as the primary SVOCs. Mirex and other pesticide chemicals were found at concentrations up to 938 mg/kg. Higher concentrations are found at depth and oil sheens have been observed in soil borings. Ponds 1 and 2 are considered to be a major, ongoing source of contaminant migration to groundwater.

Pond 3

Former Pond 3 covers about 2.9 acres and contains approximately 69,000 cubic yards of waste and fill. Neutralized sludge materials within the former pond range from 1 to 4 feet thick, and the materials have a low hydraulic conductivity. Groundwater is encountered 2 to 5 feet below ground surface and permeates some of the fill. Total VOCs detected in the fill and underlying soil ranged up to 17 mg/kg, with PCE as the primary VOC in the till deposits. Total SVOCs ranged up to 12 mg/kg, with diphenyl sulphone, phenol, and benzoic acid found. Mirex and other pesticide chemicals were found at concentrations up to 4 mg/kg. Pond 3 is not believed to be a major ongoing source of contaminant migration to groundwater.

Pond 4

Former Pond 4 covers about 1.3 acres and contains approximately 19,100 cubic yards of waste and fill. Neutralized sludge materials within the former pond range from 1 to 9 feet thick, and most of the pond has a thick soil cover. Groundwater is encountered 3 to 7 feet below ground surface and permeates some of the fill. Total VOCs detected in the fill and underlying soil ranged up to 98 mg/kg, with acetone as the primary VOC in the till deposits, along with PCE and benzene. Total SVOCs ranged up to 29 mg/kg, with diphenyl sulphone, 1,2,-dichlorobenzene, and benzoic acid as the primary SVOCs. Mirex was found at concentrations less than 1 mg/kg. Pond 4 is not believed to be a major ongoing source of contaminant migration to groundwater, although additional downgradient groundwater sampling is planned.

Pond 7

Former Pond 7 covers about 0.8 acres and contains approximately 10,600 cubic yards of waste and fill. Neutralized sludge materials within the former pond range from 2.5 to 9 feet thick. The sludge materials are found at or near the surface of the former pond because Nease Chemical was unable to completely cover and fill Pond 7 due to the low bearing strength of the sludge. Groundwater is encountered 2 to 5 feet below ground surface and permeates some of the waste. Total VOCs detected in the fill and underlying soil ranged up to 164 mg/kg, with benzene as the primary VOC in the sludge. Total SVOCs ranged up to 1,200 mg/kg, with diphenyl sulphone as the primary SVOC. Mirex and other pesticide chemicals were found at concentrations up to 22 mg/kg. Pond 7 is not believed to be a major ongoing source of contaminant migration to groundwater, although additional downgradient groundwater sampling is planned.

5.6.2 Soil (Including Exclusion Areas)

Soil data was collected from test pits and soil borings during the RI. The soil in Exclusion Areas A and B was extensively investigated because these areas were historically suspected source areas and previous response actions (discussed in Section 2.3) resulted in the removal of highly contaminated soil and drums from these areas. A summary of key findings includes:

- The primary area of chemically contaminated soil is limited to the old Nease facility. However, because of construction of some of the interim remedial measures after the RI sampling, the exact distribution of soil contaminants must be confirmed.

- The highest contaminant concentrations in soils (outside of the former neutralization ponds) were found in Exclusion Areas A and B (despite the previous response actions, there are some residual contaminants in these areas), and the former production area (especially northwest of Ponds 1 and 2). VOCs in these areas appear to increase with depth. The primary VOCs detected were PCE, 1,1,2,2-TCA, TCE and benzene. Total VOC ranges by depth are:

    - 0 to 0.5 feet - non-detect to 1.4 mg/kg

  - 0.5 to 3.5 feet - non-detect to 6.5 mg/kg
  - 3.5 to 6.5 feet - non-detect to 18.7 mg/kg

- Mirex was detected, primarily in shallow soil. Mirex detected below 0.5 feet is primarily limited to Exclusion Areas A and B, and the former production area (especially northwest of Ponds 1 and 2). Where it is found at depth, mirex levels in soil generally decrease with depth:

  - 0 to 0.5 feet - non-detect to 2,080 mg/kg
  - 0.5 to 3.5 feet - non-detect to 126 mg/kg
  - 3.5 to 6.5 feet - non-detect to 32.8 mg/kg

5.6.3 Overburden Groundwater

A brief description of the geological characteristics of the overburden (shallow) groundwater unit is found in Section 5.2. This discussion will focus on the extent of chemical contamination. The area of overburden groundwater impacts from VOCs is shown on Figure 9. While SVOCs have also been detected in groundwater, VOCs are the primary risk-drivers. The eastern VOC plume is about 750 feet in length and centers around and downgradient of Ponds 1 and 2. The eastern extent of the plume is limited by the relatively low permeability and the thinning of the overburden on the Crane-Deming property, where bedrock approaches the surface and the shallow groundwater discharges at the Crane-Deming seep. Contaminant concentrations near Ponds 1 and 2 have been detected at levels greater than 100 parts per million (ppm) of total VOCs. Other groundwater contamination has been detected in discreet areas in the overburden in the southern part of the Site. The southern shallow plume seems to be unrelated to the known source areas.

5.6.4 Bedrock Groundwater

A brief description of the geological characteristics of the bedrock (deep) groundwater unit is found in Section 5.2. This discussion will focus on the extent of chemical contamination. Bedrock groundwater impacts from VOCs are shown on Figure 10. The VOCs in the MKS extend for about 1,700 feet from the source areas towards the east. The downgradient extent of the plume appears to be limited because the deep flow turns north as it enters and mixes with flow in the buried bedrock valley of the MFLBC.

Like the overburden groundwater, concentrations in the bedrock groundwater are highest near Ponds 1 and 2, where they exceed 100 ppm of total VOCs. As discussed in Section 5.5.2, numerous VOCs have been found in groundwater at the Site. The most significant constituents in the bedrock groundwater plume include the chlorinated ethene and ethane classes of compounds, as well as benzene and chlorobenzene. These contaminants seem to comprise well over 90% of the mass of organic compounds found. Comparison of the 1995-1996 data provided in the RI to more recent 2003 data indicates that the extent of groundwater impacts has not expanded and that concentration reductions appear to have occurred within the plume.

DNAPL has been observed in several wells on-site that are located in proximity to Ponds 1 and 2. The DNAPL does not appear in discrete pools, rather it appears more sporadically. Horizontal and/or vertical migration of DNAPL may have occurred through the bedding planes or fractures. Additionally, concentrations of DNAPL chemicals have been detected at greater than 1% of their solubility in other wells. The primary source of DNAPL is not known, but it is expected that DNAPL chemicals were contained in Ponds 1 and 2.

The FS contains an extensive evaluation of natural attenuation. It assesses the degradation chemistry of the COCs (including examining "parent" and "daughter" compounds, and their relationships along the length of the plume), and evaluates biodegradation mechanisms. Historical data trends were reviewed and biodegradation modeling was conducted. Additionally, geochemical indicators (dissolved oxygen, oxydation-reduction potential, nitrate, sulfate, chloride, etc.) were evaluated. While more data is desirable, the lines of evidence support that natural attenuation is occurring at OU 2.

6.0 Current and Potential Future Land and Resource Uses

For purposes of the risk and ecological assessment for this Site, current and reasonably anticipated future land uses and current and potential beneficial groundwater uses were identified. Because there are potentially different exposure populations, the EA distinguishes between "on-facility" areas (the original Nease plant facility), adjacent "off-facility" areas (e.g., Crane-Deming property, residential property along State Route 14), and locations along MFLBC. Land use at Feeder Creek and the MFLBC will be described in the future ROD for OU 3.

Current land use at OU 2 of the Nease Chemical Site is industrial. The on-facility area is home to a decommissioned and largely demolished chemical manufacturing plant. Portions of the Site (including Ponds 1, 2, and 7, Exclusion Areas A and B, and the old plant facility) are currently surrounded by security fencing that precludes casual access to these areas. The remaining areas can only be accessed from the active railroad line or the Crane-Deming property which somewhat act as a buffer for the unfenced areas of the Site (including Ponds 3 and 4, and the Crane-Deming seep). The only remaining building on the old facility currently houses the groundwater treatment system used as part of the OU 1 interim remedial measures, and there are very few workers on the facility (and they are appropriately trained in health and safety requirements). The off-facility area to the east-northeast is industrial and houses the Crane-Deming building. ROC acquired the Crane-Deming property in late-1997, but continued to lease the property to Crane-Deming. Until mid-2005, Crane-Deming operated a pump manufacturing business (conducted within the building), and operated on a conventional work week.

Populations that were evaluated in the EA as having the potential for current exposure to the contaminants from OU 2 of the Site include: industrial workers (who perform general maintenance work around the groundwater treatment plant or on the interim remedial measures, or workers at the Crane-Deming facility that may occasionally perform activities outside of the building); trespassers; and off-facility residents (southeast of the Site).

Future land use is expected to remain the same, but portions of the property could potentially become residential. The facility is currently zoned for "heavy industrial" use, but local officials have indicated in meetings that portions of OU 2, particularly along State Route 14, might be developed for residential purposes. Areas along State Route 14 in close proximity to the facility are residential, and there will be clean, unrestricted portions of the OU upon completion of the clean up. ROC is currently evaluating leasing or selling the Crane-Deming property to a new industrial user. If the property is transferred, U.S. EPA will work with the new owner/lessee to develop "reasonable steps" so that operations are consistent with the remedy requirements of this ROD, and if applicable, the future requirements for OU 3. Populations that the EA evaluated for potential future exposure to the contaminants from OU 2 of the Site (in the absence of further remedial action) include: industrial workers (including construction workers); trespassers; and on- and off-facility residents (including farmers).

Based on information presented in the RI report, and confirmed by private well sampling, there are no known current receptors or users of contaminated groundwater at the Site. There are no current on-facility uses of groundwater. Some adjacent residential property owners use private groundwater wells, however it appears (based on sampling) that the wells are unaffected by Site contaminants. ROC has indicated a willingness to conduct additional, confirmatory residential well sampling as part of the PDI (the PDI will evaluate the potential for vapor intrusion as well). There is no groundwater use at the Crane-Deming plant, although there appears to be a sump inside the building where groundwater may seep in and accumulate. ROC has submitted recent sampling results indicating that no contaminants were detected in water from the sump. In the past, the owner of Dunlap Disposal, a facility east of Crane-Deming indicated that a commercial well found on that property was not in use, and was not likely to be used in the future. This will be reconfirmed. Public water supply is available in the vicinity from the City of Salem. Potential future groundwater use includes installation of groundwater wells for drinking water or industrial purposes (which will need to be prevented until remedial goals are attained). Because the levels of VOCs are high in some portions of the aquifer, any future land use will need to consider the potential for vapor intrusion.

7.0 Summary of Operable Unit Risks

ROC, with oversight by U.S. EPA and Ohio EPA, prepared a baseline human health risk assessment and an ecological risk assessment for the Nease Site to evaluate potential risks to human health and the environment if no action was taken. This process characterizes current and future threats or risks to human health and the environment posed by contaminants at the Site. The risk assessment provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of the baseline human health risk assessment and the ecological risk assessment for OU 2.

In accordance with U.S. EPA guidance on preparing RODs, the information presented here focuses on the information that is driving the need for the response action at the OU and does not necessarily summarize the entire baseline human health or ecological risk assessment. The

information in this ROD focuses on OU 2, although the assessment was conducted for the entire Site. Further information is contained in the risk assessment document, entitled *Endangerment Assessment for the Nease Chemical Company, Salem, Ohio Site* (April 2004, with errata pages September 2004) (the "EA"), included in the Administrative Record for the site.

7.1 Summary of Human Health Risk Assessment

The human health risk assessment evaluated the potential risks that could result to people from exposure to the contaminants at the Site. The human health risk assessment conducted at this Site used Risk Assessment Guidance for Superfund (RAGS) and other supplemental guidances to evaluate human health risks. The risk assessment evaluated the risks associated with both reasonable maximum exposure (RME) and central tendency scenarios. Based on the current and anticipated future land use at the site, the EA considered the risks associated with several land use scenarios and receptors. Figure 4 shows the CSM used in the human health risk assessment.

Although the EA considers the entire Site, for purposes of selecting the remedy for OU 2, the FS and ROD for OU 2 is considering only the OU 2 media, which include the on-facility and off-facility groundwater and soil (including surface soil in the State Route 14 drainage ditch). Feeder Creek and MFLBC media (surface water, sediments, floodplain soil, fish, beef, and milk) are included in OU 3 and will be addressed in the future with an FS and ROD for OU 3.

7.1.1 Identification of Contaminants of Concern

A variety of contaminants including pesticides, inorganics, volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs), and media (soil, sediment, surface water, groundwater, and air) were sampled at the Site. As part of the human health risk assessment, the EA identified a number of chemical contaminants of potential concern that were carried through the risk assessment evaluation. This section focuses on only those contaminants of concern that drive the need for remedial action at OU 2.

Contaminants of concern (COCs) are compounds that are present at the site in sufficient quantities to present an unacceptable risk to human health or the environment. COCs were identified by the following screening process:

- Samples from the various media present – including air, surface water, groundwater, sediment, and soil were analyzed for a variety of contaminants.

- Based on available data, 155 chemicals detected at least once in the sampled media were retained for further evaluation.

- The 155 chemicals were evaluated for selection as a chemicals of potential concern (COPCs) based on the following criteria: (1) the frequency of detection; (2) whether the chemical is facility-related; (3) availability of toxicity data; and (4) a concentration-toxicity screen.

- In summary, 49 chemicals were retained for consideration in the quantitative risk assessment in at least one environmental medium.

The primary risk-driving COCs at OU 2 are mirex, and the VOCs: 1,1,2,2-TCA; PCE; benzene; 1,2-DCA; chlorobenzene; 1,2,-DCE; and vinyl chloride. The primary media of concern are soil and groundwater. Data usability was addressed in the EA, and all data used in the risk assessment were found suitable for use.

Table 2 summarizes the primary risk-driving contaminants in the soil and groundwater at the Site, as well as the range of detected concentrations, the frequency of detection and the exposure point concentration for each contaminant of concern. Note that some of the contaminants retained in the risk assessment were detected in media within OU 2, but did not present unacceptable risks in those media. In addition, some inorganic chemicals (iron, manganese, arsenic) were found in soil and/or groundwater at levels that might present unacceptable risks under some exposure conditions. However, the levels are consistent with measured or literature background levels. As a result, information on those other contaminants are not included in Table 2, but can be found in the EA.

7.1.2 Exposure Assessment

The risk assessment evaluated several exposure pathways for on-facility and off-facility exposure in both a current and a reasonably anticipated future use scenario. An exposure pathway is a means by which a person may come in contact with site contaminants. Section V of the EA contains the exposure assessment for the site. The exposure assessment estimates the magnitude, frequency, duration, and routes of exposure to the COPCs at the site, and describes all assumptions, data and methods used to evaluate the potential for human exposure to the site contaminants. Table 3 shows the exposure pathways that were evaluated in the risk assessment. The exposure pathways evaluated were:

Current Use Scenarios

Current Use Scenario – On-Facility Locations

Current on-facility trespasser exposures of COPCs in the air and soil were evaluated for the following exposure pathways: incidental ingestion of soils; dermal contact with soil; inhalation of soil dust; and inhalation of outdoor air.

Current Use Scenario – Off-Facility Locations

Current off-facility industrial worker exposures to COPCs in air, soil, and groundwater were evaluated for the following exposure pathways: incidental ingestion of soils; dermal contact with soil; and inhalation of air above the off-facility seep (west of the Crane-Deming building).

Current off-facility residential exposures to COPCs in air, soil, and groundwater were evaluated for the following exposure pathways: incidental ingestion of soils; dermal contact with soil; inhalation of soil dust; inhalation of outdoor and indoor air; and ingestion of game and vegetables.

Future Use Scenarios

Future Use Scenario – On-Facility Locations

Future on-facility trespasser exposures to COPCs are the same as those under the current scenario.

Future on-facility industrial worker exposures to COPCs in air, soil and groundwater were evaluated for the following exposure pathways: ingestion of groundwater; dermal contact with groundwater while showering; inhalation of indoor air while showering; incidental ingestion of soils; dermal contact with soil; and inhalation of indoor air.

Future on-facility construction worker exposures to COPCs in air, surface soils, and subsurface soil (up to 20 feet below ground surface) were evaluated for four pathways: incidental ingestion of soils; dermal contact with soil; inhalation of soil dust due to construction activities; and inhalation of organic vapors due to construction activities.

Future on-facility residential exposures to COPCs in air, groundwater, and soils were evaluated for the following exposure pathways: ingestion of groundwater; dermal contact with groundwater; inhalation of indoor air while showering; incidental ingestion of soils; dermal contact with soil; inhalation of soil dust; inhalation of outdoor and indoor air; and ingestion of homegrown vegetables.

Future Use Scenario – Off-Facility Locations

Future off-facility industrial worker exposures to COPCs in air, groundwater, and soil were evaluated for the following exposure pathways: ingestion of groundwater; dermal contact with groundwater; inhalation of indoor air while showering; incidental ingestion of soils; dermal contact with soils; inhalation of air above the groundwater seep; and inhalation of indoor air.

Future off-facility residential exposures to COPCs in air, groundwater, soils, and sediments were evaluated for the following exposure pathways: ingestion of groundwater; dermal contact with groundwater; inhalation of indoor air while showering; incidental ingestion of soils; dermal contact with soil; inhalation of soil dust; inhalation of outdoor and indoor air; ingestion of game; and ingestion of home-grown vegetables.

7.1.3 Toxicity Assessment

U.S. EPA has conducted toxicological assessments on many frequently occurring environmental chemicals and has developed standardized toxicity values for use in the risk assessment. In general, U.S. EPA derived toxicity values were used in the EA. These toxicity values - reference doses (RfDs) and reference concentrations (RfCs) for noncarcinogenic effects, and cancer slope factors (CSFs) and unit risks for known, suspected, or possible carcinogens are published by U.S. EPA in Health Effects Assessment Summary Tables (HEAST) and the on-line Integrated Risk Information System (IRIS).

However, in-depth evaluations were conducted by ROC for mirex, photomirex and kepone (related chlorinated pesticides or the breakdown chemicals) because of the significance of these chemicals at the Site and the toxicological data bases that exist for these chemicals. Based on a toxicological literature review, ROC requested a revision to the mirex RfD that was in use in 1992. Subsequently, U.S. EPA has developed a verified RfD for mirex (based on a study of chronic liver and thyroid effects in rats), which was used in the EA. In 1987, U.S. EPA had classified mirex as in Group B2, probable human carcinogen and reported a CSF. In 1992, ROC submitted information relevant to the carcinogenic classification and CSF for mirex. Based on ROC's requested toxicity reassessment, U.S. EPA prepared issue papers and provisional revisions of the mirex CSF. The EA, particularly Appendix D, contains abundant information related to the reassessment of mirex toxicity. Based on the extensive review, U.S. EPA determined a CSF for mirex for use in the human health risk assessment.

Additionally, U.S. EPA has not developed toxicity criteria (Agency verified RfD or CSF values) for photomirex or kepone. Based on ROC's review of the toxicological data for photomirex (a breakdown product of mirex), U.S. EPA believes that photomirex is more toxic than mirex (based on a reproductive toxicity study in the rat). A derived RfD for photomirex was used for the EA. Based on the literature review, photomirex may qualify as Group D carcinogen, not classifiable as to human carcinogenicity. Based on ROC's review of the toxicological data for kepone (a related pesticide), a chronic oral RfD was derived (based on a mouse study). After evaluation of the literature review, and consultation with other scientists, U.S. EPA Region 5 determined that the available data were inadequate to allow evaluation of the carcinogenic potential of kepone at this time.

The toxicity information of the other chemicals found at the Site can be found in Appendix A of the EA. The toxicological concerns of many of the primary, risk-driving VOC contaminants are similar. Vinyl chloride and benzene are Group A, human carcinogens; 1,2-DCA is a Group B2, probable human carcinogen; 1,1,2,2-TCA is Group C, possible human carcinogen. The non-cancer effects of the VOCs include adverse effects on liver, kidney, central nervous system, respiratory system, and skin.

7.1.4 Risk Characterization

U.S. EPA's risk guidance identifies a target cancer risk range of 10^{-4} to 10^{-6} (1 in 10,000 to 1 in a million) excess cancer risk for Superfund sites. If site contamination poses a risk of less than 10^{-6}, there is generally no need for action. Cancer risks greater than 10^{-4} generally require action to reduce and/or abate the risk, and cancer risks between 10^{-4} and 10^{-6} present a potential cause for remedial action. U.S. EPA's guidance also indicates that a non-cancer hazard index exceeding 1.0 generally is a cause for action to reduce and/or abate the potential non-cancer risks associated with site contamination, while a hazard index less than 1.0 generally does not require action. The major risks from OU 2 are discussed below and summarized in Table 4.

Location	Scenario	Hazard Index - RME	Cumulative Excess Lifetime Cancer Risks - RME				
			Soil: Ingestion, Dermal Contact and Food	Groundwater: Ingestion, Dermal Contact and Showering	Outdoor Air and/or Dust Inhalation	Indoor Air Inhalation	TOTAL CANCER RISKS
On-Facility	Industrial Worker (future)	$2x10^{3}$	$4.6x10^{-5}$	$2.3x10^{-1}$	NA	$6.5x10^{-4}$	$2.3x10^{-1}$
	Construction Worker (future)	$5.4x10^{1}$	$1.6x10^{-6}$	NA	$7.3x10^{-5}$	NA	$7.5x10^{-5}$
	Residential (future)	$3.5x10^{3}$	$3x10^{-4}$	$5.4x10^{-1}$	$1x10^{-6}$	$1.6x10^{-4}$	$5.4x10^{-1}$
Off-Facility	Industrial Worker (future)	$7.1x10^{1}$	$1.1x10^{-6}$	$4.9x10^{-3}$	$3x10^{-10}$	$4.8x10^{-6}$	$4.9x10^{-3}$
	Residential (future)	7.2	$1.7x10^{-4}$	$6.8x10^{-5}$	$1x10^{-6}$	$1x10^{-8}$	$2.4x10^{-4}$

Table 4: Summary of Potential Human Health Risk

- None of the current use scenario exposure pathways resulted in potential risks exceeding U.S. EPA's acceptable risk range.
- None of the calculated potential risks for the future trespasser exceed U.S. EPA's acceptable risk range.
- Exposure to groundwater (primarily VOCs) is responsible for the majority of the unacceptable potential risk calculated for the hypothetical future resident and industrial worker scenarios.

- Unacceptable non-cancer risks to the construction worker are also due to exposures from the inhalation of construction dust and vapors and incidental ingestion of soil.

- None of the calculated potential risks for industrial worker exposure to surface soil exceed U.S. EPA's acceptable risk range.

- Concentrations of arsenic, manganese, and iron, which are major contributors to some of the calculated potential risks, are consistent with literature background.

7.2 Summary of Ecological Risk Assessment

ROC conducted an ecological risk assessment for OU 2 of the Nease Site to help understand the actual or potential risks to the environment posed by the contaminants at the OU. This assessment can be found in Chapter X of the EA. For purposes of the ecological risk assessment, the assessment was conducted for the "on-property" ecological resources. The "on-property" area is defined as the Nease Site except the MFLBC and its floodplains. This encompasses about 74 acres including the old Nease facility (about 43 acres), the Crane-Deming property (about 31 acres), a portion of Feeder Creek, and areas adjacent to the Conrail line.[4] Although a portion of Feeder Creek was included in the ecological risk assessment for the on-property areas, as discussed in Section 4 of this ROD, Feeder Creek will be evaluated as part of OU 3.

The ecological risk assessment considers those chemicals that were detected in surface water, sediment, and/or surface soils. The assessment incorporates both measured and modeled estimates of exposure, the available guidance and published information on the environmental fate and toxicities of the chemicals evaluated, and the expected/known habitats and likely species in the area. More detailed information can be found in Chapter X of the EA.

7.2.1. Site Characterization

The habitat in OU 2 of the Nease Site reflects the relatively developed nature of the property and surrounding area, and consists principally of (mowed and unmowed) grass uplands interspersed with successional forbs and shrubs. A few wooded areas are scattered throughout. Seasonal aquatic or semiaquatic habitat is provided by several intermittent streams and ditches. Small pockets of palustrine emergent wetland exist.

Wildlife species most likely to use the area are those adapted to developed/urban or field habitats. Mammalian species likely include fox, raccoon, opossum, rabbits, moles, voles, and shrews. Bird species likely include pigeons, mourning doves, crows, starlings, sparrows, robins, mockingbirds, marsh wrens, and an occasional woodpecker and hawk.

[4] The difference in acreage for the Nease facility and the Crane-Deming facility from that discussed in Section 1 reflects that the ecological assessment does not include developed areas in the assessment.

7.2.2 Selection of Chemicals for Evaluation

A total of 104 chemicals were detected in one or more media of concern (29 organic chemicals in surface water, 44 organic chemicals in surface soils, and 78 chemicals detected in sediments, including 55 organic and 23 inorganic chemicals. For each medium, the chemicals were screened to identify which might potentially contribute to ecological risk. Selection criteria included background concentrations, toxicological screening benchmarks, and the potential for bioaccumulation.

After the screening process, the following were retained for further evaluation in the ecological risk assessment: 11 of the 29 chemicals detected in surface waters; 29 of 55 organic chemicals detected in sediment; 22 of 23 inorganic chemicals detected in sediment; and 15 of 44 chemicals detected in surface soils. Table 5 shows the retained chemicals for each media. Mirex and its degradation product, photomirex are the principal ecological COCs.

7.2.3 Characterization of Exposure

U.S. EPA defines characterization of exposure as an evaluation of the interaction of stressors with one or more ecological components. The complete exposure pathways for biota include the surface water and sediment in the intermittent water bodies and surface soils in the on-property areas. Exposure routes include direct ingestion, consumption of contaminants in the food chain, or dermal contact. Three primary assessment endpoints were considered:

- Maintenance of viable populations of aquatic and/or semiaquatic species that might inhabit the water bodies.
- Maintenance of viable populations of soil dwelling invertebrates and terrestrial plants.
- Maintenance of viable populations of herbivorous, insectivorous, omnivorous and/or carnivorous birds and mammals that might inhabit the terrestrial habitat in the area.

Because of the complexity of ecosystems, receptor species were chosen to represent the larger biological community for the Nease Site ecological risk assessment. The following species were chosen for exposure modeling and risk characterization in the on-property area: Marsh Wren; Red-tailed Hawk; Meadow Vole; Northern Short-tailed Shrew; Racoon; and Red Fox. Also, aquatic and semiaquatic biota, terrestrial invertebrates, and plants were considered.

7.2.4 Characterization of Ecological Effects

U.S. EPA defines the characterization of ecological effects as the portion of an ecological risk assessment that evaluates the ability of a stressor to cause adverse effects under a particular set of circumstances. The ecological risk assessment for the Nease Site uses measurement endpoints to characterize potential effects for potential receptors. The measurement endpoints include

screening level toxicological benchmarks for lower trophic level biota and toxicological benchmarks for dietary ingestion.

Potential risks to lower trophic level biota were assessed by comparing concentrations at individual sample locations against toxicological benchmarks for that media. Risks to the six upper trophic level species (chosen to be representative) were calculated based on an area-wide assessment using mean chemical concentrations in the various media. Hazard quotients were calculated by comparing the chemical concentration in the media against the corresponding toxicological benchmarks for that media.

7.2.5 Risk Conclusions

The ecological risk assessment is a conservative screening-level assessment intended to characterize the potential risks to on-property ecological receptors based on the available ecological, exposure and toxicological information. A general summary of the risk characterization indicates:

- Hazard quotients exceeding one were calculated for upper trophic wildlife receptors as a result of exposure to mirex in surface soil and through diet. However, it was conservatively assumed the these receptors acquire their entire diet from the on-facility area, while in reality the home range of some these receptors is larger.

- Receptors with small home ranges, such as the shrew, vole, and marsh wren have hazard quotients above one as a result of exposure to mirex in the diet.

- Potential risks to lower trophic level biota were assessed as being very low. However, there are no toxicological benchmarks for mirex and photomirex, which are detected at the highest frequency and concentrations. Without benchmarks, the mirex-related risks to soil dwelling lower trophic level biota cannot be predicted.

7.3 Basis for Action

A response action at OU 2 of the Nease Chemical Site is warranted because, using RME assumptions, the cumulative excess lifetime carcinogenic risk to human health exceeds 10^{-4} for the future residential and future industrial worker use scenarios at the on-facility portion of the Site (the old Nease facility) and for the future residential and future industrial worker scenarios at the off-facility portion of the Site. In addition, a hazard quotient of one is exceeded for the same use scenarios, as well as for the future on-facility construction worker. Finally, there are potential ecological risks to biota at the OU that may be exposed to mirex in the soil or through dietary uptake. The response action selected in this ROD is necessary to protect the public health or welfare or the environment from the actual or threatened releases of hazardous substances into the environment.

8.0 Remedial Action Objectives and ARARs

8.1 Remedial Action Objectives

Remedial Action Objectives (RAOs) provide a general description of what the proposed alternative will accomplish. For OU 2 of the Nease Site, RAOs were developed through a consensual process between U.S. EPA, Ohio EPA and ROC. The FS contains more detail on each RAO, including site-specific goals developed to address potential risks to human health and the environment. It is important to note that term "mitigate" refers to site-specific targets to achieve acceptable risk goals.

The following RAOs apply to this Site:

- RAO 1 - Mitigate future releases from and potential exposures to COCs contained within former Ponds 1 and 2.
- RAO 2 - Mitigate future exposures to COCs contained within former Ponds 3, 4, and 7.
- RAO 3 - Mitigate shallow groundwater discharges.
- RAO 4 - MKS groundwater receptor protection/restoration.
- RAO 5 - Protect on-property residential and groundwater receptors.
- RAO 6 - Mitigate future worker and ecological exposures to soil.

The preliminary remediation goals (PRGs) to achieve the RAOs for this Site were generated consistent with the NCP and U.S. EPA's RI/FS guidance. PRGs finalized within this ROD are then known as remediation goals. Remediation goals (and PRGs prior to ROD completion) for soil and groundwater are used as criteria, or points of reference within the ROD.

The following remediation goals are established for OU 2 of the Nease Site:

8.1.1 Groundwater

The U.S. EPA maximum contaminant levels (MCLs) or Ohio EPA MCLs (where more stringent) listed in Table 6 are considered to be remediation goals for OU 2 groundwater. However, MCLs provided for individual constituents may not account for cumulative risks posed by mixtures of constituents. Therefore, completion of groundwater remedial action at the Site will require an evaluation of the cumulative residual risk.

8.1.2 Soil

Since there are no promulgated soil standards, the remediation goals for OU 2 soils have been developed based on the EA. In particular, a range of potential remediation goals for surface soil have been calculated based on potential ecological exposures to mirex, since ecological receptors are the most sensitive.

The approach used to develop a range of PRGs for mirex in surface soil is presented in the FS. The PRGs were calculated for upper trophic level biota by back calculating a soil concentration that would result in a hazard quotient of one based on food chain modeling. In completing the calculations, it was assumed that none of the on-site soil was remediated. Adjustments were made for wide-ranging receptors to reflect the size of the Site compared to the size of their home range, and included potential exposure to floodplain soil at MFLBC. No adjustments to the dietary composition for home range were made for the less wide-ranging receptors such as meadow vole, short-tailed shrew and marsh wren. Table 7 shows the calculated mirex soil concentrations resulting in a hazard quotient of one.

Receptor	Meadow Vole	Short-tailed Shrew	Racoon	Red Fox	Marsh Wren	Red-tailed Hawk
NOAEL[5] based	2,935	186	2,600	1,220	2,150	270,000
LOAEL[6] based	14,675	930	13,000	3,700	10,750	1,350,000

Table 7: Soil Mirex Concentration (ug/kg) Resulting in a Hazard Quotient of One

The range of potential PRGs for upper trophic level receptors was reviewed considering the primary ecological assessment endpoints (especially the goal to maintain viable populations in the terrestrial habitat). Based on this review, and considering the uncertainties in the ecological risk assessment and the concern with population effects, a remediation goal of 1,000 ug/kg of mirex in surface soil has been determined. All surface soils exceeding the remediation goal of 1,000 ug/kg of mirex will be included in response actions established to meet RAO 6 - Mitigate Future Worker and Ecological Exposures to Soil. The remediation goal of 1,000 ug/kg of mirex in surface soil is protective of potential human exposures and protective of groundwater. It is anticipated that upon completion of remedial construction, the average surface soil concentration of mirex at OU 2 will be below all of the LOAEL based, and all of the NOAEL based PRGs (except possibly the NOAEL based PRG for the short-tailed shrew).

[5] No observed adverse effects level - The highest tested dose of a substance that has been reported to have no adverse health effects on the target organism.

[6] Lowest observed adverse effects level - The lowest tested dose of a substance that has been reported to cause adverse health effects on the target organism.

8.2 Applicable or Relevant and Appropriate Requirements (ARARs)

Section 121(d) of CERCLA requires that Superfund remedial actions at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations which are collectively referred to as ARARs, unless such ARARs are waived under CERCLA Section 121(d)(4). Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a Superfund site. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that, while not applicable, address problems or situations sufficiently similar to those encountered at the Superfund site that their use is well-suited to the particular site.

In addition to ARARs, guidance materials that have not been promulgated or regulatory standards that are not applicable or relevant and appropriate may be considered (including local/county requirements); these are referred to as items "to be considered" (TBC). While TBCs may be considered along with ARARs, they do not have the status of ARARs.

The ARARs and TBCs identified for the Site are categorized into three types: chemical-specific, action-specific and location-specific. Chemical-specific ARARs establish the acceptable amounts or concentrations of a chemical that may be found in, or discharged to the ambient environment. Action-specific ARARs are technology- or activity-based performance or design requirements associated with the potential remedial activities being considered. Location-specific ARARs establish requirements that protect environmentally-sensitive areas and other areas of special interest.

A list of the potential ARARs and TBCs identified for OU 2 of the Nease Site are presented in Tables 6 and 8.

8.2.1 Identification of Federal ARARs

This section presents a summary of those federal regulations that may be found to be applicable or relevant and appropriate to the Nease Chemical operable unit 2, specifically:

<u>The Comprehensive Environmental Response, Compensation and Liability Act</u>
CERCLA, last amended in January 2002, provides the U.S. EPA Administrator the authority to respond to any past disposal of hazardous substances and any new uncontrolled releases of hazardous substances. Within CERCLA, a trust fund has been established for cleanup of abandoned past disposal sites and leaking underground storage facilities, as well as the authority to bring civil actions against violators of this act. The National Contingency Plan (NCP), which guides removal and remedial actions at Superfund sites, was developed subject to this act.

The Superfund Amendments and Reauthorization Act (SARA) of 1986 extensively amended CERCLA. The major goals of SARA were to include more public participation, and to establish more consideration of State clean-up standards, with an emphasis on achieving remedies that permanently and significantly reduce the mobility, toxicity, or volume of wastes.

The Resource Conservation and Recovery Act

RCRA regulates the management and land disposal of hazardous waste and solid waste material and the recovery of materials and energy resources from the waste stream. RCRA regulates the generation, transportation, treatment, storage and disposal of hazardous wastes, as well as solid waste disposal facilities. RCRA applies to remedial actions that include disposal, treatment, storage or transportation of regulated wastes. Remedies that include on-site disposal of hazardous wastes will be required to meet RCRA design, monitoring, performance, and closure standards. Off-site transportation of regulated wastes, whether as part of a remedial action or as generated during the investigation, will require use of the manifest system, a RCRA-licensed transporter and proof of acceptance at a licensed facility approved for the particular wastes.

The Hazardous and Solid Waste Act Amendments

The Hazardous and Solid Waste Act Amendments (HSWA) of 1984 impose new and more stringent requirements on hazardous waste generators, transporters, and owner/operators of treatment, storage, and disposal facilities. Land disposal restrictions, as described in 40 C.F.R. part 268, identify hazardous wastes that are restricted from land disposal and define those limited circumstances under which an otherwise prohibited waste may continue to be land disposed.

The Clean Water Act

The Federal Water Pollution Control Act, amended by the Clean Water Act of 1977, was last amended October 1992, and is commonly referred to as the Clean Water Act (CWA). Federal Ambient Water Quality Criteria documents have been published for 65 priority pollutants listed as toxic under the CWA. These criteria are guidelines that may be used by states to set surface water quality standards. Although these criteria were intended to represent a reasonable estimate of pollutant concentrations consistent with the maintenance of designated water uses, states may appropriately modify these values to reflect local conditions. Under SARA, however, remedial actions must attain a level or standard of control that will result in surface water conditions equivalent to these criteria, unless a waiver has been granted.

The water quality criteria are generally represented in categories that are aligned with different surface water-use designations. These criteria represent concentrations that, if not exceeded in surface water, should protect most aquatic life against acute or chronic toxicity. For many chemical compounds, specific criteria have not been established because of insufficient data. The criteria are used to calculate appropriate limitations for discharges to surface water. These limitations are incorporated in the National Pollutant Discharge Elimination System (NPDES) permits.

The provisions of the CWA are potentially applicable to uncontrolled groundwater discharges to surface water bodies and to remedial actions that include a discharge of treated water to surface water.

The Safe Drinking Water Act

The Safe Drinking Water Act of 1974 (SDWA), regulates the quality of water collected, distributed or sold for drinking purposes. Standards are set for MCLs permissible in water delivered to any user of public drinking water. The SDWA also has been broadened to protect groundwater and public drinking water supplies against contamination.

National primary drinking water standards established under the SDWA are promulgated as MCLs that represent the maximum allowable levels of specific contaminants in public water systems. MCLs are generally based on lifetime exposure to the contaminant for a 70 kg (154 pound) adult who consumes two liters (0.53 gallons) of water per day.

The SDWA provides for primary drinking water regulations to be established for maximum contaminant level goals (MCLGs), with MCLs as close to MCLGs as feasible. MCLGs are non-enforceable health goals at which no known or anticipated adverse effects on the health of persons would be expected to occur, thus allowing an adequate margin of safety. MCLGs only serve as goals for U.S. EPA in the course of setting MCLs and, therefore, are initial steps in the MCL rule-making process.

MCLs for contaminants of concern at OU-2 are established as remediation goals for the Site.

The Clean Air Act

The Clean Air Act (CAA), with amendments through December 1991, was enacted to protect and enhance the quality of air resources to protect public health and welfare. The CAA is intended to initiate and accelerate national research and development programs to achieve the prevention and control of air pollution. Under the CAA, the Federal Agencies are to provide technical and financial assistance to state and local governments for the development and execution of their air pollution programs. The U.S. EPA is the administrator of the Act and is given the responsibility to meet the objectives of the Act. The Act establishes emission levels for certain hazardous air pollutants that result from treatment processes.

Requirements of the CAA are potentially applicable to remedial actions that result in air emissions, such as excavation and treatment activities.

Floodplains/Wetlands

Appendix A of 40 C.F.R. Part 6 describes the requirements for floodplain/wetlands review of proposed U.S. EPA actions. These regulations are potentially applicable for work to be done in the creeks or other wetland areas, and for remedial activities within the floodplain, such as the near Feeder Creek.

8.2.2 Identification of State ARARs

The purpose of this section is to identify ARARs that exist based on Ohio state regulations that must be complied with when performing a remedial action. The agency charged with developing and enforcing environmental regulations for Ohio is the Ohio EPA. A list of the potential ARARs and TBCs identified for OU 2 of the Nease Site are presented in Tables 6 and 8.

9.0 Description of Alternatives

Following development of the RAOs, a screening and evaluation of potential remedial alternatives was conducted in accordance with CERCLA and the NCP in the FS Report.

In simplest terms, OU 2 has four main problems that represent different areas/media on the Site that require a distinct remedial approach. These are:

- Ponds 1 and 2;
- Remaining ponds and soil;
- Shallow (overburden) groundwater; and
- Deep (bedrock) groundwater.

First, a number of technology types and process options[7] for addressing the main problem areas were identified and screened (evaluated) based on technical implementability. Those retained after the first screening were then evaluated based on the expanded criteria of effectiveness, implementability and relative cost. The technology types and representative process options[8] retained following the screening process were then combined to develop potential remedial alternatives for the site. The alternatives discussed below were selected for detailed analysis and subjected to evaluation under nine NCP criteria. Five remedial alternatives were evaluated.

9.1 Description of Remedy Components

Each of the five alternatives is briefly described below. More detailed information about each of the alternatives can be found in the FS Report, which is included in the Administrative Record for the Site.

[7] An example of a technology type is "soil containment" and an example process option within that technology type is "capping."

[8] Selection of a particular process option as representative was done to streamline the development of potential remedial alternatives. A process option not selected as representative still could be considered during remedial design if its technology type is part of the selected remedial alternative.

Alternative A: No Further Action[9]

(1) *Description of Alternative*: Under this alternative, no further remediation would occur at OU 2. Because the existing shallow groundwater systems are operating under an enforcement agreement, this option includes continued operation of LCS 1 and 2 (See Sections 2.3 and 4.1 above). No monitoring would be conducted to assess the overall condition of OU 2 over time, although the operating system would be monitored for influent and effluent conditions. Naturally-occurring processes would occur on their own, over time. No institutional controls would be put in place. Evaluation of the No Action or No Further Action alternative is required by the NCP and provides a baseline against which the other potential remedial alternatives are evaluated.

(2) *Treatment Technologies and Materials they will Address*: The treatment associated with this alternative would be limited to treatment of chemical contamination of a portion of the shallow groundwater. Flow from LCS-1 is directed to the on-site treatment facility comprised of a stripper with a carbon filter, while flow from LCS-2 is disposed off-site due to the high iron content. The two systems are not currently capturing all contaminated shallow groundwater.

(3) *Containment Component*: There is no containment component associated with this remedy.

(4) *Costs*: The estimated present worth of this alternative is $4,700,000. This estimate is based on a 30-year period of operation and maintenance, using a discount rate of 5% for all present worth calculations. The total estimated cost is provided in 2005 dollars.

Alternative B

(1) *Description of Alternative* (See Figure 11 for a conceptual layout):

- Ponds 1 and 2 - Ponds 1 and 2 would be treated in-situ with a process called soil mixing/ stripping, stabilization and solidification (S/S/S). The process involves a multi-step approach where chemicals are air stripped via soil mixing with air injection. After completion of the stripping phase, stabilization and solidification reagents (e.g., cement, bentonite, kiln dust) would be injected and mixed with the remaining soils and any residual contaminants. During all phases of treatment, vapors will be captured in a shroud placed over the work area and treated. Figure 12 shows a conceptual diagram of S/S/S on Ponds 1 and 2.

[9] The NCP recommends developing a "no action" alternative. However, circumstances at OU 2 are such that a "no further action" alternative is more appropriate. All groundwater at the Site is being addressed in this ROD. Some of the shallow groundwater was previously addressed, and interim response actions (discussed in Sections 2.3 and 4.1) are ongoing. Because the ongoing groundwater collection/treatment systems are governed by an enforceable AOC, and because ROC has been operating the systems for more than a decade, it was unreasonable to assume that the system operations would be terminated (a "no action" scenario).

- Remaining ponds and soil - The remaining ponds and soil (including drainage ditch soil) would be contained using either an impermeable geosynthetic membrane covered with clean soil, or only clean soil. It is estimated that about 11 acres will be covered with the combined impermeable membrane/soil cap. Most of this area would be to the west of the Conrail tracks and would include the treated Ponds 1 and 2, Pond 7, Exclusion Areas A and B and the soil areas around them to provide a continuous cover. The impermeable cap would also cover a small area east of the rail tracks, near the Crane-Deming seep. The goals of the combined cap are to prevent direct contact and to reduce rainwater infiltration, which will limit the volume of shallow groundwater to be treated. Other areas, such as Ponds 3 and 4, and soils that exceed the mirex remediation goal will be covered with clean soil to prevent contact.

- Shallow (overburden) groundwater - The easterly component of the shallow groundwater would be captured in a new collection trench (expected to be located east of the Conrail tracks) and pumped above ground for on-site treatment. Because the impermeable membrane may reduce infiltration sufficiently, this Alternative also has an option that allows a design modification for in-situ treatment through a series of cells in the trench that may consist of reactive iron, biotreatment and carbon (based on results of the PDI). The southern component of the shallow groundwater would be treated by injection of a slurry of nanoscale zero-valent iron (NZVI).

- Deep (bedrock) groundwater - The deep groundwater would be treated by injection of NZVI in the core of the plume (the areas of highest contamination near Ponds 1 and 2). NZVI treatment would possibly be followed by accelerated biological treatment if monitoring during the first few rounds of NZVI injections indicates that design performance standards might not be met by NZVI alone. Monitoring of natural attenuation will occur to ensure remediation of the far downgradient portion of the plume.

(2) *Treatment Technologies and Materials they will Address*: There is substantial treatment associated with this alternative. The S/S/S process will treat the contaminants in Ponds 1 and 2 that continue to act as a source of contamination to groundwater. While a PDI and treatability tests will be necessary to establish the design performance standards, it is expected that greater than 90% of the contaminants could be stripped from Ponds 1 and 2, while the mobility of the residuals would be substantially reduced by stabilization treatment.

Treatment of the eastern shallow groundwater would be through a conventional, ex-situ treatment facility using components such as air stripping and liquid and vapor phase carbon. Alternatively, if the design supports the modification, treatment of the eastern shallow groundwater would occur through staged, in-situ treatment cells. The change from ex-situ to in-situ treatment would be made during remedial design based on the results of the PDI and treatability tests. However, the goal to treat the shallow groundwater to meet the RAOs would remain the same.

Treatment of the southern shallow groundwater and the deep groundwater would be by NZVI. NZVI is a relatively new technology and is described in more detail in the FS. Described simply,

NZVI involves the injection of a slurry of nanoscale (microscopic) iron particles which are expected to remain suspended and flow with the groundwater (including into bedrock fractures). The iron particles provide a reactive surface area. Breakdown of the groundwater contaminants would be by a oxidation-reduction reaction (NZVI is the electron donor).

(3) *Containment Component*: As described above, there is a containment component associated with this remedy for the former ponds and areas of contaminated surface soil. The primary basis for the cover is to prevent contact with residual contaminants (particularly for ecological receptors and mirex contamination). The combined impermeable/soil cover will also have the benefit of reducing infiltration, which will limit the volume of contaminated shallow groundwater that requires treatment.

(4) *Costs*: The estimated present worth of this alternative is $18,960,000. This estimate is based on a construction period of a year or two for the S/S/S, cap and groundwater structures, up to 10 years of NZVI injection, and a 30-year period of operation and maintenance, using a discount rate of 5% for all present worth calculations. The total estimated cost is provided in 2005 dollars.

Alternative C

(1) *Description of Alternative*:

- Ponds 1 and 2 - Ponds 1 and 2 would be treated by thermal desorption. In this process, thermal wells are inserted into the waste area and heat from an electric current causes the soil around the wells to heat up. A silica blanket is placed over the area to minimize VOC and steam loss. Some of the waste is destroyed in-situ by the heated soil, while the other chemicals would be vaporized and drawn into the wells using vacuum capture. Extracted vapors would be treated.

- Remaining ponds and soil - The remaining ponds and soil (including drainage ditch soil) would be covered with clean soil. It is difficult to estimate the size of the soil cap because soil movement has occurred as a result of the interim clean up actions. A PDI is necessary to delineate areas that exceed the mirex soil remediation goal.

- Shallow (overburden) groundwater - The eastern shallow groundwater would be collected in a new collection trench and treated in-situ through a series of cells in the trench, similar to the in-situ option discussed in Alternative B. The southern component of the shallow groundwater would be treated by NZVI, the same as Alternative B.

- Deep (bedrock) groundwater - The deep groundwater would be treated by NZVI, the same as Alternative B.

(2) *Treatment Technologies and Materials they will Address*: There is substantial treatment associated with this alternative. The thermal desorption process will treat the contaminants in Ponds 1 and 2 that continue to act as a source of contamination to groundwater. Treatment of the

eastern shallow groundwater would be through a through a series of staged, in-situ treatment cells. Like Alternatives B and E, treatment of the southern shallow groundwater and the deep groundwater would be by NZVI.

(3) *Containment Component*: As described above (and the same as Alternatives D and E), there is a containment component of a clean soil cover associated with this remedy for the former ponds and areas of contaminated surface soil. The primary basis for the cover is to prevent contact with residual contaminants (particularly for ecological receptors and mirex contamination).

(4) *Costs*: The estimated present worth of this alternative is $24,650,000. This estimate is based on a construction period of a year or two for the thermal desorption, soil cover and groundwater structures, up to 10 years of NZVI injection, and a 30-year period of operation and maintenance, using a discount rate of 5% for all present worth calculations. The total estimated cost is provided in 2005 dollars.

Alternative D

(1) *Description of Alternative*:

- Ponds 1 and 2 - Ponds 1 and 2 would not be treated, waste would be managed by containment in place. A physical barrier would be constructed around the waste using: a low permeability cap (using clay or geosynthetic materials and soil); vertical barriers (such as a slurry wall); and a horizontal barrier below the former ponds (by injection of cement or bentonite grout at the top of the fractured Washingtonville Shale).

- Remaining ponds and soil - The remaining ponds and soil would be covered with clean soil, the same as Alternative C.

- Shallow (overburden) groundwater - The easterly component of the shallow groundwater would be collected in a new trench, pumped above ground at treated on-site, the same as in Alternative B. The southern component of the shallow groundwater would be treated by NZVI, the same as Alternative B.

- Deep (bedrock) groundwater - The bedrock groundwater would be pumped out through a series of deep extraction wells and treated ex-situ in a new or modified on-site groundwater treatment plant. Monitored Natural Attenuation would be the approach for the far downgradient portion of the plume.

(2) *Treatment Technologies and Materials they will Address*: There is no treatment of the waste materials in Ponds 1 and 2 associated with this alternative. Like Alternative B, treatment of the eastern shallow groundwater would be through a conventional, ex-situ treatment facility using components such as air stripping and liquid and vapor phase carbon. Like Alternatives B, C, and E, treatment of the southern shallow groundwater would be by NZVI. This alternative is

unique in its approach to treatment of the deep groundwater, which would be extracted through a series of wells and treated ex-situ in an on-site groundwater treatment plant.

(3) *Containment Component*: This alternative has the greatest reliance on containment to meet the RAOs. The waste materials and contaminated soils of Ponds 1 and 2 would be contained in place by construction of physical barriers around the waste. The conceptual design includes an impermeable cap, vertical barriers and a horizontal barrier above the bedrock. Additionally, as with Alternatives C and E, there is a containment component of a clean soil cover associated with this remedy for the former ponds and areas of contaminated surface soil. The primary basis for the cover is to prevent contact with residual contaminants.

(4) *Costs*: The estimated present worth of this alternative is $21,350,000. This estimate is based on a construction period of a year or two for the containment barrier around Ponds 1 and 2, soil cover and groundwater structures, up to 5 years of NZVI injection for the southern shallow groundwater, and a 30-year period of operation and maintenance (including operation of the bedrock pump and treat system), using a discount rate of 5% for all present worth calculations. The total estimated cost is provided in 2005 dollars.

Alternative E

(1) *Description of Alternative*:

- Ponds 1 and 2 - Ponds 1 and 2 would be treated by the S/S/S process, the same as in Alternative B.

- Remaining ponds and soil - The remaining ponds and soil would be covered with clean soil, the same as Alternatives C and D.

- Shallow (overburden) groundwater - The eastern shallow groundwater would be collected in a new collection trench and treated in-situ through a series of cells in the trench, the same as Alternative C (similar to the in-situ option discussed in Alternative B). The southern component of the shallow groundwater would be treated by NZVI, the same as Alternative B.

- Deep (bedrock) groundwater - The deep groundwater would be treated by NZVI, the same as Alternative B.

(2) *Treatment Technologies and Materials they will Address*: This option is very similar to Alternative B in the treatment technologies used. Like Alternative B, the waste materials in Ponds 1 and 2 would be treated in-situ by the S/S/S processes. Like Alternative B, treatment of the southern shallow groundwater and the deep groundwater would be by NZVI. Like Alternative C (and similar to the in-situ option for Alternative B), treatment of the eastern shallow groundwater would be through a through a series of staged, in-situ treatment cells.

(3) *Containment Component*: As with Alternatives C and D, there is a containment component of a clean soil cover associated with this remedy for the former ponds and areas of contaminated surface soil. The primary basis for the cover is to prevent contact with residual contaminants.

(4) *Costs*: The estimated present worth of this alternative is $13,780,000. This estimate is based on a construction period of a year or two for the S/S/S, soil cover and groundwater structures, up to 10 years of NZVI injection, and a 30-year period of operation and maintenance, using a discount rate of 5% for all present worth calculations. The total estimated cost is provided in 2005 dollars.

9.2 Common Elements and Distinguishing Features of Each Alternative

Table 9 summarizes the common elements and distinguishing features of the major remedy components for each of the five remedial alternatives.

Alternative	Ponds 1 & 2	Ponds 3, 4, 7, and Contaminated Soil	Shallow Eastern Groundwater	Deep Groundwater	Cost
Alternative A	--	--	Operate Existing LCS 1 & 2	--	$4,700,000
Alternative B	S/S/S	Impermeable Cap and Soil Cover	Collection Trench, Ex-situ Treatment	NZVI	$18,960,000
Alternative C	Thermal Desorption	Soil Cover	In-situ Treatment via Staged Cells	NZVI	$24,650,000
Alternative D	Containment	Soil Cover	Collection Trench, Ex-situ Treatment	Pump & Treat	$21,350,000
Alternative E	S/S/S	Soil Cover	In-situ Treatment via Staged Cells	NZVI	$13,780,000

Table 9: Summary of Major Remedy Components for Each Alternative

Each of the active remedial alternatives (B, C, D, and E) share some additional common elements. These common elements include remedial action components, as well as PDI activities. The common elements are summarized below and described in more detail in the FS.

9.2.1 Institutional Controls

To be protective of human health and the environment, each active alternative described within this ROD requires use or access restrictions on some contaminated properties within the boundaries of the Site. Use restrictions or access restrictions would be implemented through the use of institutional controls. Institutional controls are administrative or legal constraints that minimize the potential for exposure to contamination by limiting land or resource use. Specific

actions taken at sites to restrict access or use could include: Governmental Controls - such as zoning restrictions or ordinances; Proprietary Controls - such as easements or covenants; Enforcement Tools - such as consent decrees or administrative orders; and Informational Devices- such as deed notices or state registries. Several types of access or use restrictions employed simultaneously can increase the effectiveness of institutional controls.

For OU 2 at the Nease Site, it is anticipated that institutional controls will be needed for each of the former pond areas and areas with surface soil mirex contamination where a cover is required. These areas will have contaminants remaining at levels that do not allow unrestricted use or unlimited access. The goal of these institutional controls is to prevent direct contact exposure with the residual contamination. Therefore, digging or disturbance of the cover (or underlying contaminated material) will be prevented (or if needed, repairs will be made). There will be a program of Operation, Monitoring and & Maintenance, and this will include routine inspection of the covers and require any necessary repairs. Since ROC owns the property, it is anticipated that institutional controls will be relatively simple to develop, likely through a layered approach, including: proprietary controls (easements and/or covenants); deed restrictions; and enforcement tools (AOCs and/or consent decrees), which will ensure the long-term reliability of the controls.

Although MCLs have been established as the remediation goals for the groundwater (unless modified because there is a mixture of chemicals that does not meet the risk goals), it is anticipated that institutional controls will be needed to control use of groundwater (and prevent vapor intrusion) until cleanup is complete. The goals of these institutional controls are: to prevent use of and exposure to (ingestion, dermal contact, inhalation of vapors) groundwater until remediation goals are attained; and prevent a vapor intrusion pathway from occurring. Therefore, installation of groundwater production wells will be prevented (additional monitoring wells may be installed). Additionally, new construction over areas where vapor intrusion may be a problem will be prevented, or the construction will be outfitted with mitigation measures for vapors. There will be a program of Operation, Monitoring and & Maintenance, and this will include routine inspection to ensure that no new production wells or buildings have been constructed. Since ROC currently owns most of the property overlying the groundwater plumes, it is anticipated that institutional controls will be relatively simple to develop for these areas, likely through a layered approach, including: proprietary controls (easements and/or covenants); deed restrictions; and enforcement tools (AOCs and/or consent decrees), which will ensure the long-term reliability of the controls.

There will be some portions of OU 2 that will be suitable for unrestricted use after completion of the remedial action (and possible after completion of remedy construction). The area to the northwest of Pond 7 and areas along State Route 14 may have limited or no soil contamination and may not lie over contaminated groundwater. The PDI will confirm this, and these areas may be suitable for reuse and redevelopment.

ROC has indicated that it may sell or lease a portion of the former Crane-Deming property. If so, U.S. EPA will work with the prospective purchaser to ensure that there are mechanisms to allow

the unrestricted operation of the remedy, guarantees that institutional controls will remain effective, and that other provisions of the Brownfields to CERCLA amendments are followed.

9.2.2 Pre-Design Investigation (PDI)

Each of the active remedial alternatives would require a PDI. It is expected that the PDI will occur through an AOC with ROC, and is anticipated to include the following activities (the complete, final scope will be developed through an Agency approved PDI Work Plan):

- Additional groundwater sampling downgradient of Ponds 4 and 7.
- Baseline shallow groundwater monitoring to establish pre-construction conditions. This may involve new wells, in addition to existing wells.
- Field hydraulic testing of the eastern shallow groundwater to determine flow rates for design of the collection trench.
- Evaluation of potential impacts to residents from the southern shallow groundwater. This will include additional residential well sampling and a soil gas study (with possible follow-up vapor intrusion assessment).
- Baseline bedrock groundwater monitoring to establish pre-construction conditions. This may involve new wells, in addition to existing wells. This may also involve a focused DNAPL investigation.
- Extent of the current soil barrier cover over Ponds 3, 4, and 7, and stability of the ponds.
- Extent of mirex contamination in surface soil (including the Crane-Deming seep).
- Wetland and floodplain assessments to evaluate potential construction impacts.

9.2.3 Operation, Monitoring and & Maintenance

Each active remedial alternative will require a detailed program of Operation, Monitoring and & Maintenance for the soil and groundwater components. This program will be developed during remedial design, and modified as necessary after construction of the remedy. The plan will include provisions for the periodic removal of DNAPL, if feasible. Groundwater will be monitored routinely to assess effectiveness of treatment and monitor trends. The plan will also include provisions to ensure that soil PRGs have been attained after construction.

9.2.4 Surface Water Management

Each active remedy will result in considerable surface earthwork construction. A property-wide surface water management system will be developed to provide for the effective control of

surface water runoff and to minimize future erosion. The property-wide surface water management system is anticipated to include:

- A grading plan that integrates final surface topography in the remedial areas into the surrounding areas.

- Use of proper slopes, berms, channels, etc., and surface armoring using natural vegetation and/or other materials to effectively convey surface water runoff off the remediated areas and provide erosion protection.

- A program of regular inspection, maintenance and repair.

9.3 Expected Outcomes of Each Alternative

Alternative A, which includes limited active remediation measures, would not achieve protectiveness in the foreseeable future. Alternatives B, C, D, and E, each are expected to be protective, attain ARARs, and achieve the RAOs for the Site. Alternatives B, C, D, and E each leave some of the contaminated materials in place at the Site, and would require long-term land-use restrictions on portions of the Site. Alternative C, with the greatest reliance on containment, leaves the most contaminants at the Site. Each active remedial alternative will require treatability tests, the PDI, and each requires about the same time to complete physical construction (about one to two years). While it is difficult to predict the time to attain the groundwater goals, it is anticipated that the alternatives that use NZVI for the bedrock aquifer (Alternatives B, C, and E) will be faster and more effective than Alternative D, which uses a pump-and-treat approach. None of the alternatives would leave all of OU 2 available for unrestricted use and unlimited exposure at the completion of the remedial action, although each leave some portions of the Site available for reuse (and possibly unrestricted use in some portions).

9.4 Preferred Alternative

The preferred alternative described in the Proposed Plan for OU 2 of the Nease Site was Alternative B. The estimated cost of the preferred alternative is $18,960,000.

10.0 Summary of Comparative Analysis of Alternatives

This section explains the U.S. EPA's rationale for selecting the preferred alternative. The U.S. EPA has developed nine criteria to evaluate remedial alternatives to ensure that important considerations are factored into remedy-selection decisions. These criteria are derived from the statutory requirements of Section 121 of CERCLA, the NCP, as well as other technical and policy considerations that have proven to be important when selecting remedial alternatives. When selecting a remedy for a site, U.S. EPA conducts a detailed analysis of the remedial alternatives consisting of an assessment of the individual alternatives against each of the nine evaluation criteria and a comparative analysis focusing upon the relative performance of each alternative against those criteria.

The nine evaluation criteria are described below.

Threshold Criteria

The two most important criteria are statutory requirements that must be satisfied by any alternative in order for it to be eligible for selection.

1. **Overall protection of human health and environment** addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls or institutional controls.

2. **Compliance with ARARs** addresses whether or not a remedy will meet all of the Applicable or Relevant and Appropriate Requirements of other Federal and State environmental statutes and/or provide grounds for invoking a waiver.

Primary Balancing Criteria

Five primary balancing criteria are used to identify major trade-offs between remedial alternatives. These trade-offs are ultimately balanced to identify the preferred alternative and to select the final remedy.

3. **Long-term effectiveness and permanence** refers to the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met.

4. **Reduction of toxicity, mobility, or volume through treatment** addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity, mobility or volume of the hazardous substances as their principal element. This preference is satisfied when treatment is used to reduce the principal threats at the site through destruction of toxic contaminants, reduction of the total mass of toxic contaminants, irreversible reduction in contaminant mobility, or reduction of total volume of contaminated media.

5. **Short-term effectiveness** addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community and the environment during construction of the remedy until cleanup levels are achieved. This criterion also considers the effectiveness of mitigative measures and time until protection is achieved through attainment of the RAOs.

6. **Implementability** addresses the technical and administrative feasibility of a remedy from design through construction, including the availability of services and materials needed to implement a particular option and coordination with other governmental entities.

7. **Cost** includes estimated capital costs, annual operation and maintenance costs (assuming a 30-year time period), and net present value of capital and operation and maintenance costs, including long-term monitoring.

Modifying Criteria

These criteria may not be considered fully until after the formal public comment period on the Proposed Plan and RI/FS Report are complete.

8. **State Acceptance** considers whether the State support agency concurs with the selected remedy for the site.

9. **Community Acceptance** addresses the public's general response to the remedial alternatives and the preferred alternative presented in the Proposed Plan. This ROD includes a responsiveness summary that summarizes the public comments and U.S. EPA's response to those comments. The responsiveness summary is included as Appendix A.

The full text of the detailed analysis of the five remedial alternatives against the nine evaluation criteria (including both the individual analysis and the comparative analysis) is contained in the FS Report for OU 2 which is included in the Administrative Record for the Site. Because the two Modifying Criteria cannot be fully evaluated until public comment is received, they were not evaluated in the FS. The responsiveness summary of this ROD contains a more detailed discussion of public comments received. This section of the ROD summarizes the highlights of the comparative analysis.

10.1 Overall Protection of Human Health and the Environment

Under the current use scenarios, all remedial alternatives for OU 2, including Alternative A: No Further Action, provide protection of human health. However, Alternative A does not provide current protection of ecological receptors, nor does it address potential future human health or ecological risks.

Alternatives B, C, D, and E will all provide future protection of human health and the environment. However, the degree of protection may differ between alternatives. Differences between alternatives are discussed more fully below in Sections 10.3 through 10.7. In summary:

- For Ponds 1 and 2, the degree of protection provided by Alternatives C and D is considered to be lower than Alternatives B and E due to potential lower effectiveness for addressing waste in the ponds, the principal source of groundwater impacts.

- For shallow groundwater treatment, the degree of protection provided by Alternatives C and E is considered to be lower than Alternatives B and D due to potential lower effectiveness of the in-situ shallow groundwater treatment, if infiltration is not controlled.

- The deep groundwater extraction and ex-situ treatment of Alternative D is considered to provide lower protection compared to the in-situ treatment (Alternatives B, C, and E) because of potential lower effectiveness due to site-specific hydrogeologic conditions.

- All of the active alternatives (B, C, D, and E) would be monitored to track progress toward achieving protectiveness. Alternative A may eventually reduce risks at the site through naturally-occurring processes (over a very long time), but no monitoring would be conducted to verify that protectiveness had been achieved.

10.2 Compliance with ARARs

Alternatives B, C, D and E are expected to comply with chemical-specific, action-specific, and location-specific ARARs and include monitoring to demonstrate compliance. However, it may be more difficult to achieve chemical-specific ARARs under Alternatives C and D due to concerns about the long-term effectiveness in managing wastes in Ponds 1 and 2. Also, compliance with chemical-specific ARARs is less certain for Alternatives C and E due to questions about the long-term effectiveness in treating shallow groundwater without infiltration control.

Since limited active remedial measures would take place under Alternative A, no additional action-specific or location-specific ARARs apply (beyond those that apply to the existing systems). The chemical-specific ARARs may eventually be achieved through naturally-occurring processes, but no monitoring would be conducted to assess the overall condition of OU 2 over time or to verify that ARARs had been achieved.

10.3 Long-Term Effectiveness and Permanence

Alternative B provides the highest degree of long-term effectiveness and permanence, as principle threat wastes in Ponds 1 and 2 would be treated by S/S/S; principal threat wastes in deep groundwater would be treated by NZVI; shallow groundwater would be treated by NZVI and collection and ex-situ treatment; and soils with lower levels of contamination and materials in the remaining ponds would be contained under a clean cover consisting of either a combined impermeable membrane and clean soil, or clean soil only.

The long-term effectiveness and permanence of Alternatives B and E are expected to be higher than for Alternatives C and D due to the anticipated higher degree of effectiveness of the remedial components that address materials in former Ponds 1 and 2. S/S/S is anticipated to reduce more than 90% of the chemical contamination in those source areas.

- The ability of containment (Alternative D) to effectively and permanently contain the extremely contaminated material is questionable, especially because it may be difficult to construct the horizontal containment barrier below the waste.

- There are concerns with effectiveness and implementability of thermal desorption (Alternative C) because of: the saturated conditions of the fill/sludge; the potential generation of hydrogen chloride (given the presence of chlorinated organic compounds); potential buildup of ash around the thermal wells that would reduce treatment efficiency; and heterogeneity and low permeability of the fill/sludge.

Alternatives B, C, and E are expected to provide a higher degree of long-term effectiveness and permanence than Alternative D relative to the remediation of the deep groundwater. Because of conditions at the Nease Site, in situ NZVI (possibly followed by accelerated biological treatment) is expected to provide technical advantages over groundwater extraction and ex-situ treatment (Alternative D), as follows:

- NZVI is expected to create a zone in the groundwater where treatment of the dissolved organic mass will occur. NZVI is also expected to create or enhance geochemical conditions that can support accelerated biological treatment and that will enhance natural attenuation (which is already occurring at the Site).

- NZVI is potentially able to provide more effective remediation of source area impacts, particularly if residual source materials (DNAPL) are present in fractures. This is expected to result in reduced cleanup times. Fractured bedrock potentially contains discontinuities, and dead-end or low permeability fractures where chemicals are isolated from extracted groundwater. Additionally, groundwater contaminant levels can rebound after extraction due to residual chemicals in the cracks or pores.

Alternatives B and D are expected to provide a higher degree of long-term effectiveness and permanence than Alternatives C and E relative to the remediation of the eastern shallow groundwater. The following long-term effectiveness concerns have been identified for in-situ treatment of the eastern shallow groundwater. These concerns are expected to be resolvable only where low flows (i.e., about 1 gallon per minute) require treatment. The low permeability cover of Alternative B may reduce flows such that in-situ treatment may become more effective.

- While the remedial technologies that would be used for in-situ treatment are effective on some compounds individually, incorporating them into a small, sequential treatment zone may affect their performance.

- Variations in flow, especially elevated flow rates, would decrease residence time and may reduce effectiveness.

- A primary concern with the long-term effectiveness is fouling of the treatment zone. Fouling may reduce effectiveness and be difficult to correct. Additionally, oxygenated groundwater may result in clogging the iron treatment zone.

- Effectiveness will be difficult to monitor.

Alternative A leaves all contaminated materials and media in place at the Site with no active remedial measures (other than the limited collection and treatment of some of the shallow groundwater). While the EA assessed that the risks to human health were acceptable under the current use scenarios, Alternative A does not provide current protection of ecological receptors, nor does it address potential future human health or ecological risks. The remediation goals and RAOs may eventually be achieved through naturally-occurring processes, but no monitoring would be conducted to assess the overall condition of the Site over time. Considering the persistence of mirex in the environment, and the likelihood that source materials in Ponds 1 and 2 (as well as the DNAPL) will continue to contaminate groundwater, an unacceptably long period of time would be required until that protection would be achieved.

10.4 Reduction of Toxicity, Mobility, or Volume Through Treatment

Each of the five alternatives includes some active treatment of contaminated materials; therefore, there is some reduction in toxicity, mobility, or volume through treatment for all alternatives. The reduction in toxicity, mobility, or volume through treatment is higher for Alternatives B, C, and E, that treat the waste in Ponds 1 and 2. Alternatives B and E are rated higher than Alternative C due to implementability concerns with thermal desorption that may reduce treatment effectiveness. Alternatives B, C, and E also provide a higher degree of reduction in toxicity, mobility, or volume through in-situ treatment by NZVI of the bedrock groundwater. As discussed in Section 10.3, NZVI is believed to be a more effective means for treating contaminated groundwater under the conditions found at the Nease Site (fractured bedrock, residual DNAPL source material).

10.5 Short-Term Effectiveness

Alternative A will result in the least short-term adverse impacts, as no additional action will be taken. Alternative D will result in less impacts as the sludge in Ponds 1 and 2 will be contained rather than disturbed during in-situ treatment (Alternative B, C, and E), which could result in some short-term effects during construction. Alternative C is expected to have a higher potential for short-term effects than Alternatives B and E due to concerns regarding controlling steams and vapors generated from extreme heat. Implementation of appropriate health and safety practices should protect both remediation workers and the community from unacceptable exposure during construction of all alternatives.

Due to the presence of DNAPL in bedrock, the timeframes for achieving groundwater restoration goals are difficult to predict. However, Alternative B is expected to result in the shortest remediation timeframe as a result of providing the greatest amount of source control, limiting infiltration to shallow groundwater, and providing in-situ treatment of the bedrock groundwater. Alternative E is expected to have the next shortest remediation timeframe, followed by Alternative C. Alternative D is expected to have a longer remediation timeframe because the reliance on ex-situ treatment of the deep groundwater is not expected to be as effective due to Site conditions. Alternative A will have the longest remediation timeframe.

10.6 Implementability

All five alternatives are technically implementable. For components of the remedies that are standard (e.g., extraction wells, ex-situ groundwater treatment systems, covers and caps, etc.), the necessary personnel, equipment, services and materials are readily available and easily implemented. For components of the remedies that are innovative technologies or new applications, implementation may be more difficult if the necessary personnel, equipment, services and materials are less readily available. The long-term operation, maintenance and monitoring for all alternatives can be readily performed.

Alternative A is the easiest to implement, as no further action is needed. Alternative B and E are next easiest to implement. Alternatives C and D are the most difficult to implement.

- Alternatives (B, C, E, and to a limited extent D) that use NZVI are utilizing specialty materials, although NZVI is becoming a more common remedial technology and the manufacturing of NZVI is becoming more routine.

- Alternatives (B and D) that use a collection trench with ex-situ treatment of the shallow groundwater may encounter spatial constraints for construction of a short section of the north end of the trench.

- Alternatives (C and E) that rely on in-situ treatment of the shallow groundwater through staged cells may encounter moderate difficulty with construction. Monitoring of the system's effectiveness and hydraulic performance will be difficult to implement. Repairs, if needed, would be difficult to implement.

- Alternatives that use S/S/S on Ponds 1 and 2 (B and E) may encounter low bearing strength of the fill/sludge that requires sequential treatment. Also, this component uses specialty services and equipment, although there are expected to be a number of experienced contractors that can do the work.

- Alternative C includes thermal desorption as the remedial approach for Ponds 1 and 2. This is a specialized technology and the equipment, methods and materials are not as readily available. Installation of the heater wells may be difficult due to soft ground conditions. Saturated conditions in the waste may affect system operation.

- Alternative D includes subsurface horizontal containment for Ponds 1 and 2. This component is expected to be difficult to implement due to limited access for drilling jet grout boreholes and difficulties constructing and verifying a continuous barrier over the fractured bedrock.

10.7 Cost

Cost includes estimated capital costs and annual operation and maintenance costs (assuming a 30-year time period). Present worth cost represents the total cost of an alternative over time in terms of today's dollar value. In accordance with U.S. EPA guidance, cost estimates developed for the FS are expected to be accurate within a range of +50 to -30 percent.

Detailed cost estimates for each of the five alternatives are presented in the FS Report. The estimated present worth costs to implement the five potential remedial alternatives at OU 2 of the Nease Site are as follows:

Alternative A: $4.7 million
Alternative B: $19 million
Alternative C: $24.7 million
Alternative D: $21.4 million
Alternative E: $13.8 million

Cost differences between the active alternatives are generally based on the costs of managing the wastes in Ponds 1 and 2 and the cost of groundwater treatment. Containment of the pond waste (Alternative D) is the least costly, followed by S/S/S treatment (Alternatives B and E), followed by thermal desorption (Alternative C). In-situ groundwater treatment is less costly than ex-situ. Ex-situ treatment of shallow groundwater is reflected in the costs for Alternatives B and D, and Alternative D also includes more costly ex-situ treatment costs for the bedrock groundwater.

10.8 State Agency Acceptance

The State of Ohio had been involved with the Site before it was listed as a Superfund Site, and has continued to be actively involved with the Site throughout the RI/FS process, has reviewed documents and provided comments to U.S. EPA and ROC, and provided support at the public meeting for the proposed plan.

Although the State of Ohio has not yet provided a concurrence letter for this ROD, the State has indicated that it intends to concur with the selection of Alternative B for OU 2 of the Nease Site. The State of Ohio's concurrence letter will be added to the Administrative Record upon receipt.

10.9 Community Acceptance

During the public comment period on the Proposed Plan, the community expressed no concerns (no support or opposition) with the proposed remedy for OU 2 of the Nease Site. As discussed in the Responsiveness Summary found as Appendix A to this ROD, public concerns focused on the amount of time that the Superfund process has taken at the Site and the public supported moving ahead with a decision for OU 2 and subsequent cleanup. The community was concerned with who would perform the cleanup and how it would be funded. The public was also very

concerned with potential health effects from site-related contaminants and concerned that a decision be made for the MFLBC.

11.0 Principal Threat Wastes

The NCP establishes an expectation that U.S. EPA will use treatment to address principal threats posed by a site wherever practicable. The term "principal threat" refers to source materials that are considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. In accordance with the NCP, this ROD formulates treatment alternatives that will address the principal threats posed.

The principal threat wastes in OU 2 of the Nease Site are the contaminated sludges and fill in Ponds 1 and 2, and the underlying contaminated overburden soil. Estimates of organic mass provided in the FS indicate that Ponds 1 and 2 contain the majority of organic contamination remaining on site. These ponds are believed to contain about 560,000 pounds of organic chemical contaminant mass (in about 48,000 cubic yards of soil/fill), NAPL is present, and the contaminants are sitting below the water table. Ponds 1 and 2 are the major source of ongoing contaminant migration to groundwater. During development of the EA, the magnitude of potential risk from materials in Ponds 1 and 2 was tacitly recognized in that these materials were excluded from the risk assessment because they were deemed to require remediation.

The other principal threat waste in OU 2 is the DNAPL in groundwater. Because of the nature of DNAPL, and particularly because of the fractured strata underlying the site, the DNAPL is highly mobile, difficult to locate and contain, and will continue to act as a source of contamination to the aquifer as it slowly releases chemicals to the dissolved phase. If exposure were to occur (via ingestion, inhalation or dermal contact), the contaminants would present a significant risk to human health.

12.0 Selected Remedy

This section describes the selected remedy and provides U.S. EPA's reasoning behind its selection. Alternatives can change or be modified if new information is made available to U.S. EPA through further investigation or research. An appropriate range of alternatives was developed, based upon the initial screening of technologies, the potential for contaminants to impact the environment, and site-specific RAOs and goals.

12.1 Identification of the Selected Remedy and Summary of the Rationale for its Selection

Based on the analysis of the nine criteria conducted in the FS Report and summarized in Section 10 of this ROD, the selected remedy for OU 2 of the Nease Chemical Site is Alternative B. This alternative represents the best balance of overall protectiveness, compliance with ARARs, long-

term effectiveness and permanence, costs, and other criteria, including State and community acceptance.

12.2 Description of the Selected Remedy

A summary of the selected remedy, Alternative B is provided below (See Figure 11 for a conceptual layout):

- Ponds 1 and 2 - Ponds 1 and 2 will be treated in-situ with S/S/S. Treatment of the contaminated matrix will include all materials above bedrock. The fill/sludge will be mixed with large augers or paddles that are moved through the soil column. Due to the heat generated by the large air compressors used, the injected air is warmer than ambient air, which enhances volatilization. The lower volatility chemicals that are not stripped will be stabilized and solidified by mixing the remaining soils and any residual contaminants with reagents (e.g., cement, bentonite, kiln dust). Treatability testing will be conducted during the PDI to determine design parameters and performance standards.

- Remaining ponds and soil - The remaining ponds (Ponds 3, 4, and 7) and soil exceeding the mirex remediation goal (including drainage ditch soil) will be contained using either an impermeable geosynthetic membrane covered with clean soil, or only clean soil. It is estimated that about 11 acres will be covered with the combined impermeable membrane/soil cap. Most of this area would be to the west of the Conrail tracks and would include the treated Ponds 1 and 2, Pond 7, Exclusion Areas A and B and the soil areas around them to provide a continuous cover. The impermeable cap would also cover a small area east of the rail tracks, near the Crane-Deming seep. The goals of the combined cap are to prevent direct contact and to reduce rainwater infiltration, which will limit the volume of shallow groundwater to be treated. Other areas, such as Ponds 3 and 4, and soils that exceed the mirex remediation goal will be covered with clean soil to prevent contact. All components of the impermeable cap and soil cover will be finalized in design. It is anticipated that soil modifications to improve bearing strength may be needed in some areas (e.g., Ponds 3 and 7), before the cover is placed.

- Eastern shallow groundwater - The easterly component of the shallow groundwater would be captured in a new collection trench (expected to be located east of the Conrail tracks and about 600 feet in length) and pumped above ground for on-site treatment. Because the impermeable membrane may reduce infiltration sufficiently, this Alternative also has an option that allows a design modification (based on results of the PDI) for in-situ treatment through a series of cells in the trench that may consist of reactive iron, biotreatment and carbon.

- Southern shallow groundwater - The southern component of the shallow groundwater would be treated by injection of a slurry of NZVI.

- Deep groundwater - The deep groundwater would be treated by injection of NZVI in the core of the plume. A series of injection wells will be constructed within the source areas. It is anticipated that injections of NZVI will occur on a quarterly basis until the treatment zone expends throughout the MKS source area. The location and design of the injection wells and the amount and frequency of NZVI injections will be determined in remedial design, following treatability testing during the PDI.

- Deep groundwater - Should NZVI injections not be sufficiently effective in treating all organic compounds, then accelerated biological treatment may be implemented. If needed, nutrient injections (with or without bioaugmentation) will be utilized. The decision to implement accelerated biological treatment will be made if monitoring during the first few rounds of NZVI injections indicates that design performance standards and RAOs might not be met by NZVI alone.

- Deep groundwater - Monitored natural attenuation will be implemented for the far downgradient portion of the plume, which is outside the treatment zone. Natural conditions at the Site support natural attenuation, and conditions that will be created by NZVI (and accelerated biological treatment) will enhance natural conditions.

- Pilot studies and/or treatability tests for S/S/S and NZVI will be conducted before the remedial design is complete.

- The common elements discussed in Section 9.2 (institutional controls; PDI; operation, monitoring and maintenance; and surface water management) will be included as components of the remedy. Not all of OU 2 will require institutional controls upon completion of the remedy.

12.3 Summary of the Estimated Remedy Costs and Time Required for Implementation

The estimated cost of the selected remedy for OU 2 of the Nease Site is about $19 million. The physical construction of the remedy is estimated to take approximately one to two years to complete. Injection of NZVI, which will occur periodically, is estimated to take place over five years for the southern shallow groundwater and ten years for the deep groundwater. A detailed estimate of the costs is provided in Table 10.

12.4 Expected Outcomes of the Selected Remedy

The selected remedy for OU 2 of the Nease Site, Alternatives B, will achieve the RAOs for OU 2. The selected remedy will be protective and is expected to attain ARARs. The selected remedy leaves some of the contaminated materials in place at the Site, and requires long-term land-use restrictions on some portions of the Site. OU 2 will not be available for unrestricted use and unlimited exposure at the completion of the remedial action, and institutional controls will be required. However, there may be portions of the OU that are suitable for development after completion of the remedial action (including portions suitable for unrestricted use).

The selected remedy requires treatability testing to establish design parameters for operation of the S/S/S treatment on Ponds 1 and 2 and the NZVI treatment on the groundwater. The treatability tests are expected to result in remedial design standards that will ensure the protectiveness of the remedy. After the physical construction period (estimated to be about one to two years), there will be immediate risk reductions to ecological receptors by mitigating contact with mirex in soil (and resulting bioaccumulation). After construction, there will be immediate benefits to groundwater because the primary source of ongoing contamination (Ponds 1 and 2) will be treated. While it is difficult to predict the time to attain the groundwater goals, it is anticipated that the selected remedy will be faster than other alternatives because the NZVI is expected to provide treatment within the bedrock aquifer.

The actions to remediate OU 2 that will result from this ROD will constitute source control actions for OU 3 and will be compatible with future anticipated actions for OU 3. A subsequent ROD will be written for OU 3.

13.0 Statutory Determinations

Under CERCLA Section 121 and the NCP, remedies selected for Superfund sites are required to be protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a waiver is justified), be cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the toxicity, mobility or volume of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the selected remedy for OU 2 of the Nease Chemical Site meets these statutory requirements.

13.1 Protection of Human Health and the Environment

The current and potential future risks at OU 2 of the Nease Site are primarily due to the presence of VOCs in groundwater and mirex in surface soils. Implementation of the selected remedy will be protective of human health and the environment through the treatment of wastes in Ponds 1 and 2 (sources of groundwater contamination), treatment of the groundwater plumes, and containment of the remaining former ponds and less contaminated soil. The OU-specific RAOs were developed to protect current and future receptors that are potentially at risk from contaminants at OU 2. The selected remedy will meet the RAOs. Portions of the Site will not be available for unrestricted use and unlimited exposure at the completion of the remedial action and institutional controls will be required to ensure that the remedy remains protective.

13.2 Compliance with ARARs

Section 121(d) of CERCLA requires that Superfund remedial actions meet ARARs. A brief discussion of the primary ARARs is provided below. In addition to ARARs, non-enforceable guidelines, criteria, and standards may be useful in designing the selected remedy. As described

previously in Section 8.2 of this ROD, these guidelines, criteria and standards are known as TBCs. The selected remedy will comply with the ARARs for the Site.

Chemical Specific ARARs

The selected treatment of the groundwater plumes is expected to achieve compliance with chemical specific ARARs (MCLs) shown in Table 6 over time. The timeframe to achieve the MCLs is uncertain and long-term groundwater monitoring will be conducted to assess compliance.

Action Specific ARARs

Table 8 summarizes the potential action and location specific ARARs and TBCs. Highlights of the action specific ARARs and TBCs that pertain to the selected remedy include:

- State air pollution control ARARs: Vapors generated during S/S/S of Ponds 1 and 2 will require collection and treatment to meet emission standards; ex-situ treatment of shallow groundwater may generate emissions that must meet standards; and activities such as surface preparation work may require measures to mitigate air pollution nuisances (e.g., dust). Also, air monitoring may trigger TBC considerations.

- Drilling, operation and maintenance of injection and monitoring wells may trigger the Water Well Standards. State underground injection control regulations are considered ARARS for injection of NZVI, although the activities are expected to fall under an exemption for aquifer remediation projects.

- Potential action specific surface water ARARs are shown on Table 8. The selected remedy includes the collection and treatment of shallow groundwater, therefore the national pollutant discharge elimination system permit equivalency may apply. The treatment system will be designed to meet water quality standards.

- The surface water management plan will require compliance with local and State Erosion and Sediment Control ARARs.

- Federal and State requirements for solid and/or hazardous waste facility low permeability caps are not considered ARARs for the impermeable and soil covers, however, they may be considered as TBCs during design. Management of any waste generated as a result of the remedial actions will be in compliance with the appropriate solid or hazardous waste requirements.

Location Specific ARARs

The selected remedy may affect wetlands on the Site. If so, the activities may trigger ARARs that require protection of wetlands and floodplains.

13.3 Cost Effectiveness

U.S. EPA has determined that the selected remedy for the OU 2 at the Nease Chemical Site is cost effective and represents a reasonable value for the money to be spent. A cost-effective remedy in the Superfund program is one whose costs are proportional to its overall effectiveness. The overall effectiveness of the potential remedial alternatives for OU 2 was evaluated in the FS by considering the following three criteria: long-term effectiveness and permanence, reduction in toxicity, mobility and volume through treatment, and short-term effectiveness. The overall effectiveness was then compared to cost to determine whether an alternative is cost effective. Of the remedial alternatives evaluated for this OU, Alternative B (the selected remedy) provides the highest degree of overall effectiveness. Although Alternative E costs $5.8 million less (about 30% less), its long-term effectiveness and permanence is questionable (particularly related to the eastern shallow groundwater).

13.4 Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

U.S. EPA has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at OU 2. Of those alternatives that are protective of human health and the environment and comply with ARARs, U.S. EPA has determined that the selected remedy provides the best balance of trade-offs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element and considering State and community acceptance.

As discussed in Section 10 of this ROD, the selected remedy (Alternative B) provides the highest degree of long-term protectiveness and represents a more permanent solution than other alternatives for OU 2 of the Nease Site. Treatment technologies are significant components of the selected remedy. The in-situ S/S/S treatment process will be used on Ponds 1 and 2. While performance specifications will not be established until after the completion of the PDI and during design, it is anticipated that the process may remove and treat more than 90% of the chemical contamination in those source areas. The residual contamination that is not removed by the stripping will be treated by the stabilization/solidification part of the process to reduce its mobility to groundwater. This treatment approach is somewhat innovative, although it combines reliable, proven technologies.

The shallow groundwater will be captured in a trench and treated to destroy the contaminants. While this ROD calls for ex-situ treatment of the shallow groundwater, it also allows the agencies to approve a modification that would allow treatment to be conducted in-situ in a series of staged cells (such as iron permeable reactive barrier, accelerated biodegradation, and activated carbon). The change from ex-situ to in-situ treatment would be made during remedial design based on the results of the PDI and treatability tests. However, the goal to successfully treat the shallow groundwater would remain the same. If the staged system of cells is chosen over ex-situ treatment, the design of the reactor system will be innovative, although each individual technology is more conventional and have proven reliable to treat the COCs.

The southern shallow and deep (bedrock) groundwater will be treated by NZVI. This is an innovative approach. As discussed in Sections 10 and 12 of this ROD, U.S. EPA believes that this approach will be more effective in treating the COCs at this site. Due to Site conditions, (fractured bedrock, presence of DNAPL), many groundwater treatment and recovery options are expected to have limitations. It is anticipated that the NZVI can flow with the groundwater to provide treatment within the fractures. Extensive PDI work and a treatability study will be performed prior to full scale implementation of this component of the remedy.

13.5 Preference for Treatment as a Principal Element

By treating the high levels of VOCs, SVOCs and NAPL in Ponds 1 and 2 and the core areas of the groundwater plumes by S/S/S for the ponds, collection in a trench and treatment of the shallow eastern plume at a new or modified treatment plant (or in-situ through a series of treatment cells), and NZVI for the deep groundwater and southern plume, the selected remedy addresses principal threats posed by OU 2 through the use of treatment technologies. By utilizing treatment as a significant portion of the remedy, the statutory preference for remedies that employ treatment as a principal element is satisfied. As discussed in Section 11 of this ROD, the principal threat wastes are the contaminated sludges and fill in Ponds 1 and 2 and the underlying contaminated overburden soil, and the DNAPL in groundwater. The selected remedy provides treatment of the principal threat wastes. The selected remedy does not call for off-site disposal of untreated wastes.

13.6 Five-Year Review Requirements

The NCP requires that the remedial action be reviewed no less often than every five years if the remedial action results in hazardous substances, pollutants or contaminants remaining at the Site above levels that allow for unlimited use and unrestricted exposure. Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on some portions of OU 2 above levels that allow for unlimited use and unrestricted exposure at the completion of the remedial action, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment. Section 12.4 of this ROD describes the expected outcome of the selected remedy.

14.0 Documentation of Significant Changes

The Proposed Plan for OU 2 of the Nease Site was released for public comment on May 23, 2005, and the public comment period ran from June 1 through July 8, 2005. The Proposed Plan identified Alternative B (S/S/S for Ponds 1 and 2; clean cover for remaining ponds and soil; collection in a trench and treatment of shallow groundwater on the eastern side of the Site; and NZVI treatment for deep groundwater and the southern plume), as the preferred alternative for OU 2. U.S. EPA reviewed all written and verbal comments submitted during the public comment period and determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

FIGURES

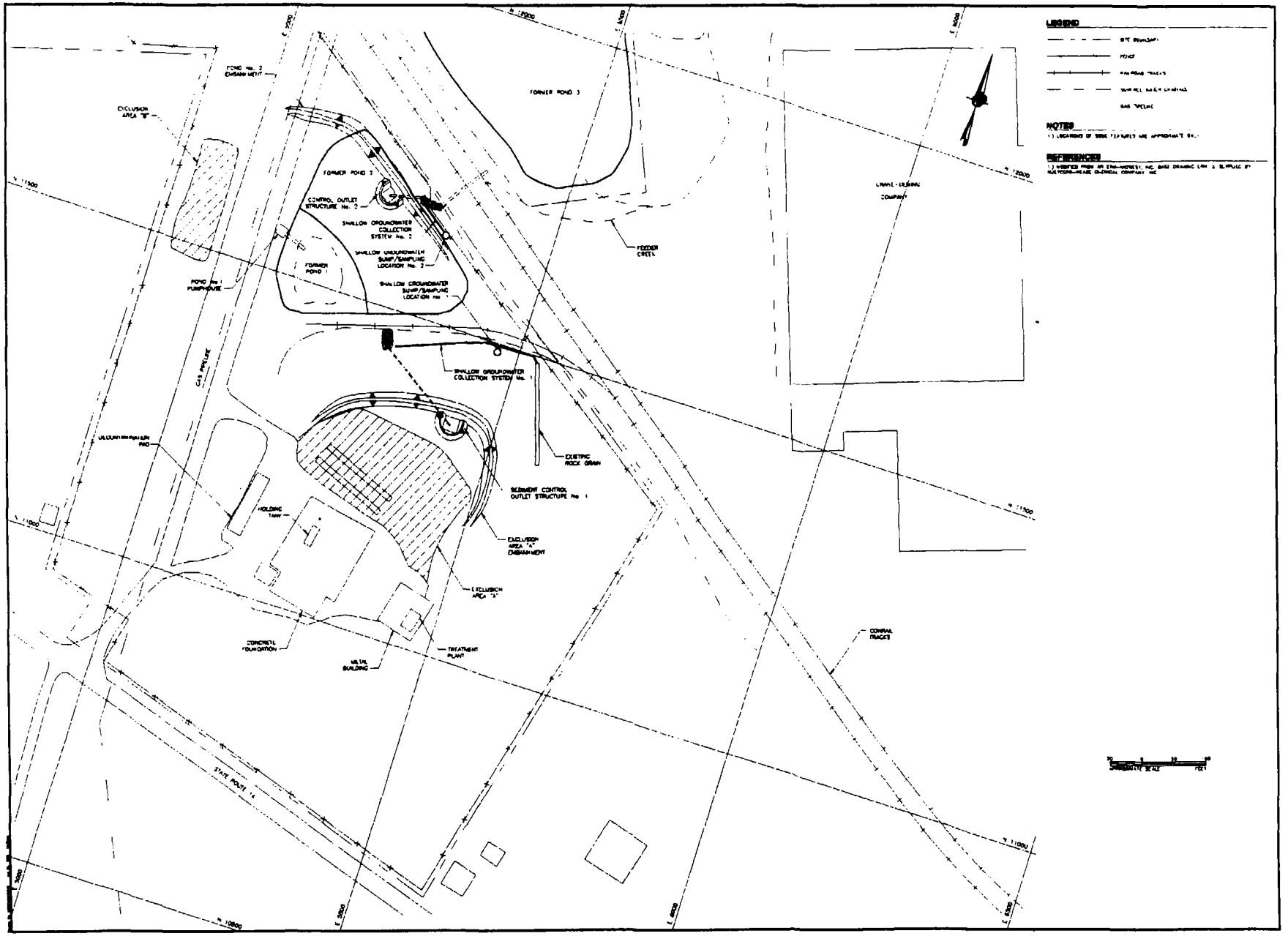
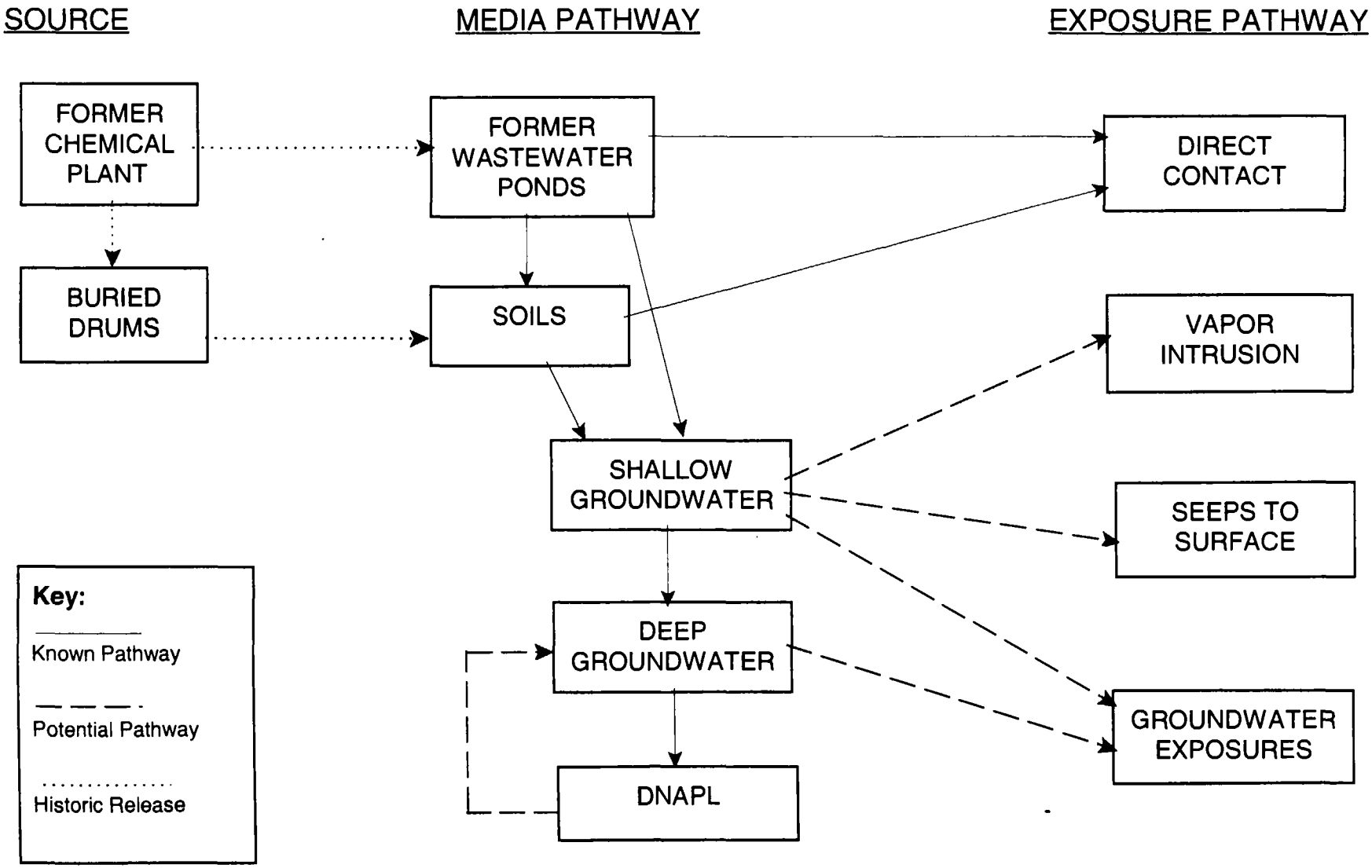
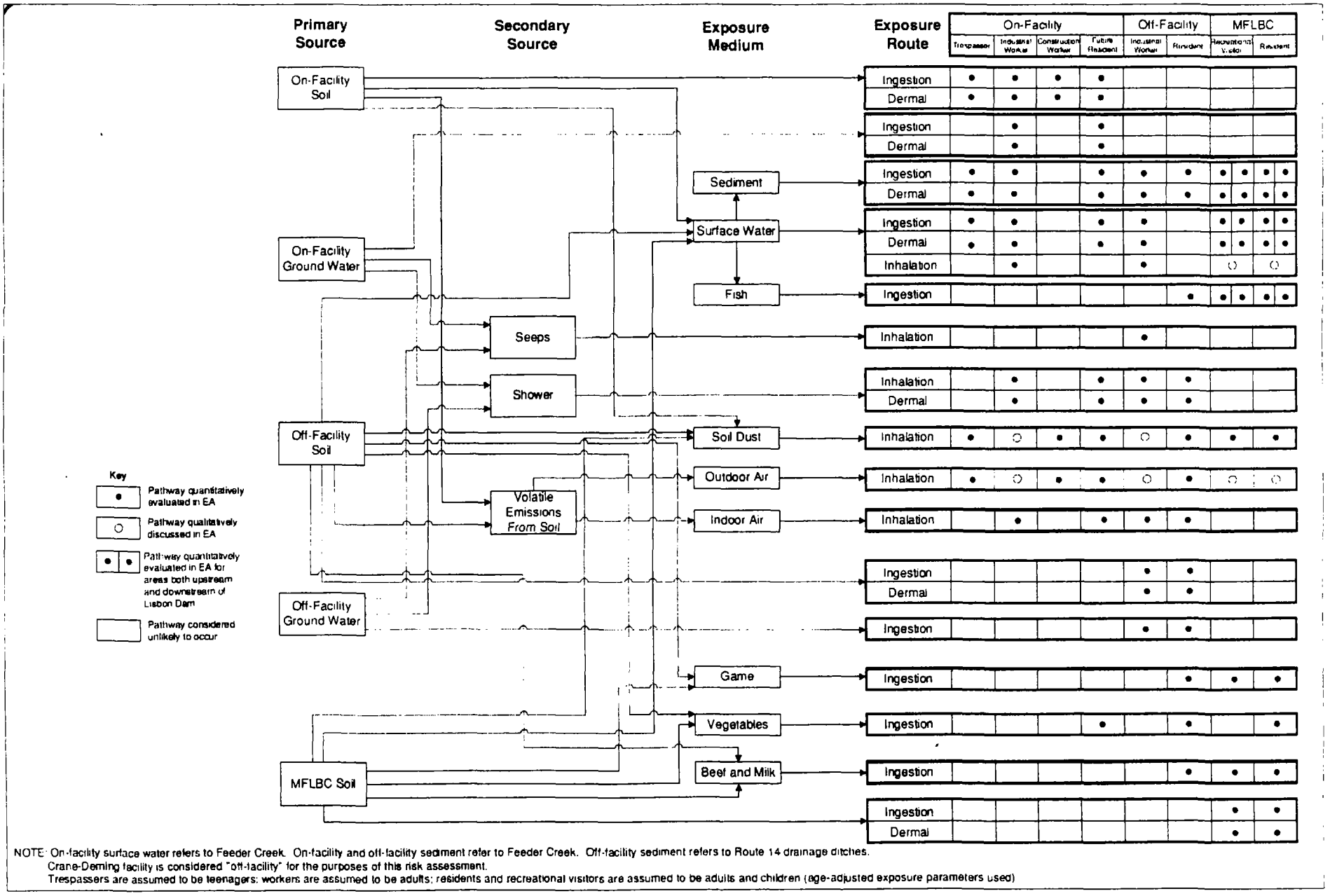


Figure 2 Interim Remedial Measures

Figure 3: CONCEPTUAL SITE MODEL
Nease Chemical Site - Operable Unit 2





NOTE: On-facility surface water refers to Feeder Creek. On-facility and off-facility sediment refer to Feeder Creek. Off-facility sediment refers to Route 14 drainage ditches.
Crane-Deming facility is considered "off-facility" for the purposes of this risk assessment.
Trespassers are assumed to be teenagers; workers are assumed to be adults; residents and recreational visitors are assumed to be adults and children (age-adjusted exposure parameters used)

Figure 4: Conceptual Site Model for Human Health Risk Assessment, Nease Chemical Company, Salem, Ohio

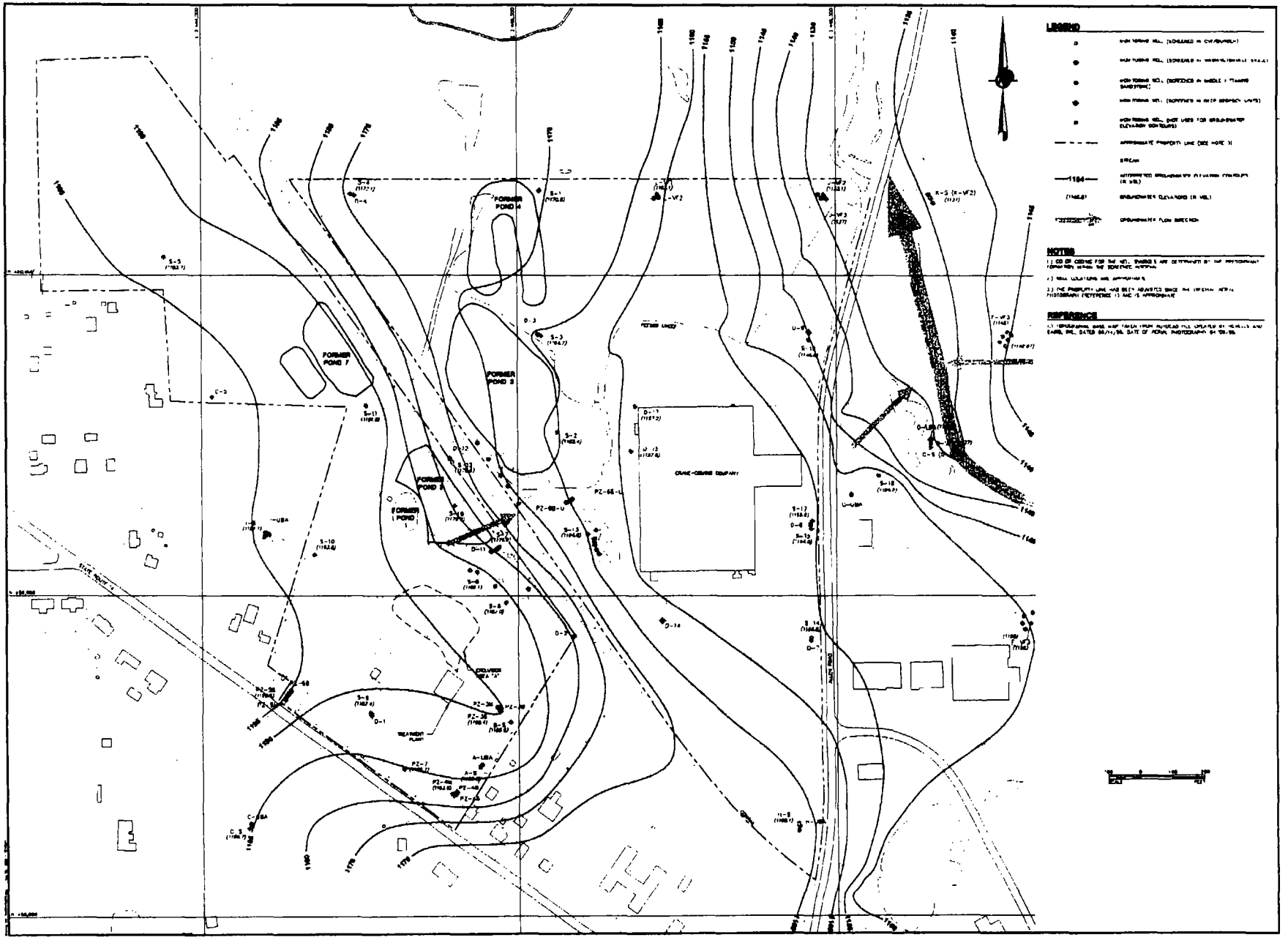


Figure 5 **Overburden Groundwater Flow**

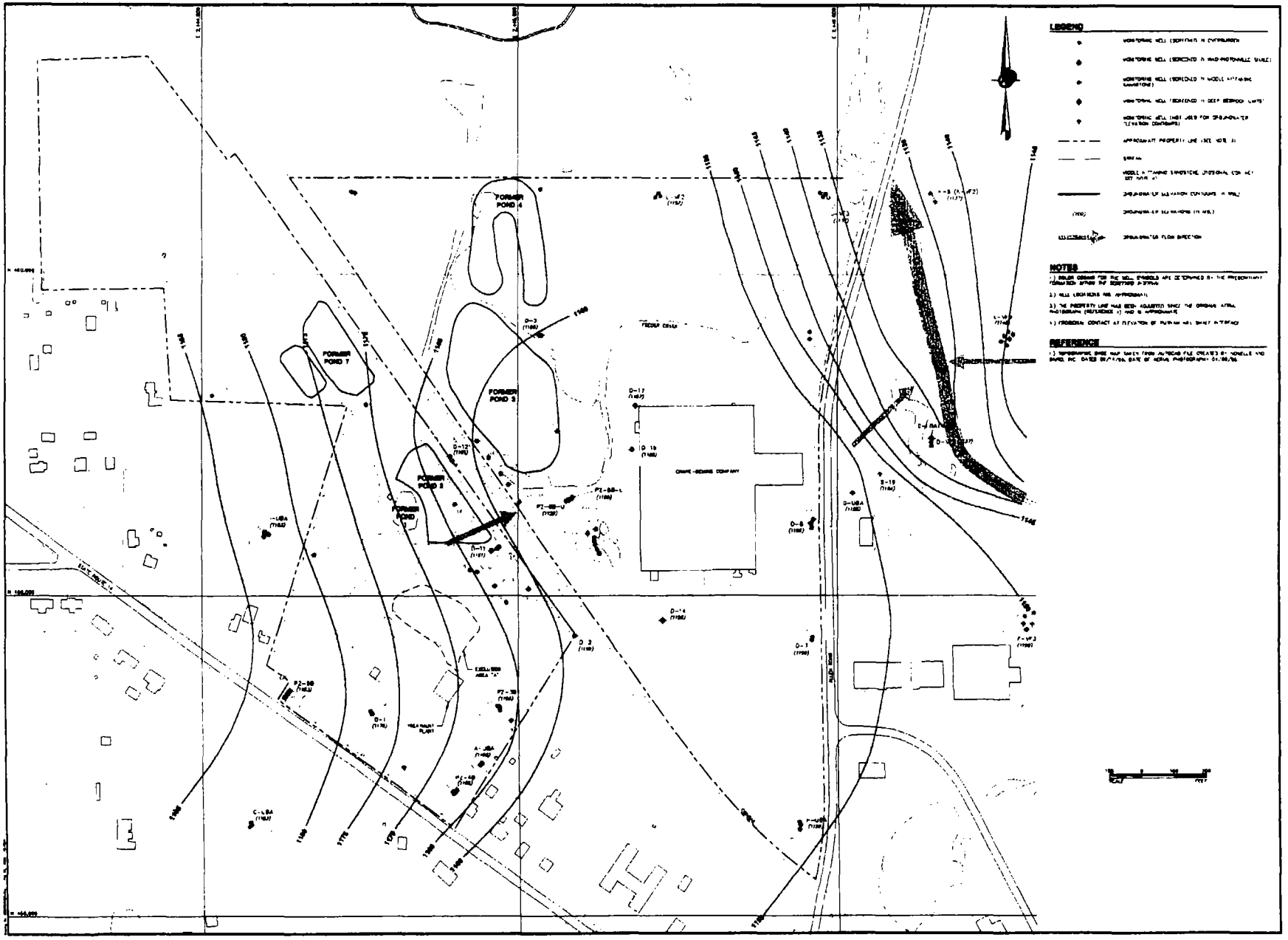


Figure 6 **Bedrock Groundwater Flow**

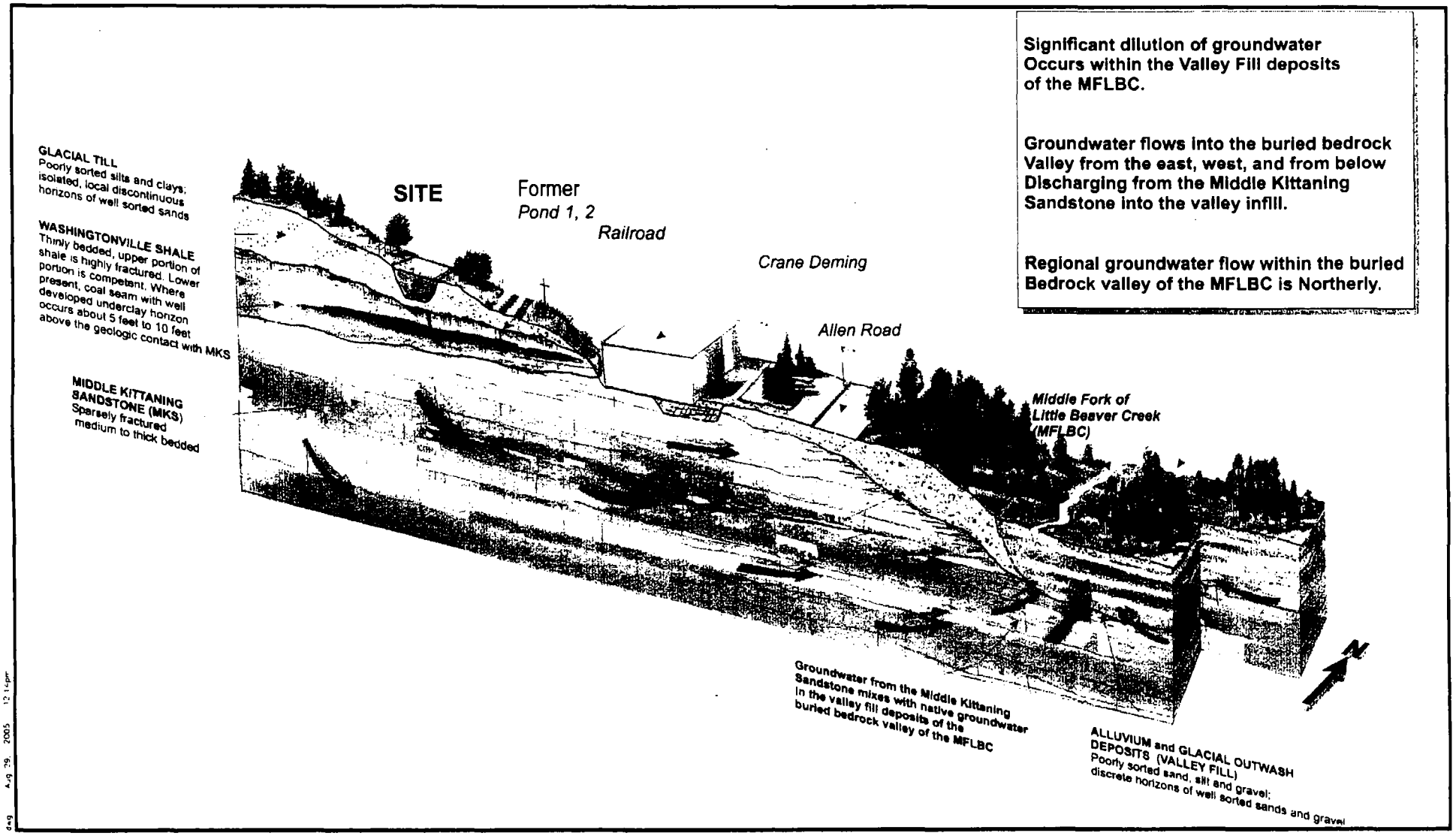


Figure 7 Conceptual Hydrologic Setting and Transport Pathways

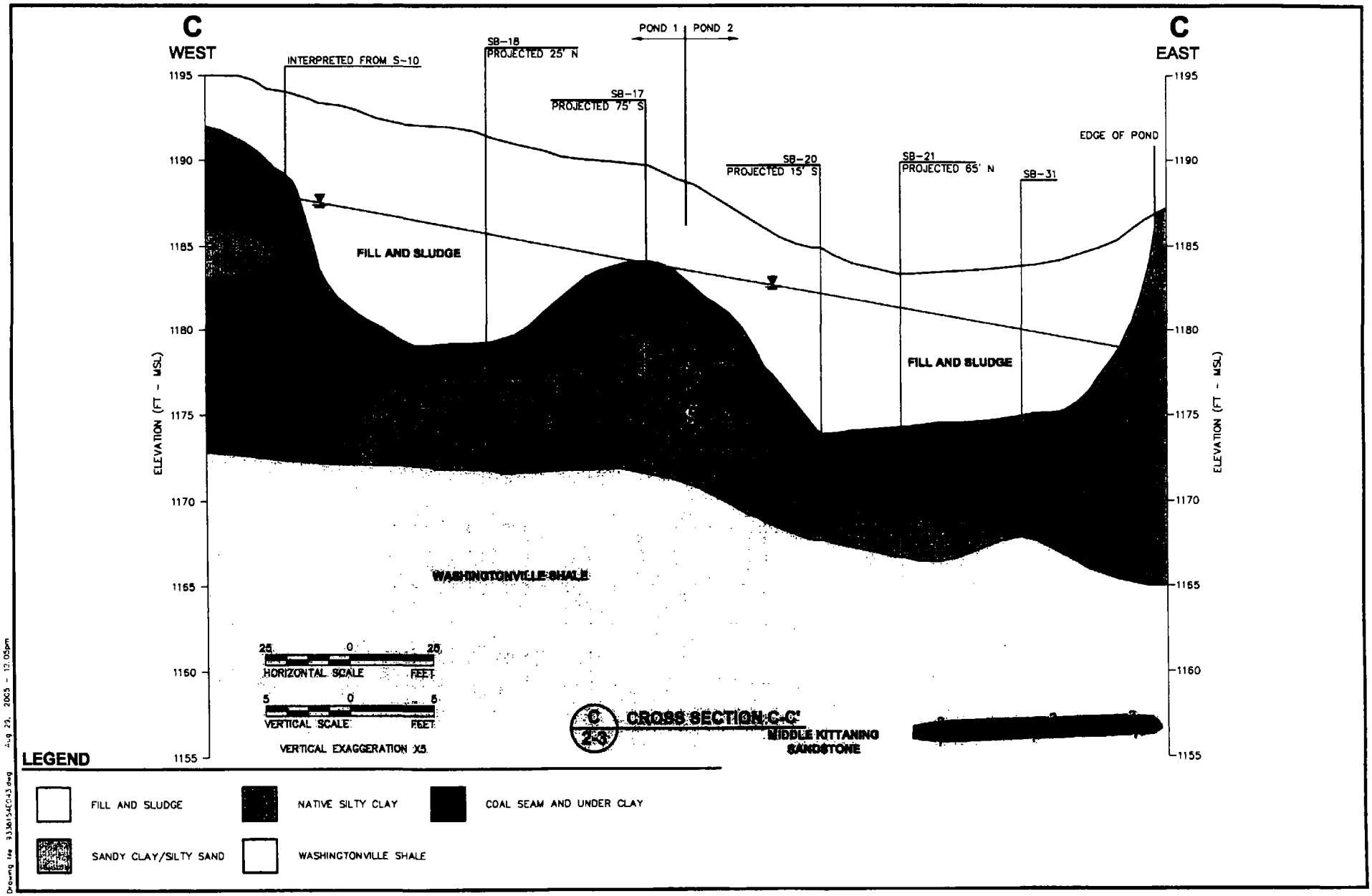


Figure 8 **Cross Section of Ponds 1 and 2**

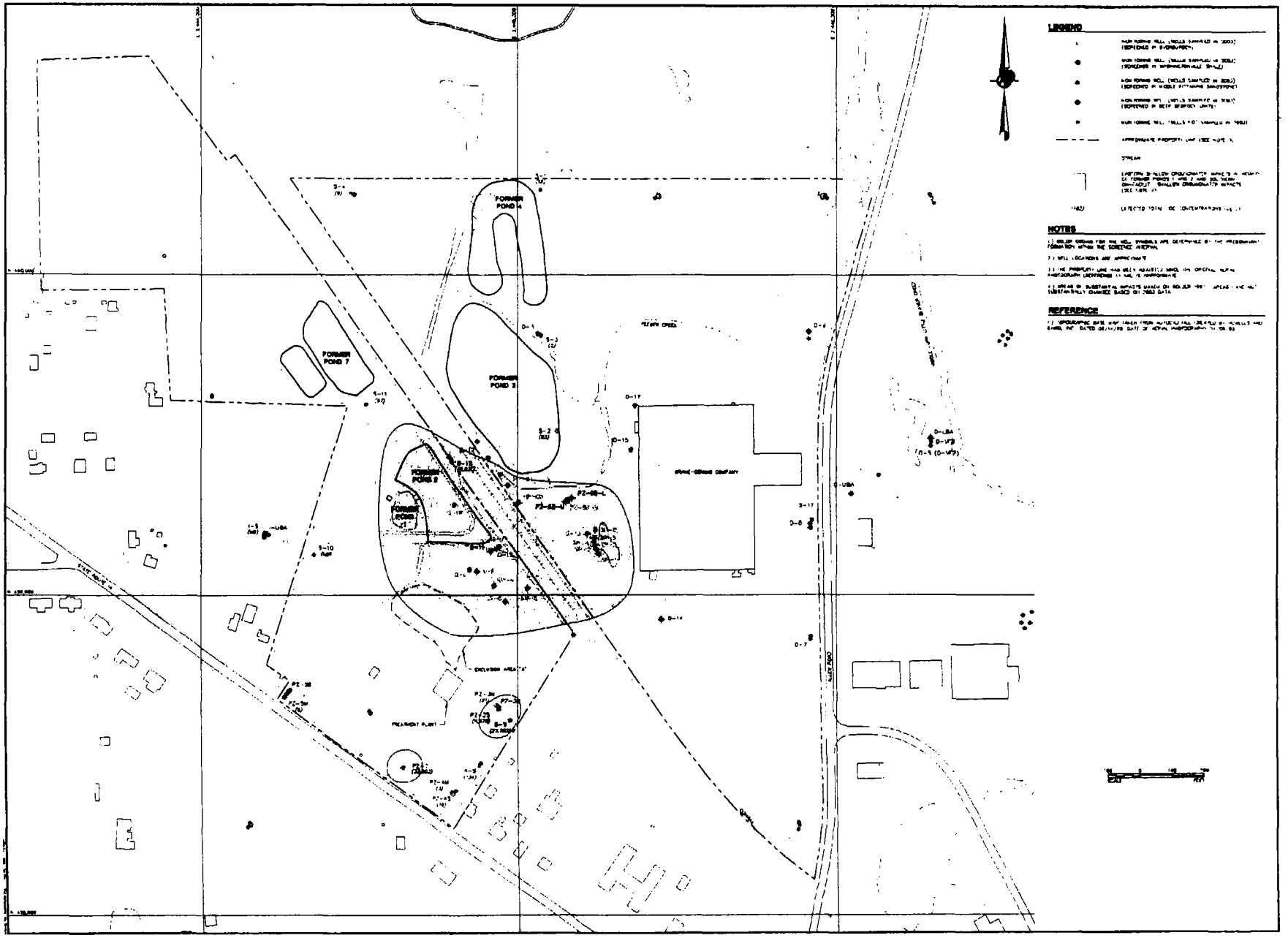


Figure 9 **Overburden Groundwater Contamination**

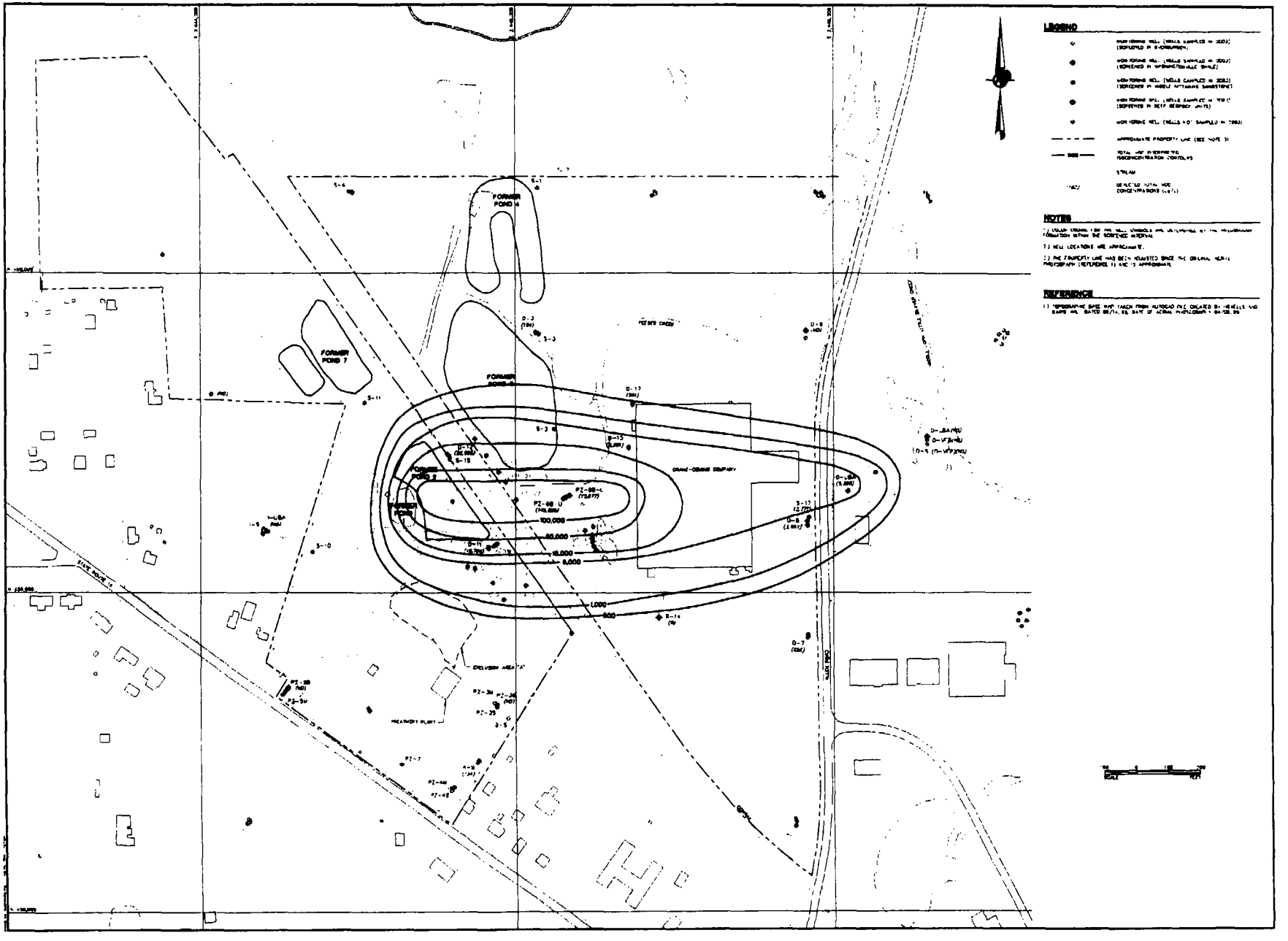


Figure 10 Bedrock Groundwater Contamination

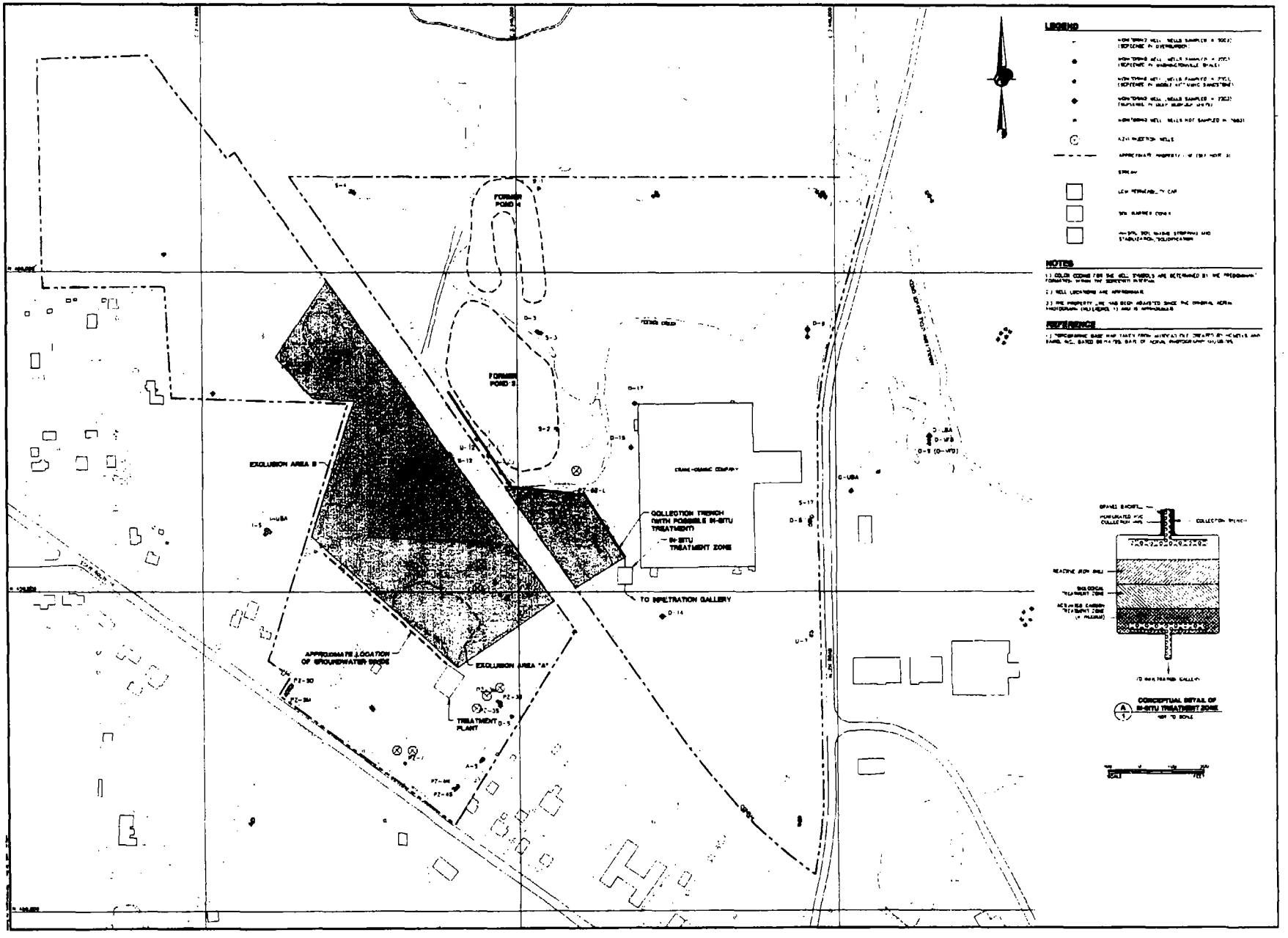


Figure 11 Conceptual Model of Alternative B

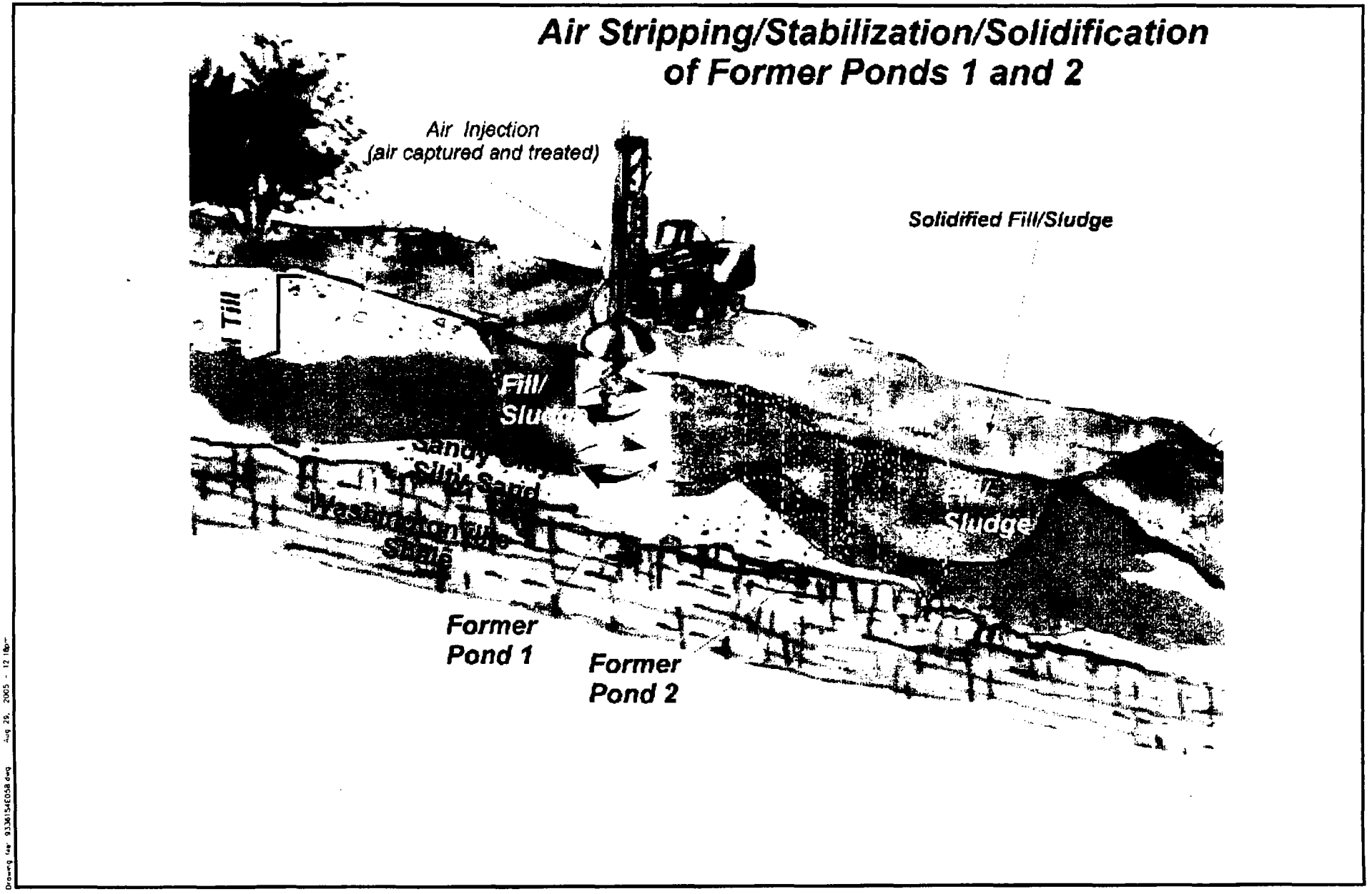


Figure 12 **Conceptual Diagram of S/S/S**

TABLES

Table 1: Physical/Chemical Characteristics of Former Ponds

Former Ponds	Fill Volume (yd3)	NAPL Observed	OVA Readings (PPM)	Estimated Organics Mass	Organic Mass In Till Below Base	Fill/Sludge Thickness	Thickness of Underlying Silty Clay
Former Ponds 1 & 2	24,285	Yes	> 1,000	560,000 lb.	385,000 lb.	10 to 15 ft	1 to 9 ft.
Former Pond 3	69,000	No	< 50	902 lb.	2 lb.	< 5 ft	7 to 11 ft.
Former Pond 4	19,078	No	< 100	725 lb.	6 lb.	< 10 ft	> 20 ft.
Former Pond 7	10,610	No	< 100	9,919 lb.	7 lb.	< 10 ft	5 to 6 ft.

Table 2: Summary of Primary Contaminants of Concern

Location	Chemical	GROUNDWATER			SOIL		
		Range of detected concentration (ug/l)	Frequency of detection[1]	Exposure point concentration (ug/l)	Range of detected concentration (mg/kg)	Frequency of detection	Exposure point concentration (mg/kg)
On-Facility (Derived from the EA - based on future residential exposure via ingestion)	mirex	ND - 240	120/218	240	ND - 2,080	145/162	220
	1,1,2,2-TCA	ND - 60,000	36/222	49,000	ND - 2.3	63/159	0.056
	PCE	ND - 130,000	36/221	105,000	ND - 4.1	93/161	0.062
	benzene	ND - 45,000	64/222	45,000	ND - 0.015	64/160	0.004
	1,2-DCA	ND - 23,000	62/222	23,000	ND - 0.011	43/153	0.004
	chlorobenzene	ND - 4,700	46/221	4,700	ND - 0.056	48/158	0.006
	1,2-DCE	ND - 2,100	51/151	2,100	ND - 0.35	9/148	0.009
	TCE	ND - 30,000	55/222	23,000	ND - 0.28	80/159	0.017
Off-Facility (Derived from the EA - based on future industrial worker exposure via ingestion)	mirex	ND - 0.18	120/218	0.2	ND - 2.2	27/39	1.4
	1,1,2,2-TCA	ND - 500	36/222	500	ND	NA	NA
	PCE	ND - 1,800	36/221	1,800	ND - 0.004	5/18	0.004
	benzene	ND - 1,200	64/222	1,200	ND	NA	NA
	1,2-DCA	ND - 280	62/222	280	ND	NA	NA
	1,2-DCE	ND - 8,000	51/151	8,000	ND	NA	NA
	TCE	ND - 2,000	55/222	2,000	ND - 0.003	5/11	0.003
	vinyl chloride	ND - 410	39/221	410	ND	NA	NA

[1] Endangerment Assessment Report does not distinguish on-facility and off-facility groundwater in reporting frequency.

Table 3: Potential Exposure Pathway Quantitatively Assessed at the Nease Chemical Company, Salem Site

Exposure Medium/ Exposure Route	Potentially Exposed Population[a]							
	On-Facility				Areas Adjacent to Facility (Off- Facility)		Locations Along MFLBC	
	Trespasser	Industrial Worker	Constructio n Worker	Resident (Farmer)	Industrial Worker	Resident (Farmer)	Recreational Visitor	Resident (Farmer)
Ingestion of Ground Water	--	F	--	F	F	F	--	--
Dermal Contact with Ground Water	--	F	--	F	F	F	--	--
Inhalation of Chemicals in Ground Water While Showering	--	F	--	F	F	F	--	--
Ingestion of Soil	C, F	F	F	F	C, F	C, F	C, F	C, F
Dermal Contact with Soil	C, F	F	F	F	C, F	C, F	C, F	C, F
Inhalation of Soil Dust	C, F	b	F	F	b	C, F	C, F	C, F
Inhalation of Outdoor Air	C, F	b	F	F	b	C, F	--	--
Inhalation of Volatilizing Chemicals from Ground Water Seeps	--	--	--	--	C, F	--	--	--
Inhalation of Indoor Air	--	F	--	F	F	C, F	--	--
Ingestion of Surface Water	C, F	F	--	F	C, F	--	C, F	C, F
Dermal Contact with Surface Water	C, F	F	--	F	C, F	--	C, F	C, F
Inhalation of Air Above Surface Water	--	F	--	--	C, F	--	--	--
Ingestion of Sediments	C, F	F	--	F	C, F	C, F	C, F	C, F
Dermal Contact with Sediments	C, F	F	--	F	C, F	C, F	C, F	C, F
Ingestion of Fish	--	--	--	--	--	F	C, F	C, F
Ingestion of Game	--	--	--	--	--	C, F	C, F	C, F
Ingestion of Vegetables	--	--	--	F	--	C, F	--	C, F
Ingestion of Beef and Milk	--	--	--	--	--	F	F	F

Notes:

a Industrial and construction workers are assumed to be adults; trespassers are assumed to be older children and teenagers; both adult and child parameters considered for residents and recreational visitors.

b Inhalation exposures to industrial workers assumed to be adequately characterized by indoor air pathway; thus, inhalation of outdoor air and soil dust were not assessed for this population.

C Indicates that potential exposure is possible under current exposure scenarios.

F Indicates that potential exposure is possible under hypothetical future exposure scenarios.

-- Indicates that potential exposure by this pathway is not considered likely, as discussed in the text of Chapter V.

Table 5
Summary of the Chemicals Retained for Further Evaluation of Risk to Lower Trophic Level Receptors

Chemical	Surface Water	Sediment	Surface Soil
Evaluated in the Exposure and Risk Characterization Portions of the Risk Assessment			
1,1,2,2-Tetrachloroethane	X		
Tetrachloroethene	X	X	
1,2-Dichlorobenzene	X	X	
1,2-Dichloroethane		X	
1,2-Dichloroethene (total)		X	
Anthracene		X	
Benzo(a)pyrene		X	
Benzo(g,h,i)perylene		X	
Benzo(k)fluoranthene		X	
Benzoic acid	X		
Benzyl alcohol	X		
Dibenzo(a,h)anthracene		X	
Diethylphtalate		X	
2,4-Dichlorphenol		X	
Fluoranthene		X	
Hexachloroethane		X	
Indeno(1,2,3-cd)pyrene		X	
Phenanthrene		X	
Phenol		X	
Pyrene		X	
2,4,6-Trichlorophenol		X	
4,4'-DDD		X	
Methoxychlor	X	X	
Mirex	X	X	X[(a)]
Photomirex	X	X	X[(a)]

Chemical	Surface Water	Sediment	Surface Soil
Acetone		X	X
Arsenic		X	
Cadmium		X	
Chromium		X	
Copper		X	
Iron		X	
Lead		X	
Manganese		X	
Mercury		X	
Nickel		X	
Silver		X	
Zinc		X	
Chemicals Addressed in the Uncertainty Section of the Risk Assessment			
2-Butanone			X
1,1,2-Trichloroethane			X
1,2-Dichlorobenzene			X
Acenapthylene		X	
1.2-Dichlorobenzene			X
4-Chloro-3-Methylphenol			X
Benzo(b)fluoranthene		X	
Bis(2-chloroethyl)ether	X	X	
4-Methylphenol			X
Dibenzofuran			X
Diphenyl sulfone	X	X	X
Hexachlorobenzene		X	X[(a)]
Hexachlorobutadiene		X	X

Chemical	Surface Water	Sediment	Surface Soil
Hexachloroethane			X
delta - BCH			X
Kepone	X	X	
Antimony		X	
Barium		X	
Beryllium		X	
Calcium		X	
Cobalt		X	
Magnesium		X	
Potassium		X	
Selenium		X	
Sodium		X	
Thallium		X	
Vanadium		X	

[(a)] Evaluated quantitatively for food chain exposure only. There are no soil screening toxicological benchmarks.

Table 6 Chemical Specific ARARs

Groundwater	Ohio MCL[1] [µg/l]	Federal MCL[2] [µg/l]
1,1,2,2-Tetrachloroethane	NA	NA
1,2-Dichlorobenzene	600	600
1,2-Dichloroethane (DCA)	5	5
1,2-Dichloroethene (mixed)	70	70
2-Nitroaniline	NA	NA
Aluminum	NA	NA
Arsenic	50 (3)	50 (3)
Benzene	5	
bis (2-ethylhexyl) phthalate	6	NA
Carbon Tetrachloride	5	5
Chlorobenzene	100	100
cis-1,2-Dichloroethene	70	70
Diphenyl Sulfone	NA	NA
Endrin	2	2
Hexachlorobenzene	1	1
Hexachlorobutadiene	NA	NA
Hexachloroethane	NA	NA
Iron	NA	NA
Manganese	NA	NA
Mirex	NA	NA
Nickel	100	NA
Tetrachloroethene (PCE)	5	5
Trichloroethene (TCE)	5	5
Vanadium	NA	NA
Vinyl Chloride	2	2

NA - Not Applicable, a MCL has not been promulgated for this chemical

1. Ohio Primary Drinking Water Standards OAC 3745-81
2. National Primary Drinking Water Standards (40 CFR Part 141)
3. Arsenic MCL will change to 10 ug/l by January 2006

Table 8 Potential Action-Specific and Location-Specific ARARs

CATEGORY	ORC	OAC	PARA.	CAPTION	TEXT	APPLICATION
ODNR	1517.16			CHANNEL MODIFICATIONS MUST BE APPROVED	NO GOVERNMENTAL BODY MAY MODIFY THE CHANNEL OF ANY WATERCOURSE WITHIN A WILD, SCENIC OR RECREATIONAL RIVER AREA OUTSIDE THE LIMITS OF A MUNICIPAL CORPORATION WITHOUT APPROVAL FROM THE DIRECTOR OF ODNR	CONSIDER FOR ANY ACTION THAT INCLUDES DREDGING OR ALTERING OF RIVERBANKS
ODNR	1518.02			ENDANGERED PLANT SPECIES	PROHIBITS REMOVAL OR DESTRUCTION OF ENDANGERED PLANT SPECIES (SOME PRIVATE PROPERTY EXCEPTIONS).	APPLIES TO REMEDIATION SITES WHERE CHEMICALS MAY HARM ENDANGERED SPECIES. CLEARLY ESTABLISHES THAT RECEPTOR PLANT SPECIES MUST BE CONSIDERED IN RISK ASSESSMENTS. THIS ACT MAY REQUIRE CONSIDERATION OF ENDANGERED SPECIES IN REMEDIATIONS THAT INVOLVE MOVEMENT OR DISPLACEMENT OF LARGE VOLUMES OF SURFACE SOIL.
ODNR	1531.25			ENDANGERED ANIMAL SPECIES	PROHIBITS REMOVAL OR DESTRUCTION OF ENDANGERED ANIMAL SPECIES	APPLIES TO REMEDIATION SITES WHERE CHEMICALS MAY HARM ENDANGERED SPECIES. CLEARLY ESTABLISHES THAT RECEPTOR ANIMAL SPECIES MUST BE CONSIDERED IN RISK ASSESSMENTS. THIS ACT MAY REQUIRE CONSIDERATION OF ENDANGERED SPECIES IN REMEDIATIONS THAT INVOLVE MOVEMENT OR DISPLACEMENT OF LARGE VOLUMES OF SURFACE SOIL.
APC	3704.05		A-I	PROHIBITS VIOLATION OF AIR POLLUTION CONTROL RULES	PROHIBITS EMISSION OF AN AIR CONTAMINANT IN VIOLATION SEC. 3704 OR ANY RULES, PERMIT, ORDER OR VARIANCE ISSUED PURSUANT TO THAT SECTION OF THE ORC.	MAY PERTAIN TO ANY SITE WHERE EMISSIONS OF AN AIR CONTAMINANT OCCURS EITHER AS A PRE-EXISTING CONDITION OF THE SITE OR AS A RESULT OF REMEDIAL ACTIVITIES. SHOULD BE CONSIDERED FOR VIRTUALLY ALL SITES. QUIRE THE MANAGEMENT OF SOLID/HAZARDOUS WASTES O
HW	3734.02		(H)	"DIGGING" WHERE HAZ OR SOLID WASTE FACILITY WAS LOCATED	FILLING, GRADING, EXCAVATING, BUILDING, DRILLING OR MINING ON LAND WHERE HAZARDOUS WASTE OR SOLID WASTE FACILITY WAS OPERATED IS PROHIBITED WITHOUT PRIOR AUTHORIZATION FROM THE DIRECTOR OF THE OHIO EPA.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS OR SOLID WASTE HAS COME TO BE LOCATED. CERTAIN ALTERNATIVES INCLUDE EXCAVATION ACTIVITIES WHICH MAY UNCOVER SOLID AND/OR HAZARDOUS WASTE. SHOULD THOSE ACTIVITIES REQUIRE THE MANAGEMENT OF SOLID/HAZARDOUS WASTES ON-SITE, AN EXEMPTION TO PERMITTING AND OTHER REQUIREMENTS MAY BE WARRANTED.

CATEGORY	ORC	OAC	PARA.	CAPTION	TEXT	APPLICATION
HW APC	3734.02		(I)	AIR EMISSIONS FROM HAZARDOUS WASTE FACILITIES	NO HAZARDOUS WASTE FACILITY SHALL EMIT ANY PARTICULATE MATTER, DUST, FUMES, GAS, MIST, SMOKE, VAPOR OR ODOROUS SUBSTANCE THAT INTERFERES WITH THE COMFORTABLE ENJOYMENT OF LIFE OR PROPERTY OR IS INJURIOUS TO PUBLIC HEALTH.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE WILL BE MANAGED SUCH THAT AIR EMISSIONS MAY OCCUR. CONSIDER FOR SITES THAT WILL UNDERGO MOVEMENT OF EARTH OR INCINERATION.
DSIWM	3734.03			PROHIBITS OPEN DUMPING OR BURNING	PROHIBITS OPEN BURNING OR OPEN DUMPING OF SOLID WASTE OR TREATED OR UNTREATED INFECTIOUS WASTE.	PERTAINS TO ANY SITE AT WHICH SOLID WASTE HAS COME TO BE LOCATED OR WILL BE GENERATED DURING A REMEDIAL ACTION.
HW	3734.05		(D)6,d,g,h	HAZARDOUS WASTE SITING CRITERIA	(D),6,d. A HAZARDOUS WASTE FACILITY INSTALLATION AND OPERATION PERMIT SHALL NOT BE APPROVED UNLESS IT PROVES THAT THE FACILITY REPRESENTS THE MINIMUM RISK OF ALL OF THE FOLLOWING (i)CONTAMINATION OF GROUND AND SURFACE WATERS (ii)FIRES OR EXPLOSIONS FROM TREATMENT, STORAGE OR DISPOSAL METHODS (iii)ACCIDENT DURING TRANSPORTATION (iv)IMPACT ON PUBLIC HEALTH AND SAFETY (v)AIR POLLUTION (vi)SOIL CONTAMINATION (D),6,g,h. PROHIBITS THE FOLLOWING LOCATIONS FOR TREATMENT, STORAGE AND DISPOSAL OF ACUTE HAZARDOUS WASTE: (i) WITHIN 2000 FEET OF ANY RESIDENCE, SCHOOL, HOSPITAL, JAIL OR PRISON; (ii) ANY NATURALLY OCCURRING WETLAND (iii) ANY FLOOD HAZARD AREA (iv) WITHIN ANY STATE PARK OR NATIONAL PARK OR RECREATION AREA	PERTAINS TO ALL SITES AT WHICH HAZARDOUS WASTE HAS COME TO BE LOCATED AND/OR AT WHICH HAZARDOUS WILL BE TREATED, STORED OR DISPOSED OF. MAY FUNCTION AS SITING CRITERIA.
HW	3734.05		(D)(6)(c)	HAZARDOUS WASTE FACILITY ENVIRONMENTAL IMPACT	A HAZARDOUS WASTE FACILITY INSTALLATION AND OPERATION PERMIT SHALL NOT BE APPROVED UNLESS IT PROVES THAT THE FACILITY REPRESENTS THE MINIMUM ADVERSE ENVIRONMENTAL IMPACT, CONSIDERING THE STATE OF AVAILABLE TECHNOLOGY, THE NATURE AND ECONOMICS OF VARIOUS ALTERNATIVES AND OTHER PERTINENT CONSIDERATIONS	PERTAINS TO ALL SITES AT WHICH HAZARDOUS WASTE HAS COME TO BE LOCATED AND/OR AT WHICH HAZARDOUS WASTE WILL BE TREATED, STORED OR DISPOSED OF. MAY FUNCTION AS SITING CRITERIA.
APC DSW	3767.13			PROHIBITION OF NUISANCES	PROHIBITS NOXIOUS EXHALATIONS OR SMELLS AND THE OBSTRUCTION OF WATERWAYS.	PERTAINS TO ANY SITE THAT MAY HAVE NOXIOUS SMELLS OR MAY OBSTRUCT WATERWAYS.
DSW	3767.14			PROHIBITION OF NUISANCES	PROHIBITION AGAINST THROWING REFUSE, OIL, OR FILTH INTO LAKES, STREAMS, OR DRAINS.	PERTAINS TO ALL SITES LOCATED ADJACENT TO LAKES, STREAMS, OR DRAINS.
DSW	6111.04			ACTS OF POLLUTION PROHIBITED	POLLUTION OF WATERS OF THE STATE IS PROHIBITED.	PERTAINS TO ANY SITE WHICH HAS CONTAMINATED ON-SITE GROUND OR SURFACE WATER OR WILL HAVE A DISCHARGE TO ON-SITE SURFACE OR GROUND WATER.

CATEGORY	ORC	OAC	PARA.	CAPTION	TEXT	APPLICATION
DSW	6111.07		A,C	WATER POLLUTION CONTROL REQUIREMENTS - DUTY TO COMPLY	PROHIBITS FAILURE TO COMPLY WITH REQUIREMENTS OF SECTIONS 6111.01 TO 6111.08 OR ANY RULES, PERMIT OR ORDER ISSUED UNDER THOSE SECTIONS.	PERTAINS TO ANY SITE WHICH HAS CONTAMINATED GROUND WATER OR SURFACE WATER OR WILL HAVE A DISCHARGE TO ON-SITE SURFACE OR GROUND WATER.
DSIWM	3734.04.1		A,C,D,G	EXPLOSIVE GAS MONITORING	REQUIRES EXPLOSIVE GAS MONITORING PLANS FOR SANITARY LANDFILLS AND PROVIDES AUTHORITY TO THE DIRECTOR OF OHIO EPA TO ORDER AN OWNER OR OPERATOR OF A FACILITY TO IMPLEMENT AN EXPLOSIVE GAS MONITORING AND REPORTING PLAN	PERTAINS TO ALL SANITARY LANDFILLS EXCEPT FOR THOSE THAT DISPOSED OF NONPUTRESCIBLE WASTES.
HW	3734.14.1			CONDITIONS FOR DISPOSAL OF ACUTE HAZARDOUS WASTE	PROHIBITS DISPOSAL OF ACUTE HAZARDOUS WASTE UNLESS IT: (1) CANNOT BE TREATED, RECYCLED OR DESTROYED; (2) HAS BEEN REDUCED TO ITS LOWEST LEVEL OF TOXICITY; AND (3) HAS BEEN COMPLETELY ENCAPSULATED OR PROTECTED TO PREVENT LEACHING.	PERTAINS TO ANY SITE WHERE ACUTE HAZARDOUS WASTE HAS COME TO BE LOCATED.
DSW	6111.04.2			RULES REQUIRING COMPLIANCE WITH NATIONAL EFFLUENT STDS	ESTABLISHES REGULATIONS REQUIRING COMPLIANCE WITH NATIONAL EFFLUENT STANDARDS.	PERTAINS TO ANY SITE WHICH WILL HAVE A POINT SOURCE DISCHARGE.
UIC	6111.04.3			INJECTION OF SEWAGE OR WASTES INTO WELLS	ESTABLISHES A REGULATORY PROGRAM FOR THE INJECTION OF WASTES INTO WELLS THAT PREVENTS THE CONTAMINATION OF UNDERGROUND SOURCES OF DRINKING WATER.	PERTAINS TO ANY SITE THAT EITHER HAS OR INTENDS TO INJECT WASTES OF ANY TYPE INTO WELLS.
DSW		3745-1-03		ANALYTICAL AND COLLECTION PROCEDURES	SPECIFIES ANALYTICAL METHODS AND COLLECTION PROCEDURES FOR SURFACE WATER DISCHARGES.	PERTAINS TO BOTH DISCHARGES TO SURFACE WATERS AS A RESULT OF REMEDIATION AND ANY ON-SITE SURFACE WATERS AFFECTED BY SITE CONDITIONS.
DSW		3745-1-04	A,,B,C,D,E	THE "FIVE FREEDOMS" FOR SURFACE WATER	ALL SURFACE WATERS OF THE STATE SHALL BE FREE FROM: A) OBJECTIONABLE SUSPENDED SOLIDS. B)FLOATING DEBRIS, OIL AND SCUM. C) MATERIALS THAT CREATE A NUISANCE. D) TOXIC, HARMFUL OR LETHAL SUBSTANCES. E) NUTRIENTS THAT CREATE NUISANCE GROWTH	PERTAINS TO BOTH DISCHARGES TO SURFACE WATERS AS A RESULT OF REMEDIATION AND ANY ON-SITE SURFACE WATERS AFFECTED BY SITE CONDITIONS.
DSW		3745-1-05	A-C	ANTIDEGRADATION POLICY FOR SURFACE WATER	PREVENTS DEGRADATION OF SURFACE WATER QUALITY BELOW DESIGNATED USE OR EXISTING WATER QUALITY. EXISTING IN STREAM USES SHALL BE MAINTAINED AND PROTECTED. THE MOST STRINGENT CONTROLS FOR TREATMENT SHALL BE REQUIRED BY THE DIRECTOR TO BE EMPLOYED FOR ALL NEW AND EXISTING POINT SOURCE DISCHARGES. PREVENTS ANY DEGRADATION OF STATE RESOURCE WATERS	REQUIRES THAT BEST AVAILABLE TECHNOLOGY (BAT) BE USED TO TREAT SURFACE WATER DISCHARGES. DWQPA USES THIS RULE TO SET STANDARDS WHEN EXISTING WATER QUALITY IS BETTER THAN THE DESIGNATED USE.

CATEGORY	ORC	OAC	PARA.	CAPTION	TEXT	APPLICATION
DSW		3745-1-07	C	WATER QUALITY CRITERIA	ESTABLISHES WATER QUALITY CRITERIA FOR POLLUTANTS WHICH DO NOT HAVE SPECIFIC NUMERICAL OR NARRATIVE CRITERIA IDENTIFIED IN TABLES 7-1 THROUGH 7-15 OF THIS RULE.	PERTAINS TO BOTH DISCHARGES TO SURFACE WATERS AS A RESULT OF REMEDIAL ACTION AND ANY SURFACE WATERS AFFECTED BY SITE CONDITIONS.
DSW		3745-1-15		WATER USE DES FOR L. BEAVER CREEK	ESTABLISHES WATER USE DESIGNATIONS FOR STREAM SEGMENTS WITHIN THE LITTLE BEAVER CREEK BASIN	PERTINENT IF STREAM OR STREAM SEGMENT IS ON-SITE AND IS EITHER AFFECTED BY SITE CONDITIONS OF IF REMEDY INCLUDES DIRECT DISCHARGE. USED BY DWQPA TO ESTABLISH WASTE LOAD ALLOCATIONS.
DSW		3745-3-04	A-D	PROHIBITED DISCHARGES	PLACES RESTRICTIONS ON DISCHARGES TO POTW'S THAT MAY HARM TREATMENT FUNCTIONS OR PASS THROUGH TO RECEIVING STREAM.	CONSIDER FOR SITES WITH DISCHARGES TO POTW.
DSW		3745-3-05	A-C	NOTIFICATION OF POTENTIAL PROBLEMS INCLUDING SLUG LOAD	REQUIRES INDUSTRIAL USERS TO NOTIFY POTW OF DISCHARGES THAT MAY ADVERSELY AFFECT TREATMENT OPERATIONS, INCLUDING SLUG LOADS	CONSIDER FOR SITES WITH DISCHARGES TO POTW.
GW		3745-9-04	A,B	LOCATION/SITING OF NEW GW WELLS	MANDATES THAT GROUND WATER WELLS BE:A) LOCATED AND MAINTAINED SO AS TO PREVENT CONTAMINANTS FROM ENTERING WELL.B) LOCATED SO AS TO BE ACCESSIBLE FOR CLEANING AND MAINTENANCE.	PERTAINS TO ALL GROUND WATER WELLS ON THE SITE THAT EITHER WILL BE INSTALLED OR HAVE BEEN INSTALLED SINCE FEB. 15, 1975. WOULD PERTAIN DURING THE FS IF NEW WELLS ARE CONSTRUCTED FOR TREATABILITY STUDIES.
GW		3745-9-05	A1,B-H	CONSTRUCTION OF NEW GW WELLS	SPECIFIES MINIMUM CONSTRUCTION REQUIREMENTS FOR NEW GROUND WATER WELLS IN REGARDS TO CASING MATERIAL, CASING DEPTH, POTABLE WATER, ANNULAR SPACES, USE OF DRIVE SHOE, OPENINGS TO ALLOW WATER ENTRY, CONTAMINANT ENTRY.	PERTAINS TO ALL GROUND WATER WELLS ON THE SITE THAT EITHER WILL BE INSTALLED OR HAVE BEEN INSTALLED SINCE FEB. 15, 1975. WOULD PERTAIN DURING THE FS IF NEW WELLS ARE CONSTRUCTED FOR TREATABILITY STUDIES.
GW		3745-9-06	A,B,D,E	CASING REQUIREMENTS FOR NEW GW WELLS	ESTABLISHES SPECIFIC REQUIREMENTS FOR WELL CASINGS, SUCH AS SUITABLE MATERIAL, DIAMETERS AND CONDITION.	PERTAINS TO ALL GROUND WATER WELLS ON THE SITE THAT EITHER WILL BE INSTALLED OR HAVE BEEN INSTALLED SINCE FEB. 15, 1975. WOULD PERTAIN DURING THE FS IF NEW WELLS ARE CONSTRUCTED FOR TREATABILITY STUDIES.
GW		3745-9-07	A-F	SURFACE DESIGN OF NEW GW WELLS	ESTABLISHES SPECIFIC SURFACE DESIGN REQUIREMENTS, SUCH AS HEIGHT ABOVE GROUND, WELL VENTS, WELL PUMPS, ETC.	PERTAINS TO ALL GROUND WATER WELLS ON THE SITE THAT EITHER WILL BE INSTALLED OR HAVE BEEN INSTALLED SINCE FEB. 15, 1975. WOULD PERTAIN DURING THE FS IF NEW WELLS ARE CONSTRUCTED FOR TREATABILITY STUDIES.

CATEGORY	ORC	OAC	PARA.	CAPTION	TEXT	APPLICATION
DW		3745-9-09	A-C,D1,E-G	MAINTENANCE & OPERATION OF GW WELLS	ESTABLISHES SPECIFIC MAINTENANCE AND MODIFICATION REQUIREMENTS FOR CASING, PUMP AND WELLS IN GENERAL.	PERTAINS TO ALL GROUND WATER WELLS ON THE SITE THAT EITHER WILL BE INSTALLED OR HAVE BEEN INSTALLED SINCE FEB. 15, 1975. WOULD PERTAIN DURING THE FS IF NEW WELLS ARE CONSTRUCTED FOR TREATABILITY STUDIES.
GW		3745-9-10	A,B,C	ABANDONMENT OF TEST HOLES & GW WELLS	FOLLOWING COMPLETION OF USE, WELLS AND TEST HOLES SHALL BE COMPLETELY FILLED WITH GROUT OR SIMILAR MATERIAL OR SHALL BE MAINTAINED IN COMPLIANCE OF ALL REGULATIONS.	PERTAINS TO ALL GROUND WATER WELLS ON THE SITE THAT EITHER WILL BE INSTALLED OR HAVE BEEN INSTALLED SINCE FEB. 15, 1975. GIVES EXCEPTIONS FROM MONITORING, SOIL LINER, CAPPING, GEOMEMBRA
GW		3745-9-11		USE OF WELLS FOR DISPOSAL	NO PERSON SHALL USE ANY WELL TO INJECT OR REINJECT ANY SUBSTANCE INTO THE GROUND WITHOUT NECESSARY PERMITS.	MAY PERTAIN TO SYSTEMS THAT ENTAIL INJECTION OR REINJECTION OF FLUID INTO THE GROUND. CONSIDER FOR IN-SITU BIOREMEDIATION, SOIL FLUSHING AND GROUND WATER PLUME CONTAINMENT.
ODNR		1501:31-23	01, A-B	LIST OF ENDANGERED ANIMAL SPECIES	LIST OF OHIO ANIMAL SPECIES CONSIDERED ENDANGERED.	MAY APPLY TO REMEDIATION SITES WHERE LISTED SPECIES ARE THREATENED BY CHEMICAL RELEASES. MAY ALSO APPLY AT SITES WHERE REMEDIAL ACTIVITIES COULD DISTURB EXISTING HABITATS.
ODNR		1501-18-1	03, A	LIST OF ENDANGERED PLANT SPECIES	PLANT SPECIES CONSIDERED ENDANGERED IN OHIO	MAY APPLY AT REMEDIATION SITES WHERE CHEMICAL RELEASE THREATENS LISTED SPECIES. SHOULD ALSO BE CONSIDERED WHERE REMEDIAL ACTIVITIES MAY DISRUPT HABITATS.
DSW		3745-1-34	A-D	WATER QUALITY CRITERIA FOR THE OHIO RIVER DRAINAGE BASIN	APPLIES TO DISCHARGES TO STREAMS WITHIN THE OHIO RIVER BASIN, USED BY DSW TO DETERMINE DISCHARGE LIMITS	CONSIDER FOR SITES WITH DISCHARGES TO OHIO RIVER BASIN
APC		3745-15-06	A1,A2	MALFUNCTION & MAINTENANCE OF AIR POLL CONTROL EQUIPMENT	ESTABLISHES SCHEDULED MAINTENANCE AND SPECIFIES WHEN POLLUTION SOURCE MUST BE SHUT DOWN DURING MAINTENANCE	PERTAINS TO ANY SITE WHICH UTILIZES OR WILL UTILIZE AIR POLLUTION CONTROL EQUIPMENT ON-SITE.
APC		3745-15-07	A	AIR POLLUTION NUISANCES PROHIBITED	DEFINES AIR POLLUTION NUISANCE AS THE EMISSION OR ESCAPE INTO THE AIR FROM ANY SOURCES(s)) OF SMOKE, ASHES, DUST, DIRT, GRIME, ACIDS, FUMES, GASES, VAPORS, ODORS AND COMBINATIONS OF THE ABOVE THAT ENDANGER HEALTH, SAFETY OR WELFARE OF THE PUBLIC OR CAUSE PERSONAL INJURY OR PROPERTY DAMAGE. SUCH NUISANCES ARE PROHIBITED.	PERTAINS TO ANY SITE WHICH CAUSES, OR MAY REASONABLY CAUSE, AIR POLLUTION NUISANCES. CONSIDER FOR SITES THAT WILL UNDERGO EXCAVATION, DEMOLITION, CAP INSTALLATION, METHANE PRODUCTION, CLEARING AND GRUBBING, WATER TREATMENT, INCINERATION AND WASTE FUEL RECOVERY.
APC		3745-15-08	A	CIRCUMVENTION	FORBIDS DILUTION OR OTHER MEANS TO CONCEAL EMISSIONS WITHOUT ACTUAL REDUCTIONS	CONSIDER FOR SITES WITH EMISSIONS TO AIR, AIR STRIPPING, INCINERATION, SOIL VAPOR EXTRACTION ETC.

CATEGORY	ORC	OAC	PARA.	CAPTION	TEXT	APPLICATION
DSW		3745-1-51	A-C	WETLAND NARRATIVE CRITERIA	LISTS CRITERIA TO BE PROTECTED IN WETLAND ENVIRONMENTS	CONSIDER FOR SITES THAT HAVE IMPACTED WETLANDS OR WHERE REMEDIAL ACTIVITIES WOULD IMPACT WETLANDS.
DSW		3745-1-52		NUMERIC CHEMICAL CRITERIA FOR WASTE WATER DISCHARGE	REQUIRES THAT DISCHARGE CRITERIA APPLY AT END OF PIPE	CONSIDER FOR SITES THAT HAVE IMPACTED WETLANDS OR WHERE REMEDIAL ACTIVITIES WOULD IMPACT WETLANDS.
DSW		3745-1-54	A-D	WETLAND ANTIDEGRADATION	REQUIRES THAT ALL WETLANDS BE ASSIGNED A CATEGORY CLASSIFICATION AND GIVES CRITERIA FOR CLASSIFICATION. DISCUSSES REQUIREMENTS FOR AVOIDANCE AND MINIMIZATION OF WETLANDS DAMAGE AS WELL AS COMPENSATORY MITIGATION.	CONSIDER FOR SITES THAT HAVE IMPACTED WETLANDS OR WHERE REMEDIAL ACTIVITIES WOULD IMPACT WETLANDS.
APC		3745-16-02	B,C	STACK HEIGHT REQUIREMENTS	ESTABLISHES ALLOWABLE STACK HEIGHT FOR AIR CONTAMINANT SOURCES BASED ON GOOD ENGINEERING PRACTICE.	PERTAINS TO ANY SITE THAT HAS OR WILL HAVE AN AIR CONTAMINANT SOURCE ON-SITE (PARTICULATE, DUST, FUMES, GAS, MIST, SMOKE, VAPOR, ODORS) EMITTED FROM A STACK. CONSIDER FOR REMEDIES INCORPORATING INCINERATION, WASTE FUEL RECOVERY AND WASTEWATER TREATMENT.
APC		3745-17-02	A,B,C	PARTICULATE AMBIENT AIR QUALITY STANDARDS	ESTABLISHES SPECIFIC STANDARDS FOR TOTAL SUSPENDED PARTICULATES.	PERTAINS TO ANY SITE THAT MAY EMIT MEASURABLE QUANTITIES OF PARTICULATE MATTER (BOTH STACK AND FUGITIVE). CONSIDER FOR SITES THAT WILL UNDERGO EXCAVATION, DEMOLITION, CAP INSTALLATION, CLEARING AND GRUBBING, INCINERATION AND WASTE FUEL RECOVERY.
APC		3745-17-05		PARTICULATE NON-DEGRADATION POLICY	DEGRADATION OF AIR QUALITY IN ANY AREA WHERE AIR QUALITY IS BETTER THAN REQUIRED BY 3745-17-02 IS PROHIBITED	PERTAINS TO SITES IN CERTAIN LOCATIONS THAT MAY EMIT OR ALLOW THE ESCAPE OF PARTICULATES (BOTH STACK AND FUGITIVE). CONSIDER FOR SITES THAT WILL UNDERGO EXCAVATION, DEMOLITION, CAP INSTALLATION, CLEARING AND GRUBBING, INCINERATION.
APC		3745-17-08	A1,A2,B,D	EMISSION RESTRICTIONS FOR FUGITIVE DUST	ALL EMISSIONS OF FUGITIVE DUST SHALL BE CONTROLLED.	PERTAINS TO SITES WHICH MAY HAVE FUGITIVE EMISSIONS (NON-STACK) OF DUST. CONSIDER FOR SITES THAT WILL UNDERGO GRADING, LOADING OPERATIONS, DEMOLITION, CLEARING AND GRUBBING AND CONSTRUCTION UTILIZE INCINERATION OR FUEL RECOVERY (WASTE FUEL RECOVERY)
APC		3745-19-04	A,B,C,D	OPEN BURNING STANDARDS IN UNRESTRICTED AREAS	OPEN BURNING WITHOUT PRIOR AUTHORIZATION FROM OHIO EPA IS PROHIBITED	PERTAINS TO SITES WITHIN AN UNRESTRICTED AREA (OUTSIDE THE BOUNDARY OF A MUNICIPALITY AND A ZONE EXTENDING BEYOND SUCH MUNICIPALITY).

CATEGORY	ORC	OAC	PARA.	CAPTION	TEXT	APPLICATION
APC		3745-21-02	A,B	AMBIENT AIR QUALITY STANDARDS AND GUIDELINES	ESTABLISHES SPECIFIC AIR QUALITY STANDARDS FOR CARBON MONOXIDE, OZONE AND NON-METHANE HYDROCARBONS	PERTAINS TO ANY SITE WHICH WILL EMIT CARBON MONOXIDE, OZONE OR NON-METHANE HYDROCARBONS. CONSIDER FOR SITES WHERE TREATMENT SYSTEMS WILL RESULT IN AIR EMISSIONS.
APC		3745-21-03	B,C	METHODS OF AMBIENT AIR QUALITY MEASUREMENT	SPECIFIES MEASUREMENT METHODS TO DETERMINE AMBIENT AIR QUALITY FOR THE FOLLOWING CONSTITUENTS: CARBON MONOXIDE, OZONE AND NON-METHANE HYDROCARBONS.	PERTAINS TO ANY SITE WHICH WILL EMIT CARBON MONOXIDE, OZONE OR NON-METHANE HYDROCARBONS. CONSIDER FOR SITES WHERE TREATMENT SYSTEMS WILL RESULT IN AIR EMISSIONS.
APC		3745-21-07	A,B,G,I,J	ORGANIC MATERIALS EMISSION CONTROL: STATIONARY SOURCES	REQUIRES CONTROL OF EMISSIONS OF ORGANIC MATERIALS FROM STATIONARY SOURCES. REQUIRES BEST AVAILABLE TECHNOLOGY.	PERTAINS TO ANY SITE WHICH IS EMITTING OR WILL EMIT ORGANIC MATERIAL. CONSIDER FOR SITES THAT WILL UNDERGO WATER TREATMENT (AIR STRIPPING) INCINERATION AND FUEL BURNING (WASTE FUEL RECOVERY).
HW		3745-248-011	A-E	DESIGN AND OPERATING STANDARDS FOR CONTAINMENT BUILDING	STANDARDS FOR DESIGN AND OPERATION OF CONTAINMENT BUILDINGS	CONSIDER FOR SITES WITH BUILDINGS FOR TREATMENT, STORAGE OR DISPOSAL
HW		3745-248-02	A,B	CLOSURE AND POST-CLOSURE CARE OF CONTAINMENT BUILDINGS.	STANDARDS FOR CONTAINMENT BUILDING CLOSURE.	CONSIDER FOR SITES WITH BUILDINGS FOR TREATMENT, STORAGE OR DISPOSAL
HW		3745-270-03	A-D	DILUTION PROHIBITED AS A SUBSTITUTE FOR TREATMENT.	FORBIDS DILUTION AS A MEANS OF ACHIEVING LAND DISPOSAL RESTRICTION LEVELS	CONSIDER FOR REMEDIAL OPTIONS INCLUDING LAND DISPOSAL OR LEAVING WASTES IN-PLACE
HW		3745-270-07	A-E	TESTING, TRACKING, AND RECORDKEEPING REQUIREMENTS	TESTING, TRACKING, AND RECORDKEEPING REQUIREMENTS FOR GENERATORS, TREATERS, AND DISPOSAL FACILITIES.	CONSIDER FOR SITES AT WHICH WASTES ARE GENERATED, STORED, DISPOSED, OR TREATED
HW		3745-270-09	A-D	SPECIAL RULES REGARDING CHARACTERISTIC WASTES	RULES APPLICABLE TO LAND DISPOSAL OF CHARACTERISTIC WASTES	CONSIDER FOR SITES THAT GENERATE CHARACTERISTIC WASTES
HW		3745-270-38	A-E	PROHIBITIONS, ORGANIC TOXICITY, COKE OVEN WASTES, ETC	RESTRICTIONS ON LAND DISPOSAL OF ORGANIC TOXIC WASTE, COKE OVEN WASTES AND CHLOROTOLUENE WITHOUT PROPER TREATMENT	CONSIDER FOR SITES WITH ORGANIC TOXIC WASTE, COKE OVEN WASTES AND CHLOROTOLUENE
HW		3745-270-40	A-J	APPLICABILITY OF TREATMENT STANDARDS	DETAILED LISTING OF CHEMICAL SPECIFIC LAND TREATMENT STANDARDS OR REQUIRED TREATMENT TECHNOLOGIES.	CONSIDER FOR SITES THAT GENERATE WASTES OR WITH WASTES DISPOSED ON-SITE

CATEGORY	ORC	OAC	PARA.	CAPTION	TEXT	APPLICATION
HW		3745-270-42	A-D	TREATMENT STANDARDS EXPRESSED AS SPECIFIED TECHNOLOGIES	LISTS SPECIFIC TREATMENT TECHNOLOGIES REQUIRED FOR SPECIFIC WASTES	CONSIDER AT ALL SITES GENERATING WASTES OR WITH ON-SITE DISPOSAL
HW		3745-270-45	A-D	TREATMENT STANDARDS FOR HAZARDOUS DEBRIS	SPECIFIES TREATMENT TECHNOLOGIES AND PERFORMANCE STANDARDS FOR VARIOUS DEBRIS.	CONSIDER FOR SITES WITH CONTAMINATION BY DEBRIS.
HW		3745-270-48	A	UNIVERSAL TREATMENT STANDARDS	GIVES CONTAMINANT CHEMICAL SPECIFIC STANDARDS FOR LAND DISPOSAL	CONSIDER FOR SITES WITH WASTE GENERATION OR ON-SITE DISPOSAL
HW		3745-270-49	A-E	LAND DISPOSAL RESTRICTION FOR CONTAMINATED SOILS	SPECIFIES STANDARDS FOR SOIL TREATMENT	CONSIDER AT SITES WHERE CONTAMINATED SOILS ARE GENERATED
DSIWM		3745-27-05	A,B,C	AUTHORIZED, LIMITED & PROHIBITED SOLID WASTE DISPOSAL	ESTABLISHES ALLOWABLE METHODS OF SOLID WASTE DISPOSAL; SANITARY LANDFILL, INCINERATION, COMPOSTING. PROHIBITS MANAGEMENT BY OPEN BURNING AND OPEN DUMPING.	PERTAINS TO ANY SITE AT WHICH SOLID WASTES WILL BE MANAGED. PROHIBITS MANAGEMENT BY OPEN BURNING AND OPEN DUMPING.
HW		3745-270-50	A-F	PROHIBITIONS ON STORAGE OF RESTRICTED WASTES	RULES FOR STORAGE OF WASTES THAT VIOLATE LDR'S	CONSIDER AT SITES WHERE REMEDIATION INCLUDES STORAGE OF WASTES.
DSIWM		3745-27-06	B,C	REQUIRED TECHNICAL INFORMATION FOR SANITARY LANDFILLS	SPECIFIES THE MINIMUM TECHNICAL INFORMATION REQUIRED OF A SOLID WASTE PERMIT TO INSTALL. INCLUDED ARE A HYDROGEOLOGIC INVESTIGATION REPORT, LEACHATE PRODUCTION AND MIGRATION INFORMATION, SURFACE WATER DISCHARGE INFORMATION, DESIGN CALCULATIONS, PLAN DRAWINGS.	THIS PARAGRAPH PRESENTS SUBSTANTIVE REQUIREMENTS OF A SOLID WASTE PERMIT TO INSTALL. PERTAINS TO ANY NEW SOLID WASTE DISPOSAL FACILITY CREATED ON-SITE AND EXPANSIONS OF EXISTING SOLID WASTE LANDFILLS . ALSO PERTAINS TO EXISTING AREAS OF CONTAMINATION THAT ARE CAPPED PER SOLID WASTE RULES . THIS RULE ESTABLISHES THE MINIMUM INFORMATION REQUIRED DURING THE REMEDIAL DESIGN STAGE.
DSIWM		3745-27-08	C,D-H	CONSTRUCTION SPECIFICATIONS FOR SANITARY LANDFILLS	SPECIFIES THE MINIMUM REQUIREMENTS FOR THE SOIL/CLAY LAYERS, GRANULAR DRAINAGE LAYER, GEOSYNTHETICS, LEACHATE MANAGEMENT SYSTEM, GAS MONITORING SYSTEM, ETC. ALSO ESTABLISHES CONSTRUCTION REQUIREMENTS FOR FACILITIES TO BE LOCATED IN GEOLOGICALLY UNFAVORABLE AREAS.	PERTAINS TO ANY NEW SOLID WASTE DISPOSAL FACILITY CREATED ON-SITE AND ANY EXPANSIONS TO EXISTING SOLID WASTE LANDFILLS. PORTIONS ALSO PERTAIN TO AREAS OF CONTAMINATION THAT ARE CAPPED PER SOLID WASTE RULES. MAY SERVE AS SITING CRITERIA.

CATEGORY	ORC	OAC	PARA.	CAPTION	TEXT	APPLICATION
DSIWM		3745-27-10	B,C,D,E,F	SANITARY LANDFILL - GW MONITORING AND CORRECTION	GROUND WATER MONITORING PROGRAM MUST BE ESTABLISHED FOR ALL SANITARY LANDFILL FACILITIES. THE SYSTEM MUST CONSIST OF A SUFFICIENT NUMBER OF WELLS THAT ARE LOCATED SO THAT SAMPLES INDICATE BOTH UPGRADIENT (BACKGROUND) AND DOWNGRADIENT WATER SAMPLES. THE SYSTEM MUST BE DESIGNED PER THE MINIMUM REQUIREMENTS SPECIFIED IN THIS RULE. THE SAMPLING AND ANALYSIS PROCEDURES USED MUST COMPLY WITH THIS RULE. SPECIFIES PROCEDURES FOR ASSESSMENT AND CORRECTION OF CONTAMINATION.	PERTAINS TO ANY NEW SOLID WASTE FACILITY AND ANY EXPANSIONS OF EXISTING SOLID WASTE LANDFILLS ON-SITE. ALSO MAY PERTAIN TO EXISTING AREAS OF CONTAMINATION THAT ARE CAPPED IN-PLACE PER THE SOLID WASTE RULES.
DSIWM		3745-27-11	B,G	FINAL CLOSURE OF SANITARY LANDFILL FACILITIES	REQUIRES CLOSURE OF A LANDFILL IN A MANNER WHICH MINIMIZES THE NEED FOR POST-CLOSURE MAINTENANCE AND MINIMIZES POST-CLOSURE FORMATION AND RELEASE OF LEACHATE AND EXPLOSIVE GASES TO AIR, SOIL GROUND WATER OR SURFACE WATER. SPECIFIES ACCEPTABLE CAP DESIGN; SOIL BARRIER LAYER, GRANULAR DRAINAGE LAYER, SOIL AND VEGETATIVE LAYER. PROVIDES FOR USE OF COMPARABLE MATERIALS TO THOSE SPECIFIED WITH APPROVAL OF DIRECTOR.	SUBSTANTIVE REQUIREMENTS PERTAIN TO ANY NEW SOLID WASTE LANDFILLS CREATED ON-SITE, ANY EXPANSIONS OF EXISTING SOLID WASTE LANDFILLS ON-SITE AND ANY EXISTING AREAS OF CONTAMINATION THAT ARE CAPPED IN-PLACE PER THE SOLID WASTE RULES.
DSIWM		3745-27-12	A-Q	SANITARY LANDFILL - EXPLOSIVE GAS MONITORING	ESTABLISHES WHEN AN EXPLOSIVE GAS MONITORING PLAN IS REQUIRED FOR SOLID WASTE LANDFILLS. SPECIFIES THE MINIMUM INFORMATION REQUIRED IN SUCH A PLAN, INCLUDING DETAILED ENGINEERING PLANS, SPECIFICATIONS, INFORMATION ON GAS GENERATION POTENTIAL, SAMPLING AND MONITORING PROCEDURES, ETC. MANDATES WHEN REPAIRS MUST BE MADE TO AN EXPLOSIVE GAS MONITORING SYSTEM. THIS RULE ONLY APPLIES TO LANDFILLS WHICH RECEIVED PUTRESCIBLE SOLID WASTES. REQUIRES CORRECTIVE ACTIONS WHEN EXPLOSIVE GAS HAZARDS ARE DETECTED. EMPOWERS DIRECTOR TO ORDER ACTIONS TO ABATE EXPLOSIVE GAS HAZARDS.	PERTAINS TO ANY SITE WHICH HAS HAD OR WILL HAVE PUTRESCIBLE SOLID WASTES PLACED ON-SITE AND WHICH HAS A RESIDENCE OR OTHER OCCUPIED STRUCTURE LOCATED WITHIN 1000 FEET OF THE EMPLACED SOLID WASTE.
DSIWM		3745-27-12	I, J	EXPLOSIVE GAS MONITORING FOR SANITARY LANDFILLS	IDENTIFIES PARAMETERS AND SCHEDULE FOR EXPLOSIVE GAS MONITORING	PERTAINS TO ANY DISPOSAL SITE WHERE EXPLOSIVE GAS GENERATION AND MIGRATION MAY BE A THREAT.

CATEGORY	ORC	OAC	PARA.	CAPTION	TEXT	APPLICATION
DSIWM		3745-27-13	A,C	DISTURBANCES WHERE HAZ OR SOLID WASTE FAC WAS OPERATED	REQUIRES THAT A DETAILED PLAN BE PROVIDED TO DESCRIBE HOW ANY PROPOSED FILLING, GRADING, EXCAVATING, BUILDING, DRILLING OR MINING ON LAND WHERE A HAZARDOUS WASTE FACILITY OR SOLID WASTE FACILITY WAS OPERATED WILL BE ACCOMPLISHED. THIS INFORMATION MUST DEMONSTRATE THAT THE PROPOSED ACTIVITIES WILL NOT CREATE A NUISANCE OR ADVERSELY AFFECT THE PUBLIC HEALTH OR THE ENVIRONMENT. SPECIAL TERMS TO CONDUCT SUCH ACTIVITIES MAY BE IMPOSED BY THE DIRECTOR TO PROTECT THE PUBLIC AND THE ENVIRONMENT.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS OR SOLID WASTE HAS BEEN MANAGED, EITHER INTENTIONALLY OR OTHERWISE. DOES NOT PERTAIN TO AREAS THAT HAVE HAD ONE-TIME LEAKS OR SPILLS.
DSIWM		3745-27-14	A	POST-CLOSURE CARE OF SANITARY LANDFILL FACILITIES	SPECIFIES THE REQUIRED POST-CLOSURE CARE FOR SOLID WASTE FACILITIES. INCLUDES CONTINUING OPERATION OF LEACHATE AND SURFACE WATER MANAGEMENT SYSTEMS, MAINTENANCE OF THE CAP SYSTEM AND GROUND WATER MONITORING.	SUBSTANTIVE REQUIREMENTS PERTAIN TO ANY NEWLY CREATED SOLID WASTE LANDFILLS ON-SITE, ANY EXPANSIONS OF EXISTING SOLID WASTE LANDFILLS ON-SITE AND ANY EXISTING AREAS OF CONTAMINATION THAT ARE CAPPED PER THE SOLID WASTE RULES.
DSIWM		3745-27-19	J	SANITARY LANDFILL OPERATIONS - SURFACE WATER MGMNT.	SURFACE WATER MUST BE DIVERTED FROM AREAS WHERE SOLID WASTE IS BEING, OR HAS BEEN, DEPOSITED. ALSO REQUIRES RUN-ON AND RUN-OFF TO BE CONTROLLED TO MINIMIZE INFILTRATION THROUGH THE COVER MATERIALS AND TO MINIMIZE EROSION OF THE CAP SYSTEM.	PERTAINS TO NEW SOLID WASTE DISPOSAL FACILITIES TO BE CREATED ON-SITE AND EXISTING LANDFILLS THAT WILL BE EXPANDED DURING REMEDIATION. PORTIONS ALSO MAY PERTAIN TO EXISTING AREAS OF CONTAMINATION THAT WILL BE CAPPED IN-PLACE PER SOLID WASTE RULES.
DSIWM		3745-27-19	K	SANITARY LANDFILL OPERATIONS - LEACHATE MANAGEMENT	REQUIRES REPAIR OF LEACHATE OUTBREAKS; COLLECTION AND TREATMENT OF LEACHATE ON THE SURFACE OF THE LANDFILL; AND ACTIONS TO MINIMIZE, CONTROL OR ELIMINATE CONDITIONS CAUSING LEACHATE OUTBREAKS.	PERTAINS TO NEW SOLID WASTE DISPOSAL FACILITIES TO BE CREATED ON-SITE AND EXISTING LANDFILLS THAT WILL BE EXPANDED DURING REMEDIATION. PORTIONS ALSO MAY PERTAIN TO EXISTING AREAS OF CONTAMINATION THAT WILL BE CAPPED IN-PLACE PER SOLID WASTE RULES.
DSIWM		3745-27-19	E	SANITARY LANDFILL GENERAL OPERATIONAL REQUIREMENTS	SPECIFIES GENERAL OPERATIONAL REQUIREMENTS FOR SOLID WASTE LANDFILLS. INCLUDES REQUIREMENTS FOR: PREPARATIONS FOR OPERATING DURING INCLEMENT WEATHER; MANAGEMENT TO MINIMIZE NOISE , DUST AND ODORS; VECTOR CONTROL; ADEQUATE FIRE CONTROL EQUIPMENT; NOT CAUSING A NUISANCE OR HEALTH HAZARD OR WATER POLLUTION; MINIMIZATION OF DISTURBED AREA; CHEMICAL COMPATIBILITY TESTING, IF NECESSARY. SPECIFIES THAT BULK LIQUIDS, HAZARDOUS WASTE , PCBs AND INFECTIOUS WASTE MAY NOT BE ACCEPTED FOR DISPOSAL.	PERTAINS TO NEW SOLID WASTE DISPOSAL FACILITIES TO BE CREATED ON-SITE AND EXISTING LANDFILLS THAT WILL BE EXPANDED DURING REMEDIATION. PORTIONS ALSO MAY PERTAIN TO EXISTING AREAS OF CONTAMINATION THAT WILL BE CAPPED IN-PLACE PER SOLID WASTE RULES.

CATEGORY	ORC	OAC	PARA.	CAPTION	TEXT	APPLICATION
DSIWM		3745-27-19	D(2)	SANITARY LANDFILL OPERATIONS - CONSTRUCTION COMPLIANCE	REQUIRES THE OWNER/OPERATOR TO IMPLEMENT MEASURES TO ATTAIN COMPLIANCE WITH REQUIREMENTS OF THESE RULES IN THE EVENT THAT TESTING INDICATES THAT A COMPONENT OR PORTION OF THE LANDFILL HAVE NOT BEEN CONSTRUCTED IN ACCORDANCE WITH THOSE RULES.	PERTAINS TO NEW SOLID WASTE DISPOSAL FACILITIES TO BE CREATED ON-SITE AND EXISTING LANDFILLS THAT WILL BE EXPANDED DURING REMEDIATION. ALSO PERTAINS TO CONSTRUCTION OF FINAL COVER SYSTEMS.
UIC		3745-34-06		PROHIBITION OF UNAUTHORIZED INJECTION	UNDERGROUND INJECTION IS PROHIBITED WITHOUT AUTHORIZATION FROM THE DIRECTOR.	PERTAINS TO SITES AT WHICH MATERIALS ARE TO BE INJECTED UNDERGROUND. CONSIDER FOR TECHNOLOGIES SUCH AS BIOREMEDIATION AND SOIL FLUSHING.
UIC		3745-34-07		NO MOVEMENT OF FLUID INTO UNDERGROUND DRINKING WATER	THE UNDERGROUND INJECTION OF FLUID CONTAINING ANY CONTAMINANT INTO AN UNDERGROUND SOURCE OF DRINKING WATER IS PROHIBITED IF THE PRESENCE OF THAT CONTAMINANT MAY CAUSE A VIOLATION OF THE PRIMARY DRINKING WATER STANDARDS OR OTHER WISE ADVERSELY AFFECT THE HEALTH OF PERSONS.	PERTAINS TO SITES AT WHICH MATERIALS ARE TO BE INJECTED UNDERGROUND. CONSIDER FOR TECHNOLOGIES SUCH AS BIOREMEDIATION AND SOIL FLUSHING.
UIC		3745-34-13		CLASS V WELLS	SPECIFIES REQUIREMENTS FOR CLASS V WELLS. SEE 3745-34-04 FOR DEFINITIONS.	PERTAINS TO SITES AT WHICH MATERIALS ARE TO BE INJECTED UNDERGROUND. CONSIDER FOR TECHNOLOGIES SUCH AS BIOREMEDIATION AND SOIL FLUSHING.
UIC		3745-34-26		CONDITIONS APPLICABLE TO ALL PERMITS	SPECIFIES MINIMUM CONDITIONS TO BE APPLIED TO ALL UNDERGROUND INJECTIONS.	PERTAINS TO SITES AT WHICH MATERIALS ARE TO BE INJECTED UNDERGROUND. CONSIDER FOR TECHNOLOGIES SUCH AS BIOREMEDIATION AND SOIL FLUSHING.
UIC		3745-34-34		MECHANICAL INTEGRITY	SPECIFIES REQUIREMENTS TO BE MET TO ENSURE MECHANICAL INTEGRITY OF WELLS.	PERTAINS TO SITES AT WHICH MATERIALS ARE TO BE INJECTED UNDERGROUND. CONSIDER FOR TECHNOLOGIES SUCH AS BIOREMEDIATION AND SOIL FLUSHING.
UIC		3745-34-36		PLUGGING AND ABANDONING CLASS I WELLS	SPECIFIES REQUIREMENTS TO BE MET WHEN PLUGGING OR ABANDONING A CLASS I WELL. SEE 3745-34-04 FOR DEFINITIONS.	PERTAINS TO SITES AT WHICH MATERIALS ARE TO BE INJECTED UNDERGROUND. CONSIDER FOR TECHNOLOGIES SUCH AS BIOREMEDIATION AND SOIL FLUSHING.
UIC		3745-34-38		OPERATING, MONITORING & REPORTING REQ FOR CLASS I WELLS	SPECIFIES OPERATING, MONITORING AND REPORTING REQUIREMENTS NECESSARY FOR CLASS I WELLS.	PERTAINS TO SITES AT WHICH MATERIALS ARE TO BE INJECTED UNDERGROUND. CONSIDER FOR TECHNOLOGIES SUCH AS BIOREMEDIATION AND SOIL FLUSHING.
HW		3745-50-44	C1	ADD'L PERMIT INFO: HAZ WASTE STORAGE IN CONTAINERS	ESTABLISHES THE SUBSTANTIVE HAZARDOUS WASTE PERMIT REQUIREMENTS NECESSARY FOR OHIO EPA TO DETERMINE ADEQUACY OF CONTAINER STORAGE. INCLUDES INFORMATION SUCH AS DESCRIPTION OF CONTAINMENT SYSTEM, DETAILED DRAWINGS, ETC. SEE OAC 3745-55-70 THROUGH 3745-55-78 FOR ADDITIONAL CONTAINER REQUIREMENTS.	PERTAINS TO ANY SITE AT WHICH STORAGE OF HAZARDOUS WASTE ON-SITE WILL OCCUR IN CONTAINERS. CONSIDER FOR WASTES AND CONTAMINATED SOILS THAT ARE STORED PRIOR TO TREATMENT OR DISPOSAL. THIS, ALONG WITH OTHER PARAGRAPHS OF THIS RULE AND OAC 3745-55-70 THROUGH 3745-55-78, ESTABLISHES THE MINIMUM INFORMATION REQUIRED DURING THE REMEDIAL DESIGN STAGE.

CATEGORY	ORC	OAC	PARA.	CAPTION	TEXT	APPLICATION
HW		3745-50-44	C2	ADD'L PERMIT INFO: HAZ WASTE STORAGE/ TREAT IN TANKS	ESTABLISHES SUBSTANTIVE HAZARDOUS WASTE PERMIT REQUIREMENTS NECESSARY FOR OHIO EPA TO DETERMINE ADEQUACY OF TANK TREATMENT AND STORAGE UNITS. INCLUDES INFORMATION SUCH AS ASSESSMENT OF STRUCTURAL INTEGRITY, DETAILED PLANS OF TANK SYSTEM(S), DESCRIPTION OF SECONDARY CONTAINMENT SYSTEM, ETC. SEE OAC 3745-55-90 THROUGH 3745-55-99 FOR ADDITIONAL REQUIREMENTS.	PERTAINS TO ANY SITE AT WHICH STORAGE OR TREATMENT OF HAZARDOUS WASTE IN TANKS WILL OCCUR ON-SITE. THIS, ALONG WITH OTHER PARAGRAPHS OF THIS RULE AND OAC 3745-55-90 THROUGH 3745-55-99, ESTABLISHES THE MINIMUM INFORMATION REQUIRED DURING THE REMEDIAL DESIGN STAGE.
HW		3745-50-44	C4	ADD'L PERMIT INFO: HAZ WASTE STOR/TREAT IN WASTE PILES	ESTABLISHES SUBSTANTIVE HAZARDOUS WASTE PERMIT REQUIREMENTS NECESSARY FOR OHIO EPA TO DETERMINE ADEQUACY OF WASTE PILES USED TO TREAT OR STORE HAZARDOUS WASTE. INCLUDES INFORMATION SUCH AS WASTE CHARACTERISTICS, DETAILED DESIGN PLANS AND REPORTS, CONTROL OF RUN-ON AND RUN-OFF, CLOSURE INFORMATION, ETC.	PERTAINS TO SITES AT WHICH HAZARDOUS WASTE WILL BE STORED OR TREATED IN WASTE PILES. CONSIDER FOR TEMPORARY STORAGE ALSO.
HW		3745-50-44	C8	ADD'L PERMIT INFO: HAZ WASTE T/S/D IN MISC UNITS	ESTABLISHES SUBSTANTIVE HAZARDOUS WASTE PERMIT REQUIREMENTS NECESSARY FOR OHIO EPA TO DETERMINE ADEQUACY OF MISCELLANEOUS UNITS USED TO TREAT OR STORE HAZARDOUS WASTE. INCLUDES INFORMATION SUCH AS WASTE CHARACTERISTICS, DETAILED DESIGN PLANS AND REPORTS, CONTROL OF RUN-ON AND RUN-OFF, CLOSURE INFORMATION, ETC.. SEE OAC 3745-57-90 THROUGH 3745-57-93 FOR ADDITIONAL REQUIREMENTS FOR MISCELLANEOUS UNITS. PERTAINING TO CHANNELS, DITCHES,	PERTAINS TO FACILITY/SITE AT WHICH HAZARDOUS WASTE WILL BE STORED, TREATED OR DISPOSED OF IN MISCELLANEOUS UNITS. THIS, ALONG WITH OTHER PARAGRAPHS OF THIS RULE AND OAC 3745-57-90 THROUGH 3745-57-93, ESTABLISHES THE MINIMUM INFORMATION REQUIRED DURING THE REMEDIAL DESIGN STAGE.
HW		3745-50-44	C6	ADD'L PERMIT INFO: ENVIRONMENTAL PERFORMANCE STANDARDS	ESTABLISHES SUBSTANTIVE HAZARDOUS WASTE PERMIT REQUIREMENTS NECESSARY FOR OHIO EPA TO DETERMINE ADEQUACY OF SURFACE IMPOUNDMENTS, WASTE PILES, LAND TREATMENT UNITS, LANDFILLS, AND UNDERGROUND INJECTION WELLS USED TO TREAT, STORE OR DISPOSE OF HAZARDOUS WASTE. INCLUDES INFORMATION SUCH AS WASTE CHARACTERISTICS, DETAILED DESIGN PLANS AND REPORTS, CONTROL OF RUN-ON AND RUN-OFF, CLOSURE INFORMATION, ETC. SEE OAC 3745-57-01 ADDITIONAL REQUIREMENTS.	PERTAINS TO SITE AT WHICH HAZARDOUS WASTE WILL BE OR HAS BEEN STORED, TREATED OR DISPOSED OF IN SURFACE IMPOUNDMENTS, WASTE PILES, LAND TREATMENT UNITS, LANDFILLS OR UNDERGROUND INJECTION WELLS . THIS, ALONG WITH OTHER PARAGRAPHS OF THIS RULE AND OAC 3745-57-01 ESTABLISHES THE MINIMUM INFORMATION REQUIRED DURING THE REMEDIAL DESIGN STAGE.

CATEGORY	ORC	OAC	PARA.	CAPTION	TEXT	APPLICATION
HW		3745-50-44	C3	ADD'L PERMIT INFO: HAZ WASTE STOR/TREAT IN SURF IMPOUND	ESTABLISHES SUBSTANTIVE HAZARDOUS WASTE PERMIT REQUIREMENTS NECESSARY FOR OHIO EPA TO DETERMINE ADEQUACY OF BOTH NEW SURFACE IMPOUNDMENTS AND EXTENSIONS OF EXISTING SURFACE IMPOUNDMENTS USED TO STORE OR TREAT HAZARDOUS WASTE. INCLUDES INFORMATION SUCH AS WASTE CHARACTERISTICS, DETAILED PLANS AND REPORTS, INFORMATION ON STRUCTURAL INTEGRITY, CLOSURE INFORMATION, ETC. SEE OAC 3745-56-20 THROUGH 3745-56-33 FOR ADDITIONAL SURFACE IMPOUNDMENT REQUIREMENTS.	PERTAINS TO ANY SITE AT WHICH EITHER A NEW SURFACE IMPOUNDMENT WILL BE INSTALLED OR AN EXISTING SURFACE IMPOUNDMENT WILL BE EXPANDED. THIS, ALONG WITH OTHER PARAGRAPHS OF THIS RULE AND OAC 3745-20-50 THROUGH 3745-33-60, ESTABLISHES THE MINIMUM INFORMATION REQUIRED DURING THE REMEDIAL DESIGN STAGE.
HW		3745-50-44	A	PERMIT INFO REQUIRED FOR ALL HAZ WASTE FACILITIES	ESTABLISHES THE SUBSTANTIVE HAZARDOUS WASTE PERMIT REQUIREMENTS NECESSARY FOR OHIO EPA TO DETERMINE FACILITY COMPLIANCE. INCLUDES INFORMATION SUCH AS FACILITY DESCRIPTION, WASTE CHARACTERISTICS, EQUIPMENT DESCRIPTIONS, CONTINGENCY PLAN, FACILITY LOCATION, TOPOGRAPHIC MAP, ETC.	PERTAINS TO ANY SITE WHICH WILL HAVE TREATMENT, STORAGE OR DISPOSAL OF HAZARDOUS WASTE OCCURRING ON-SITE OR HAS EXISTING AREAS OF HAZARDOUS WASTE CONTAMINATION ON-SITE THAT WILL BE CAPPED IN-PLACE. THIS, ALONG WITH OTHER PARAGRAPHS OF THIS RULE, ESTABLISHES THE MINIMUM INFORMATION REQUIRED DURING THE REMEDIAL DESIGN STAGE. CORRECTIVE ACTION FOR WASTE MANAGEMENT UNITS
HW		3745-50-44	B	PERMIT INFO REQ FOR ALL HAZ WASTE LAND DISP FACILITIES	ESTABLISHES THE SUBSTANTIVE HAZARDOUS WASTE LAND DISPOSAL PERMIT REQUIREMENTS NECESSARY FOR OHIO EPA TO DETERMINE ADEQUATE PROTECTION OF THE GROUND WATER. INCLUDES INFORMATION SUCH AS GROUND WATER MONITORING DATA, INFORMATION ON INTERCONNECTED AQUIFERS, PLUME(S) OF CONTAMINATION, PLANS AND REPORTS ON GROUND WATER MONITORING PROGRAM, ETC. MANAGEMENT OF SOLID/HAZARDOUS WAS	PERTAINS TO ANY FACILITY/SITE WHICH WILL HAVE HAZARDOUS WASTE DISPOSED OF ON-SITE OR HAS EXISTING AREAS OF HAZARDOUS WASTE CONTAMINATION ON-SITE THAT WILL BE CAPPED IN-PLACE. THIS, ALONG WITH OTHER PARAGRAPHS OF THIS RULE, ESTABLISHES THE MINIMUM INFORMATION REQUIRED DURING THE REMEDIAL DESIGN STAGE.
HW		3745-50-44	C7	ADD'L PERMIT INFO: HAZ WASTE DISPOSAL IN LANDFILLS	ESTABLISHES SUBSTANTIVE HAZARDOUS WASTE PERMIT REQUIREMENTS NECESSARY FOR OHIO EPA TO DETERMINE ADEQUACY OF LANDFILLS USED FOR DISPOSAL OF HAZARDOUS WASTE. INCLUDES INFORMATION SUCH AS WASTE CHARACTERISTICS, DETAILED DESIGN PLANS AND REPORTS, CONTROL OF RUN-ON AND RUN-OFF, CLOSURE INFORMATION, ETC.. SEE OAC 3745-57-02 THROUGH 3745-57-18 FOR ADDITIONAL LANDFILL REQUIREMENTS.	PERTAINS TO SITE AT WHICH HAZARDOUS WASTE WILL BE OR HAS BEEN DISPOSED OF IN LANDFILLS. THIS, ALONG WITH OTHER PARAGRAPHS OF THIS RULE AND OAC 3745-57-02 THROUGH 3745-57-18, ESTABLISHES THE MINIMUM INFORMATION REQUIRED DURING THE REMEDIAL DESIGN STAGE.
HW		3745-50-58	E,I,J	HAZARDOUS WASTE FACILITY PERMIT CONDITIONS	ESTABLISHES GENERAL PERMIT CONDITIONS APPLIED TO ALL HAZARDOUS WASTE FACILITIES IN OHIO. INCLUDES CONDITIONS SUCH AS OPERATION AND MAINTENANCE, SITE ACCESS, MONITORING, ETC.	PERTAINS TO ALL ALTERNATIVES THAT WILL INCORPORATE TREATMENT, STORAGE OR DISPOSAL OF HAZARDOUS WASTE.
HW		3745-52-11	A-D	EVALUATION OF WASTES	ANY PERSON GENERATING A WASTE MUST DETERMINE IF THAT WASTE IS A HAZARDOUS WASTE (EITHER THROUGH LISTING OR BY CHARACTERISTIC).	PERTAINS TO SITES AT WHICH WASTES OF ANY TYPE (BOTH SOLID AND HAZARDOUS) ARE LOCATED.

CATEGORY	ORC	OAC	PARA.	CAPTION	TEXT	APPLICATION
HW		3745-52-20		HAZARDOUS WASTE MANIFEST - GENERAL REQUIREMENTS	REQUIRES A GENERATOR WHO TRANSPORTS OR OFFERS FOR TRANSPORTATION HAZARDOUS WASTE FOR OFF-SITE TREATMENT, STORAGE OR DISPOSAL TO PREPARE A UNIFORM HAZARDOUS WASTE MANIFEST	PERTAINS TO SITES WHERE HAZARDOUS WASTE WILL BE TRANSPORTED OFF-SITE FOR TREATMENT, STORAGE OR DISPOSAL
HW		3745-52-22		HAZARDOUS WASTE MANIFEST - NUMBER OF COPIES	SPECIFIES THE NUMBER OF MANIFEST COPIES TO BE PREPARED	PERTAINS TO SITES WHERE HAZARDOUS WASTE WILL BE TRANSPORTED OFF-SITE FOR TREATMENT, STORAGE OR DISPOSAL
HW		3745-52-23		HAZARDOUS WASTE MANIFEST - USE	SPECIFIES PROCEDURES FOR THE USE OF HAZARDOUS WASTE MANIFESTS INCLUDING A REQUIREMENT THAT THEY BE HAND SIGNED BY THE GENERATOR	PERTAINS TO SITES WHERE HAZARDOUS WASTE WILL BE TRANSPORTED OFF-SITE FOR TREATMENT, STORAGE OR DISPOSAL
HW		3745-52-30		HAZARDOUS WASTE PACKAGING	REQUIRES A GENERATOR TO PACKAGE HAZARDOUS WASTE IN ACCORDANCE WITH U.S. DOT REGULATIONS FOR TRANSPORTATION OFF-SITE.	PERTAINS TO ANY SITE WHERE HAZARDOUS WASTE WILL BE GENERATED BY ON-SITE ACTIVITIES AND SHIPPED OFF-SITE FOR TREATMENT AND/OR DISPOSAL.
HW		3745-52-31		HAZARDOUS WASTE LABELING	REQUIRES PACKAGES OF HAZARDOUS WASTE TO BE LABELED IN ACCORDANCE WITH U.S.DOT REGULATIONS FOR OFF-SITE TRANSPORTATION.	PERTAINS TO ANY SITE WHERE HAZARDOUS WASTE WILL BE GENERATED BY ON-SITE ACTIVITIES AND SHIPPED OFF-SITE FOR TREATMENT AND/OR DISPOSAL.
HW		3745-52-32		HAZARDOUS WASTE MARKING	SPECIFIES LANGUAGE FOR MARKING PACKAGES OF HAZARDOUS WASTE PRIOR TO OFF-SITE TRANSPORTATION	PERTAINS TO ANY SITE WHERE HAZARDOUS WASTE WILL BE GENERATED BY ON-SITE ACTIVITIES AND SHIPPED OFF-SITE FOR TREATMENT AND/OR DISPOSAL.
HW		3745-52-33		HAZARDOUS WASTE PLACARDING	GENERATOR SHALL PLACARD HAZARDOUS WASTE PRIOR TO OFF-SITE TRANSPORTATION.	PERTAINS TO ANY SITE WHERE HAZARDOUS WASTE WILL BE GENERATED BY ON-SITE ACTIVITIES AND SHIPPED OFF-SITE FOR TREATMENT AND/OR DISPOSAL.
HW		3745-52-34		ACCUMULATION TIME OF HAZARDOUS WASTE	IDENTIFIES MAXIMUM TIME PERIODS THAT A GENERATOR MAY ACCUMULATE A HAZARDOUS WASTE WITHOUT BEING CONSIDERED AN OPERATOR OF A STORAGE FACILITY. ALSO ESTABLISHES STANDARDS FOR MANAGEMENT OF HAZARDOUS WASTES BY GENERATORS.	PERTAINS TO A SITE WHERE HAZARDOUS WASTE WILL BE GENERATED AS A RESULT OF THE REMEDIAL ACTIVITIES.
HW		3745-52-40	A-D	RECORDKEEPING REQUIREMENTS, THREE YEAR RETENTION	SPECIFIES RECORDS THAT SHALL BE KEPT FOR THREE YEARS	CONSIDER FOR SITES AT WHICH HAZARDOUS WASTES ARE GENERATED
HW		3745-52-41	A,B	ANNUAL REPORT	REQUIRES GENERATORS TO PREPARE ANNUAL REPORT TO OPEA	APPLICABLE AT SITES GENERATING WASTES FOR OFF--SITE SHIPMENT
HW		3745-54-13	A	GENERAL ANALYSIS OF HAZARDOUS WASTE	PRIOR TO ANY TREATMENT, STORAGE OR DISPOSAL OF HAZARDOUS WASTES, A REPRESENTATIVE SAMPLE OF THE WASTE MUST BE CHEMICALLY AND PHYSICALLY ANALYZED.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF).

CATEGORY	ORC	OAC	PARA.	CAPTION	TEXT	APPLICATION
HW		3745-54-14	A,B,C	SECURITY FOR HAZARDOUS WASTE FACILITIES	HAZARDOUS WASTE FACILITIES MUST BE SECURED SO THAT UNAUTHORIZED AND UNKNOWING ENTRY ARE MINIMIZED OR PROHIBITED.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF).
HW		3745-54-15	A,C	INSPECTION REQUIREMENTS FOR HAZARDOUS WASTE FACILITIES	HAZARDOUS WASTE FACILITIES MUST BE INSPECTED REGULARLY TO DETECT MALFUNCTIONS, DETERIORATIONS, OPERATIONAL ERRORS AND DISCHARGES. ANY MALFUNCTIONS OR DETERIORATIONS DETECTED SHALL BE REMEDIED EXPEDITIOUSLY.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF).
HW		3745-54-17	A,B,C	REQ FOR IGNITABLE, REACTIVE OR INCOMPATIBLE HAZ WASTES	PRESENTS GENERAL PRECAUTIONS TO BE TAKEN TO PREVENT ACCIDENTAL IGNITION OR REACTION OF IGNITABLE, REACTIVE OR INCOMPATIBLE WASTES.	PERTAINS TO ANY SITE AT WHICH POTENTIALLY REACTIVE, IGNITABLE OR INCOMPATIBLE WASTES ARE PRESENT.
HW		3745-54-31		DESIGN & OPERATION OF HAZARDOUS WASTE FACILITIES	HAZARDOUS WASTE FACILITIES MUST BE DESIGNED, CONSTRUCTED, MAINTAINED AND OPERATED TO MINIMIZE THE POSSIBILITY OF FIRE, EXPLOSION OR UNPLANNED RELEASE OF HAZARDOUS WASTE OR HAZARDOUS CONSTITUENTS TO THE AIR, SOIL OR SURFACE WATER WHICH COULD THREATEN HUMAN HEALTH OR THE ENVIRONMENT.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF).
HW		3745-54-32	A,B,C,D	REQUIRED EQUIPMENT FOR HAZARDOUS WASTE FACILITIES	ALL HAZARDOUS WASTE FACILITIES MUST BE EQUIPPED WITH EMERGENCY EQUIPMENT, SUCH AS AN ALARM SYSTEM, FIRE CONTROL EQUIPMENT AND A TELEPHONE OR RADIO.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF). SPECIFICATIONS
HW		3745-54-33		TESTING & MAINTENANCE OF EQUIPMENT; HAZ WASTE FACILITIES	ALL HAZARDOUS WASTE FACILITIES MUST TEST AND MAINTAIN EMERGENCY EQUIPMENT TO ASSURE PROPER OPERATION.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF).
HW		3745-54-34		ACCESS TO COMMUNICATIONS OR ALARM SYSTEM; HAZ WASTE FAC	WHENEVER HAZARDOUS WASTE IS BEING HANDLED, ALL PERSONNEL INVOLVED SHALL HAVE IMMEDIATE ACCESS TO AN INTERNAL ALARM OR EMERGENCY COMMUNICATION DEVICE.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF).
HW		3745-54-35		REQUIRED AISLE SPACE AT HAZ WASTE FACILITIES	ADEQUATE AISLE SPACE SHALL BE MAINTAINED TO ALLOW UNOBSTRUCTED MOVEMENT OF PERSONNEL, FIRE EQUIPMENT, SPILL CONTROL EQUIPMENT AND DECONTAMINATION EQUIPMENT INTO ANY AREA OF THE FACILITY OPERATION IN THE EVENT OF AN EMERGENCY.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF). CONSIDER FOR SITES WHERE WASTES WILL BE STORED IN CONTAINERS.
HW		3745-54-37	A,B	ARRANGEMENTS/ AGREEMENTS WITH LOCAL AUTHORITIES	ARRANGEMENTS OR AGREEMENTS WITH LOCAL AUTHORITIES, SUCH AS POLICE, FIRE DEPARTMENT AND EMERGENCY RESPONSE TEAMS MUST BE MADE. IF LOCAL AUTHORITIES WILL NOT COOPERATE, DOCUMENTATION OF THAT NON-COOPERATION SHOULD BE PROVIDED.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF).

CATEGORY	ORC	OAC	PARA.	CAPTION	TEXT	APPLICATION
HW		3745-54-52	A-F	CONTENT OF CONTINGENCY PLAN; HAZ WASTE FACILITIES	HAZARDOUS WASTE FACILITIES MUST HAVE A CONTINGENCY PLAN THAT ADDRESSES ANY UNPLANNED RELEASE OF HAZARDOUS WASTES OR HAZARDOUS CONSTITUENTS INTO THE AIR, SOIL OR SURFACE WATER. THIS RULE ESTABLISHES THE MINIMUM REQUIRED INFORMATION OF SUCH A PLAN.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF).
HW		3745-54-53	A,B	COPIES OF CONTINGENCY PLAN; HAZARDOUS WASTE FACILITIES	COPIES OF THE CONTINGENCY PLAN REQUIRED BY 3745-54-50 MUST BE MAINTAINED AT THE FACILITY AND SUBMITTED TO ALL LOCAL POLICE DEPARTMENTS, FIRE DEPARTMENTS, HOSPITALS LOCAL EMERGENCY RESPONSE TEAMS AND THE OHIO EPA.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF)
HW		3745-54-54	A	AMENDMENT OF CONTINGENCY PLAN; HAZ WASTE FACILITIES	THE CONTINGENCY PLAN MUST BE AMENDED IF IT FAILS IN AN EMERGENCY, THE FACILITY CHANGES (IN ITS DESIGN, CONSTRUCTION, MAINTENANCE OR OPERATION), THE LIST OF EMERGENCY COORDINATORS CHANGE OR THE LIST OF EMERGENCY EQUIPMENT.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF).
HW		3745-54-55		EMERGENCY COORDINATOR; HAZARDOUS WASTE FACILITIES	AT ALL TIMES THERE SHOULD BE AT LEAST ONE EMPLOYEE EITHER ON THE PREMISES OR ON CALL TO COORDINATE ALL EMERGENCY RESPONSE MEASURES.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF).
HW		3745-54-56	A-I	EMERGENCY PROCEDURES; HAZARDOUS WASTE FACILITIES	SPECIFIES THE PROCEDURES TO BE FOLLOWED IN THE EVENT OF AN EMERGENCY.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF).
HW		3745-54-73	A,B	OPERATING RECORD	SPECIFIES RECORDS TO BE KEPT AT TSD FACILITIES	CONSIDER FOR SITES WITH ON-SITE TREATMENT, STORAGE OR DISPOSAL
HW		3745-54-77	A	ADDITIONAL REPORTS	REQUIRES FACILITIES TO REPORT FIRES, EXPLOSIONS OR OTHER MISHAPS	CONSIDER AT SITES WITH TREATMENT, STORAGE OR DISPOSAL ON-SITE
HW		3745-54-90		GROUND WATER PROTECTION; APPLICABILITY	ESTABLISHES CIRCUMSTANCES UNDER WHICH AN OPERATOR OF A HAZARDOUS WASTE FACILITY MUST IMPLEMENT A GROUND WATER PROTECTION PROGRAM OR A CORRECTIVE ACTION PROGRAM.	PERTAINS TO ALL SITES WITH LAND-BASED HAZARDOUS WASTE UNITS (SURFACE IMPOUNDMENTS, WASTE PILES, LAND TREATMENT UNITS, LANDFILLS). THIS INCLUDES EXISTING LAND-BASED AREAS OF CONTAMINATION.
HW		3745-54-91	A	REQ GROUND WATER PROGRAMS FOR HAZ WASTE FACILITIES	PRESENTS THE GROUND WATER MONITORING AND RESPONSE PROGRAMS REQUIRED FOR HAZARDOUS WASTE LAND-BASED UNITS.	PERTAINS TO ALL SITES WITH LAND-BASED HAZARDOUS WASTE UNITS (SURFACE IMPOUNDMENTS, WASTE PILES, LAND TREATMENT UNITS, LANDFILLS). THIS INCLUDES EXISTING LAND-BASED AREAS OF CONTAMINATION.

CATEGORY	ORC	OAC	PARA.	CAPTION	TEXT	APPLICATION
HW		3745-54-92		GROUND WATER PROTECTION STANDARD; HAZ WASTE FACILITIES	COMPLIANCE MUST BE ATTAINED WITH THE CONDITIONS SPECIFIED IN THE PERMIT TO ENSURE THAT HAZARDOUS CONSTITUENTS (SEE 3745-54-93) DO NOT EXCEED THE PROMULGATED LIMITS (SEE 3745-54-94).	PERTAINS TO ALL SITES WITH LAND-BASED HAZARDOUS WASTE UNITS (SURFACE IMPOUNDMENTS, WASTE PILES, LAND TREATMENT UNITS, LANDFILLS). THIS INCLUDES EXISTING LAND-BASED AREAS OF CONTAMINATION.
HW		3745-54-95	A,B	POINT OF COMPLIANCE FOR GROUND WATER; HAZ WASTE FACIL	ESTABLISHES POINT OF COMPLIANCE AT VERTICAL SURFACE LOCATED AT THE HYDRAULICALLY DOWNGRADIENT LIMIT OF THE WASTE MANAGEMENT AREA THAT EXTENDS DOWN INTO THE UPPERMOST AQUIFER UNDERLYING THE UNIT(S).	PERTAINS TO ALL SITES WITH LAND-BASED HAZARDOUS WASTE UNITS (SURFACE IMPOUNDMENTS, WASTE PILES, LAND TREATMENT UNITS, LANDFILLS). THIS INCLUDES EXISTING LAND-BASED AREAS OF CONTAMINATION.
HW		3745-54-96	A,B,C	COMPLIANCE PERIOD FOR GROUND WATER; HAZ WASTE FACIL	COMPLIANCE PERIOD DURING WHICH THE GROUND WATER PROTECTION STANDARDS APPLY WILL BE SPECIFIED IN THE PERMIT. RULE REQUIRES THAT THE COMPLIANCE PERIOD FOR A FACILITY UNDERGOING A CORRECTIVE ACTION PROGRAM WILL EXTEND UNTIL IT CAN BE DEMONSTRATED THAT THE GROUND WATER PROTECTION STANDARD OF OAC 3745-54-92 HAS NOT BEEN EXCEEDED FOR A PERIOD OF THREE CONSECUTIVE YEARS.	PERTAINS TO ALL SITES WITH LAND-BASED HAZARDOUS WASTE UNITS (SURFACE IMPOUNDMENTS, WASTE PILES, LAND TREATMENT UNITS, LANDFILLS). THIS INCLUDES EXISTING LAND-BASED AREAS OF CONTAMINATION.
HW		3745-54-97	A-H	GEN GROUND WATER MONITORING REQUIREMENTS; HAZ WASTE FAC	PRESENTS GENERAL GROUND WATER MONITORING PROGRAM REQUIREMENTS. INCLUDES NUMBER, LOCATION AND DEPTH OF WELLS, CASING REQUIREMENTS, SAMPLING AND ANALYSIS PROCEDURES, ETC.	PERTAINS TO ALL SITES WITH LAND-BASED HAZARDOUS WASTE UNITS (SURFACE IMPOUNDMENTS, WASTE PILES, LAND TREATMENT UNITS, LANDFILLS). THIS INCLUDES EXISTING LAND-BASED AREAS OF CONTAMINATION.
HW		3745-54-98	A-I	GROUND WATER DETECTION MONITORING PROG; HAZ WASTE FAC	PRESENTS REQUIREMENTS OF GROUND WATER DETECTION PROGRAM.	PERTAINS TO ALL SITES WITH LAND-BASED HAZARDOUS WASTE UNITS (SURFACE IMPOUNDMENTS, WASTE PILES, LAND TREATMENT UNITS, LANDFILLS) AT WHICH HAZARDOUS CONSTITUENTS HAVE NOT BEEN DETECTED IN THE GROUND WATER. THIS INCLUDES EXISTING LAND-BASED AREAS OF CONTAMINATION.
HW		3745-54-99	A-J	GROUND WATER COMPLIANCE MONITORING PROG; HAZ WASTE FAC	PRESENTS REQUIREMENTS OF GROUND WATER COMPLIANCE MONITORING PROGRAM.	PERTAINS TO ALL SITES WITH LAND-BASED HAZARDOUS WASTE UNITS (SURFACE IMPOUNDMENTS, WASTE PILES, LAND TREATMENT UNITS, LANDFILLS) AT WHICH HAZARDOUS CONSTITUENTS HAVE BEEN DETECTED. THIS INCLUDES EXISTING LAND-BASED AREAS OF CONTAMINATION.

CATEGORY	ORC	OAC	PARA.	CAPTION	TEXT	APPLICATION
HW		3745-55-01	A-F	GROUND WATER CORRECTIVE ACTION PROGRAM; HAZ WASTE FAC	PRESENTS THE REQUIREMENTS OF A GROUND WATER CORRECTIVE ACTION PROGRAM THAT PREVENTS HAZARDOUS CONSTITUENTS FROM EXCEEDING THEIR RESPECTIVE CONCENTRATION LIMITS AT THE COMPLIANCE POINT BY EITHER REMOVAL OR TREATMENT OF THESE HAZARDOUS CONSTITUENTS.	PERTAINS TO ALL SITES WITH LAND-BASED HAZARDOUS WASTE UNITS (SURFACE IMPOUNDMENTS, WASTE PILES, LAND TREATMENT UNITS, LANDFILLS) AT WHICH HAZARDOUS CONSTITUENTS HAVE BEEN DETECTED. THIS INCLUDES EXISTING LAND-BASED AREAS OF CONTAMINATION.
HW		3745-55-01 1	A,C	CORRECTIVE ACTION FOR WASTE MANAGEMENT UNITS	REQUIRES AN APPLICANT FOR A HAZARDOUS WASTE PERMIT TO INSTITUTE CORRECTIVE ACTION FOR ALL RELEASES OF HAZARDOUS WASTE OR CONSTITUENTS FROM ANY WASTE MANAGEMENT UNIT, REGARDLESS OF THE TIME AT WHICH WASTE WAS PLACED IN SUCH UNIT.	PERTAINS TO ALL SITES WITH LAND-BASED HAZARDOUS WASTE UNITS (SURFACE IMPOUNDMENTS, WASTE PILES, LAND TREATMENT UNITS, LANDFILLS) AT WHICH HAZARDOUS CONSTITUENTS HAVE BEEN DETECTED. THIS INCLUDES EXISTING LAND-BASED AREAS OF CONTAMINATION.
HW		3745-55-11	A,B,C	GENERAL CLOSURE PERFORMANCE STANDARD; HAZ WASTE FACIL	REQUIRES THAT ALL HAZARDOUS WASTE FACILITIES BE CLOSED IN A MANNER THAT MINIMIZES THE NEED FOR FURTHER MAINTENANCE, CONTROLS, MINIMIZES, ELIMINATES OR PREVENTS POST-CLOSURE ESCAPE OF HAZARDOUS WASTE, HAZARDOUS CONSTITUENTS, LEACHATE, CONTAMINATED RUN-OFF OR HAZARDOUS WASTE DECOMPOSITION PRODUCTS TO THE GROUND OR SURFACE WATER OR THE ATMOSPHERE.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN TREATED, STORED OR DISPOSED OF).
HW		3745-55-12	B	CONTENT OF CLOSURE PLAN; HAZ WASTE FACILITIES	SPECIFIES THE MINIMUM INFORMATION REQUIRED IN A CLOSURE PLAN FOR OHIO EPA TO DETERMINE THE ADEQUACY OF THE PLAN.	SUBSTANTIVE REQUIREMENTS PERTAIN TO ANY SITE AT WHICH HAZARDOUS WASTE IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN TREATED, STORED OR DISPOSED OF).
HW		3745-55-14		DISPOSAL/ DECON OF EQUIPMENT, STRUCTURES & SOILS	REQUIRES THAT ALL CONTAMINATED EQUIPMENT, STRUCTURES AND SOILS BE PROPERLY DISPOSED OF OR DECONTAMINATED. REMOVAL OF HAZARDOUS WASTES OR CONSTITUENTS FROM A UNIT MAY CONSTITUTE GENERATION OF HAZARDOUS WASTES.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN TREATED, STORED OR DISPOSED OF).
HW		3745-55-17	B	POST-CLOSURE CARE AND USE OF PROPERTY	SPECIFIES THE POST-CLOSURE CARE REQUIREMENTS, INCLUDING MAINTENANCE, MONITORING AND POST-CLOSURE USE OF PROPERTY.	PERTAINS TO ALL SITES WITH LAND-BASED HAZARDOUS WASTE UNITS (LANDFILLS AND SURFACE IMPOUNDMENTS, WASTE PILES, LAND TREATMENT UNITS AND TANKS THAT MEET REQUIREMENTS OF LANDFILLS AFTER CLOSURE). THIS INCLUDES EXISTING LAND-BASED AREAS OF CONTAMINATION.

CATEGORY	ORC	OAC	PARA.	CAPTION	TEXT	APPLICATION
HW		3745-55-18	B	POST-CLOSURE PLAN	PRESENTS THE INFORMATION NECESSARY FOR OHIO EPA TO DETERMINE THE ADEQUACY OF A POST-CLOSURE PLAN.	PERTAINS TO ALL SITES WITH LAND-BASED HAZARDOUS WASTE UNITS (LANDFILLS AND SURFACE IMPOUNDMENTS, WASTE PILES, LAND TREATMENT UNITS AND TANKS THAT MEET REQUIREMENTS OF LANDFILLS AFTER CLOSURE). THIS INCLUDES EXISTING LAND-BASED AREAS OF CONTAMINATION.
HW		3745-55-19	B	NOTICE TO LOCAL LAND AUTHORITY	REQUIRES THAT A RECORD OF THE TYPE, LOCATION AND QUANTITY OF HAZARDOUS WASTES DISPOSED OF IN EACH UNIT BE SUBMITTED TO THE LOCAL LAND AUTHORITY AND THE DIRECTOR OF THE OHIO EPA. ALSO REQUIRES THAT A NOTATION TO THE DEED TO THE FACILITY PROPERTY BE MADE INDICATING THAT THE LAND WAS USED TO MANAGE HAZARDOUS WASTES AND THAT CERTAIN USE RESTRICTIONS MAY APPLY TO THE PROPERTY.	PERTAINS TO ALL SITES WITH LAND-BASED HAZARDOUS WASTE UNITS (LANDFILLS AND SURFACE IMPOUNDMENTS, WASTE PILES, LAND TREATMENT UNITS AND TANKS THAT MEET REQUIREMENTS OF LANDFILLS AFTER CLOSURE). THIS INCLUDES EXISTING LAND-BASED AREAS OF CONTAMINATION.
HW		3745-55-71		CONDITION OF CONTAINERS	CONTAINERS HOLDING HAZARDOUS WASTE MUST BE MAINTAINED IN GOOD CONDITION (NO RUST OR STRUCTURAL DEFECTS).	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE WILL BE STORED IN CONTAINERS.
HW		3745-55-72		COMPATIBILITY OF WASTE WITH CONTAINERS	HAZARDOUS WASTES PLACED IN CONTAINER MUST NOT REACT WITH THE CONTAINER MATERIAL OR LINER MATERIAL.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE WILL BE STORED IN CONTAINERS.
HW		3745-55-73		MANAGEMENT OF CONTAINERS	CONTAINERS HOLDING HAZARDOUS WASTE MUST BE CLOSED (EXCEPT TO ADD OR REMOVE WASTE) AND MUST NOT BE HANDLED IN A MANNER THAT MAY RUPTURE THE CONTAINER OR CAUSE IT TO LEAK.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE WILL BE STORED IN CONTAINERS.
HW		3745-55-74		CONTAINER INSPECTIONS	REQUIRES AT LEAST WEEKLY INSPECTIONS OF CONTAINER STORAGE AREAS.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE WILL BE STORED IN CONTAINERS.
HW		3745-55-75	A,B,C,D	CONTAINER STORAGE AREA CONTAINMENT SYSTEM	REQUIRES THAT CONTAINER STORAGE AREAS HAVE A CONTAINMENT SYSTEM AND SPECIFIES THE MINIMUM REQUIREMENTS OF SUCH A SYSTEM.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE WILL BE STORED IN CONTAINERS.
HW		3745-55-76		CONTAINER REQUIREMENTS FOR IGNITABLE/REACTIVE WASTES	PRESENTS GENERAL PRECAUTIONS TO BE TAKEN TO PREVENT ACCIDENTAL IGNITION OR REACTION OF IGNITABLE OR REACTIVE WASTES THAT WILL BE STORED IN CONTAINERS.	PERTAINS TO ANY SITE AT WHICH POTENTIALLY REACTIVE OR IGNITABLE WASTES THAT ARE STORED, OR ARE TO BE STORED, IN CONTAINERS.
HW		3745-55-77	A,B,C	CONTAINER REQUIREMENTS FOR INCOMPATIBLE WASTES	PRESENTS GENERAL PRECAUTIONS TO BE TAKEN WHEN DEALING WITH INCOMPATIBLE WASTES.	PERTAINS TO ANY SITE AT WHICH POTENTIALLY INCOMPATIBLE WASTES ARE PRESENT.
HW		3745-55-78		CONTAINER CLOSURE REQUIREMENTS	SPECIFIES CLOSURE REQUIREMENTS FOR CONTAINERS AND CONTAINMENT SYSTEM.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE WILL BE STORED IN CONTAINERS.

CATEGORY	ORC	OAC	PARA.	CAPTION	TEXT	APPLICATION
HW		3745-55-91	A,B,D	ASSESSMENT OF EXISTING TANK SYSTEMS INTEGRITY	REQUIRES THAT EACH EXISTING TANK USED TO STORE OR TREAT HAZARDOUS WASTE THAT DOES NOT HAVE SECONDARY CONTAINMENT BE TESTED TO ASSURE TANK INTEGRITY.	PERTAINS TO ANY SITE WHICH HAS EXISTING HAZARDOUS WASTE TREATMENT OR STORAGE TANKS THAT LACK SECONDARY CONTAINMENT.
HW		3745-55-92	A-G	DESIGN & INSTALLATION OF NEW TANK SYSTEMS OR COMPONENTS	REQUIRES A SECONDARY CONTAINMENT SYSTEM FOR TANKS AND ASSESSMENT TO DETERMINE TANK INTEGRITY.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE WILL BE EITHER STORED OR TREATED IN TANKS.
HW		3745-55-93	A-G,I	CONTAINMENT AND DETECTION OF RELEASES FOR TANK SYSTEMS	REQUIRES SECONDARY CONTAINMENT AND LEAK DETECTION SYSTEMS FOR TANKS.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE WILL BE EITHER STORED OR TREATED IN TANKS.
HW		3745-55-94	A,B,C	GENERAL OPERATING REQUIREMENTS FOR TANK SYSTEMS	SPECIFIES GENERAL OPERATING REQUIREMENTS FOR TANK SYSTEMS.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE WILL BE EITHER STORED OR TREATED IN TANKS.
HW		3745-55-95	A-D	INSPECTIONS OF TANK SYSTEMS	REQUIRES INSPECTIONS AT LEAST ONCE EACH OPERATING DAY.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE WILL BE EITHER STORED OR TREATED IN TANKS.
HW		3745-55-96	A,B,C,E	RESPONSE TO LEAKS OR SPILLS OF TANK SYSTEMS	REQUIRES THAT UNFIT TANKS BE REMOVED FROM USE AND FURTHER RELEASES BE PREVENTED.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE WILL BE EITHER STORED OR TREATED IN TANKS.
HW		3745-55-97	A,B	CLOSURE AND POST-CLOSURE CARE FOR TANK SYSTEMS	SPECIFIES CLOSURE AND POST-CLOSURE REQUIREMENTS FOR TANK SYSTEMS.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE WILL BE EITHER STORED OR TREATED IN TANKS. SPECIFIES THE MINIMUM INFORMATION
HW		3745-55-98		TANK REQUIREMENTS FOR IGNITABLE/REACTIVE WASTES	PRESENTS GENERAL PRECAUTIONS TO BE TAKEN TO PREVENT ACCIDENTAL IGNITION OR REACTION OF IGNITABLE OR REACTIVE WASTES THAT ARE TREATED OR STORED IN TANKS.	PERTAINS TO ANY SITE AT WHICH POTENTIALLY REACTIVE OR IGNITABLE WASTES ARE STORED OR TREATED (OR TO BE STORED OR TREATED) IN EXISTING TANKS.
HW		3745-55-99	A,B	TANK REQUIREMENTS FOR INCOMPATIBLE WASTES	PRESENTS GENERAL PRECAUTIONS TO BE TAKEN WHEN DEALING WITH POTENTIALLY INCOMPATIBLE WASTES THAT ARE STORED OR TREATED IN TANKS.	PERTAINS TO ANY SITE AT WHICH POTENTIALLY INCOMPATIBLE WASTES ARE STORED OR TREATED (OR TO BE STORED OR TREATED) IN TANKS.
HW		3745-56-20	A,B	APPLICABILITY OF RULES CONCERNING SURFACE IMPOUNDMENT	SPECIFIES THAT THE RULES OF 3745-56 SHALL APPLY TO SURFACE IMPOUNDMENTS USED TO TREAT OR STORE HAZARDOUS WASTES	CONSIDER FOR SITES WITH SURFACE IMPOUNDMENTS
HW		3745-56-21	A-G	DESIGN & OPERATING REQUIREMENTS ; SURFACE IMPOUNDMENTS	PRESENTS DESIGN AND OPERATING CRITERIA FOR SURFACE IMPOUNDMENTS.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE WILL BE TREATED OR STORED IN SURFACE IMPOUNDMENTS (LAGOONS). PERTAINS TO SITES WHICH HAVE SURFACE IMPOUNDMENTS THAT WILL NOT BE (OR HAVE NOT BEEN) CLEAN CLOSED.

CATEGORY	ORC	OAC	PARA.	CAPTION	TEXT	APPLICATION
HW		3745-56-26	A,B,C	MONITORING & INSPECTION OF SURFACE IMPOUNDMENTS	REQUIRES INSPECTION OF LINERS DURING CONSTRUCTION. ALSO REQUIRES WEEKLY AND AFTER STORM INSPECTIONS.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE WILL BE TREATED OR STORED IN SURFACE IMPOUNDMENTS (LAGOONS). PERTAINS TO SITES WHICH HAVE SURFACE IMPOUNDMENTS THAT WILL NOT BE (OR HAVE NOT BEEN) CLEAN CLOSED.
HW		3745-56-27	A-E	EMERGENCY REPAIRS & CONTINGENCY PLANS ; SURFACE IMPOUND	SPECIFIES WHEN AND HOW SURFACE IMPOUNDMENTS SHOULD BE REMOVED FROM SERVICE FOR REPAIRS.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE WILL BE TREATED OR STORED IN SURFACE IMPOUNDMENTS (LAGOONS). PERTAINS TO SITES WHICH HAVE SURFACE IMPOUNDMENTS THAT WILL NOT BE (OR HAVE NOT BEEN) CLEAN CLOSED.
HW		3745-56-28	A,B,C	CLOSURE & POST-CLOSURE OF SURFACE IMPOUNDMENTS	PROVIDES CLOSURE AND POST-CLOSURE REQUIREMENTS FOR SURFACE IMPOUNDMENTS.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE WILL BE TREATED OR STORED IN SURFACE IMPOUNDMENTS (LAGOONS). PERTAINS TO SITES WHICH HAVE SURFACE IMPOUNDMENTS THAT WILL NOT BE (OR HAVE NOT BEEN) CLEAN CLOSED.
HW		3745-56-29	A,B	SURFACE IMP. REQUIREMENTS FOR IGNITABLE/REACTIVE WASTES	PRESENTS GENERAL PRECAUTIONS TO BE TAKEN WHEN DEALING WITH POTENTIALLY IGNITABLE OR REACTIVE WASTES THAT ARE STORED OR TREATED IN SURFACE IMPOUNDMENTS.	PERTAINS TO ANY SITE AT WHICH POTENTIALLY IGNITABLE OR REACTIVE HAZARDOUS WASTE WILL BE TREATED OR STORED IN SURFACE IMPOUNDMENTS (LAGOONS). PERTAINS TO SITES WHICH HAVE SURFACE IMPOUNDMENTS THAT WILL NOT BE (OR HAVE NOT BEEN) CLEAN CLOSED.
HW		3745-56-30		SURFACE IMPOUND. REQUIREMENTS FOR INCOMPATIBLE WASTES	PRESENTS GENERAL PRECAUTIONS TO BE TAKEN WHEN DEALING WITH POTENTIALLY INCOMPATIBLE WASTES THAT ARE STORED OR TREATED IN SURFACE IMPOUNDMENTS.	PERTAINS TO ANY SITE AT WHICH POTENTIALLY INCOMPATIBLE HAZARDOUS WASTE WILL BE TREATED OR STORED IN SURFACE IMPOUNDMENTS (LAGOONS). PERTAINS TO SITES WHICH HAVE SURFACE IMPOUNDMENTS THAT WILL NOT BE (OR HAVE NOT BEEN) CLEAN CLOSED.
HW		3745-56-33	A,B	SPECIAL REQUIREMENTS FOR "F" WASTES IN SURFACE IMPOUND.	PROHIBITS THE PLACEMENT OF HAZARDOUS WASTES F020, F021, F022, F023, F026 AND F027 IN SURFACE IMPOUNDMENTS.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS F-WASTE ARE TREATED OR STORED IN SURFACE IMPOUNDMENTS (LAGOONS). PERTAINS TO SITES WHICH HAVE SURFACE IMPOUNDMENTS THAT WILL NOT BE (OR HAVE NOT BEEN) CLEAN CLOSED.
HW		3745-56-51	A-F	DESIGN & OPERATING REQUIREMENTS FOR WASTE PILES	SPECIFIES THE DESIGN AND OPERATION REQUIREMENTS FOR WASTE PILES. INCLUDES LINER SYSTEM, LEACHATE COLLECTION AND REMOVAL SYSTEM, WIND DISPERSAL PREVENTION AND RUN-ON/RUN-OFF CONTROL.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE WILL BE EITHER STORED OR TREATED IN WASTE PILES.
HW		3745-56-54	A,B	MONITORING & INSPECTION OF WASTE PILES	WASTE PILES MUST BE MONITORED DURING CONSTRUCTION OR INSTALLATION AND OPERATION.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE WILL BE EITHER STORED OR TREATED IN WASTE PILES.

CATEGORY	ORC	OAC	PARA.	CAPTION	TEXT	APPLICATION
HW		3745-56-56	A,B	WASTE PILE REQUIREMENTS FOR IGNITABLE/ REACTIVE WASTES	PRESENTS GENERAL PRECAUTIONS TO BE TAKEN WHEN DEALING WITH POTENTIALLY IGNITABLE OR REACTIVE HAZARDOUS WASTES THAT ARE STORED OR TREATED IN WASTE PILES.	PERTAINS TO ANY SITE AT WHICH POTENTIALLY IGNITABLE OR REACTIVE HAZARDOUS WASTE WILL BE EITHER STORED OR TREATED IN WASTE PILES.
HW		3745-56-57	A,B,C	WASTE PILE REQUIREMENTS FOR INCOMPATIBLE WASTES	PRESENTS GENERAL PRECAUTIONS TO BE TAKEN WHEN DEALING WITH POTENTIALLY INCOMPATIBLE WASTES THAT ARE STORED OR TREATED IN WASTE PILES.	PERTAINS TO ANY SITE AT WHICH POTENTIALLY INCOMPATIBLE HAZARDOUS WASTE WILL BE EITHER STORED OR TREATED IN WASTE PILES.
HW		3745-56-58	A,B,C	CLOSURE & POST-CLOSURE CARE FOR WASTE PILES	SPECIFIES CLOSURE AND POST-CLOSURE CARE REQUIREMENTS FOR WASTE PILES.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE WILL BE EITHER STORED OR TREATED IN WASTE PILES.
HW		3745-56-60	A,B	SPECIAL REQUIREMENTS FOR "F" WASTES IN WASTE PILES	PROHIBITS THE PLACEMENT OF HAZARDOUS WASTES F020, F021, F022, F023, F026 AND F027 IN WASTE PILES.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS F-WASTES WILL BE EITHER STORED OR TREATED IN WASTE PILES.
HW		3745-57-03	A-I	LANDFILL DESIGN AND OPERATING REQUIREMENTS	PRESENTS DESIGN AND OPERATING REQUIREMENTS FOR LANDFILLS. INCLUDES LINER, LEACHATE COLLECTION AND REMOVAL, RUN-ON/RUN-OFF CONTROL, ETC.	PERTAINS TO ALL SITES AT WHICH A HAZARDOUS WASTE LANDFILL WILL EITHER BE LOCATED OR AN EXISTING LANDFILL WILL BE EXPANDED. THIS RULE ALSO PERTAINS TO EXISTING LAND-BASED AREAS OF CONTAMINATION.
HW		3745-57-05	A,B	MONITORING AND INSPECTIONS OF LANDFILLS	REQUIRES INSPECTION OF LANDFILLS DURING CONSTRUCTION OR INSTALLATION AND OPERATION.	PERTAINS TO ALL SITES AT WHICH A HAZARDOUS WASTE LANDFILL WILL EITHER BE LOCATED OR AN EXISTING LANDFILL WILL BE EXPANDED. THIS RULE PERTAINS TO EXISTING LAND-BASED AREAS OF CONTAMINATION.
HW		3745-57-10	A,B	LANDFILL CLOSURE AND POST-CLOSURE CARE	SPECIFIES CLOSURE AND POST-CLOSURE REQUIREMENTS FOR HAZARDOUS WASTE LANDFILLS. INCLUDES FINAL COVER AND MAINTENANCE.	PERTAINS TO ALL SITES AT WHICH A HAZARDOUS WASTE LANDFILL WILL EITHER BE LOCATED OR AN EXISTING LANDFILL WILL BE EXPANDED. THIS RULE PERTAINS TO EXISTING LAND-BASED AREAS OF CONTAMINATION.
HW		3745-57-12	A,B	LANDFILL REQUIREMENTS FOR IGNITABLE/REACTIVE WASTES	PROHIBITS THE DISPOSAL OF IGNITABLE OR REACTIVE WASTE IN A LANDFILL, UNLESS THE WASTE IS TREATED, RENDERED OR MIXED SO THAT THE RESULTANT MATERIAL NO LONGER MEETS THE DEFINITION OF IGNITABLE OR REACTIVE WASTE.	PERTAINS TO ALL SITES AT WHICH POTENTIALLY IGNITABLE OR REACTIVE HAZARDOUS WASTE MAY BE LANDFILLED.
HW		3745-57-13		LANDFILL REQUIREMENTS FOR INCOMPATIBLE WASTES	PROHIBITS THE DISPOSAL OF INCOMPATIBLE WASTE IN THE SAME CELL OF A LANDFILL.	PERTAINS TO ALL SITES AT WHICH POTENTIALLY INCOMPATIBLE HAZARDOUS WASTE MAY BE LANDFILLED.
HW		3745-57-15	A,B	LANDFILL REQUIREMENTS FOR CONTAINERS	UNLESS THEY ARE VERY SMALL, CONTAINERS MUST EITHER BE AT LEAST 90% FULL WHEN PLACED IN THE LANDFILL OR CRUSHED/SHREDDED PRIOR TO PLACEMENT IN THE LANDFILL.	PERTAINS TO ALL SITES AT WHICH A HAZARDOUS WASTE LANDFILL WILL EITHER BE LOCATED OR AN EXISTING LANDFILL WILL BE EXPANDED AND CONTAINERS ARE TO BE DISPOSED OF IN THE LANDFILL.

CATEGORY	ORC	OAC	PARA.	CAPTION	TEXT	APPLICATION
HW		3745-57-17	A	LANDFILL CONSTRUCTION INSPECTIONS	ALLOWS OHIO EPA OPPORTUNITY TO INSPECT LANDFILL DURING CONSTRUCTION.	PERTAINS TO ALL SITES AT WHICH A HAZARDOUS WASTE LANDFILL WILL EITHER BE LOCATED OR AN EXISTING LANDFILL WILL BE EXPANDED. THIS RULE PERTAINS TO EXISTING LAND-BASED AREAS OF CONTAMINATION.
HW		3745-57-18	A,B	SPECIAL REQUIREMENTS FOR "F" WASTES IN LANDFILLS	PROHIBITS THE PLACEMENT OF HAZARDOUS WASTES F020, F021, F022, F023, F026 AND F027 IN LANDFILLS.	PERTAINS TO ALL SITES AT WHICH A HAZARDOUS WASTE LANDFILL WILL EITHER BE LOCATED OR AN EXISTING LANDFILL WILL BE EXPANDED AND F-WASTES ARE BEING CONSIDERED FOR LANDFILLING.
HW		3745-57-91	A,B,C	ENVIRONMENTAL PERFORMANCE STANDARDS FOR MISC UNITS	ESTABLISHES LOCATION, DESIGN, CONSTRUCTION, OPERATION, MAINTENANCE AND CLOSURE REQUIREMENTS FOR MISCELLANEOUS UNITS USED TO TREAT, STORE OR DISPOSE OF HAZARDOUS WASTES.	PERTAINS TO ANY ALTERNATIVE THAT INCORPORATES TREATMENT, STORAGE OR DISPOSAL OF HAZARDOUS WASTES IN MISCELLANEOUS UNITS.
HW		3745-57-92		MONITORING, INSPECTING, ANALYZING, ... FOR MISC UNITS	REQUIRES THAT MONITORING, ANALYSIS, INSPECTION, RESPONSE, REPORTING AND CORRECTIVE ACTION BE CONDUCTED AS NECESSARY AT MISCELLANEOUS UNITS TO ASSURE THAT HUMAN HEALTH AND THE ENVIRONMENT ARE PROTECTED.	PERTAINS TO ANY ALTERNATIVE THAT INCORPORATES TREATMENT, STORAGE OR DISPOSAL OF HAZARDOUS WASTES IN MISCELLANEOUS UNITS.
HW		3745-57-93		POST-CLOSURE CARE FOR MISC DISPOSAL UNITS	REQUIRES POST-CLOSURE CARE OF MISCELLANEOUS UNITS THAT ARE DISPOSAL UNITS AND OF TREATMENT OR STORAGE MISCELLANEOUS UNITS THAT THAT LEAVE CONTAMINATED SOILS OR GROUND WATER AFTER CLOSURE.	PERTAINS TO ANY ALTERNATIVE THAT INCORPORATES TREATMENT, STORAGE OR DISPOSAL OF HAZARDOUS WASTES IN MISCELLANEOUS UNITS.
DW		3745-81-11	A,B,C	MAXIMUM CONTAMINANT LEVELS FOR INORGANIC CHEMICALS	PRESENTS MAXIMUM CONTAMINANT LEVELS FOR INORGANICS.	PERTAINS TO ANY SITE WHICH HAS CONTAMINATED GROUND OR SURFACE WATER THAT IS EITHER BEING USED, OR HAS THE POTENTIAL FOR USE, AS A DRINKING WATER SOURCE.
DW		3745-81-12	A,B,C	MAXIMUM CONTAMINANT LEVELS FOR ORGANIC CHEMICALS	PRESENTS MCLS FOR ORGANICS.	PERTAINS TO ANY SITE WHICH HAS CONTAMINATED GROUND OR SURFACE WATER THAT IS EITHER BEING USED, OR HAS THE POTENTIAL FOR USE, AS A DRINKING WATER SOURCE.
DW		3745-81-27	A-E	ANALYTICAL TECHNIQUES	PRESENTS GENERAL ANALYTICAL TECHNIQUES FOR MCLS.	PERTAINS TO ANY SITE WHICH HAS CONTAMINATED GROUND OR SURFACE WATER THAT IS EITHER BEING USED, OR HAS THE POTENTIAL FOR USE, AS A DRINKING WATER SOURCE.

Table 10 Preliminary Cost Estimate for Alternative B

ACTIVITY	Initial Cost	PW of O&M
RAO 1 - Former Ponds 1 and 2	$4,423,036	$16,141
RAO 2 - Former Ponds 3, 4, and 7	$498,643	$48,423
RAO 3A - Eastern Shallow Groundwater	$2,898,360	$4,067,551
RAO 3B - Southern Shallow Groundwater	$54,000	$181,838
RAO 4 - MKS Groundwater	$147,000	$1,495,473
RAO 5 - Groundwater Pathway Elimination	$10,000	$32,282
RAO 6 - Surface Soils	$393,484	$32,282
Subtotal	**$8,420,000**	**$5,870,000**
INITIAL COST TOTAL		**$8,420,000**
CONSTRUCTION BONDING (3%)		**$250,000**
ENGINEERING DESIGN/CQA (15%)		**$1,260,000**
TOTAL PW OF O&M COST		**$5,870,000**
SUBTOTAL		**$15,800,000**
CONTINGENCY (20%)		**$3,160,000**
TOTAL NET PRESENT WORTH COST		**$18,960,000**

Table 10 Preliminary Cost Estimate for Alternative B

Remedial Action Components to Address - RAO-1 (Former Ponds 1 and 2) - Air Stripping/Stabilization/Solidification				
Activity	**Unit Costs**	**Units**	**Quantity**	**Estimated Cost**
Initial Cost - Air Stripping/Stabilization/Solidification				
Pilot Study (mixture determination, stripping time, etc.)	$75,000	Lump Sum	1	$75,000
Mobilization / Demobilization	$250,000	Lump Sum	1	$250,000
Clearing/Grubbing/Fine Grading (ground preparation)	$0.20	sf	65,180	$13,036
Stripping/Solidification/Stabilization	$85	cy	48,000	$4,080,000
Soil Barrier (cost included in RAO-3, impermeable cap)	--	--	--	
Contractor Surveying and E&S Controls	$5,000	Lump Sum	1	$5,000
RAO-1 TOTAL INITIAL COST				**$4,423,036**
Annual Operation & Maintenance (O&M)				
Site Maintenance, Inspections, Legal (surface water controls, cover, vegetation, ICs)	$1,000	Lump Sum	1	$1,000
RAO-1 TOTAL ANNUAL O&M COST				**$1,000**
Years of O&M, 5% Discount Rate	30	Years		
Discount Rate	5	%		
RAO-1 PRESENT WORTH OF ANNUAL O&M COST				**$16,141**
RAO-1 TOTAL PRESENT WORTH				**$4,439,177**

Remedial Action Components to Address - RAO-2 (Former Ponds 3, 4, and 7)				
Activity	**Unit Costs**	**Units**	**Quantity**	**Estimated Cost**
Initial Cost - Structural Covers Barriers				
Institutional Controls				
Legal Fees	$10,000	Lump Sum	1	$10,000
Surveying	$10,000	Lump Sum	1	$10,000
Mobilization / Demobilization - Soil Mixing/Earthwork Equipment	$20,000	Lump Sum	1	$20,000
Former Pond 3 - entire aerial extent				
Clearing (ground preparation)	$0.20	sf	124,247	$24,849
Soil Barrier	$0.70	sf	124,247	$86,973
16 oz/sy Non-woven geotextile	$0.17	sf	124,247	$21,122
Pilot Study Structural Stabilization	$25,000	Lump Sum	1	$25,000
Structural Stabilization (In-Situ Stabilization) - soil mixing	$200,000	Lump Sum	1	$200,000
Former Pond 4				
Clearing (1/4 of Former Pond) (ground preparation)	$0.20	sf	14,672	$2,934
Repairs to the Existing Soil Barrier (over 1/4 of Former Pond)	$0.70	sf	14,672	$10,270
16 oz/sy Non-woven Geotextile (1/4 of Former Pond)	$0.17	sf	14,672	$2,494
Former Pond 7 - entire aerial extent & adjacent sludge pile				
Soil Barrier (cost included in RAO-3, low permeability)	--	--	--	
Structural Stabilization (In-Situ Stabilization) - soil mixing	$75,000	Lump Sum	1	$75,000
Contractor Surveying and E&S Controls	$10,000	Lump Sum	1	$10,000
RAO-2 TOTAL INITIAL COST				**$498,643**
Annual Operation & Maintenance (O&M)				
Site Maintenance, Inspections, Legal (surface water controls, cover, vegetation, ICs)	$3,000	Lump Sum	1	$3,000
RAO-2 TOTAL ANNUAL O&M COST				**$3,000**
Years of O&M	30	Years		
Discount Rate	5	%		
RAO-2 PRESENT WORTH OF ANNUAL O&M COST				**$48,423**
RAO-2 TOTAL PRESENT WORTH				**$547,067**

Remedial Action Components to Address - RAO-3A (Eastern Shallow Groundwater; Off-Facility)				
Activity	**Unit Costs**	**Units**	**Quantity**	**Estimated Cost**
Initial Cost - Collection Trench and Ex-Situ Treatment				
Install Off-Facility Collection Trench				
Earthwork (excavation, pipe bedding, backfill, relocation of excavated fill)	$24	cy	2,640	$63,360
Mechanical (pipes/pumps)	$75,000	Lump Sum	1	$75,000
Upgrades to Existing Treatment Plant	$900,000	Lump Sum	1	$900,000
Main Plant Area (with Ponds 1&2, Exclusion Area A&B) & Pond 7				
Low Permeability Cap (includes grading & capping)	$167,273	acre	11	$1,840,000
Mobilization / Demobilization, Contractor Surveying and E&S Controls	$20,000	Lump Sum	1	$20,000
RAO-3A TOTAL INITIAL COST				**$2,898,360**
Annual Operation & Maintenance (O&M)				
Site Maintenance, Inspections, Legal (surface water controls, cover, vegetation, ICs)	$2,000	Lump Sum	1	$2,000
Treatment Plant O&M	$250,000	Lump Sum	1	$250,000
RAO-3A TOTAL ANNUAL O&M COST				**$252,000**
Site Maintenance, Inspections, Legal (surface water controls, cover, vegetation, ICs)	30	Years		$32,282
Treatment Plant O&M	30	Years		$4,035,268
Discount Rate	5	%		
RAO-3A PRESENT WORTH OF ANNUAL O&M COST				**$4,067,551**
RAO-3A TOTAL PRESENT WORTH				**$6,965,910**

Remedial Action Components to Address - RAO-3B (Southern Shallow Groundwater; On-Facility)				
Activity	**Unit Costs**	**Units**	**Quantity**	**Estimated Cost**
Initial Cost - In-Situ Treatment				
Install Injection/Monitoring Wells - 8 wells (2 in diameter, 20 ft deep)	$32,000	Lump Sum	1	$32,000
Southern Shallow Groundwater In-situ Treatment				
Injection Equipment	$20,000	Lump Sum	1	$20,000
Mobilization / Demobilization	$2,000	Lump Sum	1	$2,000
RAO-3B TOTAL INITIAL COST				**$54,000**
Annual Operation & Maintenance (O&M)				
Monitoring Cost - Southern Shallow Groundwater	$15,000	Lump Sum	1	$15,000
Southern Shallow Groundwater - In-situ injections of iron/HRC	$25,000	Lump Sum	1	$25,000
RAO-3B TOTAL ANNUAL O&M COST				**$40,000**
Monitoring Cost - Southern Shallow Groundwater	5	Years		$68,189
Southern Shallow Groundwater - In-situ injections of iron/HRC	5	Years		$113,649
Discount Rate	5	%		
RAO-3B PRESENT WORTH OF ANNUAL O&M COST				**$181,838**
RAO-3B TOTAL PRESENT WORTH				**$235,838**

Remedial Action Components to Address - RAO-4 (MKS Groundwater - Source and Plume)				
Activity	**Unit Costs**	**Units**	**Quantity**	**Estimated Cost**
Initial Cost - Injection Wells and In-Situ Treatment				
In-situ Treatment of Source Area & Plume (NZVI)				
Well Installation - 12 New Deep Wells	$120,000	Lump Sum	1	$120,000
Retrofitting Existing Wells for Injections - 3 Existing Deep Wells	$5,000	Lump Sum	1	$5,000
Injection Equipment	$20,000	Lump Sum	1	$20,000
Mobilization / Demobilization	$2,000	Lump Sum	1	$2,000
RAO-4 TOTAL INITIAL COST				**$147,000**
Annual Operation & Maintenance (O&M)				
Treatment Injections (NZVI/year then Bionutrients)	$60,000	Lump Sum	1	$60,000
Monitoring Cost - Source Area & Plume	$60,000	Lump Sum	1	$60,000
Periodic DNAPL Recovery	$5,000	Lump Sum	1	$5,000
RAO-4 TOTAL ANNUAL O&M COST				**$125,000**

Remedial Action Components to Address - RAO-5 (Groundwater Residential Use)				
Activity	**Unit Costs**	**Units**	**Quantity**	**Estimated Cost**
Initial Cost - Institutional Controls				
Institutional Controls				
Legal Fees	$5,000	Lump Sum	1	$5,000
Surveying	$5,000	Lump Sum	1	$5,000
RAO-5 TOTAL INITIAL COST				**$10,000**
Annual Operation & Maintenance (O&M)				
Inspections and Documentation	$2,000	Lump Sum	1	$2,000
RAO-5 TOTAL ANNUAL O&M COST				**$2,000**
	30	Years		
Discount Rate	5	%		
RAO-5 PRESENT WORTH OF ANNUAL O&M COST				**$32,282**
RAO-5 TOTAL PRESENT WORTH				**$42,282**

Remedial Action Components to Address - RAO-6 (On-Facility Soils)				
Activity	**Unit Costs**	**Units**	**Quantity**	**Estimated Cost**
Initial Cost - Soil Barriers and Institutional Controls				
Institutional Controls				
Legal Fees	$5,000	Lump Sum	1	$5,000
Surveying	$5,000	Lump Sum	1	$5,000
Soil Barrier (assumes 2 acres in addition to area included in RAO-3 cap)[1]	$0.70	sf	87,120	$60,984
Drainage Ditch Soil Cover	$125	lf	1,500	$187,500
Surface Water Management	$125,000	Lump Sum	1	$125,000
Mobilization / Demobilization, Contractor Surveying and E&S Controls	$10,000	Lump Sum	1	$10,000
RAO-6 TOTAL INITIAL COST				**$393,484**
Annual Operation & Maintenance (O&M)				
Site Maintenance, Inspections, Legal (surface water controls, cover, vegetation, ICs)	$2,000	Lump Sum	1	$2,000
RAO-6 TOTAL ANNUAL O&M COST				**$2,000**
Years of O&M	30	Years		
Discount Rate	5	%		
RAO-6 PRESENT WORTH OF ANNUAL O&M COST				**$32,282**
RAO-6 TOTAL PRESENT WORTH				**$425,766**

ESTIMATED TOTAL PRESENT WORTH FOR THIS ALTERNATIVE	**$14,290,000**

1. The extent, location, and thickness of the soil barrier will be defined during detail design following the implementation of the PDI. For costing purposes in the FS, a 2-acre cap (likely located west of the low permeability cap) with a thickness of 1-foot has been assumed.

APPENDIX A

APPENDIX A

RESPONSIVENESS SUMMARY
for Operable Unit 2 of the Nease Chemical Site

This Responsiveness Summary provides both a summary of the public comments U.S. EPA received regarding the Proposed Plan for Operable Unit 2 (OU 2) of the Nease Chemical Site and U.S. EPA's responses to those comments. The Proposed Plan was released to the public on May 23, 2005, and the public comment period ran from June 1, 2005 through July 8, 2005. Ohio EPA provided support on the Proposed Plan. U.S. EPA held a public meeting regarding the Proposed Plan on June 22, 2005, at the Salem Public Library in Salem, Ohio. Ohio EPA participated in the public meeting, assisted in responding to questions, and provided support at the meeting.

U.S. EPA received written comments (via regular and electronic mail) and verbal comments (at the public meeting) during the public comment period. In total, U.S. EPA received comments from approximately 10 different people, most of them verbal comments at the public meeting. Copies of all the comments received (including the verbal comments reflected in the transcript of the public meeting) are included in the Administrative Record for the Site. U.S. EPA carefully considered all comments prior to selecting the final Site remedy documented in the ROD.

This Responsiveness Summary does not repeat verbatim each individual comment. Rather, the comments are summarized and grouped by the type of issue raised. The comments fell within several different categories: support for the proposed remedy, project schedule, health concerns, the Middle Fork of Little Beaver Creek (MFLBC), primary chemical contaminants, interim response actions, and legal and policy issues. There were also a number of questions asked at the June 22, 2005 public meeting. While the questions were not submitted as official public comment, the underlying concerns are also summarized here, within the stated categories.

U.S. EPA received a comment letter dated June 30, 2005, submitted on behalf of Rutgers Organics Corporation (ROC), the Site owner. ROC acquired the assets of Nease Chemical Company (including the non-operational Salem facility) in 1977. Since 1982, ROC has cooperated with Ohio EPA and U.S. EPA to address the Site. ROC and its consultant, Golder Associates, participated in the public meeting and assisted in responding to technical questions, as well as questions about ROC's future responsibilities. A summary of ROC's comments and U.S. EPA's responses is included below.

The remainder of this Responsiveness Summary contains a summary of the comments U.S. EPA received and U.S. EPA's responses to those comments, grouped by category.

I. SUPPORT FOR THE PROPOSED REMEDY

ROC expressed support for the proposed remedy for the Site [Alternative B: treatment of Ponds 1 and 2 by soil mixing/stripping, stabilization and solidification (S/S/S); covering the remaining

ponds and contaminated soil with either clean soil or an impermeable membrane combined with clean soil; collection in a trench of the eastern shallow groundwater with ex-situ treatment; and treatment of the southern shallow groundwater and the deep groundwater with nanoscale zero-valent iron (NZVI)]. ROC's comment in the June 30, 2005 letter stated that Alternative B "offers the best approach to cleanup based on the selection criteria established by the National Contingency Plan."

No other commentor expressed support or opposition for any of the other alternatives that U.S. EPA evaluated, and no one said that they did not support Alternative B. Many people expressed satisfaction that the Site cleanup would finally begin.

II. PROJECT SCHEDULE

Several people commented on the project schedule (both past and future) for Site cleanup. Many people expressed frustration with the amount of time between initial work on the Site and a cleanup proposal. Several people expressed concerns about the time required before full-scale construction on OU 2 would begin. One person wanted exact dates for completion of the remaining work and wanted some assurance that ROC and U.S. EPA and Ohio EPA would meet the dates.

U.S. EPA acknowledges that studies at the Nease Chemical Site have taken longer than at many other Superfund Sites. In hindsight, there may have been opportunities to improve the schedule, however, there were circumstances at the Nease Site that added substantial time to the studies, including: the complexity of the Site; uniqueness of some of the key chemicals of concern (mirex, photomirex and kepone); and the need for a toxicity reassessment for those chemicals. At this point, U.S. EPA believes that these issues are resolved, and that the Site will progress rapidly towards completion of cleanup.

In the materials used to describe the proposed alternative, U.S. EPA indicated that full-scale construction might be expected in 2008. Many people did not understand why construction could not occur sooner, if the remedy were to be picked in 2005. The selected remedy for OU 2 at the Nease Site includes two components that are either an innovative technology (NZVI) or a unique combination/application of more standard technologies (S/S/S). As such, the remedy will require an extensive pre-design investigation (PDI), including treatability tests. After completion of the PDI, detailed engineering design plans will be developed before construction. U.S. EPA will work closely with Ohio EPA and ROC to enable the PDI and design to be conducted in an expeditious manner.

U.S. EPA is unable to provide exact dates for completion of the remaining work. U.S. EPA fully expects ROC to conduct the cleanup and will be negotiating the terms of one or more enforceable legal agreements, including project schedule provisions. U.S. EPA and Ohio EPA will oversee all the cleanup work at the Site to ensure that ROC meets the terms of the enforcement document, including project schedule deadlines.

III. HEALTH CONCERNS

A few people made comments related to potential health issues and the risks associated with the contamination at the Site. Concerns included the toxic effects of mirex and its ability to build up in exposed populations. One person requested that an additional Health Assessment be conducted in the community and stated that she believed that levels of certain types of illnesses were higher in Salem. One person commented that a gentleman who inspected the MFLBC had died of leukemia and questioned whether it was because of Site-related contaminants.

In its June 30, 2005 letter, ROC submitted the following comment:

> "As noted in the proposed plan, the detailed Endangerment Assessment (EA) completed in 2004 as part of the RI/FS process did not identify any current risk to people living near the Site. Reference was made at the public meeting to Ohio Department of Health (ODH) studies conducted in 1990 and 1996. These studies were discussed in the approved EA which concluded "Given the conservative approach conventionally used in a baseline risk assessment, it is unlikely that the EA underestimates either potential exposures or calculated risks for mirex exposure. This conclusion is supported by the blood plasma mirex levels found in the two ODH surveys targeted toward identification of highly exposed populations." ROC further notes that the EA is not at variance with the ODH studies, but instead provides a more detailed risk analysis for use in selection of a cleanup plan for the Site."

As noted by ROC, a human health risk assessment was conducted for the Site, and is extensively documented in the *Endangerment Assessment for the Nease Chemical Company Salem, Ohio Site* (2004). This risk assessment evaluated the potential risks that could result to people from exposure to the contaminants at the Site under current use scenarios and potential future use scenarios, assuming that no cleanup takes place. The risk assessment uses protective assumptions in evaluating potential risks. The risk assessment considered the toxic effects of mirex in evaluating the cancer and non-cancer risks to potentially exposed individuals, and U.S. EPA conducted a toxicity reassessment as part of the study.

The results of the human health risk assessment are discussed in Section 7 of this ROD. In summary, none of the current use scenario exposure pathways (for either OU 2 or OU 3) resulted in potential risks exceeding U.S. EPA's acceptable risk range. For OU 2, the highest estimated risks are associated with potential future exposure to groundwater (primarily due to volatile organic compounds). With respect to the MFLBC, the 2004 Endangerment Assessment identified elevated risks from potential future exposures to mirex in livestock animal products (beef and milk from animals assumed to have access to the MFLBC, and from consumption of fish from MFLBC (these risks were not summarized in this ROD, as they relate to potential exposures in OU 3).

Three previous public health assessments have been conducted at the Nease Site: a 1990 assessment conducted by the Ohio Department of Health (ODH); a 1996 assessment conducted

by ODH in cooperation with the federal Agency for Toxic Substances and Disease Registry (ATSDR); and a 1997 assessment issued by ATSDR. These assessments are discussed in the EA and summarized in Section 2 of this ROD. The assessments probed into potential exposure and deliberately tried to target people most likely to have been exposed to mirex. Very few individuals had detectable mirex in their blood (despite the biased approach to sampling the most likely persons exposed). In the 1996 assessment, ODH indicated that further health studies of the general population were not recommended, based on examination of potential exposure pathways and actual measured levels of mirex in blood. The 1997 assessment concluded that "contamination of MFLBC (associated with the Nease Chemical site) represents a public health hazard, because of past exposure and the possibility of future exposures." The results of the risk assessment are consistent with ATSDR's conclusion regarding potential future exposure (the baseline human health risk assessment looked at current and potential future risks, but not past exposures).

Based on the findings of the three previous public health assessments, the recommendations of the health agencies (ODH and ATSDR) in those assessments, and the more recent human health risk assessment found in the 2004 EA, U.S. EPA is not recommending to the health agencies that an additional public health assessment be conducted for the Nease Site at this time. U.S. EPA has determined that the human health risk assessment has documented a clear basis for a response action at the Nease Site. However, the human health basis for action is due to potential future exposures, not current exposures. Without actual current exposures (different than those previously studied by ODH and ATSDR), it is unlikely that a new health assessment will draw substantially different conclusions than the previous studies.

In regard to the gentleman who died of leukemia, it is always sad to hear of the illness or death of community members. However, it is very difficult to establish a causal relationship between environmental exposures and an individual's illness. Leukemia is cancer of the blood cells in which the bone marrow produces abnormal white blood cells, which over time, crowd out the normal blood cells and platelets. Most people who have leukemia do not have any known risk factors. However, factors that increase a person's risk of having leukemia include: smoking; exposure to high levels of radiation (including chemotherapy); exposure to certain chemicals, such as benzene and formaldehyde; and other blood diseases. Males are more likely to have leukemia and incidence among adults increases after age 50. Mirex is the primary contaminant of concern in the sediment, floodplain soil and biota of the MFLBC. Mirex has been associated with adverse skin, liver, nervous system and reproductive effects, but has not been associated with leukemia.

IV. MIDDLE FORK OF LITTLE BEAVER CREEK (MFLBC)

Several people (including members of the Little Beaver Creek Wildlife and Rivers Advisory Committee) expressed concerns about the MFLBC, including concerns about: whether the work on OU 2 would delay work on MFLBC (or whether MFLBC would not be addressed at all); possible erosion of contaminants; possible adverse health effects from contaminants in the creek; and the condition of the signs posted to alert the public about fish consumption and contact

advisories. In addition, in its June 30, 2005 letter, ROC submitted a comment about its conclusions about the overall health of the aquatic system based on newer data.

The MFLBC is part of the Nease Site that has been included in OU 3. U.S. EPA and Ohio EPA fully intend that the MFLBC will addressed through the Superfund process, and that a subsequent decision will be issued for OU 3. As such, this Responsiveness Summary is concerned with comments related to OU 2. However, U.S. EPA will provide brief responses to some concerns that were expressed regarding the MFLBC. U.S. EPA will not respond to ROC's conclusions about the health of the system at this time because additional sampling of the MFLBC is currently underway and the comment is not pertinent to the OU 2 Record of Decision.

U.S. EPA does not expect the OU 2 cleanup work to unduly delay work on the MFLBC. Contamination on the old Nease facility was the source of mirex to the MFLBC. The cleanup actions in the selected remedy for OU 2 will constitute source control actions for OU 3. As discussed in U.S. EPA's Directive 9285.6-08: Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites (February 12, 2002), it is important to control sources early. While some of the interim response actions have controlled Site runoff and mitigated releases to the MFLBC, those actions were not a permanent solution to control the source.

As one person noted, there has been recent flooding in the Salem area that may have caused erosion of contaminated sediments. U.S. EPA and Ohio EPA are currently working with ROC to get additional data within the MFLBC. In August 2005, a physical sediment reconnaissance was conducted to evaluate current sediment deposition patterns compared to historical. Additional chemical sampling will be conducted in the fall of 2005 to examine current conditions and trends over time. This data will help in understanding the affect of the recent flooding on mirex distribution in the MFLBC, and will support the future Feasability Study and ROD for OU 3.

In regard to concerns about health effects from contaminants in the MFLBC, the 2004 Endangerment Assessment contains information concerning human health risks from exposures to contaminants in the MFLBC. The 2004 Endangerment Assessment identified no present risk exceeding U.S. EPA's acceptable levels under current conditions and data collected to date (using protective assumptions). U.S. EPA will address potential human health risks associated with contamination in the MFLBC in a future ROD for OU3.

In regard to concerns about the signs along the MFLBC, signs were originally supplied by ODH starting in 1988 due to the issuance of ODH's original contact and fish consumption advisories for the creek in the late 1980s. The advisories were based on the presence of elevated levels of mirex measured in stream sediments and fish in sampling carried out in MFLBC in the mid-1980's. U.S. EPA and Ohio EPA are currently working with ODH to assess the existing advisory against contact with stream waters and sediment. This ongoing review is based on the toxicity reassessment of mirex from U.S. EPA and newer sampling data for sediments along and in the MFLBC. The results of this review by the Agencies will likely determine if there still is a need for the contact advisory along the creek. Upon conclusion of this process, it will be determined whether new or modified signs are needed. However, U.S. EPA believes that it is

important to note that some the original signs have been replaced due to theft or vandalism, and that destruction of new signs is likely. Destruction of posted advisory signs is not unique to the Nease Site, but is a common problem. The Agencies are willing to work with the community to see if there are other ways to convey information that may be more effective.

V. PRIMARY CHEMICAL CONTAMINANTS

One person at the June 22, 2005, public meeting expressed concerns about whether Agent Orange was manufactured at the Nease Site. At the meeting, U.S. EPA, Ohio EPA and ROC's consultant responded that there was no evidence to support that Agent Orange had been manufactured at the Site, and that chemical data did not show the presence of chemicals of concern (dioxins) associated with Agent Orange.

Subsequently, in its June 30, 2005 letter, ROC submitted the following comment:

> "As noted in the proposed plan, the primary contaminants associated with the Site are the pesticide mirex, which was manufactured by Nease Chemical, and various volatile organic compounds (VOCs) that were also used by Nease. Concern was raised at the public meeting that "Agent Orange" may have been manufactured at the site. ROC notes the following facts in response:
>
> a. There is no evidence that Nease Chemical ever manufactured "Agent Orange." This material was manufactured for the U.S. military, the manufacturers are well documented, and do not include Nease;
> b. As documented in the Remedial Investigation (RI) the Site has been tested for a wide range of chemicals, including 2,3,7,8 Tetrachlorodibenzo-p-dioxin (2,3,7,8 TCDD or dioxin) the impurity in "Agent Orange" that has given rise to health concerns;
> c. Dioxin testing was included in three separate rounds of groundwater sampling, including eight wells located in the main source area of groundwater contamination on the Nease site. 2,3,7,8 TCDD was detected in only one well at a level well within the safe drinking water standards (Federal MCLs);
> d. Furthermore, as noted in the proposed plan, nobody is drinking groundwater contaminated by the Nease site."

U.S. EPA acknowledges ROC's comment. Based on data from the Remedial Investigation and consistent with ROC's comment, U.S. EPA continues to believe there is no evidence to indicate that Agent Orange was manufactured at the Nease Site, nor that dioxin is a contaminant of concern at the Nease Site.

VI. INTERIM RESPONSE ACTIONS

During the public meeting on June 22, 2005, several people commented that "nothing has been done" at the Site over a long time period. In its June 30, 2005 letter, ROC submitted the following comment:

> "The proposed plan does not fully document the cleanup work that has already been undertaken at the Site by ROC; some of these measures, including items b through e below, will continue to be implemented by ROC while the additional actions presented in the proposed plan are designed and built. The previous cleanup measures include:
>
> a. Removal of 115 buried drums and 5,700 cubic yards of contaminated soil and disposal at an appropriate off-site facility;
> b. Installation of surface water and sediment control structures on-Site to mitigate runoff of potentially contaminated sediment from the Site;
> c. Installation and maintenance of 13 fabric barriers in Feeder Creek to control off-Site migration of potentially contaminated sediment;
> d. Construction and continuous operation of two shallow groundwater collection systems. Over 20 million gallons of extracted groundwater have been treated in an on-Site treatment plant over the past 10 years, and, in addition, 5,000 to 15,000 gallons are shipped to an off-site treatment facility each month.
> e. Daily site inspections and monthly monitoring and sampling to ensure proper operation of the groundwater, surface water and sediment control systems."

U.S. EPA acknowledges ROC's comment and recognizes that previous response actions have occurred at the Site. Previous response actions are summarized in Section 2 of this ROD. The proposed plan format used by U.S. EPA, Region 5 is a very simple, streamlined description of the remedial alternatives, and is not intended to describe all the information that can be found in the Administrative Record for the Site.

VII. LEGAL & POLICY ISSUES

A few people made comments that dealt with various legal or policy issues associated with the cleanup. Several people asked about who would pay for the cleanup and expressed concerns that no public funding should be used to finance the work. A related concern was whether the costs related to OU 2 cleanup would prevent cleanup of OU 3, and specifically the MFLBC. One person submitted a copy of a news story and asked that it be made part of the Administrative Record for the Site.

U.S. EPA has a policy under which it is expected that the Agency will seek to have potentially responsible parties conduct or fund work at Superfund sites. U.S. EPA fully expects ROC to conduct the cleanup work specified in this ROD. ROC has worked cooperatively with the Agencies to develop the remedial alternatives in the Feasibility Study and has stated that it supports the selected remedy. At the public meeting on June 22, 2005, ROC stated that it has

already spent about $20 million on the Site and that it is "committed to fulfill obligations" of the OU 2 cleanup. U.S. EPA will negotiate one or more enforcement agreements that establish ROC's obligations to complete the required work. The estimated cost of the OU 2 remedy is $19 million. There will be additional costs associated with any selected action for OU 3, but those costs cannot be predicted now. U.S. EPA expects that ROC will conduct any necessary work for OU 3, as well.

In regard to the request to add a newspaper story to the Administrative Record, U.S. EPA will not add the item to the Administrative Record. An Administrative Record documents the basis for selection of a remedy. The newspaper story in question was not used by U.S. EPA as a basis for the remedy selected in this ROD. U.S. EPA has no control over the content of any media story, and no ability to guarantee its accuracy. The story that was submitted was titled "Nease cleanup readied" and was authored by Ryan Gillis and printed in the Morning Journal on June 2, 2005. U.S. EPA will keep a copy of the story in the Project Manager's files.

APPENDIX B

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U.S. EPA ADMINISTRATIVE RECORD
REMEDIAL ACTION
NEASE CHEMICAL COMPANY
SALEM, COLUMBIANA COUNTY, OHIO
ORIGINAL
06/26/95

DOC#	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	00/00/00	U.S. EPA		Procedures for Pesticide/PCB Determination in Fish	4
2	10/01/73	Court of Common Pleas; Columbiana County, Ohio	Litigants	Consent Judgement	6
3	12/18/80	Freese, R., Ecology and Environment, Inc.	U.S. EPA File	Off-Site Inspection Report	13
4	06/11/81	Mount, L., Ruetgers-Nease Chemical Company, Inc.	U.S. EPA	Notification of Hazardous Waste Site	3
5	10/06/82	U.S. EPA		NPL Quality Assurance Summary Sheet	3
6	10/26/82	Ecology and Environment, Inc.	U.S. EPA	Report: Air Sampling at Nease Chemical	14
7	11/09/82	U.S. EPA		HRS Scoring Package	21
8	02/02/83	Lunsford, M., Ecology and Environment, Inc.	U.S. EPA File	Preliminary Assessment	6
9	05/12/83	Ecology and Environment, Inc.	U.S. EPA	Technical Direction Document Acknowledgement of Completion re: Air Sampling at Nease Chemical w/Attached TDDs and FIT Services Request Form	6
10	07/00/83	U.S. EPA		NPL Conditions at Listing in December 1982 and Status as of July 1983	1
11	00/00/84	World Health Organization		Publication: Environmental Health Criteria #14 - Mirex	37
12	08/09/84	Jones, G., Centers for Disease Control / USPHS / USDHHS	Fabinski, L., U.S. EPA	Memorandum re: CDC's Review of (1) Health Threats by Contamination of Sediments, Soils, and Groundwater by VOCs, Mirex, and Methoxychlor and (2) Acceptable Levels of Contaminants	5
13	08/00/87	U.S. EPA	Public	Guidance: Health Effects Assessment for Mirex (EPA/600/22)	48

DOC#	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
14	09/03/87	Foard, S., Ruetgers-Nease Chemical Company, Inc.	Bicknell, D., U.S. EPA; Beals, R., Ohio EPA	Letter re: Aquatic Survey of Middle Fork of Little Beaver Creek	3
15	09/15/87	Constantelos, B., U.S. EPA	Foard, S., Ruetgers-Nease Chemical Company, Inc.	Letter re: Special Notice of Potential Liability (UNSIGNED)	3
16	10/16/87	U.S. EPA		Sampling Plan Outline: October 13-16, 1987 Collection of Fish and Sediments	4
17	01/27/88	U.S. EPA	Respondent	Administrative Order by Consent re: RI/FS	45
18	03/28/88	Constantelos, B., U.S. EPA	Adamkus, V., U.S. EPA	Action Memorandum: Authorization for Funding of PRP RI/FS Oversight Activities	3
19	11/09/88	Jacobs Engineering Group Inc.	U.S. EPA	Final Community Relations Plan	30
20	01/06/89	Black & Veatch	U.S. EPA	Summary Report of the Fall 1987 U.S. EPA Fish and Sediment Sampling Survey of the Middle Fork of Little Beaver Creek	16
21	02/03/89	Bicknell, D., U.S. EPA; and MacMillan, S., Ohio EPA	Foard, S., Ruetgers-Nease Chemical Company, Inc.; et al.	Letter re: Additional Work for the RI/FS w/Attachments	7
22	07/28/89	Black & Veatch	U.S. EPA	Quality Assurance Project Plan: RI/FS Oversight	137
23	02/28/90	Ruetgers-Nease Chemical Company, Inc.	U.S. EPA/Ohio EPA	RI/FS Volume 1: Work Plan (Revision 4)	122
24	02/28/90	Ruetgers-Nease Chemical Company, Inc.	U.S. EPA/Ohio EPA	RI/FS Volume 2: Quality Assurance Project Plan (Revison 4)	230
25	02/28/90	Ruetgers-Nease Chemical Company, Inc.	U.S. EPA/Ohio EPA	RI/FS Volume 3: Site Specific Sampling Plan (Revison 4)	324
26	02/28/90	Ruetgers-Nease Chemical Company, Inc.	U.S. EPA/Ohio EPA	RI/FS Volume 4: Health and Safety Plan (Revision 4)	143

DOC#	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
27	10/04/90	Ohio Department of Health	U.S. EPA/Ohio EPA	Report: Assessment of Exposure to Mirex Associated with the Nease Chemical Company Superfund Site (Final)	46
28	11/26/90	Shelley, T. and Mortensen, B.; Ohio Department of Health	Blumberg, A., U.S. EPA	Letter re: Wildlife Sample Results w/Attachments	6
29	05/09/94	U.S. EPA/OSWER	U.S. EPA	Considering Wetlands at CERCLA Sites (OSWER Directive 9280.0-03; EPA/540/R-94/019; PB94-963242)	45
30	10/00/94	Golder Associates Inc.	U.S. EPA	Supplemental Well Closure Plan: Production Wells P1, P2, and P3 (Revision 1) w/Response to Comments Document	302

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COMPENDIUM OF CERCLA RESPONSE SELECTION GUIDANCE DOCUMENTS

DOC NO	VOL	TITLE	Date	Authors	Status	Pages	Tier	Attachments	OSWER/EPA Number
0000	1	INDEX TO COMPENDIUM OF CERCLA RESPONSE SELECTION GUIDANCE DOCUMENTS	05/01/89	- OWPE - PRC-ENVIRONMENTAL MANAGEMENT, INC	Final	8		1) DATA ELEMENT DEFINITIONS 2) ORGANIZATIONAL ABBREVIATIONS AND ACRONYMS IDENTIFIED IN INDEX	
**		Pre-Remedial							
0001	1	EXPANDED SITE INSPECTION TRANSITIONAL GUIDANCE FOR FY-88	10/01/87	- OSWER	Final	74	2		OSWER #9345.1-01
0002	1	PRELIMINARY ASSESSMENT GUIDANCE FISCAL YEAR 1988	01/01/88	- OSWER/OERR	Final	83	2		OSWER #9345.0-01
**		Removal Action							
1000	1	CERCLA REMOVAL ACTIONS AT MIXTURE RELEASE SITES	01/23/86	- LONDEST, H.L./OSWER	Final	2	2		OSWER #9360.0-8
1001	1	COSTS OF REMEDIAL RESPONSE ACTIONS AT UNCONTROLLED HAZARDOUS WASTE SITES	01/01/81	- RISSEL, H.L., ET AL /SCS ENGINEERS - ALBANESE, D.W./HERL	Final	164	1		
1002	1	EMERGENCY RESPONSE PROCEDURES FOR CONTAINMENT OF HAZARDOUS SUBSTANCE RELEASES	01/01/83	- MELVOLD, R.W./ROCKWELL INTERNATIONAL - MCCARTHY, L.T./HERL	Final	21	1		EPA 600/2-84-021
1003	1	ENVIRONMENTAL REVIEW REQUIREMENTS FOR REMOVAL ACTIONS	04/13/87	- OSWER/ERD	Final	6	2		OSWER #9318.0-05
1004	1	GUIDANCE ON IMPLEMENTATION OF THE "CONTRIBUTE TO REMEDIAL PERFORMANCE" PROVISION	04/06/87	- OSWER	Final	6	2		OSWER #9360.0-11
1006	2	GUIDANCE ON NON-NPL REMOVAL ACTIONS INVOLVING NATIONALLY SIGNIFICANT OR PRECEDENT SETTING ISSUES	04/03/89	- LONDEST, H.L./OERR	Final	9	2	1) REQUEST FOR CONCURRENCE	OSWER #9360.0-19
1005	1	INFORMATION ON DRINKING WATER ACTION LEVELS	04/19/88	- FIELDS, JR., T./OSWER/ERD	Final	17	2	1) MEMO RELEASES FROM LAWFULLY APPLIED PESTICIDES 2) MEMO LEDC CONTAMINATION 3) GUIDANCE FOR EVALUATING CHEMICALS IN DRINKING H2O	
1006	1	SUPERFUND REMOVAL PROCEDURES, REVISION #3	02/01/88	- OSWER/OERR	Final	365	1		OSWER #9360.0-03B
1007	1	THE ROLE OF EXPEDITED RESPONSE ACTIONS UNDER SARA	04/21/87	- LONDEST, H.L./OERR	Final	3	2		OSWER #9360.0-15
4003	26	INTERIM FINAL GUIDANCE ON REMOVAL ACTION LEVELS AT CONTAMINATED DRINKING WATER SITES (Secondary Reference)	10/06/87	- OSWER/OERR	Final	9	2		OSWER #9360.0-11
4001	32	REMOVAL COST MANAGEMENT MANUAL (Secondary Reference)	04/01/88	- OSWER/OERR	Final	170	1		OSWER #9360.0-02

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COMPENDIUM OF CERCLA RESPONSE SELECTION GUIDANCE DOCUMENTS

Doc No	Vol	Title	Date	Authors	Status	Pages	Tier	Attachments	OSWER/EPA Number
**		RI/FS - General							
2000	2	CASE STUDIES 1-23: REMEDIAL RESPONSE AT HAZARDOUS WASTE SITES	03/01/84	- OSW/OEET/HERL - OSWER/OERR	Final	830	1		EPA 540/2-84/002b
2001	3	EPA GUIDE FOR MINIMIZING THE ADVERSE ENVIRONMENTAL EFFECTS OF CLEANUP OF UNCONTROLLED HAZARDOUS-WASTE SITES	06/01/85	- ENVIRONMENTAL RESEARCH LABORATORY	Final	250	2		EPA/600/8-85/008
2002	3	GUIDANCE FOR CONDUCTING REMEDIAL INVESTIGATIONS AND FEASIBILITY STUDIES UNDER CERCLA	10/01/88	- OSWER/OERR	Final	340	1		OSWER 9355.3-01
2003	3	JOINT CORPS/EPA GUIDANCE	06/24/83	- OERR/PAS	Final	42	2		OSWER 9295.2-02
2004	4	MODELING REMEDIAL ACTIONS AT UNCONTROLLED HAZARDOUS WASTE SITES (VOL. I-IV)	04/01/85	- BOURWELL, S.H., ET AL./ANDERSON-NICHOLS AND CO. - OSWER/OERR - ANNON, D.C. AND BORNWELL, JR., T.O./HERL	Final	350	1		OSWER 9355.0-08
2005	4	POLICY ON FLOOD PLAINS AND WETLAND ASSESSMENTS FOR CERCLA ACTIONS	08/01/85	- HEDMAN, JR., W.N./OERR - LUCERO, G./OPPE	Final	9	2		OSWER 9280.0-02
2006	4	REMEDIAL RESPONSE AT HAZARDOUS WASTE SITES: SUMMARY REPORT	03/01/84	- OSW/HERL	Final	95	1		EPA 540/2-84/002A
2007	4	REVISED PROCEDURES FOR IMPLEMENTING OFF-SITE RESPONSE ACTIONS	11/13/87	- PORTER, J.W./OSWER	Final	20	2		OSWER 9834.11
2008	4	RI/FS IMPROVEMENTS	07/23/87	- LONDEST, H.L./OERR	Final	11	2	1) RI/FS IMPROVEMENTS	OSWER 9355.0-30
2009	4	RI/FS IMPROVEMENTS FOLLOW-UP	04/25/88	- LONDEST, H.L./OERR	Final	16	2	1) RI/FS IMPROVEMENTS FOLLOW-UP 2) REMEDIAL INFORMATION TRANSFER ACTIVITIES	OSWER 9355.3-05
2010	4	SUPERFUND FEDERAL-LEAD REMEDIAL PROJECT MANAGEMENT HANDBOOK	12/01/86	- OERR	Draft	179	1		OSWER 9355.1-1
2011	5	SUPERFUND REMEDIAL DESIGN AND REMEDIAL ACTION GUIDANCE	06/01/86	- OERR	Final	100	1		OSWER 9355.0-4A
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2100	5	A COMPENDIUM OF SUPERFUND FIELD OPERATIONS METHODS	12/01/87	- OERR - OPPE	Final	550	1		OSWER 9355.0-14
2101	6	DATA QUALITY OBJECTIVES FOR REMEDIAL RESPONSE ACTIVITIES: DEVELOPMENT PROCESS	03/01/87	- CDM FEDERAL PROGRAMS CORP - OERR/OPPE	Final	150	1		OSWER 9355.0-7B

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2103	6	DESIGN AND DEVELOPMENT OF HAZARDOUS WASTE REACTIVITY TESTING PROTOCOL	02/01/84	- WOLBACH, C.D., ET AL /ACUREX CORP - BARKLEY, N /MERL	Final	150	1		EPA-600/2-84-057
2104	6	FIELD SCREENING FOR ORGANIC CONTAMINANTS IN SAMPLES FROM HAZARDOUS WASTE SITES	04/02/86	- HOFFMAN, H.K., ET AL /ALS CORP. - CARTER, A /MICHIGAN DEPT OF NATURAL RESOURCES - THOMAS, T./EPA	Final	11	2	1) MEMO FIELD SCREENING FOR ORGANIC CONTAMINANTS	
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2110	7	GEOPHYSICAL METHODS FOR LOCATING ABANDONED WELLS	07/01/84	- FRISCHKNECHT, L.M., ET AL /U.S. GEOLOGICAL SURVEY - VANEE, J.J /EMSL	Final	211	1		EPA-600/4-84-065
2111	7	GEOPHYSICAL TECHNIQUES FOR SENSING BURIED WASTES AND WASTE MIGRATION	06/01/84	- BENSON, R.C., ET AL /TECHNOS, INC - VANEE, J.J /EMSL	Final	236	1		EPA-600/7-84/064
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2113	8	LABORATORY DATA VALIDATION FUNCTIONAL GUIDELINES FOR EVALUATING INORGANICS ANALYSES	07/01/88	- EPA DATA REVIEW WORK GROUP - BLEYLER, R /VIAR AND CO /SAMPLE MGMT OFFICE - HSED	Draft	20	2		
2114	8	LABORATORY DATA VALIDATION FUNCTIONAL GUIDELINES FOR EVALUATING ORGANICS ANALYSES	02/01/88	- BLEYLER, R /VIAR AND CO /SAMPLE MGMT OFFICE - EPA DATA REVIEW WORKGROUP - HSED	Draft	45	2		

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2116	8	SEDIMENT SAMPLING QUALITY ASSURANCE USER'S GUIDE	07/01/85	- BARTH, D.S & STARKS, T S /UNIV. OF NEV, LAS VEGAS - BROWN, K.W /EARD	Final	120	1		EPA/600/4-85/048
2117	8	SOIL SAMPLING QUALITY ASSURANCE USER'S GUIDE	05/01/84	- BARTH, D.S. & MASON, B J /U OF NEVADA, LAS VEGAS - BROWN, K /ORD/EARD	Final	104	1		EPA 600/4-84/043
2118	9+	TEST METHODS FOR EVALUATING SOLID WASTE, LABORATORY MANUAL PHYSICAL/CHEMICAL METHODS, THIRD EDITION (VOLUMES 1A, 1B, 1C, AND 1D)	11/01/86	- OSWER	Final	3000	1		
2119	11	USER'S GUIDE TO THE CONTRACT LABORATORY PROGRAM	12/01/88	- OSWER/OLP SAMPLE MANAGEMENT OFFICE	Final	220	2		OSWER #9240 0-1
**		RI/FS - Land Disposal Facility Technology							
2200	12	COVERS FOR UNCONTROLLED HAZARDOUS WASTE SITES	09/01/85	- MCANENY, C C., ET AL /U S COE/NES - YOUNGDD, J M /MERL	Final	475	2		EPA/540/2-85/002
2201	13	DESIGN, CONSTRUCTION, AND EVALUATION OF CLAY LINERS FOR WASTE MANAGEMENT FACILITIES	11/01/88	- COLEMAN, J L., ET AL /HLS - ROLLIER, M.H. /AREL	Final	500	2		EPA/530/SW-86/007
2202	13	EVALUATING COVER SYSTEMS FOR SOLID AND HAZARDOUS WASTE	09/01/82	- LUTTON, R J /U S A COE/WES - LANDRETH, R E /MERL	Final	58	2		OSWER #9476.00 1
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2206	15	LINING OF WASTE IMPOUNDMENT AND DISPOSAL FACILITIES	03/01/83	- LANDRETH, R /MERL	Final	480	2		OSWER 09480.00-4
2207	15	PROCEDURES FOR MODELING FLOW THROUGH CLAY LINERS TO DETERMINE REQUIRED LINER THICKNESS	01/01/84	- OSW	Draft	145	2		OSWER 09480.00-8)
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2210	15	SUPPLEMENTARY GUIDANCE ON DETERMINING LINER/LEACHATE COLLECTION SYSTEM COMPATIBILITY	08/07/86	- MIDDLE, B.R./PERMITS AND STATE PROGRAMS DIV	Final	60	2	1) ANALYSIS AND ENGINEERING OF UNEXPOSED & EXPOSED POLYMERIC MEMBRANE LINERS MATRECON INC 2) SEC 3019 EXPOSURE INFO AND HEALTH ASSESSMENTS	OSWER 09480.00-13
2211	15	TECHNICAL GUIDANCE DOCUMENT CONSTRUCTION QUALITY ASSURANCE FOR HAZARDOUS WASTE LAND DISPOSAL FACILITIES	10/01/86	- FERRMANN J G /HERL/LAND POLLUTION CONTROL DIV - OTHER	Final	88	2		OSWER 09472.001
2212	15	TREATMENT OF REACTIVE WASTES AT HAZARDOUS WASTE LANDFILLS PROJECT SUMMARY	01/01/84	- SPEDDING D. ET AL /ARTHUR D LITTLE, INC - LANDRETH, R./MERL	Final	4	2		EPA/600/S2-83/118
3000	25	APPLICABILITY OF THE RCRA MINIMUM TECHNICAL REQUIREMENTS RESPECTING LINERS AND LEACHATE COLLECTION SYSTEMS (Secondary Reference)	04/01/85	- SKINNER, J /OSW	Final	3	2		OSWER 09480.01(85)
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2300	16	A COMPENDIUM OF TECHNOLOGIES USED IN THE TREATMENT OF HAZARDOUS WASTES	09/01/87	- ORD/CERI	Final	49	2		EPA/625/8-87/014

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2302	17	ENGINEERING HANDBOOK FOR HAZARDOUS WASTE INCINERATION	09/01/81	- BONNER, T A, ET AL /MONSANTO RESEARCH CORP. - OBERACKER, D A /OTET	Final	445	2		OSWER #9488.00-5
2303	17	EPA GUIDE FOR IDENTIFYING CLEANUP ALTERNATIVES AT HAZARDOUS WASTE SITES AND SPILLS: BIOLOGICAL TREATMENT	—	- PACIFIC NORTHWEST LABORATORY - RANIERE, L.C./CORVALLIS ENVIRONMENTAL RESEARCH LAB	Final	120	2		EPA-600/3-83-063
2304	17	EPA GUIDE FOR INFECTIOUS WASTE MANAGEMENT	05/01/86	- OSWER/OSW	Final	75	2		OSWER #9410.00-2
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2306	17	GUIDANCE DOCUMENT FOR CLEANUP OF SURFACE TANK AND DRUM SITES	05/28/85	- COM/WOODWARD-CLYDE/ROY F. WESTON/C.C JOHNSON - BARTH, E AND BIXLER, B /OERR	Final	135	1		OSWER #9380.0-03
2307	18	HANDBOOK FOR EVALUATING REMEDIAL ACTION TECHNOLOGY PLANS	08/01/83	- EHRENFELD, J AND BASS, J /ARTHUR D LITTLE INC - PAHREN, H R /MERL	Final	439	1		EPA-600/2-83-076
2308	18	HANDBOOK FOR STABILIZATION/SOLIDIFICATION OF HAZARDOUS WASTE	06/01/86	- CULLINANE JR, M J, ET AL /U S COE/WES - FOURCOOD, J M /ORD/HWERL	Final	125	1		EPA/540/2-86-001
2309	19	HANDBOOK REMEDIAL ACTION AT WASTE DISPOSAL SITES (REVISED)	10/01/85	- ORD/HWERL - OSWER/OERR	Final	560	1		EPA/625/6-85/006
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2311	20	MOBILE TREATMENT TECHNOLOGIES FOR SUPERFUND WASTES	09/01/86	- CAMP, DRESSER, AND MCKEE INC - CALER, L D /HRSD	Final	130	1		EPA/540/2-86-003F
2312	21	PRACTICAL GUIDE-TRIAL BURNS FOR HAZARDOUS WASTE INCINERATORS	04/01/86	- GORMAN, P, ET AL /MIDWEST RESEARCH INSTITUTE - OBERACKER, D A /HWERL	Final	63	2		EPA/600/2-86/050
2313	21	PRACTICAL GUIDE-TRIAL BURNS FOR HAZARDOUS WASTE INCINERATORS, PROJECT SUMMARY	07/01/86	- GORMAN, P, ET AL /MIDWEST RESEARCH INSTITUTE - OBERACKER, D A /HWERL	Final	2	1		EPA/600/S2-86/050

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2315	21	REVIEW OF IN-PLACE TREATMENT TECHNIQUES FOR CONTAMINATED SURFACE SOILS-VOL 2: BACKGROUND INFORMATION FOR IN-SITU TREATMENT	11/01/84	- SIMS, R C, ET AL /R S ASSOCIATES - BARKLEY, N./HERL	Final	350	1		EPA-540/2-84-003b
2316	21	REVIEW OF IN-PLACE TREATMENT TECHNIQUES FOR CONTAMINATED SURFACE SOILS-VOL 1 TECHNICAL EVALUATION	09/19/84	- OSWER/OERR - ORD/HERL	Final	165	1		EPA/540/2-84-003a
2317	22	SLURRY WRENCH CONSTRUCTION FOR POLLUTION MIGRATION CONTROL	02/01/84	- USAE - ORD/HERL	Final	220	1		EPA/540/2-84-001
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2319	22	TECHNOLOGY SCREENING GUIDE FOR TREATMENT OF CERCLA SOILS AND SLUDGES	09/01/88	- OSWER/OERR	Final	130	1		EPA 540/2-88/004
2320	22	TREATMENT TECHNOLOGY BRIEFS ALTERNATIVES TO HAZARDOUS WASTE LANDFILLS	07/01/86	- HERL	Final	35	2		EPA/600/8-86/017
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2400	23	CRITERIA FOR IDENTIFYING AREAS OF VULNERABLE HYDROGEOLOGY UNDER RCRA STATUTORY INTERPRETIVE GUIDANCE	07/01/86	- OSWER/OGW	Final	950	2		OSWER #9472.00 2A
2401	24	FINAL RCRA COMPREHENSIVE GROUND-WATER MONITORING EVALUATION (CME) GUIDANCE DOCUMENT	12/19/86	- LUCERO, C A /OSWER	Final	55	2	1) RELATIONSHIP OF TECHNICAL INADEQUACIES TO GROUND-WATER PERFORMANCE STANDARDS	OSWER #9950.2
2402	24	GROUND-WATER MONITORING AT CLEAN-CLOSING SURFACE IMPOUNDMENT AND WASTE PILE UNITS	03/31/88	- PORTER, J W /OSWER	Final	3	2		OSWER #9476.00 14
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2404	24	GUIDELINES FOR GROUND-WATER CLASSIFICATION UNDER THE EPA GROUND-WATER PROTECTION STRATEGY	12/01/86	- OFFICE OF GROUND-WATER PROTECTION	Draft	600	2		
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2407	25	RCRA GROUND-WATER MONITORING TECHNICAL ENFORCEMENT GUIDANCE DOCUMENT(TEGD)	09/01/86	· EPA	Final	270	2		OSWER #9950 1
2408	25	RCRA GROUND-WATER MONITORING TECHNICAL ENFORCEMENT GUIDANCE DOCUMENT, TEGD: EXECUTIVE SUMMARY	07/01/87	· LUCERO, C A /OMPE	Final	8	1		OSWER #9950 1-a
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3002	25	CERCLA COMPLIANCE WITH OTHER LAWS MANUAL	08/08/88	· OSWER	Draft	245	2		OSWER #9234 1-01
3003	25	EPA'S IMPLEMENTATION OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986	05/21/87	· THOMAS, L M /EPA	Final	4	2		
3004	25	GUIDANCE MANUAL ON THE RCRA REGULATION OF RECYCLED HAZARDOUS WASTES	03/01/86	· INDUSTRIAL ECONOMICS, INC · OSW	Final	350	2		OSWER #9441 00 2
3005	25	INTERIM RCRA/CERCLA GUIDANCE ON NON-CONTIGUOUS SITES AND ON-SITE MANAGEMENT OF WASTE AND TREATMENT RESIDUE	03/27/86	· PORTER, J W /OSWER	Final	8	2	1) COMBINING HAZARDOUS WASTE SITES FOR REM ACTION	OSWER #9347 0-1
2400	23	CRITERIA FOR IDENTIFYING AREAS OF VULNERABLE HYDROGEOLOGY UNDER RCRA STATUTORY INTERPRETIVE GUIDANCE [Secondary Reference]	07/01/86	· OSWER/OSW	Final	950	2		OSWER #9472 00 2A
2401	24	FINAL RCRA COMPREHENSIVE GROUND-WATER MONITORING EVALUATION (CME) GUIDANCE DOCUMENT [Secondary Reference]	12/19/86	· LUCERO, C A /OMPE	Final	55	2	1) RELATIONSHIP OF TECHNICAL INADEQUACIES TO GROUND-WATER PERFORMANCE STANDARDS	OSWER #9950 2
2405	24	OPERATION AND MAINTENANCE INSPECTION GUIDE (RCRA GROUND-WATER MONITORING SYSTEMS) [Secondary Reference]	03/30/88	· OSWER/OMPE/RCRA ENFORCEMENT DIVISION	Final	50	2	1) TRANSMITTAL MEMO RE SAME SUBJECT	OSWER #9950 3
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9001	32	RCRA/CERCLA DECISIONS MADE ON REMEDY SELECTION (Secondary Reference)	06/24/85	· KILPATRICK, M /COMPLIANCE BRANCH, OWR	Final	3	2		
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4001	26	GUIDANCE DOCUMENT FOR PROVIDING ALTERNATE WATER SUPPLIES	02/01/88	· OERR	Final	64	2		OSWER #9355.3-03
4002	26	INTERIM FINAL GUIDANCE ON REMOVAL ACTION LEVELS AT CONTAMINATED DRINKING WATER SITES	10/06/87	· OSWER/OERR	Final	9	2		OSWER #9360.1-01
4003	26	QUALITY CRITERIA FOR WATER 1986	05/01/87	· OFFICE OF WATER REGULATIONS AND STANDARDS	Final	335	2		EPA/440/5-86-001
2301	16	CARBON ADSORPTION ISOTHERMS FOR TOXIC ORGANICS (Secondary Reference)	04/01/80	· DOBBS, R A /WERL · COHEN, J M /WERL	Final	321	2		EPA/600/8-80-023
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5001	27	CHEMICAL, PHYSICAL & BIOLOGICAL PROPERTIES OF COMPOUNDS PRESENT AT HAZARDOUS WASTE SITES	09/27/85	· CLEMENT ASSOCIATES, INC	Final	330	2		OSWER #9850.3
5002	27	FINAL GUIDANCE FOR THE COORDINATION OF ATSDR HEALTH ASSESSMENT ACTIVITIES WITH THE SUPERFUND REMEDIAL PROCESS	05/14/87	· PORTER, J W /OSWER/OERR · ATSDR	Final	22	2	1) SAME TITLE, DATED 4/22/87	OSWER #9285.4-02
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5006	27	GUIDELINES FOR MUTAGENICITY RISK ASSESSMENT (FEDERAL REGISTER, SEPTEMBER, 24, p 34006)	09/24/86	- EPA	Final	8	2		
5007	27	GUIDELINES FOR THE HEALTH RISK ASSESSMENT OF CHEMICAL MIXTURES (FEDERAL REGISTER, SEPTEMBER 24, 1986, p. 34014)	09/24/86	- EPA	Final	13	2		
5008	28+	HEALTH EFFECTS ASSESSMENT DOCUMENTS (58 CHEMICAL PROFILES) VOL 28: ACETONE, ARSENIC, ASBESTOS, BARIUM, BENZO(A)PYRENE, CADMIUM, CARBON TETRACHLORIDE, CHLOROBENZENE, CHLORDANE, CHLOROFORM, COAL TARS, COPPER, CRESOLS, CYANIDE, DDT, 1,1-DICHLOROETHANE, 1,2-DICHLOROETHANE, VOL 29: 1,1-DICHLOROETHYLENE, 1,2-DICHLOROETHYLENE, CIS-1,2-DICHLOROETHYLENE, ETHYLBENZENE, GLYCOL ETHERS, HEXACHLOROBENZENE, HEXACHLOROBUTADIENE, HEXACHLOROCYCLOPENTADIENE, HEXAVALENT CHROMIUM, IRON (AND COMPOUNDS), LEAD, LINDANE, MANGANESE (AND COMPOUNDS), MERCURY, METHYL ETHYL KETONE, METHYLENE CHLORIDE, NAPHTHALENE, NICKEL, PENTACHLOROPHENOL, PHENOL, PHENANTHRENE, VOL 30: POLYCHLORINATED BIPHENYLS (PCBS), POLYCYCLIC AROMATIC HYDROCARBONS (PAHS), PYRENE, SELENIUM (AND COMPOUNDS), SODIUM CYANIDE, SULFURIC ACID, 2,3,7,8-TETRACHLORODIBENZO-p-DIOXIN, 1,1,2,2-TETRACHLOROETHANE, TETRACHLOROETHYLENE, TOLUENE, 1,1,2-TRICHLOROETHANE, 1,1,1-TRICHLOROETHANE, TRICHLOROETHYLENE, 2,4,5-TRICHLOROPHENOL, 2,4,6-TRICHLOROPHENOL, TRIVALENT CHROMIUM, VINYL CHLORIDE, XYLENE, ZINC (AND COMPOUNDS)	09/01/84	- ORD/OHEA/ECAO - OSWER/OERR	Final	1750	2		EPA/540/1-86/001-058
5009	31	INTEGRATED RISK INFORMATION SYSTEM (IRIS) [A COMPUTER-BASED HEALTH RISK INFORMATION SYSTEM AVAILABLE THROUGH E-MAIL--PROCEDURE ON ACCESS IS INCLUDED]	-	- OHEA	Final	-	2		

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COMPENDIUM OF CERCLA RESPONSE SELECTION GUIDANCE DOCUMENTS

DOC NO	VOL	TITLE	DATE	AUTHORS	STATUS	PAGES	TIER	ATTACHMENTS	OSWER/EPA NUMBER
5010	31	INTERIM POLICY FOR ASSESSING RISKS OF "DICKING" OTHER THAN 2,3,7,8-TCDD	01/07/87	- THOMAS, L M /EPA	Final	50	2	1) INTERIM PROCEDURES FOR ESTIMATING RISKS ASSOCIATED WITH EXPOSURES TO MIXTURES. 10/86	
5011	31	PUBLIC HEALTH RISK EVALUATION DATABASE (PHRED) (USER'S MANUAL AND TWO DISKETTES CONTAINING THE DBASE III PLUS SYSTEM ARE INCLUDED)	09/16/88	- OSWER/TOXICS INTEGRATION BRANCH	Final	-	2		
5012	31	ROLE OF ACUTE TOXICITY BIOASSAYS IN THE REMEDIAL ACTION PROCESS AT HAZARDOUS WASTE SITES	08/01/87	- ARNEY, L A , ET AL /PACIFIC NORTHWEST LABORATORY - MILLER, W.E./CORVALLIS ENVIRONMENTAL RESEARCH LAB	Final	106	2		EPA/600/8-87/044
5013	31	SUPERFUND EXPOSURE ASSESSMENT MANUAL	04/01/88	- OSWER	Final	160	1		OSWER #9285.5-1
5014	31	SUPERFUND PUBLIC HEALTH EVALUATION MANUAL	10/01/86	- OSWER - OSWER	Final	500	1		OSWER #9285.4-1
5015	31	TOXICOLOGY HANDBOOK	08/01/85	- LIFE SYSTEMS, INC - TYBURSKI, T E /ICF	Draft	126	2		OSWER #9850.2
8000	32	ENHANCEMENT ASSESSMENT GUIDANCE (Secondary Reference)	11/22/85	- PORTER, J W /OSWER	Final	11	2		OSWER #9850.0.1
**		Cost Analysis							
6000	32	REMEDIAL ACTION COSTING PROCEDURES MANUAL	10/01/87	- JRB ASSOCIATES/O'BRIEN HILL - OHD/MERL - OSWER/OSWER	Final	56	1		
6001	32	REMOVAL COST MANAGEMENT MANUAL	04/01/88	- OSWER/OSWER	Final	170	1		OSWER #9360.0-02A
1003	1	ENVIRONMENTAL REVIEW REQUIREMENTS FOR REMOVAL ACTIONS (Secondary Reference)	04/13/87	- OSWER/OERR	Final	6	2		OSWER #9318.0-05
**		Community Relations							
7000	32	COMMUNITY RELATIONS IN SUPERFUND A HANDBOOK (INTERIM VERSION)	06/01/88	- OSWER	Final	188	2	1) CHAPTER 6 OF THE COMMUNITY HANDBOOK 11/01/88	OSWER #9230.0-03B

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COMPENDIUM OF OSWOLA RESPONSE SELECTION GUIDANCE DOCUMENTS

Doc NO	vol	Title	Date	Authors	Status	Pages	Tier	Attachments	OSWER/EPA Number
**		Enforcement							
8000	32	ENDANGERMENT ASSESSMENT GUIDANCE	11/22/85	- PORTER, J W /OSWER	Final	11	2		OSWER #9850 0-1
8001	32	INTERIM GUIDANCE ON POTENTIALLY RESPONSIBLE PARTY PARTICIPATION IN REMEDIAL INVESTIGATIONS AND FEASIBILITY STUDIES	05/16/88	- PORTER, J W /OSWER	Final	37	2		OSWER #9835 1a
**		Selection of Remedy/Decision Documents							
9000	32	INTERIM GUIDANCE ON SUPERFUND SELECTION OF REMEDY	12/24/86	- PORTER, J.W. /OSWER	Final	10	2		OSWER #9355 0 19
9001	32	RURA/OSWOLA DECISIONS MADE ON REMEDY SELECTION	06/24/85	- KILPATRICK, M /COMPLIANCE BRANCH, OWR	Final	3	2		

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U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR
NEASE CHEMICAL COMPANY SITE
SALEM, COLUMBIANA COUNTY, OHIO

UPDATE #1
AUGUST 17, 1998

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	04/05/91	Ruetgers-Nease Corporation	U.S. EPA	*Remedial Investigation Report: Volume 2 of 4 (Appendix A)* for the Nease Chemical Site	209
2	04/05/91	Ruetgers-Nease Corporation	U.S. EPA	*Remedial Investigation Report: Volume 3 of 4 (Appendices B-J)* for the Nease Chemical Site	600
3	04/05/91	Ruetgers-Nease Corporation	U.S. EPA	*Remedial Investigation Report: Volume 4 of 4 [1 of 2] (Appendix K: Laboratory Analytical Results)* for the Nease Chemical Site	743
4	04/05/91	Ruetgers-Nease Corporation	U.S. EPA	*Remedial Investigation Report: Volume 4 of 4 [2 of 2] (Appendix K: Laboratory Analytical Results)* for the Nease Chemical Site (Revision 1: July 6, 1993)	567
5	01/31/96	Ruetgers-Nease Corporation	U.S. EPA/ Ohio EPA	*Final Remedial Investigation Report: Volume 1 of 4* (Text, Tables, and Figures) for the Nease Chemical Site	499
6	01/31/96	Ruetgers-Nease Corporation	U.S. EPA/ Ohio EPA	*Final Remedial Investigation Report: Volume 1A of 4 (Plates)* for the Nease Chemical Site (Plates #1-16 May be Viewed at U.S. EPA Region 5)	4
7	02/00/96	U.S. EPA		*Revised Community Involvement Plan* for the Nease Chemical Site	38

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR
NEASE CHEMICAL SITE
SALEM, OHIO

UPDATE #2
SEPTEMBER 23, 2005

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	03/28/90	Blumberg, A., U.S. EPA & S. MacMillan, Ohio EPA	Foard, S., Ruetgers-Nease Chemical Company & W. Kennedy, Deckert, Price & Rhoads	Letter re: U.S. EPA/ Ohio EPA Approval of the Method Validation Study for the Nease Chemical Site	
2	04/00/90	U.S. EPA	Public	Fact Sheet: "Environmental Investigation to Begin" at the Nease Chemical Site	
3	04/05/91	Ruetgers-Nease Chemical Company, Inc.	U.S. EPA/ Ohio EPA	Appendices B-J of the RI Report for the Nease Chemical Site (Volume 3 of 4)	
4	04/05/91	Ruetgers-Nease Chemical Company, Inc.	U.S. EPA/ Ohio EPA	Appendix K of RI Report (Laboratory Analytical Results) for the Nease Chemical Site (Volume 4 of 4)	
5	07/00/92	U.S. EPA	Public	Fact Sheet: "Nease Chemical Superfund Site Update"	
6	11/00/92	U.S. EPA	Public	Fact Sheet: "Mirex"	
7	07/06/93	Ruetgers-Nease Chemical Company, Inc.	U.S. EPA/ Ohio EPA	Endangerment Assessment Report for the Nease Chemical Company Site (Appendix A to RI Report, Volume 2 of 4) [Revision 1 to April 5, 1991 Original Submittal)	
8	07/06/93	Ruetgers-Nease Chemical Company, Inc.	U.S. EPA/ Ohio EPA	Appendix K of RI Report (Laboratory Analytical Results) for the Nease Chemical Site (Volume 4) [Volume 2 of 2 - Revision 1]	

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
9	01/00/94	U.S. EPA	Public	Fact Sheet: "Nease Chemical Superfund Site Update"	
10	01/00/94	U.S. EPA	Public	Fact Sheet: Correction to the "Nease Chemical Superfund Site Update"	
11	08/18/94	Golder Associates Inc.	Ruetgers-Nease Corporation	Additional Remedial Investigation for the Middle Fork of Little Beaver Creek at the Nease Chemical Site (Volume 1 of 2: Text, Tables and Figures)	
12	08/18/94	Golder Associates Inc.	Ruetgers-Nease Corporation	Additional Remedial Investigation for the Middle Fork of Little Beaver Creek at the Nease Chemical Site (Volume 2 of 2: Appendix A)	
13	10/06/94	Golder Associates Inc.	Ruetgers-Nease Corporation	Supplemental Well Closure Plan for Production Wells P1, P2 and P3 at the Nease Chemical Site (Revision 1)	
14	11/00/94	Ruetgers-Nease Corporation	U.S. EPA/ Ohio EPA	Insert Package for Volumes 1A, 3 and 4 of the Remedial Investigation Report for the Nease Chemical Site	
15	02/16/95	Golder Associates Inc.	U.S. EPA/ Ohio EPA	Removal Action Work Plan Addendum for the Nease Chemical Site (Appendix C to Section 1, Volume 1 of the May 1994 Work Plan)	
16	09/00/95	U.S. EPA	Public	Fact Sheet: "On-Site Treatment Underway" Modifications Complete at the Nease Chemical Superfund Site	
17	03/00/96	U.S. EPA	Public	Fact Sheet: "Site Update" Progress To Date; Plans for 1996/1997 for the Nease Chemical Superfund Site	

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
18	05/00/96	Ruetgers-Nease Corporation	U.S. EPA/ Ohio EPA	Remedial Investigation Report Volume 5 (Appendix N: Middle Fork of Little Beaver Creek - Binder 1 of 3)	
19	05/00/96	Ruetgers-Nease Corporation	U.S. EPA/ Ohio EPA	Remedial Investigation Report Volume 5 (Appendix N: Middle Fork of Little Beaver Creek - Binder 2 of 3)	
20	05/00/96	Ruetgers-Nease Corporation	U.S. EPA/ Ohio EPA	Remedial Investigation Report Volume 5 (Appendix N: Middle Fork of Little Beaver Creek - Binder 3 of 3)	
21	11/00/96	U.S. EPA	Public	Fact Sheet: "Community Update" for the Nease Chemical Superfund Site	
22	12/00/06	Ohio Department of Health	File	Final Report: An Assessment of Exposure to Mirex from the Ruetgers-Nease Superfund Site	
23	02/06/97	Ohio Department of Health	File	Public Health Assessment Report for the Nease Chemical Site	
24	08/04/98	Golder Associates Inc.	Rutgers Organics Corporation	Eastern Plume/DNAPL Investigation Report for the Nease Chemical Site	
25	03/31/00	Golder Associates Inc.	Rutgers Organics Corporation	Impact Assessment Report for the Middle Fork of Little Beaver Creek in Mahoning and Columbiana Counties, OH	
26	10/31/03	White, R. & P. Finn, Golder Associates	O'Grady, J., U.S. EPA	Letter: Operable Unit 2 Feasibility Study for the Nease Chemical Site	
27	04/00/04	ENVIRON International Corporation	Rutgers Organics Corporation	Endangerment Assessment Report for the Nease Chemical Site	
28	08/30/04	Logan, M., U.S. EPA & J. Trocchio Ohio EPA	Domalski, R., Rutgers Organics Corporation	U.S. EPA/Ohio EPA Review and Approval of the Endangerment Assessment for the Nease Chemical Site	

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
29	12/00/04	U.S. EPA	Public	Fact Sheet: "Health Risks Studied; Cleanup Plan is Next Step" for the Nease Chemical Site	
30	04/21/05	Logan, M., U.S. EPA & S. Abraham, Ohio EPA	Domalski, R., Rutgers Organics Corporation	Letter re: U.S. EPA/ Ohio EPA Approval of the Revised Feasibility Study for Operable Unit 2 of the Nease Chemical Site	
31	05/11/05	Golder Associates Inc.	Rutgers Organics Corporation	Feasibility Study for Operable Unit 2 at the Nease Chemical Company Site	
32	05/28/05	Morning Journal (Lisbon, OH)	Public	Public Notice re: Announcement of June 22, 2005 U.S. EPA Public Meeting and Acceptance of Public Comments on the Feasibilty Study and Proposed Plan for the Nease Chemical Site	
33	06/00/05	U.S. EPA	Public	Fact Sheet: "Cutting-Edge Techniques Proposed for Nease Cleanup"	
34	06/22/05	Corsillo & Grandillo Court Reporters	U.S. EPA	Transcript of the June 22, 2005 Proposed Plan Public Meeting for the Nease Chemical Site	
35	06/30/05	Finn, P., Golder Associates	Logan, M., U.S. EPA	Letter re: Rutgers Organics Comments on the Proposed Cleanup Plan for the Nease Chemical Site	

United States v. Rutgers Organics Corporation (N.D. Ohio)

Consent Decree
Appendix B

Operable Unit 3 Record of Decision

Nease Chemical Site
Operable Unit Three

Columbiana and Mahoning Counties, Ohio

Record of Decision

United States
Environmental Protection Agency

Region 5

September 2008

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Unless otherwise noted, Tables and Figures are found following the Decision Summary.

APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

AOC	administrative order on consent
ARAR	applicable or relevant and appropriate requirement
ATSDR	Agency for Toxic Substances and Disease Registry
BAF	bioaccumulation factor
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
COPC	chemical of potential concern
CSF	cancer slope factor
CSM	conceptual site model
DNAPL	dense non-aqueous phase liquid
EA	Endangerment Assessment
EPA	Environmental Protection Agency
FDA	Food and Drug Administration
FS	feasibility study
HQ	hazard quotient
LOAEL	lowest observed adverse effect level
MFLBC	Middle Fork of Little Beaver Creek
mg/kg	milligrams per kilogram
MNR	monitored natural recovery
NCP	National Contingency Plan
NOAEL	no observed adverse effect level
NZVI	nanoscale zero-valent iron
ODA	Ohio Department of Agriculture
ODH	Ohio Department of Health
ODNR	Ohio Department of Natural Resources
OU	operable unit
PDI	pre-design investigation
RAO	remedial action objective
RfD	reference dose
RI	remedial investigation
RM	river mile
RME	reasonable maximum exposure
ROC	Rutgers Organics Corporation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SWAC	surface weighted average concentration
TBC	to be considered
ug/kg	microgram per kilgram
U.S. EPA	United States Environmental Protection Agency
VOC	volatile organic compound

Record of Decision - Nease Chemical Site, Operable Unit Three

Columbiana and Mahoning Counties, Ohio

This Record of Decision (ROD) documents the remedy selected for Operable Unit 3 (OU 3) at the Nease Chemical Site in Columbiana and Mahoning Counties, Ohio. The ROD is organized in two sections: Part I contains the *Declaration* for the ROD and Part II contains the *Decision Summary*. The *Responsiveness Summary* is included as Appendix A.

PART I: DECLARATION

This section summarizes the information presented in the ROD and includes the authorizing signature of the United States Environmental Protection Agency (U.S. EPA) Region 5 Superfund Division Director.

Site Name and Location

The Nease Chemical Superfund Site (CERCLIS # OHD980610018) is located in Columbiana and Mahoning Counties, Ohio. The Nease facility, a former chemical manufacturing plant, is located about 2 ½ miles northwest of the town of Salem, in Columbiana County. The Site consists of three operable units (OUs). OU 1 comprises non-time critical removal actions that were constructed in the mid-1990s. The removal actions included installation and maintenance of surface water and sediment control structures and construction and operation of two shallow groundwater collection systems. OU 2 addresses facility soils, source areas, and groundwater contamination on the Site. A ROD for OU 2 was signed in September 2005, and the remedial design for the selected remedy is underway. Because contaminated media in OU 2 were the source of contamination to OU 3, investigation and selection of the OU 2 remedy preceded this decision. OU 3, the subject of this ROD, addresses contaminated sediment in Feeder Creek, a small creek that drains the former plant, and contaminated sediment and floodplain soil in and along the Middle Fork of Little Beaver Creek (MFLBC), which receives flow from the former chemical manufacturing facility. The MFLBC extends into Mahoning County.

Statement of Basis and Purpose

This decision document presents the selected remedy for OU 3 of the Nease Chemical Site. The remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Contingency Plan (NCP). Information used to select the remedy is contained in the Administrative Record file for the Site. The Administrative Record file is available for review at the U.S. EPA Region 5 Records Center, 77 West Jackson Boulevard, Chicago, Illinois, and at the Salem Public Library, 821 E. State St., Salem, Ohio. Information about the Site can also be found at the Lepper Library in Lisbon, Ohio and at Ohio EPA's office in Twinsburg, Ohio.

Assessment of the Site

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

Description of Selected Remedy

The Nease Chemical Site is being addressed as three OUs under the framework set forth in CERCLA. The selected remedy specified in this ROD will serve as the final remedial action plan for OU 3, and will also serve as, in combination with the remedy specified in the OU 2 ROD, the final remedy for the entire Site. The selected remedy specifies response actions that will address chemically-contaminated floodplain soils and sediments at the Site. U.S. EPA believes the response actions outlined in this ROD, if properly implemented, will protect human health and the environment.

The NCP establishes the expectation that U.S. EPA will use treatment to address the principal threats posed by a Site whenever practicable. No principal threat wastes were identified for OU 3 media. Therefore this ROD cannot formulate treatment alternatives to address principal threats. Additionally, there is no practicable treatment component associated with the floodplain soil and sediment because there are no feasible, cost-effective, in-situ or ex-situ treatment technologies for mirex, the primary risk-driving contaminant in OU 3 media. However, the selected OU 2 remedy addresses the principal threat wastes for OU 2 media through the use of treatment technologies. Thus, the statutory preference for remedies that employ treatment as a principal element is satisfied for the Nease Chemical Site as a whole.

The major components of the selected remedy include:

- MFLBC Sediment – MFLBC sediment will be removed by dredging or dry excavation. Targeted sediment removal will be conducted in more highly contaminated areas to achieve the remediation goal while minimizing short-term impacts to aquatic and riparian habitats. The estimated sediment volume to be removed is approximately 4,300 cubic yards from a 6 ½ mile stretch downstream of the Nease facility. The selected remedy also includes the option of using post-removal backfilling in some areas to achieve the sediment remediation goal, if residual mirex levels are too high and additional removal is not practicable. Dredged sediment will be transported to the former Nease facility for consolidation with OU 2 contaminated soils within the Nease facility, and capped and covered as called for in the OU 2 ROD.

- MFLBC Floodplain Soil – Contaminated soil will be excavated with conventional equipment and excavated floodplain areas will be backfilled and graded. Targeted removal of floodplain soils will occur to meet the remediation goal while minimizing short-term impacts to riparian habitats. Based on current information, floodplain soils in three general locations downstream of the Nease facility exceed the remediation goal. These areas comprise about 6.5 acres, with an estimated in-place volume of 5,300 cubic yards of contaminated soil.

Excavated soil will be transported to the former Nease facility for consolidation with OU 2 contaminated soils within the Nease facility, and capped and covered as called for in the OU 2 ROD.

- Feeder Creek Sediment – Contaminated sediments in Feeder Creek will be removed and residuals (if any) covered to mitigate potential future releases of mirex into the MFLBC. Excavated sediments will be consolidated with OU 2 contaminated soils within the Nease facility, and capped and covered as called for in the OU 2 ROD. It is anticipated that sediment will be removed to a 2-foot depth along the entire creek, unless coarse material or bedrock is encountered first. The volume of contaminated sediment is estimated to be 2,600 cubic yards.

- The remediation goals for MFLBC sediment and floodplain soil, and the complete removal of contaminated sediment from Feeder Creek will allow for unrestricted use and unlimited access for those media once the goals are met. Therefore, no institutional controls or long-term operation and maintenance will be required for Feeder Creek, or MFLBC sediments or floodplain soils. However, soils and sediments will be consolidated with contaminated soils from OU 2 and contained on-Site. Institutional controls and long-term operation and maintenance of the consolidated materials will be as required for soils in the OU 2 ROD.

- A pre-design investigation (PDI) will be necessary before the remedial design can be finalized. The PDI will include further delineation of the distribution of mirex in sediments and floodplain soil, as well as establish pre-construction baseline conditions. Construction and performance monitoring are required for demonstrating compliance of the remedy with the remedial goals. Construction monitoring will be used to assess acute risks to the community, ecology, and workers that may occur as a result of implementing the remedy. Performance monitoring will be used post-remediation to assess whether short- and long-term risk reduction goals will be met by the implemented remedy.

Statutory Determinations

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to this remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment technologies (or resource recovery) to the maximum extent practicable. The remedy in this OU does not satisfy the statutory preference for treatment as a principal element of the remedy because no principal threat wastes were identified for OU 3 media and there are no feasible, cost-effective, treatment technologies for mirex, the primary risk-driving contaminant in OU 3 media. This remedy will not result in hazardous substances, pollutants, or contaminants remaining in OU 3 soils and sediments above levels that allow for unlimited use and unrestricted exposure. However, the OU 3 soils and sediments that will be consolidated on-site are anticipated to contain mirex at levels that do not allow for unlimited use and unrestricted exposure at the completion of the remedial action, and the selected remedy for OU 2 will result in hazardous substances, pollutants, or contaminants remaining on some portions of OU 2 above levels that allow for unlimited use and

unrestricted exposure at the completion of the remedial action. Because the remedies at the Nease Site will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of the first remedial action to ensure that the remedies are, or will be, protective of human health and the environment.

Data Certification Checklist

The following information is included in the Decision Summary section (Part II) of this ROD. Additional information can be found in the Administrative Record file for this Site.

- Contaminants of concern and their respective concentrations (Section 5);
- Baseline risk represented by the contaminants of concern (Section 7);
- Cleanup levels established for contaminants of concern and the basis for these levels (Section 8);
- How source materials constituting principal threats are addressed (Section 11);
- Current and reasonably anticipated future land use assumptions used in the baseline risk assessment and ROD (Sections 6 and 7);
- Potential land use that will be available at OU 3 of the Site as a result of the selected remedy (Section 12);
- Estimated total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected (Sections 9 and 12); and
- Key factors that led to selecting the remedy (Sections 10 and 12).

Support Agency Acceptance

The Nease Site Remedial Investigation and Feasibility Study investigations were conducted under a tri-party order with Ohio EPA, U.S. EPA, and Rutgers Organics Corporation, the responsible party. Ohio EPA has worked cooperatively with U.S. EPA in the RI/FS process, and state concurrence with the ROD is anticipated. Any correspondence from the State regarding concurrence with the selected remedies will be added to the Administrative Record.

Authorizing Signature

Richard C Karl

Richard C. Karl, Director
Superfund Division
United States Environmental Protection Agency, Region 5

9-24-08
Date

PART II: DECISION SUMMARY

1.0 Site Name, Location and Brief Description

The Nease Chemical Superfund Site (CERCLIS # OHD980610018) is located in Columbiana and Mahoning Counties, Ohio. The former Nease Chemical plant is located about 2 ½ miles northwest of Salem, Columbiana County, Ohio and approximately one-quarter mile northwest of the intersection of State Route 14 and Allen Road. The facility is located in a rural area. It is bounded by small light-industrial operations and residences along Allen Road to the east and northeast, residential homes along State Route 14, and wooded areas and pasture lands to the north. Conrail railroad tracks traverse the facility.

Figure 1 shows the location and some of the important features of the Nease Chemical facility. The former chemical plant covers about 44 acres. Chemical manufacturing occurred west of the railroad tracks, while wastewater disposal occurred on both sides of the tracks. Five former wastewater treatment ponds (Ponds 1, 2, 3, 4, and 7) and drum disposal areas (Exclusion Areas A and B), as well as contaminated soil throughout the plant area acted as sources of contamination to groundwater, surface water, and creek sediment.

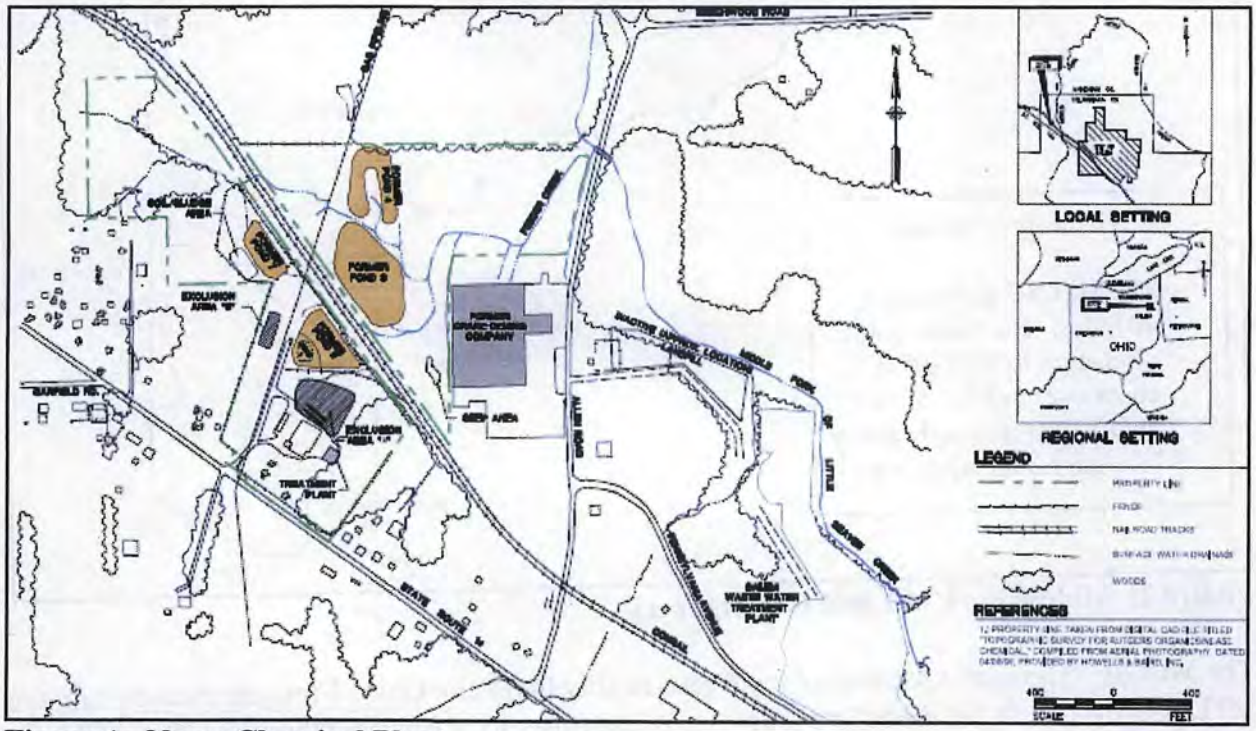

Figure 1: Nease Chemical Plant

Feeder Creek is a very small creek that originates from the contaminated former manufacturing area close to the railroad tracks. The Nease facility is on a topographic high. Surface water drainage from the plant flows via Feeder Creek to the main surface water body in the area, the Middle Fork of Little Beaver Creek (MFLBC), located about 1,800 feet east of the facility. Feeder Creek joins the MFLBC at approximately river mile (RM) 37.6, and was the primary transport route for Site-related contaminants into the MFLBC system. Figure 2 shows the MFLBC and the location of the Nease facility relative to the creek.

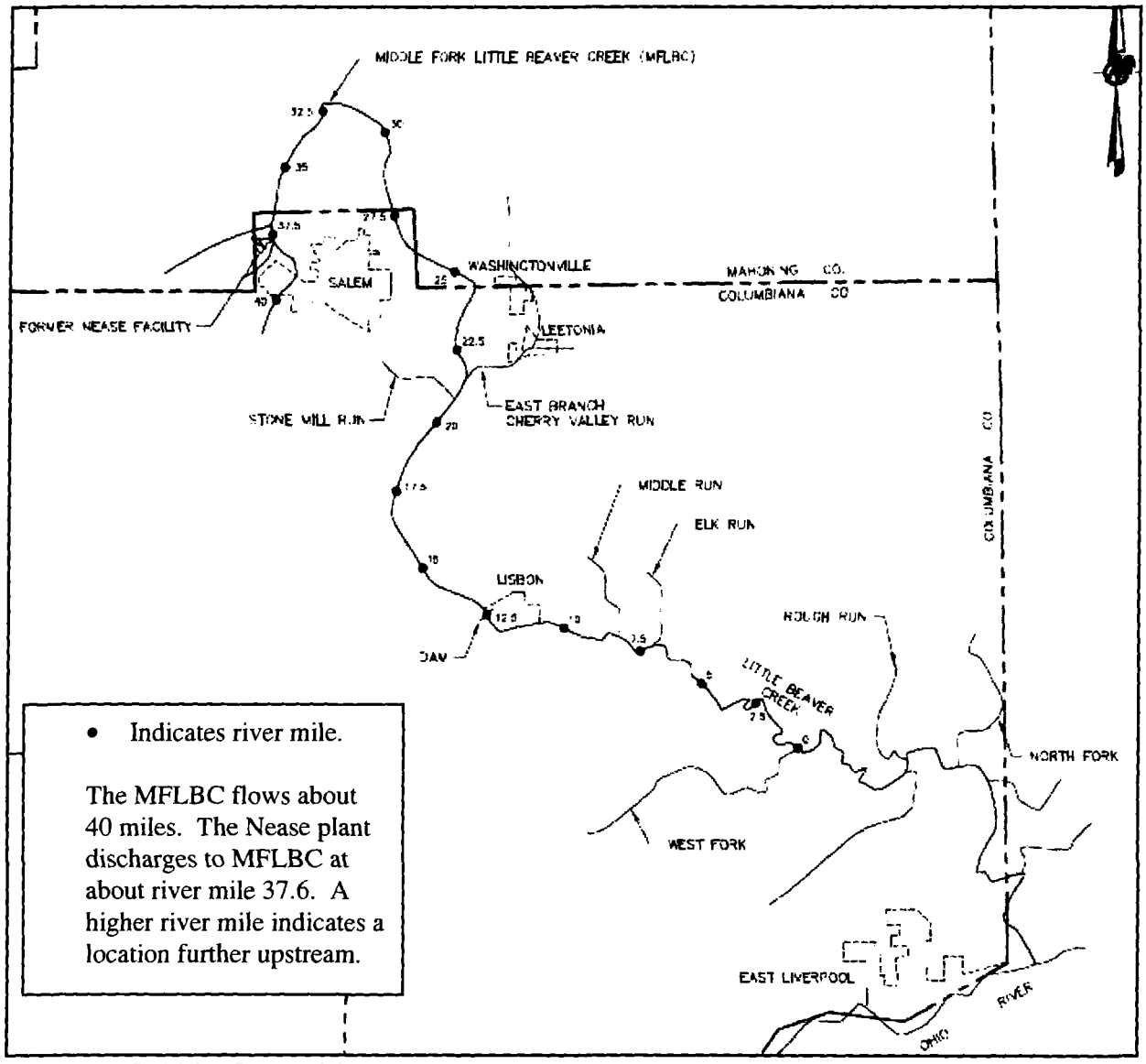

Figure 2: Middle Fork of Little Beaver Creek

The MFLBC originates upstream of the Nease facility in Salem, Ohio. From the Nease plant, the MFLBC flows north for about five miles, turns and flows southeastward through Lisbon, Ohio, and eventually joins other tributaries to form Little Beaver Creek. Little Beaver Creek flows into the Ohio River near East Liverpool, Ohio. The most northerly portion of the MFLBC is located

in Mahoning County, while the Nease plant and much of MFLBC is located in Columbiana County. The MFLBC extends approximately 40.6 river miles. Its waters are designated for agricultural, industrial, and direct contact uses, but not for drinking.

This Record of Decision (ROD) addresses contaminated sediments in Feeder Creek and contaminated sediments and floodplain soils in and along portions of the MFLBC, comprising Operable Unit 3 (OU 3) of the Nease Site.

Rutgers Organics Corporation (ROC) currently owns the former Nease property. The Nease Site[1] was added to the National Priorities List on September 30, 1983. ROC began a remedial investigation and feasibility study (RI/FS) at the Site in 1988. Both U.S. EPA and Ohio EPA have provided oversight of ROC's work under a 1988 Administrative Order on Consent (AOC). ROC completed the *Remedial Investigation Report, Nease Site, Salem, Ohio* (RI) for the Site in January 1996 and the *Feasibility Study for Operable Unit 3, Nease Chemical Company, Salem, Ohio* (FS) in June 2008. In addition, in 2004, ROC completed the *Endangerment Assessment for the Nease Chemical Company Salem, Ohio Site* (EA), which includes the human health and ecological risk assessments. U.S. EPA anticipates that the pre-design investigation (PDI), design of the remedy, and implementation of the remedy selected in this ROD will be carried out by ROC under a federal consent decree.

2.0 Site History and Enforcement Activities

2.1 Source of Contamination

From 1961 until 1973, a portion of the Site was owned and operated by the Nease Chemical Company as a chemical manufacturing plant producing specialty chemicals such as pesticides, fire retardants, household cleaning compounds and chemical intermediates used in agricultural, pharmaceutical and other chemical products. Products and chemical intermediates were manufactured in batch processes, and raw materials and finished products were stored in warehouses, bulk storage, and tanks. Some wastes from the plant processes were put into 55-gallon drums, which were buried on-site. Five unlined ponds (designated Ponds 1, 2, 3, 4 and 7) were used for the treatment and storage of acidic plant wastes or lime slurries from the neutralization of acidic wastes.

After settling in the ponds, neutralized liquids were discharged to the Salem Wastewater Treatment Plant from the late 1960s to 1973. Following notification by Ohio EPA of wastewater violations, the Nease Chemical Company agreed in a Consent Judgment in 1973 to discontinue

1 The NCP defines a Site as "the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for implementation of the response action." For the purposes of this Record of Decision, the Site includes: the former Nease facility, portions of the former Crane-Deming facility, and the underlying areas where groundwater is contaminated (comprising OU 2); Feeder Creek and portions of MFLBC (comprising OU 3); and nearby areas necessary for the implementation of the response actions.

manufacturing operations at the facility until such time as it obtained a new wastewater permit from Ohio EPA. Instead, Nease decided to close the facility. Nease neutralized and removed water in the various ponds to the Salem Wastewater Treatment Plant and filled/graded the ponds by December 31, 1975. Only Pond 1 retains any standing water. In addition, Nease removed the majority of buildings and manufacturing equipment during decommissioning activities. Only one building, which currently houses the groundwater treatment system, remains at the former manufacturing facility.

During and after operation of the chemical plant, the waste ponds and contaminated soil were a source of contamination to the groundwater and the creeks. Surface runoff from the facility carried contaminants into Feeder Creek and then on to the MFLBC. Groundwater flows generally west to east across the site in both the unconsolidated deposits and bedrock. Figure 3 shows the contaminated bedrock groundwater at the Site. Monitoring of surface water in the MFLBC and adjacent groundwater indicates that groundwater discharge is not a significant source of contaminants into the creek. Although drums, some contaminated soil, and liquids in the ponds have been removed, chemical contamination remains in the surface soil and in the soil/fill within the ponds. These remaining chemicals continue to act as a source of groundwater contamination and a potential contaminant source to sediment and floodplain soil. Soil, sources areas (such as the old ponds), and groundwater will be addressed by the remedy previously selected for OU 2, thus removing these potential sources of creek contamination.

2.2 Previous Investigations

2.2.1 Field Investigations

ROC began environmental investigations at the facility and surrounding areas in 1982 at the request of Ohio EPA. This investigation included soil borings at the chemical facility, shallow and deep groundwater monitoring wells in the overburden and bedrock, magnetic surveys to identify possible buried drums, and collection of samples of surface water, soil and sediment to characterize conditions on and adjacent to the facility. Additional monitoring wells were installed by ROC between 1983 and 1986. Several rounds of groundwater samples have been collected between 1982 and 2007. Soil samples were collected during remediation activities in 1983 in Exclusion Areas A and B, and the ponds. Additional soil borings were drilled in 1985 and 1986 east of the facility.

Sediment, fish, and surface water samples were collected from the MFLBC at various times between 1983 and 1987 by ROC, U.S. EPA, and Ohio EPA. Between 1982 and 1991, Ohio EPA periodically sampled residential water supply wells in the vicinity of the facility and in the floodplain of the MFLBC. The RI sampling program for the MFLBC was conducted by ROC between 1987 and 1995, and included analysis of samples collected from surface water, stream sediment, floodplain soil, and fish (both whole body and fillet) at locations along the MFLBC from upstream of the facility to near East Liverpool, Ohio. The RI sampling covered approximately 40 river miles, with the majority of samples located closer to the plant. Samples were analyzed for a wide array of compounds, including volatile organic compounds (VOCs), semi-volatile organic compounds, metals, and pesticides. During the RI, detailed sediment body

mapping was conducted from upstream of the Nease plant to RM 21.5, about 16 miles downstream of the confluence of Feeder Creek and MFLBC at RM 37.6. The RI also included sediment and surface water sampling in Feeder Creek.

Considerable post-RI sampling has occurred, focusing on the pesticide mirex (for further discussion of mirex, see Sections 5.5 and 7.1.3 below). Additional fish, sediment, floodplain soil and/or surface water samples were taken by ROC and/or Ohio EPA in the MFLBC in 1997, 1999 to 2001, and 2005 to 2006, with small sampling events in 2003 and 2004. In 1999, Ohio EPA and ROC jointly conducted a comprehensive biocriteria assessment of the MFLBC involving fish community, benthic macroinvertebrate community, and habitat surveys. An additional detailed sediment body mapping was conducted in 2005, confirming the historic results and extending the study down to RM 12.5. The post-RI results are found in the Middle Fork of Little Beaver Creek Mahoning and Columbiana Counties, Ohio Impact Assessment Report (March 2000) and the MFLBC Database, included in the Administrative Record, and are summarized in the FS. The post-RI sampling confirmed the findings in the RI Report regarding the nature and extent of mirex contamination in OU 3.

2.2.2 Mirex in Biota and Consumption Advisories

In July 1987, Ohio EPA shared preliminary results of its data from fish in the MFLBC, which reported mirex detected in fish specimens for a distance of at least 12 miles downstream from the facility. In October 1987, the Ohio Department of Health (ODH) issued a fish consumption advisory for the MFLBC between Allen Road in Salem and the bridge at State Route 11 near Elkton, Ohio, covering about 27 river miles downstream of the Nease plant. The advisory was due to mirex and recommended that no fish of any species be eaten from this stretch of MFLBC. In March 1988, ODH expanded the advisory to include warnings against wading and swimming. ODH began posting signs along the MFLBC during the summer of 1988. After finalization of the EA, U.S. EPA and Ohio EPA requested ODH to review the contact advisory, in light of the EA findings. Based on the most recent fish sampling, Ohio EPA has modified the fish consumption advisory. Due to mirex, the current advisory recommends consuming no more than one meal per month of carp between Allen Road and State Route 14 in Millville, a distance of about 12 river miles.[2] More information on Ohio's fish consumption advisory for the MFLBC can be found at www.epa.state.oh.us/dsw/fishadvisory/waters/Middle.html.

During the period when the fish consumption and contact advisories were first issued in 1987, the Ohio Department of Agriculture (ODA) raised the possibility that Grade A dairy herds that watered in the MFLBC might be ingesting mirex. In August 1987, ODH tested milk supplies from three farms and detected mirex in several samples at levels below the Food and Drug Administration (FDA) action level that was in place at that time. In 1988 and 1989, ODA also tested meat from two herds that had access to the MFLBC. Mirex was detected above the FDA

2 There are other fish consumption advisories on the MFLBC for carp and other fish due to contaminants unrelated to the Nease Site (PCBs and mercury). Additionally, there is a state-wide advisory to eat no more than one meal of fish per week from any source.

action level in place at that time in seven out of eighteen samples. In 1987 through 1989, ROC worked with the farmers to provide alternate water sources and restrict access of livestock to the creek and potentially contaminated floodplain soil by fencing. ODA sampling has not detected mirex in milk or beef since 1990, after access of livestock to the creek was restricted.

In 1989, ODH and the Ohio Department of Natural Resources (ODNR) took samples of blood and fat from raccoons and opossums at nine sites along the MFLBC. The samples contained low levels of mirex. These data were used to support assessment of potential risks from game consumption in the EA.

2.2.3 ODH Health Assesments

In 1990 and 1996, ODH conducted public health assessments trying to target people around the Nease Site that were most likely to have been exposed to site-related contaminants, specifically mirex. Individuals most likely to have been exposed to mirex were surveyed and a subset of respondents was sampled for blood levels of mirex. Mirex was detected in the blood of 14 of 42 area residents sampled in 1990 (levels ranging from 0.25 to 2.2 ppb), and in 8 of 177 area residents sampled in the 1996 study (levels ranging from 0.29 to 2.69 ppb).

1990 ODH Study: On October 4, 1990, ODH issued a report of a study that included resident blood sampling results and an analysis of potential exposure pathways to mirex associated with the MFLBC. The study included some former Nease employees. ODH concluded:

> "We found strong evidence that some people living near the Nease Superfund site and MFLBC have acquired body burdens of mirex released from the site or acquired while working there. However, most people who reported activities that could have resulted in uptake of mirex did not have detectable amounts of mirex in their serum.
>
> Having mirex in the blood was associated with two activities: 1) consuming animal products from animals probably contaminated with mirex and 2) work at the Nease chemical plant.
>
> In the group participating in this study, fishing, contact with contaminated stream sediment and soil, and eating gardens (sic) products grown in possibly contaminated soil were not associated with the presence of mirex in serum. Only two of the fourteen people with mirex in their serum did not report exposure to either contaminated food products or occupational exposure, but did report a variety of other activities which may have lead to their uptake of mirex.
>
> This study does not provide any evidence of widespread human uptake of mirex in people living in the vicinity of the site or MFLBC. The total number of samples was not large and the selection of people was biased toward participation by people who we thought would be most likely to have taken up mirex.
>
> The mirex levels in this study population were slightly lower or much lower than in all groups reported in published account (sic) to have any amount of mirex in their serum. Most reported exposures were in people who were probably exposed to mirex applied widely in large amounts to kill fire ants in the southern United States or who ate mirex contaminated fish from Lake Ontario ..."

1996 ODH Study: In December 1996, ODH in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR) issued the results of a larger study. While the study did not include children under seven years of age, the study looked at a much larger group than the 1990 study. ODH concluded:

> "At this time ODH will not recommend further health study of the general population in the vicinity of MFLBC. This decision is based on the fact that a large portion of the study participants reported no potential exposure pathways. Among those who did report potential exposure pathways, very few had detectable levels of mirex in the blood. For these reasons, we do not believe there has been widespread exposure to mirex in this community... Results indicate the general population living near the Middlefork of Little Beaver Creek does not show evidence of widespread exposure to Mirex. However, the pilot study did show an association of mirex detection and employment at Nease... ODH should continue to post advisories and make the community aware of the advisories... Most participants responding to the questionnaires indicated that they knew of the advisories and had curtailed activities advised against. One of the reasons for the low detection of mirex in the general population may be prudent risk management on the part of the community members as a result of these advisories."

2.2.4 ATSDR Public Health Assessment

In February 1997, ATSDR issued a public health assessment based on sampling data for the MFLBC, including 1991 sediment data, 1987-91 floodplain soil data, 1991 fish samples, 1990 raccoon and opossum blood and fat samples, and 1987-91 milk data. Based on its review, ATSDR concluded the "contamination of MFLBC (associated with the Nease Chemical site) represents a public health hazard, because of past exposure and the possibility of future exposures."

2.3 Previous Response Actions

In 1983, ROC voluntarily implemented various steps including the removal of drums and associated affected soils. A total of 115 drums were removed from Exclusion Area A. Additionally, more than 9,500 cubic yards of contaminated soil were removed from Exclusion Areas A and B, Pond 1, and a nearby ditch. The soil and drums were disposed at an off-site hazardous waste landfill. At the same time efforts were made to prevent contaminated sediment from leaving the Site. The efforts included seeding Pond 2, and installing of fabric barriers across drainage swales and ditches, rock dams, and hay-bale barriers.

In late 1991, ROC instituted further stabilization measures to reduce potential off-site transport of contaminants. Additional surface water diversion measures, berms and sediment control structures were constructed. These measures successfully reduced migration of contaminants into the MFLBC.

Under an AOC with U.S. EPA, starting in 1993 ROC took measures to control leachate releases and seeps. To reduce potential discharge of shallow groundwater to the ground surface, ROC constructed a collection trench and aggregate drain downgradient from Exclusion Area A and Ponds 1 and 2 and a collection drain and recovery well immediately downgradient of Pond 2. Shallow groundwater from these systems is presently pumped to the on-site treatment plant or transported off-site for treatment and disposal. Since the start of operations, over 23 million gallons of highly contaminated shallow groundwater have been captured and treated. In addition, water in Pond 1 is periodically pumped out and treated to prevent runoff. See Section 4.1 below for more information concerning the interim remedial measures taken under this agreement.

During the PDI for OU 2, ROC discovered unanticipated conditions at the Site which ROC took immediate actions to address. In 2007, ROC voluntarily provided vapor mitigation systems to two homes near the Site (located south of the facility along State Route 14) to prevent intrusion of contaminated vapors from the groundwater plume. Additionally, ROC removed several gallons of dense non-aqueous phase liquids (DNAPL) [3] from the Site.

2.4 Enforcement Activities

On December 30, 1977, the assets of Nease Chemical Company (including the non-operational Salem facility) were acquired and the company merged with Ruetgers Chemicals, Inc. to form Ruetgers-Nease Chemical Company, Inc. (now known as Rutgers Organics Corporation or "ROC"). ROC has never operated at the Site. Since 1982, ROC has cooperated with Ohio EPA and U.S. EPA to address the Site.

In January 1988, an AOC was signed by ROC, Ohio EPA and U.S. EPA, which required ROC to conduct a RI/FS. The RI/FS work described in this ROD was conducted by ROC under the terms of the 1988 AOC, with oversight by U.S. EPA and Ohio EPA. In November of 1993, ROC and U.S. EPA entered into an AOC calling for specific removal activities to address all leachate releases and seeps (See Sections 2.3 and 4.1 for more information on the removal activities). In May of 2006, ROC and U.S. EPA entered into an AOC which requires ROC to conduct the PDI and remedial design of the remedy for OU 2 (See Section 4.2 for more information on OU 2).

3.0 Community Participation

U.S. EPA made the Proposed Plan for OU 3 of the Nease Site available to the public for comment on July 9, 2008. Copies of the Proposed Plan and the final RI, FS, and EA reports (as well as other supporting documents) were placed in the local Information Repositories located at the Salem Public Library and the Lepper Library in Lisbon, Ohio. Documents are also available at Ohio EPA's office in Twinsburg, Ohio. U.S. EPA mailed copies of the Proposed Plan to more than 4,000 interested persons on U.S. EPA's community involvement mailing list for the Site. Copies of all documents supporting the remedy outlined in the Proposed Plan are located in the

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[3] A dense non-aqueous phase liquid (DNAPL) is a liquid that is denser than water and does not dissolve or mix easily in water (it is immiscible). In the presence of water it forms a separate phase from the water and can be a long-term source of groundwater contamination. Many chlorinated solvents are DNAPLs.

Administrative Record file for the Site, located at the U.S. EPA Records Center, 77 West Jackson Boulevard, Chicago, Illinois and the Salem Public Library, 821 E. State St., Salem, Ohio.

The public comment period ran for thirty days, from July 14 through August 13, 2008. U.S. EPA held a public meeting at the Salem Public Library on July 31, 2008, to present the Proposed Plan and approximately 35 people attended. The notice announcing the public meeting and the availability of the Proposed Plan was published in the *Salem News* and in the *Lisbon Morning Journal* on July 2, 2008. A press release was issued on July 11, 2008, to alert media in Salem, Lisbon, and Youngstown about issuance of the Proposed Plan and the start of the public comment period. Representatives of U.S. EPA and Ohio EPA were present at the public meeting, as were representatives of ROC, to answer questions regarding the proposed remedy. Responses to comments received during the public comment period (including comments received at the public meeting) are included in the Responsiveness Summary which is Appendix A of this ROD. These comments were considered prior to selection of the final remedy for OU 3 at the Nease Chemical Site.

In addition to the public involvement activities noted above, U.S. EPA mailed out fact sheets in April 1990, July 1992, November 1992, January 1994, September 1995, March 1996, November 1996, December 2004, and June 2005. Additional public meetings were held on February 3, 1988, July 14, 1992, February 10, 1994 and June 22, 2005. These fact sheets and meetings were used to inform the public about Site progress, discuss concerns about mirex toxicity and health effects, and discuss the interim and OU 2 cleanup actions. U.S. EPA developed a Community Involvement Plan when RI/FS activities began at the Site in 1988, and the plan was updated in 1996. The mailing list was revised in 2004 to add additional community members and to ensure that it was up to date. U.S. EPA also developed a website dedicated to the Nease Site. More recent factsheets, technical documents, and other information have been placed on the website, and are available at http://www.epa.gov/region5/sites/nease/index.htm.

4.0 Scope and Role of Response Action and Operable Units

Like many Superfund sites, the problems at the Nease Chemical Site are complex. As a result, U.S. EPA has organized the work into three OUs:

- OU 1: Long-term Removal Actions;
- OU 2: Soils, Source Areas, and Groundwater; and
- OU 3: Feeder Creek and MFLBC.

Because the Nease Chemical Site is being addressed as multiple OUs under the framework set forth in CERCLA, there are multiple RODs for the Site. This ROD is the second of two RODs for the Nease Chemical Site, and is intended to be the only ROD for OU 3. The ROD for OU 2 was signed in September 2005. The selected remedy specified in this ROD, in combination with the remedy selected in the OU 2 ROD, will serve as the final action for the entire Site.

4.1 Operable Unit 1

Long-term Removal Action: As discussed in Section 2.3 of this ROD, there were interim response actions conducted by ROC under a 1993 AOC with U.S. EPA. The removal actions that were conducted under that AOC have been called "OU 1." These actions included measures to control leachate releases and seeps. Two shallow groundwater collection systems were constructed downgradient of Ponds 1 and 2 and Exclusion Area A. These systems are presently in operation and contaminated groundwater is either pumped to the on-site treatment system or transported off-site for treatment and disposal. Since the start of operations, over 23 million gallons of highly contaminated shallow groundwater have been captured and treated. In addition, surface water and sediment control measures were constructed, including berms, sediment outlet control structures, fabric barriers in Feeder Creek, and runoff diversions.

Because the response actions in OU 1 were taken using removal authorities, U.S. EPA has issued no ROD for OU 1, and no ROD is planned. The ROD for OU 2 largely incorporated the elements of OU 1 that address groundwater, or have superseded them. The actions selected in the OU 2 ROD for shallow groundwater address the functions of the existing shallow groundwater collection systems implemented in the response actions for OU 1. The final design for the shallow groundwater system under the OU 2 remedy will require replacement of the existing collection trenches. Response actions selected in the ROD for OU 2 to address source areas and soils will mitigate the need for runoff control currently provided by OU 1 measures, and the final design will provide for management of surface water flow.

The OU 1 measures that relate to sediments in Feeder Creek, preventing migration of additional contaminants to the MFLBC (berms, sediment control structures, and fabric barriers), are superseded by this OU 3 ROD. Remediation of sediments in Feeder Creek, as selected in this ROD, will eliminate the need for sediment control. Those OU 1 measures will continue until they are removed during the construction of the OU 3 remedy.

4.2 Operable Unit 2

Soils, Source Areas, and Groundwater: OU 2, the subject of a ROD signed in September 2005, addresses the contaminated soils, actual or potential source areas, and groundwater. The contaminants at OU 2 of the Nease Site originated from production processes at the Nease Chemical Company from 1961 to 1973. Products and waste materials were stored and/or disposed on the facility. Upon closure of the plant, contaminants remained in unlined ponds that had been filled in, buried in drums, and in soil that had become contaminated. The chemicals in the unlined ponds, drums, and contaminated soil leached to the overburden (shallow) and bedrock (deep) groundwater. The primary contaminants of concern are VOCs in groundwater (largely chlorinated ethenes and ethanes) and mirex in soil. VOCs are found in groundwater and within the wastes of Ponds 1 and 2 as DNAPL, as well as in the dissolved state.

The major components of the selected remedy include:

- Ponds 1 and 2 will be treated by in-situ air stripping, followed by stabilization and solidification.

- Soil exceeding the remediation goal of 1 mg/kg of mirex in surface soil and the other former ponds will be capped using either an impermeable geosynthetic membrane covered with clean soil, or only clean soil. The Site will be configured to manage surface water flow and prevent erosion.

- Shallow groundwater will be captured in a new collection trench, pumped above ground and treated ex-situ in a new or modified treatment plant.

- Deep groundwater will be treated by injection of nanoscale zero-valent iron (NZVI) into the most contaminated part of the plume. NZVI treatment may be followed by accelerated biological treatment if monitoring during the first few rounds of NZVI injections indicates the design performance standards might not be met by NZVI alone. Monitoring of natural attenuation will occur to ensure remediation of the far downgradient portion of the plume.

- Institutional controls and long-term operation, monitoring and maintenance will be required for OU 2.

U.S. EPA signed the OU 2 ROD on September 29, 2005. Ohio EPA concurred on the selected remedy. U.S. EPA initiated negotiations with ROC that resulted in an AOC effective May 10, 2006, that requires ROC to conduct the remedial design of OU 2. A major component of the remedial design is a PDI. ROC conducted the PDI work in 2006 to 2007, including major treatability studies for the stabilization/solidification and the NZVI treatment of groundwater. The treatability studies were generally successful. The PDI results are currently under review by the Agencies, and will be the basis for the OU 2 design.

During the PDI for OU 2, unanticipated conditions were discovered. Based on groundwater monitoring during the PDI, sub-slab vapor monitoring was conducted at two residential properties near the Site along State Route 14. No indoor air samples were taken, however in 2007, ROC voluntarily provided vapor mitigation systems to the two homes to prevent potential intrusion of contaminated vapors from the groundwater plume. Additionally, ROC removed several gallons of DNAPL from the Site. U.S. EPA anticipates that implementation of the OU 2 remedy will be carried out by ROC under a federal consent decree.

4.3 Operable Unit 3

Feeder Creek and MFLBC: The third OU, subject of this ROD, addresses contaminated sediments in Feeder Creek and contaminated sediments and floodplain soils in and along portions of the MFLBC. The selected remedy specified in this ROD will serve as the final action for the entire Site.

The source of the contamination is discussed more fully in Sections 2.1 and 5.4 of this ROD.

Runoff carried contaminants from the plant facility into Feeder Creek and on into MFLBC. The old Nease facility is hilly and drainage flowed through ditches and intermittent streams into Feeder Creek in the northeast portion of the facility. From there, water and sediment migrate to MFLBC. The MFLBC originates upstream of the facility in Salem, Ohio, and flows north for about five miles, turns and flows eastward and then southeastward and eventually joins other tributaries to form Little Beaver Creek, which discharges to the Ohio River.

Section 2.3 of this ROD discusses some interim actions that have been taken to mitigate contaminant migration into Feeder Creek and the MFLBC. Section 2.2 discusses fish consumption and contact advisories that were put in place as a result of ODH's public health assessments, as well as measures taken to restrict access of livestock to contaminants in the creek. U.S. EPA and Ohio EPA have sent the findings of the human health risk assessment in the EA and other new information to ODH, requesting ODH to review the existing direct contact and recreational use restriction advisories. The degree and extent of contamination in OU 3 is discussed in Section 5.6 of this ROD.

The actions to remediate OU 2 will constitute source control actions for OU 3.

5.0 Operable Unit Characteristics

5.1 Conceptual Site Model for OU 3

The conceptual site model (CSM) provides an understanding of the Site based on the sources of the contaminants of concern, potential transport pathways and environmental receptors. Figure 4 depicts a highly simplified CSM for OU 3 of the Nease Site. Based on the nature and extent of the contamination and the fate and transport mechanisms described in the RI, FS, and EA Reports, the CSM includes the following components:

- Chemical contaminants from operations in the 1960s and early 1970s at the Nease Chemical plant were released to the environment. Wastewater was stored in five unlined ponds. Drums were disposed on-site. It is likely that spills occurred.

- Over time, leaking drums, runoff, and/or spills spread contamination to the facility soils. Some interim cleanup actions were conducted to remove buried drums and the most highly contaminated soil. However, surface soil over portions of the old Nease facility remains contaminated. These soils will be addressed under the selected OU 2 remedy.

- The primary contaminant of concern (COC) in OU 3 is mirex.

- Feeder Creek is the main route of surface water drainage from the former plant. Runoff carried contaminants from surface soil into Feeder Creek and on into the MFLBC. It is likely that mirex contamination remained bound to soil particles suspended in surface water.

- Mirex contaminated soil particles settled as sediment into areas of the MFLBC that were conducive to sediment deposition. Over time, relatively low amounts of mirex-contaminated sediment were transported further downstream.

- During flooding events, some of the contaminated sediment washed up and deposited in floodplain soil. There is little evidence of significant erosion of contaminated floodplains back into the MFLBC, although this could occur in certain areas.

- Biota in the MFLBC (e.g., fish) and along the contaminated floodplains (e.g., grazing cattle) bioaccumulate mirex.

- Consumers of contaminated biota would be exposed to mirex. Also, small mammals living in the contaminated floodplains would be exposed to mirex through the food chain and via direct contact.

Figure 5 depicts the CSM for the human health risk assessment used to illustrate contaminant distribution, release mechanisms, potential exposure pathways and migration routes, and potentially-exposed populations. Because the EA was completed before the Site was separated into operable units, this CSM is far more complex and includes many sources, media, and pathways associated with OU 2.

5.2 Operable Unit Overview

OU 3 of the Nease Chemical Site is located in both Mahoning and Columbiana Counties, Ohio. Figure 2 shows the old Nease plant, the MFLBC, and the county boundaries. The old plant has the approximate geographic coordinates 40° 54.9'N and 80° 53.5'W.

As discussed above, Feeder Creek is a small creek that provides the main surface water drainage of the former plant site to the MFLBC. Figure 6 shows the main stem of Feeder Creek and four "branches" that drain the former facility. Feeder Creek is only a few feet deep and wide. Feeder Creek joins the MFLBC at approximately RM 37.6. The Nease facility is on a topographic high that slopes to the northeast towards the MFLBC. The elevation at the former facility ranges from approximately 1,160 to 1,200 feet above mean sea level.

The MFLBC flows north from the City of Salem into Mahoning County, turns to the east, then flows southeast through Columbiana County until it joins other tributaries to form Little Beaver Creek. Little Beaver Creek flows into the Ohio River near East Liverpool, Ohio. The MFLBC extends approximately 40.6 river miles with an average gradient of 11.8 feet per mile. Gradients vary, as shown on Figure 7, with steeper gradients generally corresponding to higher velocity stream flow and generally less accumulated sediment. The MFLBC drains a total area of approximately 496 square miles. Creek widths vary from 10 to 120 feet (see Figure 8) and creek depths are relatively shallow (less than a foot in certain areas of concern).

The MFLBC consists of a series of riffles and pools. Sediment deposition is a complex process. Soft sediment does not cover the entire bottom of the MFLBC and is influenced by stream morphology and hydrology. In the 6 ½ miles downstream of the Nease facility, fine-grained sediment bodies only cover about 14% of the total creek bed surface. The creek substrate includes bedrock outcrops, rubble-gravel-boulders, sand, silt, and clay at various locations. From RM 38.3, upstream of the plant, to RM 29, where the creek enters an area known as Egypt Swamp, sediment accretion rates are generally constant, with a steadily increasing cumulative sediment volume (see Figure 9). Total sediment volumes increase sharply within Egypt Swamp (RM 29 to RM 24), likely due to decreased stream gradients and increased stream bed and floodplain widths. There is a spillway at RM 12.5 called "Lisbon Dam" and sediment has accumulated behind this structure.

Surface water flow was measured during the RI. The average MFLBC velocity was less than 0.5 meters per second, with a discharge of 5 to 40 cubic feet per second above the Lisbon Dam at RM 12.5 and 100 to 300 cubic feet per second below. The closest United States Geological Survey (USGS) stream gage is located in Little Beaver Creek near its confluence with the Ohio River. Data from the Little Beaver Creek gage can be extrapolated to estimate MFLBC conditions. Data from the USGS gage shows that there are three years, 1964, 1990, and 2004, with exceptionally high peak discharge rates. These three high flow, high energy events are associated with significant storm events (such as hurricanes). Comparing data from before and after high energy storm events provides information on sediment scouring, significant downstream transport, or modified deposition of sediments that could result in the redistribution of contaminants. No significant changes in stream morphology or distribution of fine grained sediments were observed as a result of the most recent high energy storm events.

Along the banks of the MFLBC the topography varies greatly, from very flat areas with wide floodplains to steep slopes with narrow floodplains. Within 6 ½ miles downstream of the Nease facility, floodplain widths range from about 60 feet to about 1,000 feet, with an average width of about 375 feet and a total area in this reach of approximately 300 acres.

5.3 Sampling Strategy

Prior to the start of RI work, sediment, fish, and surface water samples were collected from the MFLBC at various times between 1983 and 1987 by ROC, U.S. EPA, and Ohio EPA. Additionally, Ohio EPA periodically sampled residential water supply wells in the floodplain of the MFLBC to evaluate any impacts from the creek on adjacent groundwater. The strategy behind these sample events was generally to respond to Agency and/or public concerns at a time of high public interest.

A work plan that presented the scope of work for the RI was approved by the agencies on March 28, 1990, and ROC initiated work on April 16, 1990. The RI work was conducted before the Site was separated into operable units, and included an extensive sampling strategy to define the nature and extent of contamination in all media. All RI investigation activities were conducted by ROC under the supervision of U.S. EPA and Ohio EPA. The RI was conducted in phases. Site-wide field investigation activities conducted as part of the RI included:

- Air monitoring;
- Geophysical investigations;
- Monitoring well drilling and installation;
- Soil borings and samples;
- Test pit soil sampling;
- Pond borings;
- Groundwater sampling;
- DNAPL investigation;
- Aquifer testing;
- Soil hydraulic conductivity testing;
- Residential well survey;
- Topographic mapping and surveying;
- Surface water sampling;
- Sediment sampling;
- Floodplain soil sampling; and
- Fish sampling (whole body and fillet).

The RI sampling covered approximately 40 river miles in MFLBC, with the majority of samples located closer to the plant. Samples were analyzed for a wide array of compounds, including VOCs, semi-volatile organic compounds, metals, and pesticides. During the RI detailed sediment body mapping was conducted over about 16 river miles adjacent to and downstream of the plant. Physical characteristics such as depth, width, and flow were measured. The RI also included sediment and surface water sampling in Feeder Creek. In October 1993, an ecological habitat inventory and stream survey was conducted along the MFLBC riparian corridor. The results of these RI activities are described in the 1996 RI Report.

The MFLBC has variable stream flow and flooding. Several high flow events have occurred during the investigation work at the Site. Because of potentially changeable conditions, and to observe trends over time, ROC and/or Ohio EPA conducted considerable post-RI sampling, focusing on the pesticide mirex. Section 2.2.1 discusses the additional fish, sediment, floodplain soil, and surface water investigations conducted by ROC and/or Ohio EPA in the MFLBC since the RI. Data is summarized in the FS and other documents in the Administrative Record.

5.4 Source of Contamination

As discussed in Section 2.1 of this ROD, the contaminants at OU 3 of the Nease Site originated from production processes at the former Nease Chemical Company. During the operation period of the Nease Chemical plant (1961 to 1973), environmental waste regulations were very different from today's laws, and spills, leaks, and disposal of waste contaminated the Site. Upon closure of manufacturing operations, widespread contamination remained on the plant site. Runoff from the facility carried contaminants (primarily mirex) into drainage ditches, Feeder Creek and then on to the MFLBC, including areas of sediments and floodplains. Once mirex entered the MFLBC system, it bioaccumulated in fish and other biota.

Soil data was collected from test pits and soil borings during the RI. A summary of key findings includes:

- The highest contaminant concentrations in soils were found in the drum disposal areas (Exclusion Areas A and B), and the former production area (especially northwest of Ponds 1 and 2). VOCs in these areas appear to increase with depth. The primary VOCs detected were perchloroethene, 1,1,2,2-trichloroethane, trichloroethene, and benzene. Total VOC ranges by depth are:
    - 0 to 0.5 feet - non-detect to 1.4 mg/kg
    - 0.5 to 3.5 feet - non-detect to 6.5 mg/kg
    - 3.5 to 6.5 feet - non-detect to 18.7 mg/kg

- Mirex was detected primarily in shallow soil. Mirex detected below 0.5 feet is generally limited to Exclusion Areas A and B, and the former production area (especially northwest of Ponds 1 and 2). Where it is found at depth, mirex levels in soil generally decrease with depth. Mirex ranges by depth are:
    - 0 to 0.5 feet - non-detect to 2,080 mg/kg
    - 0.5 to 3.5 feet - non-detect to 126 mg/kg
    - 3.5 to 6.5 feet - non-detect to 32.8 mg/kg

It is likely that most runoff of contaminants that migrated to the MFLBC occurred from plant site soil nearest the surface (0 to 0.5 feet). While the RI data indicate that VOCs were detected in surface soil, the primary COC for OU 3 is mirex (discussed in more detail in Section 5.5 below). It is likely that if any VOCs were carried into the MFLBC, they would volatilize and/or degrade. The contaminated soil at the plant site will be addressed by the remedy selected for OU 2, and will no longer be a potential source of contamination to OU 3.

5.5 Types of Contaminants and Affected Media

Since the Nease Site housed an old chemical manufacturing facility that operated in an era before there was much regulation or sound environmental management of waste, it is not surprising that there is a large array of chemical contaminants found in several media. At the Site, air, soil, groundwater, surface water, sediment, and biota were analyzed for a variety of contaminants. The investigations found 155 chemicals detected at least once in the sampled media.[4] The EA carefully evaluated which of these chemicals and affected media were most important in driving potential risk at the Site. These findings are summarized in Section 7 of this ROD, but extensive evaluation is found in the EA. This ROD focuses on the contaminant and affected media that are most important in OU 3.

Mirex, a chlorinated hydrocarbon manufactured at the Nease Site, is the primary site-related

4 The RI and EA were substantially complete before the Site was separated into Operable Units. This ROD attempts to focus on OU 3, but at times it was difficult to separate the OU 3 assessment from the broader site-wide work. Additional detailed information is found in the Administrative Record.

COC found in OU 3. Mirex is an odorless, white, crystalline solid. It was used in pesticide formulations, and was especially common in the southern United States, where it was frequently applied to control fire ants. It was also used as a flame retardant in products such as plastics, rubber, paint, paper and electrical goods. Mirex is a very uncommon COC at Superfund sites, and has been identified at only a few other sites.

Mirex was banned in the United States in 1978. Like other chlorinated pesticides, it breaks down very slowly in the environment and can persist for years. Its breakdown product, photomirex[5], is also toxic and persistent. See Section 7.1.3 below for more discussion concerning the toxicity of mirex and photomirex. Mirex is highly sorptive and has a very low solubility (approximately 1 ug/L). These physical properties mean that mirex is likely to bind to particulate matter (especially fines and organic material) and is unlikely to travel in a dissolved state in water. Mirex can bioaccumulate in biota in the food chain, and is typically associated with lipid.

Mirex has been found in several media at the Nease Site. Within OU 3, mirex has been found in Feeder Creek sediments, Feeder Creek surface water (the results may be associated with suspended particulate matter), MFLBC sediments, and MFLBC floodplain soil. Additionally, mirex has been found in MFLBC fish, beef and milk of cattle exposed to the creek and floodplain, and other biota (raccoons and opossums) living near the MFLBC.

5.6 Extent of Contamination

This section presents a summary of the results associated with the RI and subsequent investigations conducted at the Site. A full description of the RI activities and sampling results prior to 1996 is contained in the RI Report. Additional descriptions of the extent of contamination at the Site are found in the EA, FS, and other documents regarding post-RI activities and sampling which are included in the Administrative Record for the Site. This summary discussion will focus on mirex, the primary site-related COC that is most important in creating potential risk in OU 3.

5.6.1 Feeder Creek

Feeder Creek sediment samples were collected during the RI and in a subsequent study in 1996. During the RI sediment samples were collected from seven locations. Mirex concentrations ranged from 0.38 to 129 mg/kg. During the 1996 sampling, sediment was analyzed for depth-discreet samples (0-3, 3-6, 6-10, and 10-14 inches below the surface) at six locations. Mirex was highest in the top six inches, with a maximum detection of 0.845 mg/kg.

Four samples of surface water were collected from Feeder Creek during the RI. Mirex was detected in three samples at concentrations ranging from 0.0304 to 0.362 ug/L. Detections of mirex in surface water in Feeder Creek are likely due to the presence of suspended solids since mirex adheres to fine-grained sediments and organic matter and does not dissolve easily in water.

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5 Photomirex is considered to have toxicological effects similar to mirex, so where applicable, photomirex concentrations and mirex concentrations have been summed.

5.6.2 MFLBC Sediment

The first major sediment sampling effort on the MFLBC was conducted in 1990 as part of the RI work and included 42 sediment samples. The highest mirex concentrations were detected between river miles 31.4 and 35 with a maximum concentration of 1.68 mg/kg. Mirex was detected in sediments as far downstream as RM 1.9, but at much lower concentrations. As part of the RI, in 1993-1995 19 additional sediment samples were taken from the MFLBC in conjunction with soil samples collected from adjacent floodplains. Mirex concentrations in 1993-1995 were consistent with those found in 1990, with the highest concentrations between RM 32 and RM 35.5 and a maximum detection of 1.19 mg/kg. Additional sampling occurred in 1999 and the results show a trend similar to the previous sampling, i.e. the highest concentrations were detected in the upstream portion of the stream near the former Nease facility and lower concentrations were measured downstream. In 2005, mirex was detected in 18 of 19 surface sediment samples. The highest detections were between RM 37 and RM 33.3 with a maximum concentration of 2.03 mg/kg at RM 35.4.

Figure 10 shows the results of all sediment mirex sampling events together. Over multiple sampling events spanning 15 years, results and trends of mirex in MFLBC sediment have been relatively consistent. The main area of contaminated sediment is the approximately 6.6-mile creek stretch from RM 31 to RM 37.6. Mirex binds preferentially to organic carbon and this may reduce its bioavailability. Figure 11 shows all sediment mirex results normalized according to the total organic carbon content in the sample. This supports that the area of most concern for mirex bioavailablity is from RM 31 to RM 37.6. Due to concerns for potential downstream transport of contaminated sediment over time, depositional areas such as Egypt Swamp (RM 29 through RM 24) and upstream of the Lisbon Dam were extensively investigated. Although these areas showed substantial sediment volume, they showed relatively low levels of mirex contamination. These results suggest that there has not been a large-scale movement of mirex mass downstream (although low levels of mirex have moved as far downstream as RM 1.9), even during several high-energy storm events that occurred since the original release.

5.6.3 MFLBC Floodplain Soils

During the RI, ROC conducted floodplain soil sampling in three primary phases. Phase I was in 1990 and used transects across the stream. Each transect included two samples of the top 1 foot of soil from either bank (total of four samples per transect). This sampling approach confirmed that floodplain soils closer to the creek are more likely to have higher concentrations of mirex. Separate from ROC's RI work, in August 1991, Ohio EPA collected samples from an area known as Colonial Villa (approximately RM 35.4) where there was a potential for exposure to nearby residents. Discrete samples were collected from 0-6 inch and 6-12 inch depths at each sample location. Results for these samples showed mirex concentrations ranging from non-detect to 6.65 mg/kg (the maximum value detected in floodplains), with mirex concentrations consistently decreasing with depth. In 1993, Phase II of the RI was conducted, which included "grid" sampling in three areas along the stream. These areas were selected due to the expectation that there was significant deposition in these areas based on 1990 sampling results. In 1995,

Phase III sampling was conducted to address areas where samples had not previously been collected. The results of floodplain soil sampling from the various investigations conducted between 1990 and 2005 are summarized on Figure 12. Each multi-colored bar represents the maximum, average, and minimum detection at each river mile sampled.

Additional floodplain soil sampling was conducted in September 2006. The agencies and ROC selected several floodplain soil locations where RI results showed elevated mirex concentrations or where significant potential for human exposure exists (e.g. public parks, dairy farms, and residential areas). A total of 10 primary floodplain locations were assessed using composite samples. The 2006 results generally confirm the floodplain soil sampling data collected during the RI (see Figure 13). The maximum value was about 3 mg/kg, found in a duplicate sample near Colonial Villa. Similar to sediment, the main areas of contaminated floodplain soil are in certain locations along the approximately 6 ½ mile reach from RM 31 to RM 37.6.

5.6.4 MFLBC Fish

Since 1987, ROC and/or Ohio EPA conducted several significant fish sampling events. The 1987 event included fillet and whole body data. Fillet mirex concentrations ranged from non-detect to 0.37 mg/kg with no detections of mirex downstream of RM 17.5. In 1990, as part of the RI, 27 whole-body fish and 26 fish fillet samples were collected from the MFLBC and other nearby surface water bodies. Mirex was detected in all MFLBC fillet samples with concentrations ranging from 0.0193 mg/kg to 1.82 mg/kg. In 1999, an additional 18 fish fillet samples were collected and analyzed by ROC. Although reported concentrations were lower than in previous events, the distribution of mirex appears to be similar. In addition, fillet testing performed by Ohio EPA in 1997-2001 confirms that mirex concentrations have remained relatively low downstream of RM 25.5. ROC and Ohio EPA jointly collected additional fish tissue samples in 2005 in preparation for the FS. Ohio EPA's mirex results show a range of concentrations from about 0.07 to 1.64 mg/kg and the maximum detection was found within approximately 1 river mile of the maximum detection from the 1990 investigation. Only one sample in 2005 exceeded mirex levels of 0.875 mg/kg, which is Ohio EPA's current threshold value for the 1 meal/month advisory (i.e. fish tissue concentrations below 0.875 mg/kg are safe to consume as frequently as 1 meal/week). However, several samples exceeded mirex levels of 0.2 mg/kg, which is Ohio EPA's current threshold value for unrestricted fish consumption.

The complete fish fillet data set (i.e. all years combined) is shown on Figure 14. This graph shows that only one fish fillet sample location (from 1990) had a mirex concentration above 0.8 mg/kg downstream of approximately RM 31.5. These results indicate that the area of highest fish tissue mirex concentrations generally coincides with the highest mirex concentrations in sediment. It is important to note that the values shown on Figure 14 represent only the maximum detection at each location. In the case of fish samples, multiple fish species were often collected at each sampling location and carp usually had the highest mirex concentrations. Mirex levels in the samples not shown were often considerably lower than the maximum value shown.

In addition to the fillet sample results described above, several investigations have included analyses of whole-body fish samples, which are relevant to ecological food chain exposure

pathways. The most significant whole-body fish data set is from 1990, when the majority of samples showed mirex concentrations of 1.0 mg/kg and less. The only three samples that exceeded 1.0 mg/kg were of common carp, including the maximum detection of 6.2 mg/kg. Other investigations in 1985, 1987, and 2001 show similar concentrations to those measured in 1990. Whole body samples collected in 2001 at and downstream of Lisbon Dam (RM 12.5) had concentrations of approximately 0.2 mg/kg and less.

The highest concentrations of mirex in fish are generally detected in the upstream segment of the creek where the sediment has higher mirex values. However, because fish are mobile and have different life cycles and behavior, fish with mirex are also detected in areas with relatively lower mirex in sediment. For example, one common carp fish tissue sample collected in 2005 from Egypt Swamp (an area of relatively lower mirex levels in sediment) had a mirex level of 790 ug/kg. However, based on the lengths of the three fish used for this sample, it is likely that these particular common carp were relatively mature in age because the lengths of these fish suggest that they were more than 5 years old. The mirex concentration in this particular common carp sample is therefore likely the result of long-term mirex accumulation in a relatively wide ranging species, and is not necessarily representative of typical mirex uptake into fish within this area of the creek.

5.6.5 MFLBC Surface Water

Seventeen samples of surface water were collected during the RI in the MFLBC. Mirex was not detected in any MFLBC surface water samples. In 2005, Ohio EPA requested that additional surface water samples be collected from the MFLBC for analysis with a detection limit not to exceed 0.001 ug/L. Ohio EPA personnel collected four surface water samples in October 2005 during a period of low flow in the stream. These samples were analyzed and were found to have no measurable mirex at the requested detection limit. In March 2006, Ohio EPA personnel collected four additional samples at the same locations, but this sampling event targeted high stream flow to assess whether resuspended sediments might cause detectable mirex levels during high energy storm events. Mirex was not detected in any of these surface water samples, confirming that mirex is not a COC in surface water of the MFLBC.

6.0 Current and Potential Future Land and Resource Uses

For purposes of the risk and ecological assessment for this Site, current and reasonably anticipated future land uses and current and potential beneficial surface water and/or resource uses were identified. Because OU 3 covers a large geographical area and there are potentially different exposure populations, the EA distinguishes between "on-facility" areas (the original Nease plant facility), adjacent "off-facility" areas (e.g., the former Crane-Deming property, residential property along State Route 14), and locations along MFLBC both up and downstream of Lisbon Dam (RM 12.5).

Current land use at the old facility of the Nease Chemical Site is industrial. The on-facility area is home to a decommissioned and largely demolished chemical manufacturing plant. Portions of

the Site are surrounded by security fencing that precludes casual access to these areas. The remaining areas can only be accessed from the active railroad line or the former Crane-Deming property. The railroad line and former Crane-Deming property act somewhat as a buffer for the unfenced areas of the plant (including Feeder Creek and soil areas west of the rail tracks). The only remaining building on the former Nease facility currently houses the groundwater treatment system used as part of the OU 1 interim remedial measures. There are very few workers on the facility, who conduct short daily visits to perform monitoring and maintenance, and they are appropriately trained in health and safety requirements. The off-facility area to the east-northeast along Allen Road is industrial and houses an industrial building (the former Crane-Deming building, now occupied by MAC Trailer).

ROC owns the property around Feeder Creek and its use is industrial. The properties bordering the MFLBC include residential, recreational, agricultural, and commercial/industrial uses. In the 6 ½ miles downstream of the Nease facility, land use is primarily agricultural. There are at least two dairy farms in this reach, as well as other farms where cattle are not currently kept. There are several residences in this reach, including a residential area called Colonial Villa at about RM 35.4 that houses 300 to 400 residents in a trailer park. Colonial Villa formerly had recreation facilities in the MFLBC floodplain, but removed the facilities due to concern with mirex.

Populations that were evaluated in the EA as having the potential for current exposure to the contaminants from OU 3 of the Site include: industrial workers; trespassers; off-facility residents (southeast of the Site); MFLBC recreational visitors; and MFLBC residents.

According to Ohio, the MFLBC is classified as Warmwater Habitat from the headwaters to the Lisbon Dam (RM 12.5) and Exceptional Warmwater Habitat from RM 12.5 to the mouth. All waters of the MFLBC are designated for agricultural, industrial, and direct contact uses, but not for drinking. The Beaver Creek watershed use classifications can be found at Ohio EPA's website at: http://www.epa.state.oh.us/dsw/rules/01-15.pdf. Portions of the MFLBC below the Lisbon Dam (RM 12.5) and Little Beaver Creek are designated by the State of Ohio and/or the Federal government as wild or scenic rivers.

A detailed description of habitat and wildlife along the MFLBC is provided in the RI and EA reports. Oak-hickory represents the dominant forest of Columbiana and Mahoning Counties. A number of wetland and riparian habitat types are found in association with the MFLBC. A variety of birds, mammals, reptiles and amphibians, and aquatic organisms make their home in or around the MFLBC. Table 1 lists the plant and animal species found in the MFLBC corridor identified by ODNR as threatened, endangered or rare. More detail on MFLBC flora and fauna can be found in the RI and EA reports.

Based on current zoning and development patterns in the area, future land and resources uses are expected to remain generally the same. However, water and waterfront areas are generally becoming more valuable for certain land uses and as resources.

7.0 Summary of Operable Unit Risks

ROC, with oversight by U.S. EPA and Ohio EPA, prepared a baseline human health risk assessment and an ecological risk assessment for the Nease Site to evaluate potential risks to human health and the environment if no action was taken. This process characterizes current and future threats or risks to human health and the environment posed by contaminants at the Site. The risk assessment provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of the baseline human health risk assessment and the ecological risk assessment relevant to OU 3.

In accordance with U.S. EPA guidance on preparing RODs, the information presented here focuses on the information that is driving the need for the response action, and does not necessarily summarize the entire baseline human health or ecological risk assessment. The information in this ROD focuses on OU 3, although the assessment was conducted for the entire Site. Further information is contained in the 2004 EA.

7.1 Summary of Human Health Risk Assessment

The human health risk assessment evaluated the potential risks that could result to people from exposure to the contaminants at the Site. The human health risk assessment conducted at this Site used Risk Assessment Guidance for Superfund and other supplemental guidance to evaluate human health risks. The risk assessment evaluated the risks associated with both reasonable maximum exposure (RME) and central tendency exposure scenarios. Based on the current and anticipated future land use at the site, the EA considered the risks associated with several land use scenarios and receptors. Figure 5 shows the CSM used in the human health risk assessment.

Because OU 3 covers a large geographical area and there are potentially different exposure populations, the EA distinguishes between "on-facility" areas (the original Nease plant facility), adjacent "off-facility" areas (e.g., the former Crane-Deming property, residential property along State Route 14), and locations along MFLBC both up and downstream of Lisbon Dam (RM 12.5). Although the EA considers the entire Site, for purposes of selecting the remedy for OU 3, the FS and this ROD for OU 3 consider only the OU 3 media, which include the on-facility and off-facility Feeder Creek and MFLBC media (surface water, sediments, floodplain soil, fish, game, beef, milk, and vegetables). Other media (groundwater, facility soil, source areas) were addressed in the ROD for OU 2.

7.1.1 Identification of Contaminants of Concern

A variety of contaminants including pesticides, inorganics, VOCs and semi-volatile organic compounds, media (soil, sediment, surface water, groundwater, and air), and biota (fish, game, cattle products) were sampled at the Site. As part of the human health risk assessment, the EA identified a number of chemical contaminants that were carried through the risk assessment evaluation.

Contaminants of concern (COCs) are compounds that are present at the site in sufficient quantities to present an unacceptable risk to human health or the environment. COCs for the entire Site were identified by the following screening process:

- Samples from the various media present – including surface water, sediment, floodplain soil, and fish were analyzed for a variety of contaminants.

- Based on available data, 155 chemicals detected at least once in the on-facility or off-facility samples were retained for further evaluation.

- The 155 chemicals were evaluated for selection as chemicals of potential concern (COPCs) based on the following criteria: (1) the frequency of detection; (2) whether the chemical is facility-related; (3) availability of toxicity data; and (4) a concentration-toxicity screen.

- A total of 49 chemicals were retained for consideration in the quantitative risk assessment in at least one environmental medium.

The results of the EA indicated that mirex is the only COPC in the MFLBC that is related to the Nease site and which caused estimates of potential risk above U.S. EPA's acceptable risk levels for human and/or ecological receptors. While risk estimates from exposure to photomirex did not exceed acceptable risk levels, photomirex and mirex toxicity may be additive, and so the risk estimates presented herein are summations of risks due to both mirex and photomirex. Data quality and usability was addressed in the EA, and all data used in the risk assessment were found suitable for use.

Table 2 summarizes the primary risk-driving contaminants in OU 3, as well as the range of detected concentrations, the frequency of detection and the exposure point concentration. Note that other contaminants were detected in media within OU 3 and were retained in the risk assessment, but did not present unacceptable risks in those media. As a result, information on those other contaminants is not included in Table 2, but can be found in the EA.

7.1.2 Exposure Assessment

The EA evaluates potential exposures using parameters for both adult and child populations in evaluating residential (on-facility, off-facility, MFLBC) and recreational visitor populations for the following four pathways: ingestion of soil; sediment; milk; and fish. Adult and child receptors were considered through the calculation of age-adjusted intake rates, which combine the exposure for a 1- to 6- year-old with that of an adult, to provide lifetime exposures for assessment of cancer risks. Noncancer risks were assessed based only on child parameters to ensure risks were not underestimated.

The risk assessment evaluated several exposure pathways for on-facility, off-facility, and MFLBC exposures in both current and reasonably anticipated future use scenarios. An exposure

pathway is a means by which a person may come in contact with Site contaminants. Section V of the EA contains the exposure assessment for the site. The exposure assessment estimates the magnitude, frequency, duration, and routes of exposure to the COPCs at the site, and describes all assumptions, data and methods used to evaluate the potential for human exposure to the site contaminants. The exposure pathways evaluated are described as follows.

Current Use Scenario - On-Facility Locations

- Current on-facility trespasser exposures to COPCs in Feeder Creek surface water and sediments were evaluated for several pathways. These included incidental ingestion of surface water, dermal contact with surface water, incidental ingestion of sediments, and dermal contact with sediments.

Current Use Scenario - Off-Facility Locations

- Current off-facility industrial worker exposures to COPCs in surface water and sediments were evaluated for several pathways. These included incidental ingestion of surface water, dermal contact with surface water, inhalation of air above surface water, incidental ingestion of sediments, and dermal contact with sediments.

- Current off-facility resident exposures to COPCs in game were evaluated for the ingestion pathway.

Current Use Scenario –MFLBC Locations

- Current MFLBC recreational visitor exposures to COPCs in floodplain soil, sediments, surface water, fish, and game were evaluated for several pathways upstream and downstream of Lisbon dam. These included incidental ingestion of soils, dermal contact with soil, inhalation of wind-blown soil dust, incidental ingestion of surface water, dermal contact with surface water, incidental ingestion of sediments, dermal contact with sediments, ingestion of fish, and ingestion of game.

- Current MFLBC residential exposures to COPCs in floodplain soil, sediments, surface water, fish, game, and vegetables were evaluated for several pathways upstream and downstream of Lisbon dam. These included incidental ingestion of soils, dermal contact with soil, inhalation of wind-blown soil dust, incidental ingestion of surface water, dermal contact with surface water, incidental ingestion of sediments, dermal contact with sediments, ingestion of fish, ingestion of game, and ingestion of home-grown vegetables.

Future Use Scenario – On-Facility Locations

- Future on-facility industrial worker exposures to COPCs in Feeder Creek surface water and sediments were evaluated for several pathways. These included incidental ingestion of

surface water, dermal contact with surface water, inhalation of air above surface water, incidental ingestion of sediments, and dermal contact with sediments.

- Future on-facility resident exposures to COPCs in Feeder Creek surface water and sediments were evaluated for several pathways. These included incidental ingestion of surface water, dermal contact with surface water, incidental ingestion of sediments, and dermal contact with sediments.

Future Use Scenario – Off-Facility Locations

- Future off-facility industrial worker exposures to COPCs in Feeder Creek surface water and sediments were evaluated for several pathways. These included incidental ingestion of surface water, dermal contact with surface water, inhalation of air above surface water, incidental ingestion of sediments, and dermal contact with sediments.

- Future off-facility residential exposures to COPCs in game, beef, milk, and fish were evaluated for the ingestion pathway.

Future Use Scenario – MFLBC Locations

- Future MFLBC recreational visitor exposures to COPCs in soil, surface water, sediments, fish, game, beef, and milk were evaluated for several pathways upstream and downstream of Lisbon dam. These included incidental ingestion of soil, dermal contact with soil, inhalation of wind-blown soil dust, incidental ingestion of surface water, dermal contact with surface water, incidental ingestion of sediments, dermal contact with sediments, ingestion of fish, ingestion of game, ingestion of beef, and ingestion of milk.

- Future MFLBC residential exposures to COPCs in soil, surface water, sediments, fish, game, vegetables, beef, and milk were evaluated for several pathways upstream and downstream of Lisbon dam. These included incidental ingestion of soil, dermal contact with soil, incidental ingestion of surface water, dermal contact with surface water, incidental ingestion of sediments, dermal contact with sediments, ingestion of fish, ingestion of game, ingestion of home-grown vegetables, ingestion of beef, and ingestion of milk.

7.1.3 Toxicity Assessment

U.S. EPA has conducted toxicological assessments on many frequently occurring environmental chemicals and has developed standardized toxicity values for use in the risk assessment. In general, U.S. EPA derived toxicity values were used in the EA. These toxicity values - reference doses (RfDs) and reference concentrations for noncarcinogenic effects, and cancer slope factors (CSFs) and unit risks for known, suspected, or possible carcinogens are published by U.S. EPA in Health Effects Assessment Summary Tables and the on-line Integrated Risk Information System.

However, in-depth evaluations were conducted by ROC for mirex, photomirex and kepone (related chlorinated pesticides or the breakdown chemicals) because of the significance of these chemicals at the Site and the toxicological data bases that exist for these chemicals. Based on a toxicological literature review, ROC requested a revision to the mirex RfD that was in use in 1992. Subsequently, U.S. EPA has developed a verified RfD for mirex (based on a study of chronic liver and thyroid effects in rats), which was used in the EA. In 1987, U.S. EPA had classified mirex as in Group B2, probable human carcinogen and reported a CSF. In 1992, ROC submitted information relevant to the carcinogenic classification and CSF for mirex. Based on ROC's requested toxicity reassessment, U.S. EPA prepared issue papers and provisional revisions of the mirex CSF. The EA, particularly Appendix D, contains abundant information related to the reassessment of mirex toxicity. Based on the extensive review, U.S. EPA determined a CSF for mirex for use in the human health risk assessment.

Additionally, U.S. EPA has not developed toxicity criteria (Agency verified RfD or CSF values) for photomirex or kepone. Based on ROC's review of the toxicological data for photomirex (a breakdown product of mirex), U.S. EPA believes that photomirex is more toxic than mirex (based on a reproductive toxicity study in the rat). A derived RfD for photomirex was used for the EA. Based on the literature review, photomirex may qualify as Group D carcinogen, not classifiable as to human carcinogenicity. Based on ROC's review of the toxicological data for kepone (a related pesticide), a chronic oral RfD was derived (based on a mouse study). After evaluation of the literature review, and consultation with other scientists, U.S. EPA Region 5 determined that the available data were inadequate to allow evaluation of the carcinogenic potential of kepone at this time. The toxicity information of the other chemicals found at the Site can be found in Appendix A of the EA.

7.1.4 Risk Characterization

U.S. EPA's risk guidance identifies a target cancer risk range of 10^{-4} to 10^{-6} (1 in 10,000 to 1 in a million) excess cancer risk for Superfund sites. If site contamination poses a risk of less than 10^{-6}, there is generally no need for action. Cancer risks greater than 10^{-4} generally require action to reduce and/or abate the risk, and cancer risks between 10^{-4} and 10^{-6} present a potential cause for remedial action. U.S. EPA's guidance also indicates that a non-cancer hazard index exceeding 1.0 generally is a cause for action to reduce and/or abate the potential non-cancer risks associated with site contamination, while a hazard index less than 1.0 generally does not require action. Table 3 shows all exposure pathways and calculated risks from mirex and photomirex for the future RME and central tendency exposure scenarios that were evaluated in the risk assessment relevant to OU 3 (current scenarios and other COPCs are not show in Table 3 because they do not exceed acceptable risk criteria). The primary risks from mirex (the primary COC) in OU 3 media are summarized in Table 4[6] and discussed below.

6 The "total" risk numbers shown in Tables 3 and 4 are not identical because Table 4 is intended only to summarize the major exposure media and scenarios that are the primary risk drivers for OU 3, while Table 3 includes all exposure media and scenarios for mirex (plus photomirex). For the MFLBC resident upstream of Lisbon Dam (future use scenario), 41 to 42% of the total risk is associated with ingestion of fish containing mirex and 14 to 24 % is associated with ingestion of beef with mirex.

Location	Scenario	Exposure Pathway	RME Risks	
			Cancer	Hazard Index
MFLBC Upstream	**Resident (future)**	Fish ingestion	1.32E-04	5.44E+00
		Beef ingestion	7.25E-05	1.61E+00
		Milk ingestion	3.11E-05	9.44E-01
		TOTAL	2.36E-04	7.99E+00
	Recreational visitor (future)	Fish ingestion	1.32E-04	5.44E+00
		Beef ingestion	1.45E-05	3.20E-01
		Milk ingestion	6.23E-06	1.89E-01
		TOTAL	1.53E-04	5.95E+00
MFLBC Downstream	**Resident (future)**	Fish ingestion	4.63E-06	1.93E-01
		Beef ingestion	7.25E-05	1.61E+00
		Milk ingestion	3.11E-05	9.44E-01
		TOTAL	1.08E-04	2.75E+00
Off-Facility	**Resident (future)**	Fish ingestion	4.93E-05	2.04E+00
		Beef ingestion	7.25E-05	1.61E+00
		Milk ingestion	3.11E-05	9.44E-01
		TOTAL	1.53E-04	4.59E+00

Table 4: Summary of Potential Human Health Risks from Primary OU 3 Exposure Media

In summary, the EA contains the following findings regarding potential human health risks:

- None of the current use scenario exposure pathways resulted in potential risks exceeding U.S. EPA's acceptable risk range.

- None of the calculated potential risks for the future trespasser, future on-facility or off-facility industrial worker, future on-facility resident, or the future MFLBC recreational visitor downstream exceed U.S. EPA's acceptable risk range.

- Exposure to mirex in fish by ingestion is responsible for a large proportion of the unacceptable potential risk calculated for the future MFLBC upstream resident and future MFLBC upstream recreational visitor.

- Exposure to mirex in beef and/or milk by ingestion, when combined with ingestion of fish is also responsible for unacceptable potential risk calculated for the future MFLBC upstream resident, future MFLBC downstream resident, future MFLBC upstream recreational visitor, and future off-facility resident scenarios.

Risk assessment provides a systematic means for organizing, analyzing, and presenting information on the nature and magnitude of risks posed by chemical exposures. Nevertheless, uncertainties and limitations are present in all risk assessments because of the quality of available data and the need to make assumptions and develop inferences based on incomplete information

about existing conditions and future circumstances. In general, the uncertainties and limitations in the risk assessment may be associated with measurement uncertainty, model uncertainty, and data gaps, and generally fall into the following categories: environmental sampling and laboratory measurement; mathematical fate and transport modeling; receptor exposure assessment; and toxicological assessment. These uncertainties are discussed in detail in the EA.

7.2 Summary of Ecological Risk Assessment

ROC conducted an ecological risk assessment for OU 3 of the Nease Site to help understand the actual or potential risks to the environment posed by the contaminants at the OU. The assessment for the MFLBC can be found in Chapter IX of the EA. The ecological risk assessment considers those chemicals that were detected in surface water, sediment, fish, and/ floodplain surface soils. The assessment incorporates both measured and modeled estimates of exposure, the available guidance and published information on the environmental fate and toxicities of the chemicals evaluated, and the expected/known habitats and likely species in the area. More detailed information can be found in Chapter IX of the EA.

7.2.1 Site Characterization

OU 3 of the Nease Site is described in Section 5.2. For purposes of the ecological risk assessment, the MFLBC was split into three reaches for assessment of floodplain soil risks and 15 reaches for assessment of sediment risks. The reach designations can be found on Figures IX-1A and IX-6 of the EA.

7.2.2 Selection of Chemicals for Evaluation

A total of 82 chemicals were detected in one or more media of concern (surface water, whole body fish, sediment, floodplain soil). For each medium, the chemicals were screened to identify which might potentially contribute to ecological risk. Selection criteria included background concentrations, toxicological screening benchmarks, site-relatedness, spatial distribution, frequency of occurrence, and the potential for bioaccumulation.

After the screening process, the following were retained for further evaluation in the ecological risk assessment: 1 of 3 chemicals detected in surface waters; 8 of 34 chemicals detected in fish; 20 of 51 chemicals detected in sediment; and 21 of 60 chemicals detected in floodplain soil. Table 5 shows the retained chemicals for each media. Mirex and its degradation product, photomirex are the principal ecological COCs.

7.2.3 Characterization of Exposure

U.S. EPA defines characterization of exposure as an evaluation of the interaction of stressors with one or more ecological components. Potential ecological exposure pathways and receptors are shown on Figure 15, the CSM for the ecological risk assessment. Exposure routes include incidental ingestion, contact, root absorption, and consumption of contaminants in the food chain. Six primary assessment endpoints were considered:

- Maintenance of viable populations and communities of herbivorous vertebrates in the MFLBC and/or adjacent floodplains.

- Maintenance of viable populations and communities of insectivorous vertebrates in the MFLBC and/or adjacent floodplains.

- Maintenance of viable populations and communities of carnivorous vertebrates in the MFLBC and/or adjacent floodplains.

- Maintenance of viable populations and communities of piscivorous vertebrates in the MFLBC and/or adjacent floodplains.

- Maintenance of a viable fish community in the MFLBC.

- Maintenance of a viable benthic macroinvertebrate community in the MFLBC.

Because of the complexity of ecosystems, receptor species were chosen to represent the larger biological community for the Nease Site ecological risk assessment. The following species were chosen for exposure modeling and risk characterization in the MFLBC assessment: American woodcock; belted kingfisher; mallard; red-tailed hawk; spotted sandpiper; meadow vole; mink; northern short-tailed shrew; and red fox. Also, aquatic and semiaquatic biota, terrestrial invertebrates, and plants were considered in the EA.

7.2.4 Characterization of Ecological Effects

U.S. EPA defines the characterization of ecological effects as the portion of an ecological risk assessment that evaluates the ability of a stressor to cause adverse effects under a particular set of circumstances. The ecological risk assessment for the Nease Site uses measurement endpoints to characterize potential effects for potential receptors. The measurement endpoints include screening level toxicological benchmarks for lower trophic level biota in surface water, sediment, and soils, as well as toxicological benchmarks for dietary ingestion.

Potential risks to lower trophic level biota were assessed by comparing concentrations at individual sample locations against toxicological benchmarks for that media. Risks to the upper trophic level species (chosen to be representative) were calculated based on an area-wide assessment using mean chemical concentrations in the various media. Hazard quotients (HQs) were calculated by comparing the estimated exposure point concentration in the media against the corresponding toxicological benchmarks for that media. In assessing the characterization results, if the value of the HQ is less than or equal to one, it is believed that no unacceptable impacts will occur in the exposed population of receptors. If the value of the HQ exceeds one, then an unacceptable impact may occur, with the predicted likelihood and/or severity of the impacts increasing as the value of the HQ increases.

7.2.5 Risk Conclusions

The ecological risk assessment is a comprehensive and conservative baseline assessment intended to characterize the potential risks to ecological receptors based on the available ecological, exposure and toxicological information. A general summary of the risk characterization indicates:

- There are no significant risks predicted in floodplain Reach 3 (downstream of Lisbon Dam at RM 12.5) for any receptors.

- There are no significant risks predicted for herbivorous, carnivorous or piscivorous birds, or for herbivorous mammals that would be exposed via food chain pathways.

- There are predicted exceedances of dietary NOAELs[7] for the insectivorous short-tailed shrew for mirex plus photomirex. The predicted exceedances are relatively low (HQ values of about 2.11 in floodplain reach 1, and 3.46 for all MFLBC reaches combined) based on the 1990 survey data. These HQ values are less than 1 when based on dietary LOAELs.[8]

- There are predicted exceedances of dietary NOAELs for the carnivorous red fox for mirex plus photomirex in floodplain reaches 1 and 2. HQ values of 5.85 and 2.5 were estimated for mirex plus photomirex for reaches 1 and 2, respectively, and 9.59 for all MFLBC reaches combined, based on the 1990 survey data. The HQ values for mirex plus photomirex are about 1.8 and 0.78 in Reaches 1 and 2 based on dietary LOAELs.

- There are predicted exceedances of dietary NOAELs for the piscivorous mink for mirex plus photomirex in 9 of the 15 sediment reaches. HQ values range from about 1.1 to 4.5 based on 1990 survey data. The HQ values are all less than 1 when based on dietary LOAELs.

- In Feeder Creek mirex (including photomirex) concentrations exceeded benchmark levels for surface water and sediment, although surface water detections of mirex were considered likely due to the presence of suspended particulates, rather than dissolved mirex. These exceedances of benchmark values indicate that there is a potential for adverse ecological effects on lower trophic level biota.

There are uncertainties associated with the ecological risk assessment that may over or under estimate risks. The actual ecological risk associated with exceeding, for example, a calculated toxicological benchmark for ingestion is contingent on all of the assumptions that are used in an extrapolation from available literature data to the site-specific situation under assessment. The

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7 No observed adverse effects level - The highest tested dose of a substance that has been reported to have no adverse health effects on the target organism.

8 Lowest observed adverse effects level - The lowest tested dose of a substance that has been reported to cause adverse health effects on the target organism.

chemical selection process relied primarily on a comparison of maximum observed media concentrations with conservative, medium-specific screening benchmarks. A number of chemicals lacked screening benchmarks for one or more media or did not meet the screening criteria. These chemicals are evaluated by media based on their facility-relatedness, frequency of occurrence, and potential contribution to overall risk.

7.3 Basis for Action

A response action at OU 3 of the Nease Chemical Site is warranted because, using RME assumptions, the cumulative excess lifetime carcinogenic risk to human health exceeds 10^{-4} for the future residential and future recreational use scenarios along the MFLBC and for the future residential scenario at the off-facility portion of the Site (property adjacent to the Nease plant). In addition, a HQ of one is exceeded for the same use scenarios, indicating the potential for non-carcinogenic risk. Additionally, there are potential ecological risks to biota within OU 3 that may be exposed to mirex in sediment and associated uptake into fish, or the floodplain soil. The response action selected in this ROD is necessary to protect the public health or welfare or the environment from the actual or threatened releases of hazardous substances into the environment.

8.0 Remedial Action Objectives and ARARs

8.1 Remedial Action Objectives

Remedial Action Objectives (RAOs) provide a general description of what the remedial alternatives will accomplish. For OU 3 of the Nease Site, RAOs were developed through a consensus-based process between U.S. EPA, Ohio EPA and ROC. The FS contains more detail on each RAO, including the site-specific goals developed to address potential risks to human health and the environment. It is important to note that term "mitigate" refers to site-specific targets to achieve acceptable risk goals.

The following RAOs apply to OU 3 of the Nease Chemical Site:

- RAO 1 – Mitigate mirex uptake in fish from exposure to MFLBC sediment.
- RAO 2 – Mitigate additional mirex contamination of the floodplain from MFLBC sediment.
- RAO 3 – Mitigate ecological exposures to unacceptable levels of mirex in floodplain soil.
- RAO 4 – Protect cattle from unacceptable mirex uptake from floodplain soil.
- RAO 5 – Mitigate additional mirex contamination of MFLBC from Feeder Creek.

The preliminary remediation goals (PRGs) to achieve the RAOs for this Site were generated consistent with the NCP and U.S. EPA's RI/FS guidance. PRGs finalized within this ROD are then known as remediation goals. The following remediation goals, selected through a weight-

of-evidence approach in accordance with U.S. EPA guidance, are established for OU 3 of the Nease Site:

8.1.1 MFLBC Floodplain Soil

Since there are no promulgated soil standards for mirex, the remediation goal for OU 3 floodplain soils has been developed based on the EA. PRG ranges for mirex in floodplain soil have been estimated based on two potential exposures/receptors of concern:

- Ecological risks associated with direct and food-chain exposure to floodplain soils; and,
- Human health risks associated with consumption of beef and dairy products produced from cattle grazing within the contaminated floodplain.

The approaches used to develop a range of PRGs for mirex in surface soil are presented in more detail in the FS.

Ecological Exposures

A range of ecological PRGs for mirex in floodplain soil was determined by using a food chain model to back calculate a soil concentration that would result in a HQ of one for the receptors of concern. Food chain modeling methods are described in detail in Chapter IX of the EA. The two most sensitive terrestrial ecological receptors are the short-tailed shrew and the red fox. For the red fox, the home range plays an important role in the calculation of PRGs. For OU 3, the PRG calculations incorporate the home range of the fox by including the percentage of the range that is comprised of floodplain soil potentially containing mirex. No adjustments to the home range were made for the less wide-ranging short-tailed shrew.

To account for possible variations along the MFLBC, the floodplain area potentially within the home range of the red fox was determined in two separate areas of the creek, one where the floodplain is narrow, and another where the floodplain is very wide. The floodplain accounts for 5% to 24% of the home range of the red fox in these two areas. Using the exposure point concentration and estimated LOAEL- and NOAEL-based HQs from the EA, a back calculation was performed to determine the floodplain soil concentration that would result in a HQ of one. More detail on this assessment can be found in Appendix I of the FS. Table 6 shows the calculated mirex soil concentrations resulting in a HQ of one for each receptor, including consideration of home range for the red fox.

Receptor	NOAEL -Based PRG (mg/kg)	LOAEL -Based PRG (mg/kg)
Short-tailed Shrew	0.186	0.930
Red Fox	0.267 to 1.281	0.862 to 4.14

Table 6: Soil Mirex Concentration Resulting in a Hazard Quotient of One

Human Exposures – Beef and Milk Ingestion

As described in the EA and Section 2.2.2 of this ROD, mirex was detected in milk and beef samples collected from three farms along the MFLBC. Fences were constructed on those farms to exclude cattle from the MFLBC and contaminated portions of the floodplain. In the years since the fences were installed, mirex has not been detected in milk or beef.

The uptake of mirex into cattle is a complicated process where both uptake from soil to feed plants, as well as biotransfer from feeding (including incidental soil ingestion) into beef and milk fat need to be considered. Since it is not possible to determine exactly which floodplain soil concentrations produced corresponding levels of mirex in cattle, a number of assumptions were made about the uptake of mirex into cattle. U.S. EPA used a methodology based on the existing literature related to uptake of mirex into beef and milk fat to calculate PRG ranges based on a range of potential plant uptake of mirex, a range of incidental soil ingestion rates, and a range of supplemental (uncontaminated) feed ingestion rates.[9]

The PRG ranges shown in Table 7 have been calculated based on a 10^{-5} cancer risk level and a hazard index of 1. Although U.S. EPA's approach uses the best available published literature, there are several uncertainties in the calculations, including: the amount of forage available from the contaminated floodplain to grazing cows; amount of time that cows are kept indoors during the cold winter months and the source of feed at that time; the pharmacokinetics of mirex distribution and elimination in cows; and soil ingestion rates. In the absence of more specific information, conservative assumptions have been made for each parameter. The use of multiple conservative assumptions suggests that the lower end of the PRG range represents an overestimation of potential risks. Additionally, comparison of the calculated modeled values with actual beef and milk levels from the late 1980s indicates that the lower end of the PRG range is not consistent with actual observed values.

Cattle Food Source	Product	Soil Mirex PRG Range (mg/kg)	
		Cancer = 10^{-5}	Hazard Index = 1
Graze in and/or provided forage from contaminated floodplains (100 % of total)	Beef	0.6 to 2.8	2.7 to 13
	Milk	0.3 to 1.4	1.0 to 4.5
Graze in or provided forage from contaminated floodplains (26 %) with supplementary clean feed (74 % of total)	Milk	0.5 to 1.6	1.6 to 5.4

Table 7: Soil Mirex PRGs for Cattle and Dairy Pasture

Floodplain Soil Remediation Goal

Based on the desired risk reduction endpoints, using multiple lines of evidence, and considering the uncertainties associated with the assessments, U.S. EPA is selecting 1.0 mg/kg of mirex as the floodplain soil remediation goal. This level will assure no material adverse ecological effect on the identified receptor populations and will ensure that cattle exposed to floodplain soil will

9 For more information on this determination, see U.S. EPA memorandum, "Preliminary Remedial Goals for Soil Mirex Based on Beef and Milk from Cows in Floodplain Areas Downstream of the Nease Chemical Site," May 1, 2008 (SDMS ID: 299751) in the Administrative Record Record and included as Appendix J of the OU 3 FS Report.

not accumulate mirex at unacceptable levels. This level is also consistent with the remediation goal for soil in OU 2, which was selected to be protective of ecological receptors and potential human exposures.

Floodplain soils exceeding the remediation goal of 1.0 mg/kg of mirex will be included in response actions established to meet RAOs 3 and 4. It is anticipated that attainment of this goal will be measured based on the average mirex concentration within surface soil (0 to 6 inches) within an exposure area of about one acre. However, PDI information will be used to determine exactly how attainment of the remediation goal will be measured and will consider valuable habitat and resources within the floodplain. Additionally, it is anticipated that PDI information may be used to define a mirex level in floodplain soil that cannot be exceeded within the remediation area.

8.1.2 MFLBC Sediment

Since there are no promulgated sediment standards for mirex, the remediation goal for OU 3 MFLBC sediments has been developed based on the EA. PRG ranges for mirex in MFLBC sediment have been estimated based on two potential exposures/receptors of concern:

- Ecological risks to wildlife associated with consumption of contaminated fish; and
- Human health risks associated with consumption of contaminated fish.

Ecological Exposures

The EA identified the mink as the most sensitive ecological receptor that potentially consumes fish from the MFLBC. In the EA, potential risks for the mink were calculated directly using measured fish concentrations and assessed against NOAEL and LOAEL based HQs of one. U.S. EPA used a methodology for calculating a sediment-biota accumulation factor (BAF) for mirex in the MFLBC based on correlations between measured sediment and fish concentrations. U.S. EPA then used the BAF to calculate sediment concentrations that would result in levels of mirex in whole fish that would be protective of mink.[10] U.S. EPA considered a number of uncertainties including: limited co-located fish and sediment data; limited whole fish samples; limited species with sufficient data; home range of the fish species; biased approach to sediment sampling in the RI; lack of organic carbon data; variation in lipid and analytical results between Ohio EPA and ROC samples; and others. U.S. EPA calculated a sediment PRG range of 0.339 to 0.753 mg/kg of mirex for the LOAEL criterion using the 1990 whole fish data.[11] Noting the uncertainty in these calculations, U.S. EPA recommended the upper third of this PRG range as the most appropriate (0.477 to 0.753 mg/kg of mirex).

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10 For more information on this determination, see U.S. EPA memorandum "Bioaccumulation of Mirex in Fish, Preliminary Remedial Goals for Sediment, and the Horizontal Pattern of Sediment Mirex in the Middle Fork of Little Beaver Creek," March 26, 2007 (SDMS ID: 299745) in the Administrative Record and included as Appendix H of the OU 3 FS Report.

11 The PRG range calculated based on the corrected 2005 data is 0.372 to 1.123 mg/kg of mirex, but these calculations are considered less reliable. Among other uncertainties, only fillet data was available in 2005.

Human Exposures – Fish Ingestion

The estimated carcinogenic and non-carcinogenic risks to residents and recreational visitors consuming fish from the upstream portions of MFLBC exceeded U.S. EPA's acceptable criteria as shown in Table 4 and discussed in Section 7 of this ROD. The RME exposure point concentrations calculated for the EA assumed that all fish consumed from the MFLBC would contain mirex at a concentration of 1.27 mg/kg. However, as shown on Figure 14, more recent sampling indicates that fish tissue levels are improving and that in 2005 only one sample of carp at a single location (RM 33.3) had fish with mirex concentrations above this value. Based on the results of the human health risk assessment, and extrapolations using the EA calculations and U.S. EPA's approach to calculating BAFs (but applied to fillet data), reducing sediment concentrations to below the ecological PRG is expected to bring the human health risks from fish consumption to within U.S. EPA's acceptable risk range.

MFLBC Sediment Remediation Goal

Based on the desired risk reduction endpoints, using multiple lines of evidence, and considering the uncertainties associated with the assessments, U.S. EPA is selecting 0.5 mg/kg of mirex as the sediment remediation goal. However, because portions of the MFLBC are high quality habitat, in certain cases, based on the PDI data and existing habitat quality, the remediation goal may be modified in remedial design to be as high as 0.75 mg/kg for those stretches. Over time, the remediation goal will assure no material adverse effects from fish consumption due to mirex uptake and will prevent additional mirex contamination of the floodplain from MFLBC sediment.

Sediments exceeding the remediation goal of 0.5 mg/kg of mirex (or as modified to protect habitat) will be included in response actions established to meet RAOs 1 and 2. Attainment of the remediation goal will be measured based on the surface weighted average concentration (SWAC) of mirex within surface sediment (expected to be 0 to 6 inches), since bioavailable surface contamination over an exposure area is the driver of mirex levels in fish. The SWAC approach will be used to measure post-remediation attainment of the mirex goal in MFLBC sediments. It is anticipated that the SWAC goal will be calculated over each one mile reach within the remediation area. However, since soft sediment does not cover the entire creek bottom and since previous sampling may have been biased to mostly soft sediment areas, the SWAC approach may need to be modified to focus on the depositional areas. PDI information will be used to determine exactly how attainment of the SWAC-based remediation goal will be measured. Additionally, it is anticipated that PDI information may be used to define a mirex level in sediment that cannot be exceeded within the remediation area.

8.2 Applicable or Relevant and Appropriate Requirements (ARARs)

Section 121(d) of CERCLA requires that Superfund remedial actions at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations which are collectively referred to as ARARs, unless such ARARs are waived under CERCLA Section 121(d)(4). Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous

substance, pollutant, contaminant, remedial action, location, or other circumstance found at a Superfund site. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that, while not applicable, address problems or situations sufficiently similar to those encountered at the Superfund site that their use is well-suited to the particular site.

In addition to ARARs, guidance materials that have not been promulgated or regulatory standards that are not applicable or relevant and appropriate may be considered (including local/county requirements); these are referred to as items "to be considered" (TBC). While TBCs may be considered along with ARARs, they do not have the status of ARARs.

The ARARs and TBCs identified for the Site are categorized into three types: chemical-specific, action-specific and location-specific. Chemical-specific ARARs establish the acceptable amounts or concentrations of a chemical that may be found in, or discharged to the ambient environment. Action-specific ARARs are technology- or activity-based performance or design requirements associated with the potential remedial activities being considered. Location-specific ARARs establish requirements that protect environmentally-sensitive areas and other areas of special interest.

A list of the potential ARARs and TBCs identified for remedial actions for OU 3 of the Nease Site is presented in Table 8.

8.2.1 Identification of Federal ARARs

This section presents a summary of those federal regulations that may be found to be applicable or relevant and appropriate to OU 3 of the Nease Chemical, specifically:

The Comprehensive Environmental Response, Compensation and Liability Act
CERCLA, last amended in January 2002, provides the U.S. EPA Administrator the authority to respond to any past disposal of hazardous substances and any new uncontrolled releases of hazardous substances. Within CERCLA, a trust fund has been established for cleanup of abandoned past disposal sites and leaking underground storage facilities, as well as the authority to bring civil actions against violators of this act. The National Contingency Plan (NCP), which guides removal and remedial actions at Superfund sites, was developed subject to this act.

The Superfund Amendments and Reauthorization Act (SARA) of 1986 extensively amended CERCLA. The major goals of SARA were to include more public participation, and to establish more consideration of State clean-up standards, with an emphasis on achieving remedies that permanently and significantly reduce the mobility, toxicity, or volume of wastes.

The Clean Water Act
The Federal Water Pollution Control Act, amended by the Clean Water Act of 1977, was last amended October 1992, and is commonly referred to as the Clean Water Act (CWA). Federal Ambient Water Quality Criteria documents have been published for 65 priority pollutants listed

as toxic under the CWA. These criteria are guidelines that may be used by states to set surface water quality standards. Although these criteria were intended to represent a reasonable estimate of pollutant concentrations consistent with the maintenance of designated water uses, states may appropriately modify these values to reflect local conditions. Under SARA, however, remedial actions must attain a level or standard of control that will result in surface water conditions equivalent to these criteria, unless a waiver has been granted.

The water quality criteria are generally represented in categories that are aligned with different surface water-use designations. These criteria represent concentrations that, if not exceeded in surface water, should protect most aquatic life against acute or chronic toxicity. For many chemical compounds, specific criteria have not been established because of insufficient data. The criteria are used to calculate appropriate limitations for discharges to surface water. These limitations are incorporated in the National Pollutant Discharge Elimination System (NPDES) permits.

The provisions of the CWA are potentially applicable to remedial actions that include a discharge of treated water to surface water.

The Clean Air Act

The Clean Air Act (CAA), with amendments through December 1991, was enacted to protect and enhance the quality of air resources to protect public health and welfare. The CAA is intended to initiate and accelerate national research and development programs to achieve the prevention and control of air pollution. Under the CAA, the Federal Agencies are to provide technical and financial assistance to state and local governments for the development and execution of their air pollution programs. The U.S. EPA is the administrator of the CAA and is given the responsibility to meet the objectives of the CAA. The CAA establishes emission levels for certain hazardous air pollutants that result from treatment processes.

Requirements of the CAA are potentially applicable to remedial actions that result in air emissions, such as excavation.

Floodplains/Wetlands

Appendix A of 40 C.F.R. Part 6 describes the requirements for floodplain/wetlands review of proposed U.S. EPA actions. These regulations are potentially applicable for work to be done in the creeks or other wetland areas, and for remedial activities within the floodplain.

8.2.2 Identification of State ARARs

The purpose of this section is to identify ARARs that exist based on Ohio state regulations that must be complied with when performing a remedial action. The agency charged with developing and enforcing environmental regulations for Ohio is the Ohio EPA. The Ohio EPA provided a generic list of potential ARARs for OU 3 which is included in Appendix L of the FS.

9.0 Description of Alternatives

Following development of the RAOs, a screening and evaluation of potential remedial alternatives was conducted in accordance with CERCLA and the NCP in the OU 3 FS Report.

In simplest terms, OU 3 has three primary source media that contribute to risks from exposure media at the Site. Each primary source media requires a distinct remedial approach. These are:

- MFLBC sediment;
- MFLBC floodplain soil; and
- Feeder Creek sediment.

First, a number of technology types and process options[12] for addressing the main problem areas were identified and screened (evaluated) based on technical implementability. Those retained after the first screening were then evaluated based on the expanded criteria of effectiveness, implementability and relative cost. The technology types and representative process options retained following the screening process were then combined to develop potential remedial alternatives for the site. The alternatives discussed below were selected for detailed analysis and subjected to evaluation under nine NCP criteria. Three remedial alternatives were evaluated.

9.1 Description of Remedy Components

Each of the three alternatives is briefly described below. More detailed information about each of the alternatives can be found in the FS Report.

Alternative A: No Action[13]

(1) *Description of Alternative*: Under this alternative, no further remediation would occur within OU 3. Naturally-occurring processes would continue, however no monitoring would be conducted to assess the effectiveness of these processes or the overall condition of OU 3 over time. Evaluation of the No Action alternative is required by the NCP and provides a baseline against which the other potential remedial alternatives are evaluated.

(2) *Treatment Technologies and Materials Addressed*: There is no treatment component associated with this remedy.

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12 An example of a technology type is "sediment removal" and an example process option within that technology type is "mechanical dredging." Selection of a particular process option as representative was done to streamline the development of potential remedial alternatives. A process option not selected as representative still could be considered during remedial design if its technology type is part of the selected remedial alternative.

13 The NCP recommends developing a "no action" alternative. However, circumstances at OU 3 are such that a "no further action" alternative was developed in the FS. ROC has entered into an enforceable AOC requiring the operation and maintenance of the existing sediment control structures in Feeder Creek discussed in Sections 2.3 and 4.1. ROC has been maintaining the structures for more than a decade and wanted the FS to reflect its intended continued compliance with the AOC.

(3) *Containment Component*: There is no containment component associated with this remedy. However, the existing sediment control structures in drainage ditches at the plant and in Feeder Creek would remain, although they would not be maintained (e.g., fabric barriers would not be replaced as they wear out, built up sediment would not be removed from the structures).

(4) *Costs*: There would be no cost for this alternative.[14]

Alternative B

(1) *Description of Alternative*:

- MFLBC Sediment – MFLBC sediment would be remediated by monitored natural recovery (MNR). MNR involves leaving contaminated sediment in place and relying on naturally occurring processes to reduce the bioavailability or toxicity of the pollutants over time. A variety of natural recovery processes, including physical, biological, and chemical, can occur that reduce the risk to receptors from sediment contamination. While physical processes do not directly change the chemical nature of contaminants, biological and chemical processes do. Instead, physical processes reduce the chance of migration or bioavailability. Examples of physical processes include erosion, dispersion, dilution, and deposition of clean sediment over contaminated areas. Biological processes involve the facilitation of chemical change by microorganisms that live in the sediment (often referred to as biodegradation). Chemical processes involve a geochemical change that can reduce the bioavailability of certain contaminants. Within the MFLBC sediment, it is likely that physical processes would dominate the natural recovery mechanisms.

  Long-term monitoring of the system would be conducted until remedial goals are attained. To assess the effectiveness of MNR, fish samples would be composited within the targeted area (RM 31 to RM 37.6) and analyzed for mirex and percent lipids. It is anticipated that 2 to 3 species would be collected at each river mile, and analyzed as fillets, and approximately 50% of the samples would also be analyzed for whole body concentrations. In addition to fish, sediment samples would also be collected at each location, and analyzed for mirex, total organic carbon, and grain size distribution. In addition to the 6 river miles where sediment mirex concentrations exceed the remediation goal, natural recovery monitoring would also include additional upstream and downstream locations. The detailed monitoring program would be developed following a PDI.

- MFLBC Floodplain Soil – Contaminated soil would be excavated with conventional equipment and transported for consolidation with OU 2 contaminated soils at the Nease facility. Following consolidation, the soils would be capped and covered as called for in the OU 2 ROD. Following excavation of the contaminated soil, the floodplain areas would be

14 In order for ROC to comply with the AOC requiring maintenance of the existing sediment control structures, the FS included an estimated $360,000 in net present worth costs for maintaining the existing sediment control structures in Feeder Creek for 30 years. These costs were developed for the "no further action" alternative to estimate the cost of compliance, and do not apply to the "no action" alternative presented herein.

restored using clean fill that is able to support vegetation. This alternative provides for targeted removal of floodplain soils where mirex concentrations exceed the remediation goal. Based on current information, floodplain soils between about RM 35.4 to RM 34.8, and near RM 33.3 and RM 32.9 exceed the remediation goal. These areas are about 6.5 acres, with an estimated in-place volume of 5,300 cubic yards of contaminated soil. The targeted approach would be designed so as to minimize unacceptable damage to valuable riparian habitat while attaining the remediation goal. The extent of areas to be removed would be determined as part of the PDI. Backfill will be placed as necessary to maintain proper surface water management and avoid erosion.

- Feeder Creek Sediment – Contaminated sediments in Feeder Creek would be removed and residuals (if any) covered to mitigate potential future releases of mirex into the MFLBC. Excavated sediments would be consolidated with OU 2 soils on-site and contained. It is anticipated that sediment will be removed to a 2-foot depth along the entire creek, unless coarse material or bedrock is encountered first. The volume of sediment to be removed is estimated to be 2,600 cubic yards. Water flow from Feeder Creek would be redirected during remediation activities. This would most likely be achieved by temporarily pumping water around the removal area. It is anticipated that the entire channel would be excavated, a geotextile would be placed, and rip-rap substrate would be placed on top. However, in the event that removal of 2-feet eliminates all mirex contamination a cover may not be necessary. The detailed design will follow the PDI and determine the most cost-effective combination of removal and cover to mitigate future mirex releases and preserve the surface water management function of the creek.

(2) *Treatment Technologies and Materials Addressed*: There is no treatment component associated with this remedy. Treatment has not been considered because there are no feasible, cost-effective, in-situ or ex-situ treatment technologies for mirex, due to mirex's resistance to both chemical and biological breakdown and because the levels of mirex in the Site's sediments and floodplain soils are low and widely dispersed.

(3) *Containment Component*: There is a containment component associated with this remedy for the floodplain soils and sediments that would be consolidated with OU 2 contaminated soils. As selected in the ROD for OU 2, at least 11 acres of the former plant site will be contained using a cap comprised of an impermeable membrane and soil, or soil only.[15] The remedial design for OU 2 is currently being completed, and the additional soil and sediment from OU 3 can easily be incorporated under the cap. The primary basis for the OU 2 cover is to prevent contact with residual mirex contamination, particularly for ecological receptors. Mirex levels in surface soil of OU 2 are much higher than the levels found in OU 3, and thus use of the OU 2 cap for OU 3 contaminated soils and sediment is not expected to affect the effectiveness or require modification of the OU 2 remedy.

(4) *Costs*: The estimated present worth of this alternative is $2,180,000. This estimate is based on construction costs for soil and sediment removal over several months to about a year, and a

15 PDI information for OU 2 indicates that the capped area will be larger than anticipated in the OU 2 ROD.

30-year period of MNR. The estimate uses a discount rate of 5% for all present worth calculations. The total estimated cost is provided in 2008 dollars.

Alternative C

(1) *Description of Alternative*:

- MFLBC Sediment – This alternative includes targeted removal of MFLBC sediment to meet the remediation goal. Sediment removal by dredging or dry excavation would be conducted in more highly contaminated areas within the reach between approximately RM 31 and RM 37.6. A targeted removal approach would be developed to achieve the SWAC-based remediation goal while minimizing short-term impacts to aquatic and riparian habitats. The estimated fine-grained sediment body volume to be removed is approximately 4,300 cubic yards. The PDI would include further delineation of sediment bodies for removal. This alternative also includes the option of using post-removal backfilling in some areas to achieve the sediment SWAC-based remediation goal, if residual mirex levels are too high and additional removal is not practical.

  Sediment remediation would occur starting upstream and working downstream. To access the sediment in the MLFBC, staging areas would likely be required along the MFLBC. Floodplain areas requiring remediation may be used for this purpose, where possible, to minimize the number of disturbed floodplain areas; however, it may also be necessary to perform clearing/grubbing of vegetation in the floodplain and construction of temporary access roads in other areas so that equipment can be placed along the stream for dredging. It is anticipated that dredged sediment will be loaded into trucks/tankers and transported to the former Nease facility for dewatering, rather than setting up temporary dewatering facilities along the creek. After dewatering, the dry sediment would be consolidated with OU 2 contaminated soils within the Nease facility, and capped and covered as called for in the OU 2 ROD. A long-term fish monitoring program would be conducted to assess the effectiveness of sediment dredging.

- MFLBC Floodplain Soil – Contaminated floodplain soils would be remediated identically to the approach in Alternative B.

- Feeder Creek Sediment – Contaminated sediments in Feeder Creek would be remediated identically to the approach in Alternative B.

(2) *Treatment Technologies and Materials Addressed*: Similar to Alternative B, there is no treatment component associated with this remedy.

(3) *Containment Component*: As described above in Alternative B, there is a containment component associated with this remedy for the floodplain soils and sediments that will be consolidated with OU 2 contaminated soils.

(4) *Costs*: The estimated present worth of this alternative is $3,770,000. This estimate is based on construction costs for soil and sediment removal over about a year, and scheduled fish monitoring periodically over a 30-year period. The estimate uses a discount rate of 5% for all present worth calculations. The total estimated cost is provided in 2008 dollars.

9.2 Common Elements and Distinguishing Features of Each Alternative

Table 9 summarizes the common elements and distinguishing features of the major remedy components for each of the three remedial alternatives.[16]

Alternative	MFLBC Sediment	MFLBC Floodplain Soil	Feeder Creek Sediment	Cost
Alternative A	No action	No action	No action	none
Alternative B	MNR	Targeted removal to meet remediation goal	Remove all sediment	$2,180,000
Alternative C	Targeted removal to meet remediation goal	Targeted removal to meet remediation goal	Remove all sediment	$3,770,000

Table 9: Summary of Major Remedy Components for Each Alternative

Both of the active remedial alternatives, B and C, share some additional common elements. These common elements include remedial action components, as well as PDI activities. The common elements are summarized below and described in more detail in the FS.

9.2.1 Common Remedial Elements

No Remediation for Portions of the MFLBC

Based on the ecological and human health-based remediation goal of 0.5 mg/kg mirex in sediment and the sediment data, there are no known locations downstream of RM 31 or upstream of RM 37.6 where unacceptable risks from sediment exist. Similarly, based on the ecological and human health-based remediation goal of 1.0 mg/kg mirex in floodplain soil and the most recent floodplain data in 2006, there are no known locations downstream of RM 31 or upstream of RM 37.6 where unacceptable risks from floodplain soil exist. Therefore, both active remedial alternatives focus on remediation in and along the reach from RM 37.6 to RM 31. Both alternatives include no remediation for the rest of the sediment and floodplain soil in and along the MFLBC (although fish sampling may occur both up- and downstream).

Sediment Control Structures on Feeder Creek

Both of the active alternatives will include removal of the existing sediment control structures on Feeder Creek. These were constructed as an interim measure to mitigate the release of mirex-

16 Pertaining to MFLBC sediments, the FS was prepared in accordance with U.S. EPA's "Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites" (2002) and "Contaminated Sediment Remediation Guidance for Hazardous Waste Sites" (2005). As such, capping was considered as a remedial alternative, but was eliminated due to the size and depth of the creek.

contaminated sediment into the MFLBC. The active alternatives address the Feeder Creek to MFLBC pathway. Therefore, the existing sediment control structures on Feeder Creek would no longer be necessary.

Transport and Disposal of Removed Sediment/Soil

Both of the active alternatives include removal of floodplain soil and/or sediment, which will be transported for consolidation with OU 2 contaminated soil at the Site (on the former Nease manufacturing property beneath the planned OU 2 low permeability cap).

Former Nease Facility Surface Water Management

The selected remedy for OU 2 requires surface water management at the former Nease Manufacturing Site. It is important to ensure that erosion of site soils cannot re-contaminate Feeder Creek and the MFLBC. As part of the OU 2 remedy, soil covers will be placed on all areas that exceed the OU 2 ecological surface soil remediation goal of 1 mg/kg. These covers will mitigate the future release of unacceptable levels of mirex into the creek system. The consolidated OU 3 materials will be placed in areas to be covered and graded to integrate with the surface water management plan.

Construction/Performance Monitoring

Construction and performance monitoring are required for demonstrating the compliance of any implemented remedy with the remedial goals. Construction monitoring will be used to assess acute risks to the community, ecology, and workers that may occur as a result of implementing the remedy. Performance monitoring will be used post-remediation to assess whether short- and long-term risk reduction goals will be met by the implemented remedy. Both active alternatives will require a combination of construction and performance monitoring.

9.2.2 Pre-Design Investigation (PDI)

Each of the active remedial alternatives would require a PDI. It is anticipated that the OU 3 PDI will include the following activities (the complete, final scope will be developed through an Agency approved PDI Work Plan):

MFLBC Sediment/Fish

- Detailed mapping of fine-grained sediment bodies in the targeted remediation area. The sediment mapping will be used in the detailed design of sediment remediation.

- Sediment sampling for mirex and total organic carbon analysis. This assessment may include the collection of sediment pore water for analysis of mirex to determine whether BAFs can be better correlated with pore water concentrations. Sediment sampling for mirex analysis will provide a baseline for assessing whether remedial goals are met. Sediment sampling will likely target fine-grained sediments because mirex is more likely to adhere to these sediments. Discrete sampling will likely be performed to determine whether there are "hot-spots" where targeted remediation can be conducted to efficiently achieve the remediation goal. In addition to surface sampling, depth-discrete sampling will be conducted to evaluate buried mirex contamination that needs to be addressed as part of the remedy.

- Fish sampling for mirex and percent lipid analysis. Fish analyses would include both whole body and fillet samples to provide a baseline sampling event consistent with the anticipated long-term fish monitoring program discussed in Section 9.2.3, below.

MFLBC Floodplain Soil

- Physical characterization of areas targeted for removal. Physical assessments may include assessing surface water drainage patterns to determine whether excavating and/or backfilling floodplain soils can be conducted without adversely affecting surface water drainage.

- Chemical characterization of areas targeted for removal. This assessment will include mirex and total organic carbon analyses. Discrete sampling will likely be performed to determine whether there are "hot-spots" where targeted remediation can be conducted to efficiently achieve the remediation goal.

Floodplain/Wetlands

An assessment of the 100-year floodplain and the presence/absence of wetlands in areas where remediation may be conducted will be included in the PDI to provide data for design.

9.2.3 Operation, Monitoring and Maintenance

The remediation goals for MFLBC sediment and floodplain soil, and the complete removal of contaminated sediment from Feeder Creek will allow for unrestricted use and unlimited access for those media once the goals are met. There will be no operation or maintenance required for the sediments or floodplain soils. However, soils and sediments will be consolidated with contaminated soils from OU 2 and contained on site. Operation, monitoring and maintenance of the consolidated materials will be as required for soils in the OU 2 ROD.

Both alternatives would include post-construction monitoring:

Surface Water Sampling

Mirex levels in surface water in Feeder Creek and MFLBC will be measured at least once after the post-construction recovery period.

Long-Term Fish Monitoring Program

Ohio EPA proposed a long-term sampling plan for the MFLBC that is included as Appendix K in the FS. The plan calls for sampling of fish for mirex after a post-construction recovery period, allowing the ecological system time to begin to recover from construction activities. The frequency of fish sampling will be flexible and will be identified in the remedial design based on the results of the baseline monitoring and first post-remediation monitoring event. Alternative B would have a more intensive long-term monitoring program.

9.2.4 Institutional Controls

The remediation goals for MFLBC sediment and floodplain soil, and the complete removal of contaminated sediment from Feeder Creek will allow for unrestricted use and unlimited access

for those media once the goals are met. Current risk from direct contact with floodplain soils and MFLBC sediment is at or below U.S. EPA's acceptable risk range. Therefore, no institutional controls are required for Feeder Creek or MFLBC sediments or floodplain soils. However, soils and sediments will be consolidated with contaminated soils from OU 2 and contained on site. Institutional control for the consolidated materials will be as required for soils in the OU 2 ROD.

As discussed in Section 2.2.2, there is currently a fish consumption advisory that recommends consuming no more than one meal per month of carp between Allen Road and State Route 14 in Millville, a distance of about 12 river miles downstream of the Nease facility. It is anticipated that the results of fish tissue monitoring will be used to re-assess the need for a sport fishing advisory based on mirex.

9.3 Expected Outcomes of Each Alternative

Alternative A, which includes no active remediation measures, would not achieve protectiveness in the foreseeable future. Alternatives B and C are both expected to be protective, attain ARARs, and achieve the RAOs and remediation goals for the operable unit. Neither Alternative B nor C requires long-term land-use restrictions on Feeder Creek or MFLBC sediment or floodplain soil. Alternative B relies on natural processes to address mirex contamination in MFLBC sediments. While it is difficult to predict the time to attain the sediment goals using MNR, it is anticipated that Alternative B will take much longer than Alternative C. Both active remedial alternatives will require a PDI, and each requires about the same time to complete physical construction (several months to about one year). Both Alternatives B and C leave Feeder Creek and MFLBC sediments and floodplains available for unrestricted use and unlimited exposure. It is anticipated that the sport fish consumption advisory due to mirex may be further relaxed or lifted at the completion of the remedial action, and this is expected to be faster for Alternative C.

9.4 Preferred Alternative

The preferred alternative described in the Proposed Plan for OU 3 of the Nease Site was Alternative C. The estimated cost of the preferred alternative is $3,770,000.

10.0 Summary of Comparative Analysis of Alternatives

This section explains the U.S. EPA's rationale for selecting the preferred alternative. The U.S. EPA has developed nine criteria to evaluate remedial alternatives to ensure that important considerations are factored into remedy-selection decisions. These criteria are derived from the statutory requirements of Section 121 of CERCLA, the NCP, as well as other technical and policy considerations that have proven to be important when selecting remedial alternatives. When selecting a remedy for a site, U.S. EPA conducts a detailed analysis of the remedial alternatives consisting of an assessment of the individual alternatives against each of the nine evaluation criteria and a comparative analysis focusing upon the relative performance of each alternative against those criteria.

The nine evaluation criteria are described below.

Threshold Criteria

The two most important criteria are statutory requirements that must be satisfied by any alternative in order for it to be eligible for selection.

1. Overall protection of human health and environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls or institutional controls.

2. Compliance with ARARs addresses whether or not a remedy will meet all of the **A**pplicable or **R**elevant and **A**ppropriate **R**equirements of other Federal and State environmental statutes and/or provide grounds for invoking a waiver.

Primary Balancing Criteria

Five primary balancing criteria are used to identify major trade-offs between remedial alternatives. These trade-offs are ultimately balanced to identify the preferred alternative and to select the final remedy.

3. Long-term effectiveness and permanence refers to the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met.

4. Reduction of toxicity, mobility, or volume through treatment addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity, mobility or volume of the hazardous substances as their principal element. This preference is satisfied when treatment is used to reduce the principal threats at the site through destruction of toxic contaminants, reduction of the total mass of toxic contaminants, irreversible reduction in contaminant mobility, or reduction of total volume of contaminated media.

5. Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community and the environment during construction of the remedy until cleanup levels are achieved. This criterion also considers the effectiveness of mitigation measures and time until protection is achieved through attainment of the RAOs.

6. Implementability addresses the technical and administrative feasibility of a remedy from design through construction, including the availability of services and materials needed to implement a particular option and coordination with other governmental entities.

7. Cost includes estimated capital costs, annual operation and maintenance costs (assuming a 30-year time period), and net present value of capital and operation and maintenance costs, including long-term monitoring.

Modifying Criteria

These criteria may not be considered fully until after the formal public comment period on the Proposed Plan and RI/FS Report are complete.

8. State Acceptance considers whether the State support agency concurs with the selected remedy for the site.

9. Community Acceptance addresses the public's general response to the remedial alternatives and the preferred alternative presented in the Proposed Plan. This ROD includes a responsiveness summary that summarizes the public's comments and U.S. EPA's response to those comments. The responsiveness summary is included as Appendix A.

The full text of the detailed analysis of the three remedial alternatives against the nine evaluation criteria (including both the individual analysis and the comparative analysis) is contained in the FS Report for OU 3 which is included in the Administrative Record for the Site. Because the two Modifying Criteria cannot be fully evaluated until public comment is received, they were not evaluated in the FS. The responsiveness summary of this ROD contains a more detailed discussion of public comments received. This section of the ROD summarizes the highlights of the comparative analysis.

10.1 Overall Protection of Human Health and the Environment

Under the current use scenarios, all remedial alternatives for OU 3, including Alternative A: No Action, provide protection of human health. However, Alternative A: No Action does not provide current protection of ecological receptors, nor does it address potential future human health or ecological risks.

Alternatives B and C will both provide future protection of human health and the environment. However, the timeframe to achieve protection is expected to be longer for Alternative B than Alternative C. The greatest certainty of timely protection of human health and the environment is provided by Alternative C because the remediation goals and RAOs for both sediment and floodplain soil will be met more quickly, while using a targeted approach to minimize environmental disruption. Differences between alternatives are discussed more fully below in Sections 10.3 through 10.7.

10.2 Compliance with ARARs

Alternatives B and C are expected to comply with action-specific and location-specific ARARs, and include monitoring to demonstrate compliance. There are no chemical-specific ARARS or TBCs that apply to mirex contamination in soils or sediments. Ohio EPA has promulgated water quality criteria for surface water in the State of Ohio within the Ohio River drainage basin (including the MFLBC) (OAC 3745-1-34) including a value of 0.00011 ug/L for mirex in surface water in the Ohio River Basin based on human health considerations including drink and nondrink exposures. For the selected remedy, these criteria may be ARARs for Feeder Creek and

the MFLBC if there are discharges to these water bodies as a result of the response action. Since no active remedial measures would take place under Alternative A, no additional action-specific or location-specific ARARs apply.

10.3 Long-Term Effectiveness and Permanence

Alternative C will have the highest long-term effectiveness and permanence because the highest levels of mirex contamination will have been removed from each component of the system and safely contained under a clean cover, after consolidation with the OU 2 soils. Effectiveness and permanence will be assured by a long-term operation, monitoring and maintenance program, as well as by the institutional controls required in the OU 2 ROD. Alternative B provides a greater long-term effectiveness for floodplain soil and Feeder Creek sediment than Alternative A because active remediation will be conducted. Alternative C contains the same features as Alternative B for Feeder Creek and the floodplain soils, and also the added effectiveness and permanence of sediment removal from the MFLBC. While MNR of the MFLBC sediments is expected to be protective in the long-term, there is a greater risk that events (such as a major storm) could disrupt the natural recovery process and decrease the long-term effectiveness and permanence for Alternative B.

Alternative A leaves all contaminated media in place within the operable unit with no active remedial measures. While the EA assessed that the risks to human health were acceptable under the current use scenarios, Alternative A does not provide current protection of ecological receptors, nor does it address potential future human health or ecological risks. The remediation goals and RAOs may eventually be achieved through naturally-occurring processes for the MFLBC sediment, but no monitoring would be conducted to assess the progress of recovery or the overall condition of the Site over time. It is less certain that naturally-occurring processes will allow the floodplain soils to reach the soil remediation goals and meet the RAOs. Considering the persistence of mirex in the environment, an unacceptably long period of time would be required until protection would be achieved.

10.4 Reduction of Toxicity, Mobility, or Volume Through Treatment

None of the three alternatives includes active treatment of contaminated materials; therefore, there is no reduction in toxicity, mobility, or volume through treatment for any alternative. The reduction of exposures (and associated toxicity) to mirex-contaminated OU 3 media is highest for Alternative C since it provides for removal of the most contaminated and bioavailable mirex-contaminated media from the system and safe containment of the materials. Alternative A provides the least reduction in exposure since no remediation will occur. Exposure reductions are not associated with treatment *per se,* as feasible treatment methods are not available.

10.5 Short-Term Effectiveness

Alternative A will result in the least short-term adverse impacts, as no additional action will be taken. Alternative C will result in the highest degree of short-term impacts, including disruption of aquatic and riparian habitats. Due to the resistance of mirex to degradation, the time frame for

remediation will be longest for Alternative A, and will be longer for Alternative B than for Alternative C. Because Alternative C includes the removal of mirex to meet the remediation goals from all three impacted areas (MFLBC sediment and floodplain and Feeder Creek sediment), it will provide the shortest overall remediation time frame. Construction of both Alternatives B and C is expected to be complete within several months to about a year. Implementation of appropriate health and safety practices should protect both remediation workers and the community from unacceptable exposure during construction of all alternatives.

10.6 Implementability

All three alternatives are technically implementable since the technologies and skills are readily available. Alternative A is the easiest to implement, as no further action is needed. Alternative C is the most difficult to implement due to potential difficulties accessing some portions of the floodplain and the MFLBC for soil and/or sediment removal. The monitoring for all alternatives can be readily performed.

10.7 Cost

Cost includes estimated capital costs and annual operation and maintenance costs (assuming a 30-year time period). Present worth cost represents the total cost of an alternative over time in terms of today's dollar value. In accordance with U.S. EPA guidance, cost estimates developed for the FS are expected to be accurate within a range of +50 to -30 percent.

Detailed cost estimates for each of the three alternatives are presented in the FS Report. The estimated present worth costs to implement the potential remedial alternatives at OU 3 of the Nease Site are as follows:

- Alternative A: no cost
- Alternative B: $2,180,000
- Alternative C: $3,770,000

The cost differences between Alternatives B and C are based on the costs of actively managing the MFLBC sediment in Alternative C versus MNR in Alternative B.

10.8 State Agency Acceptance

The Nease Site RI/FS investigations were conducted under a tri-party order with Ohio EPA, U.S. EPA, and ROC. Ohio EPA has worked cooperatively with U.S. EPA in the RI/FS process, and state concurrence with the ROD is anticipated. Any correspondence from the State regarding concurrence with the selected remedies will be added to the Administrative Record.

10.9 Community Acceptance

During the public comment period on the Proposed Plan, the community expressed some concerns, as well as support for or opposition to the proposed remedy for OU 3 of the Nease Site.

Most commenters generally supported cleanup of OU 3 and were pleased that the problem is being addressed. As discussed in the Responsiveness Summary found as Appendix A to this ROD, public concerns focused on: remedy options; health concerns; cleanup goals; timeliness of the clean up; floodplain property owner concerns; remedy implementation; oversight of the current work; and miscellaneous comments.

11.0 Principal Threat Wastes

The NCP establishes an expectation that U.S. EPA will use treatment to address principal threats posed by a site wherever practicable. The term "principal threat" refers to source materials that are considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. Conversely, source materials that generally can be reliably contained and that would present only a low risk in the event of exposure are not a principal threat waste.

The soil and sediment in OU 3 of the Nease Site comprises low toxicity source material. Under current scenarios there is no unacceptable human health risk. The mirex concentrations are not greatly above risk levels for ecological receptors or potential future human exposures. Mirex is relatively immobile in air or groundwater, generally will remain sorbed to soil or sediment particles, and does not dissolve into surface water. Therefore, no principal threat wastes were identified for OU 3 of the Nease Site.

Because no principal threat wastes occur in OU 3 media, this ROD does not formulate treatment alternatives that will address the principal threats. There is no treatment component associated with the low toxicity source material (soil and sediment) for any of the remedial alternatives because there are no feasible, cost-effective, in-situ or ex-situ treatment technologies for mirex, due to mirex's resistance to both chemical and biological breakdown and because the levels of mirex in the Site's sediments and floodplain soils are low and widely dispersed.

12.0 Selected Remedy

This section describes the selected remedy and provides U.S. EPA's reasoning behind its selection. Alternatives can change or be modified if new information is made available to U.S. EPA through further investigation or research. An appropriate range of alternatives was developed, based upon the initial screening of technologies, the potential for contaminants to impact the environment, and site-specific RAOs and goals.

12.1 Identification of the Selected Remedy and Summary of the Rationale for its Selection

Based on the analysis of the nine criteria conducted in the FS Report and summarized in Section 10 of this ROD, the selected remedy for OU 3 of the Nease Chemical Site is Alternative C. This alternative represents the best balance of overall protectiveness, compliance with ARARs, long-term effectiveness and permanence, costs, and other criteria, including State and community acceptance.

12.2 Description of the Selected Remedy

A summary of the selected remedy, Alternative C is provided below:

(1) *Description of Alternative*:

- MFLBC Sediment – The selected alternative includes removal of MFLBC sediment. A targeted removal approach will be developed to achieve the SWAC-based remediation goal while minimizing short-term deleterious impacts to aquatic and riparian habitats.
    - Sediment remediation will be conducted in the MFLBC reach between approximately RM 31 and RM 37.6. Based on sediment sampling results, there are three primary sections where removal likely will be necessary: RM 31 to RM 32.3; RM 32.8 to RM 35.8; and RM 36.3 to RM 36.9. The estimated fine-grained sediment body volume within these reaches is approximately 4,300 cubic yards. The PDI will include further delineation of sediment bodies for targeted removal to ensure the SWAC-based remediation goal is met.

    - To access the sediment in the MLFBC, staging areas will likely be required along the MFLBC. Floodplain areas requiring remediation may be used for this purpose, where possible, to minimize the number of disturbed floodplain areas; however, it also may be necessary to perform clearing/grubbing of vegetation in the floodplain and construction of temporary access roads in other areas so that equipment can be placed along the stream for dredging.

    - The FS cost estimates assume that mechanical dredging/removal will be the most practical approach (e.g. using a backhoe from the creek banks), although hydraulic removal via vacuum truck (or similar) may be more cost-effective in some areas. Mechanical dredging operations will likely include the installation of sheet pile coffer dams (or similar) to isolate and dewater sediment bodies to reduce the amount of sediment dewatering subsequently required. Sediment remediation will occur starting upstream and working downstream to allow for re-capture of sediment particles that become resuspended as a result of disturbance. Construction monitoring for dredging may include measuring downgradient transport of resuspended particles (e.g. by using real-time turbidity meters).

    - It is anticipated that dredged sediment will be loaded into trucks/tankers and transported to the former Nease facility for dewatering, rather than setting up temporary dewatering facilities along the creek. This approach will lead to less disturbance of the floodplain since it will allow for smaller staging areas along the MFLBC. It is anticipated that dewatering will be conducted using Geotubes® (or a similar approach) which have been shown to produce water free of particulates. If it is determined during detailed design of this technology that treatment of the residual water is necessary, it will likely involve additional filtration and, possibly, adsorption using activated carbon. The existing on-Site treatment plant may be considered for

this treatment process (it is part of the selected remedy for water treatment in OU 2), or a separate facility may be constructed depending upon various factors such as cost and feasibility. The details of any required treatment would be developed as part of the remedial design.

- The ideal time for conducting sediment removal is when surface water flow rates are low. Based on data collected by USGS on Little Beaver Creek at East Liverpool, discharge rates in this watershed are highest from January to May and are lowest from June to October. It is anticipated that construction of this alternative can be accomplished within one construction season between June and October. Assuming that mechanical removal is used for dredging, the volume of water removed with sediment will be minimized (compared to hydraulic methods). It is expected that about 20 truck trips per day may be required to transport sediment from MFLBC to the former Nease facility for dewatering throughout the construction period. After dewatering, the dry sediment will be consolidated with OU 2 contaminated soils within the Nease facility, and capped and covered as called for in the OU 2 ROD.

- This alternative also includes the option of using post-removal backfilling in some areas to achieve the sediment SWAC-based remediation goal, if residual mirex levels are too high and additional removal is not practical. Post remediation sediment sampling will be conducted to confirm attainment of the remediation goal.

- A long-term fish monitoring program will be conducted to assess the effectiveness of sediment dredging.

- MFLBC Floodplain Soil – Contaminated soil will be excavated with conventional equipment. A targeted removal approach will be developed to achieve the remediation goal while minimizing short-term deleterious impacts to riparian habitats.
  - Floodplain soil remediation will be conducted in the river mile reach between approximately RM 31 and RM 37.6. Based on current floodplain soil sampling results, there are three primary sections where removal likely will be necessary: between about RM 35.4 to RM 34.8; near RM 33.3; and near RM 32.9. These areas comprise about 6.5 acres, with an estimated in-place volume of 5,300 cubic yards of contaminated soil. The PDI will include further delineation the extent of floodplain areas to be removed to ensure the remediation goal is met.

  - To access the contaminated floodplains along the MLFBC, legal access will be required of property owners. It may be necessary to perform clearing/grubbing of vegetation in the floodplain and construction of temporary access roads in other areas so that equipment can be moved into the areas requiring excavation.

  - Soil removal would use conventional equipment. Construction monitoring for a soil excavation would likely include dust control and monitoring. Following excavation of the contaminated soil, the area will be restored using clean fill that is able to

support vegetation. Backfill will be placed as necessary to maintain proper surface water management and avoid erosion.

- Removed floodplain soil will also be transported to the former Nease facility in a similar manner (e.g., small trucks). It is expected that floodplain soil and sediment removal will be conducted simultaneously and can both be completed within the same construction period. At the Nease facility, floodplain soils will be consolidated with OU 2 contaminated soils. Following consolidation, the soils will be capped and covered as called for in the OU 2 ROD.

- Feeder Creek Sediment – Contaminated sediments in Feeder Creek would be removed and residuals (if any) covered to mitigate potential future releases of mirex into the MFLBC. Excavated sediments would be consolidated with OU 2 soils on-site and contained. It is anticipated that sediment will be removed to a 2-foot depth along the entire creek, unless coarse material or bedrock is encountered first. The volume of contaminated sediment is estimated to be 2,600 cubic yards. Water flow from Feeder Creek will be redirected during remediation activities, most likely by temporarily pumping water around the removal area. It is anticipated that the entire channel would be excavated, a geotextile would be placed, and rip-rap substrate will be placed on top. However, it is anticipated that a 2-foot excavation depth may eliminate all mirex contamination. In that case, a cover may not be necessary or the design may be modified for erosion control purposes. The detailed design will follow the PDI and determine the most effective combination of removal and cover to mitigate future mirex releases and preserve the surface water management function.

- The common elements discussed in Section 9.2 (common remedial elements; PDI; and long-term monitoring) will be included as components of the remedy. It is anticipated that OU 3 will not require institutional controls upon completion of the remedy. However, soils and sediments will be consolidated with contaminated soils from OU 2 and contained on site. Operation, monitoring and maintenance and institutional control of the consolidated materials will be as are required for soils in the OU 2 ROD.

12.3 Summary of the Estimated Remedy Costs and Time Required for Implementation

The estimated cost of the selected remedy for OU 3 of the Nease Site is $3,770,000. The physical construction of the remedy is estimated to take approximately several months to about one year to complete. Post-construction monitoring of surface water and fish will occur on a schedule established during remedial design. A summary of costs for the OU 3 cleanup is shown in Table 10, while a detailed estimate of the costs is provided in Table 11.

12.4 Expected Outcomes of the Selected Remedy

The selected remedy for OU 3 of the Nease Site, Alternatives C, will quickly achieve the remediation goals and RAOs for OU 3. The selected remedy will be protective and is expected to attain ARARs. It is anticipated that the selected remedy will not leave contaminated materials in place above the remediation goals in soil and sediment at the Site, and does not require long

term land-use restrictions on these media. MFLBC floodplain soil and sediment and Feeder Creek of OU 3 will be available for unrestricted use and unlimited exposure at the completion of the remedial action, and institutional controls will not be required.

The selected remedy requires a PDI to more fully delineate conditions within the target response area and to establish design parameters to ensure attainment of the remediation goals while minimizing short-term deleterious impacts to aquatic and riparian habitats. After the physical construction period (estimated to be from several months to about one year), there will be immediate risk reductions to ecological receptors by mitigating contact with mirex in soil and sediment. Feeder Creek will no longer be a potential source of contamination to the MFLBC. The MFLBC sediments will no longer be a potential source of further floodplain contamination at unacceptable levels. Should the dairy farmers return cattle to the floodplain, uptake of mirex (if any) is expected to be below acceptable risk-based levels. However, U.S. EPA and Ohio EPA intend to work with the farmers and ROC to protect the floodplain habitat, possibly by encouraging the continued exclusion of cattle. Additionally, once the MFLBC begins to recover, there should be reductions of bioaccumulation of mirex in biota, and risk reductions for consumers of those biota. U.S. EPA anticipates that the selected remedy may allow the sport fish consumption advisory due to mirex to be further relaxed or lifted.

The actions to remediate OU 3 that will result from this ROD are compatible with the ROD previously issued for OU 2 (soils, groundwater, and source areas at the facility), signed in September 2005. This ROD is the second of two planned RODs for the Nease Chemical Site. The selected remedies specified in this ROD and the OU 2 ROD will serve as the final actions for the entire Site.

13.0 Statutory Determinations

Under CERCLA Section 121 and the NCP, remedies selected for Superfund sites are required to be protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a waiver is justified), be cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the toxicity, mobility or volume of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the selected remedy for OU 3 of the Nease Chemical Site meets these statutory requirements.

13.1 Protection of Human Health and the Environment

The current and potential future risks at OU 3 of the Nease Site are primarily due to the potential presence of mirex in floodplain soils and sediment. The mirex in the floodplain soils and sediment can bioaccumulate in fish and/or beef and milk, causing potential risks for consumers. Implementation of the selected remedy will be protective of human health and the environment through the removal of contaminated soils and sediments above the remediation goals, and safe long-term containment of the material. The OU-specific RAOs and remediation goals were

developed to protect current and future receptors that are potentially at risk from contaminants at OU 3. The selected remedy will meet the RAOs and the remediation goals. Feeder Creek and the sediments and floodplains of the MFLBC will be available for unrestricted use and unlimited exposure at the completion of the remedial action.

13.2 Compliance with ARARs

Section 121(d) of CERCLA requires that Superfund remedial actions meet ARARs. A brief discussion of the primary ARARs is provided below. In addition to ARARs, non-enforceable guidelines, criteria, and standards may be useful in designing the selected remedy. As described previously in Section 8.2 of this ROD, these guidelines, criteria and standards are known as TBCs. The selected remedy will comply with the ARARs for the Site. ARARs for the selected remedy, Alternative C are shown in Table 8.

The selected remedy involves disturbing surficial materials in floodplain areas of the MFLBC. These activities can be conducted in a manner that will comply with the substantive requirements of location and action-specific ARARs including local and State Erosion and Sediment Control ARARs, ambient air quality standards for particulates during remediation, and protection of wetlands and floodplains. Similarly removal of sediment from Feeder Creek and the MFLBC triggers Ohio Water Quality Criteria that are related to dredging, filling, obstructing or altering waters of the state.

With respect to OU 3 media, there are no chemical-specific ARARS or TBCs that apply to mirex contamination in soils or sediments. U.S. EPA has not promulgated any sediment criteria, nor has published a soil screening level for mirex. In addition, Ohio EPA has not published any standards or guidance for mirex in soil or sediment. Ohio EPA has promulgated water quality criteria for surface water in the State of Ohio within the Ohio River drainage basin (including the MFLBC) (OAC 3745-1-34) including a value of 0.00011 ug/L for mirex in surface water in the Ohio River Basin based on human health considerations including drink and nondrink exposures. For the selected remedy, these criteria may be ARARs for Feeder Creek and the MFLBC if there are discharges to these water bodies as a result of the response action. In addition, U.S. EPA have unpromulgated Water Quality Criteria to give guidance to states for setting water quality criteria. For mirex, U.S. EPA has recommended a chronic continuous concentration of 0.001 ug/L, based on the protection of aquatic life, and is a TBC for OU 3.

To the extent not otherwise listed in the ARAR and TBC table for this ROD, the OU 2 ROD addresses ARARs and TBCs for capping soil contamination on-site, and consolidation of the OU 3 contaminated soils and sediments with the OU 2 contaminated soils prior to capping, as called for by this ROD, will not interfere with the overall selected remedy complying with ARARs applicable to OU 2 as well as OU 3.

Specific requirements needed to comply with the ARARs will be included with the detailed remedial design, including a wetlands assessment and floodplain evaluation. Engineering controls and monitoring will be used to assure that the final remedy complies with the substantive requirements of ARARs. While there are several location and action-specific

ARARs and TBCs that will be addressed during remedial design, none are anticipated to be problematic and compliance with these requirements is expected.

13.3 Cost Effectiveness

U.S. EPA has determined that the selected remedy for the OU 3 at the Nease Chemical Site is cost effective and represents a reasonable value for the money to be spent. A cost-effective remedy in the Superfund program is one whose costs are proportional to its overall effectiveness. The overall effectiveness of the potential remedial alternatives for OU 3 was evaluated in the FS by considering the following three criteria: long-term effectiveness and permanence; reduction in toxicity, mobility and volume through treatment; and short-term effectiveness. The overall effectiveness was then compared to cost to determine whether an alternative is cost effective. Of the remedial alternatives evaluated for this OU, Alternative C (the selected remedy) provides the highest degree of overall effectiveness. Although Alternative B costs about $1.6 million less, it has a far greater degree of uncertainty regarding long-term effectiveness and permanence because of uncertainties related to the natural processes of the MNR for the MFLBC sediments.

13.4 Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

U.S. EPA has determined that the selected remedy, Alternative C, represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at OU 3 of the Nease Site. Of those alternatives that are protective of human health and the environment and comply with ARARs, U.S. EPA has determined that the selected remedy provides the best balance of trade-offs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element and considering State and community acceptance.

As discussed in Section 10 of this ROD, the selected remedy (Alternative C) provides the highest degree of long-term effectiveness and represents a more permanent solution than other alternatives for OU 3 of the Nease Site. None of the alternatives uses treatment to reduce toxicity, mobility, or volume. However, the selected remedy provides the greatest reduction in toxicity by removing bioavailable mirex from the ecosystem and the greatest reduction in mobility by containing the most highly contaminated floodplain soils and sediments. While the selected alternative will have greater short-term effects from construction in the MFLBC, the targeted removal approach will minimize short-term deleterious impacts to aquatic and riparian habitats while reaching the remediation goals and attaining RAOs significantly faster. During comment on the FS, the Ohio EPA indicated that it preferred an active approach to remediation of the MFLBC sediments rather than MNR.

The selected remedy addresses risks by removing more highly contaminated floodplain soils and sediments from the ecosystem and safely containing them at the old manufacturing plant. For this OU, removal, consolidation with OU 2 material, and containment are found to provide the best balance of tradeoffs, because there are no feasible, cost-effective, treatment technologies for

mirex. Long-term effectiveness will be achieved through applying the engineering controls; operation, monitoring and maintenance; and institutional controls required by the OU 2 ROD.

13.5 Preference for Treatment as a Principal Element

As discussed in Section 11 of this ROD, no principal threat wastes were identified for OU 3. Because no principal threat wastes occur in OU 3 media, this ROD cannot formulate treatment alternatives that will address the principal threats. Additionally, there is no practicable treatment component associated with the floodplain soil and sediment for the selected alternative because there are no feasible, cost-effective, in-situ or ex-situ treatment technologies for mirex.

However, for the Site as a whole, principal threat wastes include the highly contaminated sludge and fill in two of the former waste ponds and DNAPL in groundwater. The selected OU 2 remedy provides treatment of these principal threat wastes through the use of treatment technologies. Thus, the statutory preference for remedies that employ treatment as a principal element is satisfied for the Nease Chemical Site as a whole.

The selected remedy does not call for off-site disposal of untreated wastes, thereby meeting the CERCLA bias against off-site disposal of untreated wastes.

13.6 Five-Year Review Requirements

The NCP requires that the remedial action be reviewed no less often than every five years if the remedial action results in hazardous substances, pollutants or contaminants remaining at the Site above levels that allow for unlimited use and unrestricted exposure. The selected remedy for OU 3 will result in hazardous substances, pollutants, or contaminants remaining in Feeder Creek and MFLBC sediments and floodplain soils at levels that allow for unlimited use and unrestricted exposure at the completion of the remedial action. However, the OU 3 soils and sediments that will be consolidated on-site with the OU 2 soils are anticipated to contain mirex at levels that do not allow for unlimited use and unrestricted exposure at the completion of the remedial action, and will require a statutory review.

Additionally, the previously selected remedy for OU 2 will result in hazardous substances, pollutants, or contaminants remaining on some portions of OU 2 above levels that allow for unlimited use and unrestricted exposure at the completion of the remedial action. Because the remedies at the Nease Site will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of the first remedial action to ensure that the remedies are, or will be, protective of human health and the environment.

It is not certain how quickly after completion of the MFLBC sediment remediation mirex levels will be reduced in fish. Therefore, the long-term fish monitoring will be considered for at least two five-year reviews.

14.0 Documentation of Significant Changes

The Proposed Plan for OU 3 of the Nease Site was released for public comment on July 8, 2008, and the public comment period ran from July 14 through August 13, 2008. The Proposed Plan identified Alternative C (targeted removal of MFLBC sediment, excavation and backfilling of floodplain surface soil and removal of Feeder Creek sediment), as the preferred alternative for OU 3. U.S. EPA reviewed all written and verbal comments submitted during the public comment period and determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

TABLES

TABLE 1: Threatened, Endangered, and Rare Species Occurrences Along MFLBC

Common Name	Scientific Name	Ohio Status	USGS Quadrangle	Number of Records	Last Sighting
PLANTS					
Mountain-fringe	*Adlumia fungosa*	T	West Point East Liverpool North	2 10	10/85 9/85
Shale barren pussy-toes	*Antennaria virginica*	T	East Liverpool North	5	6/86
Lyre-leaf rock-cress	*Arabis lyrata*	P	East Liverpool North	2	6/86
Swamp jack-in-the-pulpit	*Arisaema stewardsonii*	P	Lisbon East Liverpool North	1 2	6/84 6/84
Pale straw sedge	*Carex albolutescens*	E	Lisbon	1	7/89
Necklace sedge	*Carexprojecta*	T	Lisbon	1	6/84
Reflexed sedge	*Carex retroflexa var. retroflexa*	T	East Liverpool North	1	5/83
Straw sedge	*Carew straminea*	T	Lisbon	1	7/89
Beaked sedge	*Carex utriculata*	P	Lisbon	1	7/89
American chestnut	*Castanea dentata*	P	West Point	1	11/82
Speckled wood lily	*Clintonia umbellulata*	P	West Point East Liverpool North	1 3	7/84 7/84
Spotted coral-root	*Corallorhiza maculata*	P	Lisbon	1	8/64
Tennessee bladder fern	*Cystopteris tennesseenis*	P	East Liverpool North	1	8/84
Crinkled hairgrass	*Deschampsiaflexuosa*	T	Salem	1	6/67
Prairie tick-trefoil	*Desmodium illinoense*	E	Lisbon	1	8/60
Tall manna-grass	*Glyceria grandis*	P	Lisbon	1	7/83
Oak fern	*Gymnocarpium dryopteris*	T	East Liverpool North	5	6/86
American water-pennywort	*Hydrocotyle americana*	P	East Liverpool North	8	7/86
Southern woodrush	*Luzula bulbosa*	T	Lisbon East Liverpool North	1 1	6/67 5/83
Catberry	*Nemopanthus mucronatus*	P	Lisbon	1	7/89
Bicknell's panic-grass	*Panicum bicknellii*	T	East Liverpool North	1	8/84
Long beech-fern	*Phegopteris connectilis*	P	Lisbon	1	6/60

Common Name	Scientific Name	Ohio Status	USGS Quadrangle	Number of Records	Last Sighting
			East Liverpool North	1	6/86
Tubercled rein-orchid	*Platanthera flava*	P	Lisbon	1	7/60
Large round-leaved orchid	*Platanthera orbiculata*	P	West Point	2	7/84
Bowman's root	*Porteranthus trifoliatus*	P	West Point East Liverpool North	2 1	6/86 6/60
Black willow	*Salix nigra*	SC	Lisbon	1	1/89
BIRDS					
Sharp-shinned hawk	*Accipiter striates*	S	Salem	1	7/83
American bittern	*Botaurus lentiginosus*	E	Damacus	1	6/88
Sora	*Porzana carolina*	S	Salem Lisbon	1 1	5/88 6/86
Virginia rail	*Rallus limicola*	S	Salem Lisbon	1 1	8/87 6/85
Winter wren	*Troglodytes troglodytes*	E	East Liverpool North	1	6/92
Canada warbler	*Wilsonia canadensis*	E	East Liverpool North	1	6/92
REPTILES AND AMPHIBIANS					
Hellbender	*Cryptobranchus alleganiensis*	E	West Point	3	7/88
OTHER ORGANISMS					
Wavy-rayed lampmussel	*Lampsilisfasiola*	S	West Point East Liverpool North	1 1	8/87 8/87
VEGETATIVE COMMUNITIES					
Hemlock-white-pine-hardwood forest		RS	West Point	1	9/88
Oak-maple forest		LS	East Liverpool North	1	9/88

E - Ohio Endangered; T - Ohio Threatened; S - Ohio Special Interest; P - Ohio Potentially Threatened; LS - Locally Significant; RS – Regionally Significant; SC - State co-champion

TABLE 2: Summary of Contaminants of Concern Measured for the RI[1]

Media	COC	Range ug/l – water ug/kg – solids	Frequency of Detection	Exposure point concentration (ug/kg or ug/l)
On-Facility Surface Water	Mirex	2.92E-01	1/2	3.62E-01
	Photomirex	1.51E-02	1/2	1.51E-02
On-Facility Sediment	Mirex	1.15E+02 – 1.29E+05	23/23	7.13E+03
	Photomirex	5.73E+01 – 5.30E+02	3/23	1.95E+02
Off-Facility Surface Water	Mirex	3.04E-02 – 6.36E-02	2/2	6.36E-02
Off-Facility Sediment	Mirex	2.48E+01 – 1.14E+04	25/26	8.46E+03
	Photomirex	2.00E+00 – 2.05E+02	15/26	2.91E+01
MFLBC Soil	Mirex	7.19E-01 – 6.65E+03	115/136	1.31E+03
	Photomirex	3.00E-01 – 2.12E+02	67/133	2.84E+01
MFLBC Upstream Sediment	Mirex	4.26E+00 – 2.82E+03	48/55	5.19E+02
	Photomirex	4.79E-01 – 7.38E+00	9/55	7.38E+00
MFLBC Upstream Fish	Mirex	2.20E+01 – 1.82E+03	15/15	1.27E+03
	Photomirex	1.39E+00 – 2.88E+01	12/15	1.73E+01
MFLBC Downstream Sediment	Mirex	6.30E+00 – 1.09E+01	3/13	1.09E+01
MFLBC Downstream Fish	Mirex	6.90E+00 – 6.70E+01	9/11	4.47E+01
	Photomirex	1.55E+00 – 3.12E+00	4/11	3.12E+00

[1] Other exposure media were considered in the human health risk assessment, including: game; beef; milk; and vegetables. These exposure media were not measured for the RI. To determine exposure point concentrations the following approaches were used:

- Game – values were based blood and fat samples from 22 opossum or raccoon taken by ODH in 1989. Mirex levels ranged from non-detect to 0.0089 mg/kg. No mirex was detected in 8/22 samples.
- Vegetables – values were modeled using soil levels and deposition of particulates and root uptake.
- Beef and milk – values were based on 29 samples of local upstream cattle taken by ODA between 1987 and 1990. Mirex levels ranged from non-detect to 1.75 mg/kg. Photomirex uptake was calculated as a ratio of the mirex values.

TABLE 3
SUMMARY OF CALCULATED RISKS FOR FUTURE USE SCENARIOS[1]
NEASE CHEMICAL SITE OU-3
SALEM, OHIO

Receptor	Media Analyzed	Contaminants Contributing Significant Risk	Exposure Pathways	Exposure Point Concentration (mg/kg)	Reasonable Maximum Exposure		Central Tendency	
					Cancer Risk	Hazard Index	Cancer Risk	Hazard Index
Future On-Facility Trespasser	On-Facility Surface Water	Mirex Photomirex	Ingestion	3.62E-01 1.51E-02	9.01E-10	6.65E-05	2.25E-10	1.66E-05
	On-Facility Surface Water	Mirex Photomirex	Dermal	3.62E-01 1.51E-02	3.92E-07	2.87E-02	6.28E-08	4.61E-03
	On-Facility Sediment	Mirex Photomirex	Ingestion	7.13E+00 1.95E-01	1.78E-08	1.31E-03	2.22E-09	1.64E-04
	On-Facility Sediment	Mirex Photomirex	Dermal	7.13E+00 1.95E-01	4.79E-08	3.54E-03	4.44E-09	3.27E-04
				Total:	4.59E-07	3.36E-02	6.97E-08	5.12E-03
Future On-Facility Industrial Worker	On-Facility Surface Water	Mirex Photomirex	Ingestion	3.62E-01 1.51E-02	1.01E-09	2.68E-05	2.12E-10	2.14E-05
	On-Facility Surface Water	Mirex Photomirex	Dermal	3.62E-01 1.51E-02	3.78E-08	9.99E-04	5.80E-09	5.81E-04
	On-Facility Surface Water	Mirex Photomirex	Inhalation	2.81E-08 1.25E-09	7.74E-12	2.08E-07	9.81E-13	9.98E-08
	On-Facility Sediment	Mirex Photomirex	Ingestion	7.13E+00 1.95E-01	3.30E-07	8.76E-03	4.36E-08	4.38E-03
	On-Facility Sediment	Mirex Photomirex	Dermal	7.13E+00 1.95E-01	4.36E-07	1.16E-02	8.37E-09	8.42E-04
				Total:	8.05E-07	2.13E-02	5.80E-08	5.82E-03
Future On-Facility Resident	On-Facility Surface Water	Mirex Photomirex	Ingestion	3.62E-01 1.51E-02	1.13E-08	2.50E-04	1.16E-09	8.56E-05
	On-Facility Surface Water	Mirex Photomirex	Dermal	3.62E-01 1.51E-02	1.22E-06	2.69E-02	5.81E-08	4.27E-03
	On-Facility Sediment	Mirex Photomirex	Ingestion	7.13E+00 1.95E-01	5.92E-07	4.58E-02	7.48E-08	7.85E-03
	On-Facility Sediment	Mirex Photomirex	Dermal	7.13E+00 1.95E-01	1.40E-07	3.09E-03	1.15E-08	8.48E-04
				Total:	1.96E-06	7.61E-02	1.46E-07	1.31E-02
Future Off-Facility Industrial Worker	Off-Facility Surface Water	Mirex	Ingestion	6.36E-02	1.77E-10	4.67E-06	3.73E-11	3.73E-06
	Off-Facility Surface Water	Mirex	Dermal	6.36E-02	6.64E-09	1.75E-04	1.02E-09	1.02E-04
	Off-Facility Surface Water	Mirex	Inhalation	4.94E-09	1.36E-12	3.63E-08	1.72E-13	1.74E-08
	Off-Facility Sediment	Mirex Photomirex	Ingestion	8.46E+00 2.91E-02	3.92E-07	1.03E-02	5.17E-08	5.17E-03
	Off-Facility Sediment	Mirex Photomirex	Dermal	8.46E+00 2.91E-02	5.17E-07	1.37E-02	9.92E-09	9.94E-04
				Total:	9.16E-07	2.42E-02	6.27E-08	6.27E-03

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NEASE CHEMICAL SITE OU-3
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Receptor	Media Analyzed	Contaminants Contributing Significant Risk	Exposure Pathways	Exposure Point Concentration (mg/kg)	Reasonable Maximum Exposure		Central Tendency	
					Cancer Risk	Hazard Index	Cancer Risk	Hazard Index
Future Off-Facility Resident	Off-Facility Game	Mirex Photomirex	Ingestion	3.53E-02 7.06E-04	3.13E-07	6.91E-03	1.13E-09	8.33E-05
	Off-Facility Beef	Mirex Photomirex	Ingestion	3.74E-01 7.49E-03	7.25E-05	1.61E+00	6.00E-06	4.41E-01
	Off-Facility Milk	Mirex Photomirex	Ingestion	1.57E-01 3.14E-03	3.11E-05	9.44E-01	2.60E-06	2.42E-01
	Off-Facility Fish	Mirex Photomirex	Ingestion	4.75E-01 1.11E-02	4.93E-05	2.04E+00	7.11E-06	6.48E-01
				Total:	1.53E-04	4.60E+00	1.57E-05	1.33E+00
Future MFLBC Recreational Visitor - Upstream	MFLBC - Upstream Soil	Mirex Photomirex	Ingestion	1.31E+00 2.84E-02	2.17E-07	1.68E-02	2.74E-08	2.87E-03
	MFLBC - Upstream Soil	Mirex Photomirex	Dermal	1.31E+00 2.84E-02	3.30E-08	7.29E-04	2.92E-09	2.16E-04
	MFLBC - Upstream Soil Dust	Mirex Photomirex	Inhalation	2.88E-10 6.28E-12	3.56E-12	7.93E-08	2.74E-13	2.04E-08
	MFLBC - Upstream Sediment	Mirex Photomirex	Ingestion	5.19E-01 7.38E-03	4.31E-08	3.33E-03	5.45E-09	5.70E-04
	MFLBC - Upstream Sediment	Mirex Photomirex	Dermal	5.19E-01 7.38E-03	1.02E-08	2.25E-04	8.38E-10	6.16E-05
	MFLBC - Upstream Fish	Mirex Photomirex	Ingestion	1.27E+00 1.73E-02	1.32E-04	5.44E+00	1.91E-05	1.74E+00
	MFLBC - Upstream Game	Mirex Photomirex	Ingestion	3.53E-02 7.06E-04	6.26E-08	1.38E-03	7.75E-11	5.71E-06
	MFLBC - Upstream Beef	Mirex Photomirex	Ingestion	3.74E-01 7.49E-03	1.45E-05	3.20E-01	4.11E-07	3.03E-02
	MFLBC - Upstream Milk	Mirex Photomirex	Ingestion	1.57E-01 3.14E-03	6.23E-06	1.89E-01	1.78E-07	1.66E-02
				Total:	1.53E-04	5.97E+00	1.97E-05	1.79E+00

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SUMMARY OF CALCULATED RISKS FOR FUTURE USE SCENARIOS[1]
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SALEM, OHIO

Receptor	Media Analyzed	Contaminants Contributing Significant Risk	Exposure Pathways	Exposure Point Concentration (mg/kg)	Reasonable Maximum Exposure		Central Tendency	
					Cancer Risk	Hazard Index	Cancer Risk	Hazard Index
Future MFLBC Resident - Upstream	MFLBC - Upstream Soil	Mirex Photomirex	Ingestion	1.31E+00 2.84E-02	1.08E-06	8.37E-02	3.99E-07	4.18E-02
	MFLBC - Upstream Soil	Mirex Photomirex	Dermal	1.31E+00 2.84E-02	1.65E-07	3.64E-03	4.26E-08	3.14E-03
	MFLBC - Upstream Soil Dust	Mirex Photomirex	Inhalation	2.88E-10 6.28E-12	1.78E-11	3.97E-07	4.00E-12	2.97E-07
	MFLBC - Upstream Sediment	Mirex Photomirex	Ingestion	5.19E-01 7.38E-03	4.31E-08	3.33E-03	5.45E-09	5.70E-04
	MFLBC - Upstream Sediment	Mirex Photomirex	Dermal	5.19E-01 7.38E-03	1.02E-08	2.25E-04	8.38E-10	6.16E-05
	MFLBC - Upstream Fisb	Mirex Photomirex	Ingestion	1.27E+00 1.73E-02	1.32E-04	5.44E+00	1.91E-05	1.74E+00
	MFLBC - Upstream Game	Mirex Photomirex	Ingestion	3.53E-02 7.06E-04	3.13E-07	6.91E-03	1.13E-09	8.33E-05
	MFLBC - Upstream Beef	Mirex Photomirex	Ingestion	3.74E-01 7.49E-03	7.25E-05	1.61E+00	6.00E-06	4.41E-01
	MFLBC - Upstream Milk	Mirex Photomirex	Ingestion	1.57E-01 3.14E-03	3.11E-05	9.44E-01	2.60E-06	2.42E-01
	MFLBC - Upstream Aboveground Vegetables, Leafy	Mirex Photomirex	Ingestion	5.26E-03 1.36E-03	6.22E-08	1.43E-03	3.93E-09	3.00E-04
	MFLBC - Upstream Aboveground Vegetables, Non-Leafy	Mirex Photomirex	Ingestion	5.26E-03 1.36E-03	5.18E-08	1.19E-03	3.19E-09	2.44E-04
	MFLBC - Upstream Belowground Vegetables	Mirex Photomirex	Ingestion	9.76E-05 2.17E-05	3.43E-08	7.81E-04	2 00E-09	1.52E-04
				Total:	2.37E-04	8.09E+00	2.82E-05	2.47E+00

TABLE 3
SUMMARY OF CALCULATED RISKS FOR FUTURE USE SCENARIOS[1]
NEASE CHEMICAL SITE OU-3
SALEM, OHIO

Receptor	Media Analyzed	Contaminants Contributing Significant Risk	Exposure Pathways	Exposure Point Concentration (mg/kg)	Reasonable Maximum Exposure		Central Tendency	
					Cancer Risk	Hazard Index	Cancer Risk	Hazard Index
Future MFLBC Recreational Visitor - Downstream	MFLBC - Downstream Soil	Mirex Photomirex	Ingestion	1.31E+00 2.84E-02	2.17E-07	1.68E-02	2.74E-08	2.87E-03
	MFLBC - Downstream Soil	Mirex Photomirex	Dermal	1.31E+00 2.84E-02	3.30E-08	7.29E-04	2.92E-09	2.16E-04
	MFLBC - Downstream Soil Dust	Mirex Photomirex	Inhalation	2.88E-10 6.28E-12	3.56E-12	7.93E-08	2.74E-13	2.04E-08
	MFLBC - Downstream Sediment	Mirex	Ingestion	1.09E-02	9.04E-10	6.97E-05	1.14E-10	1.19E-05
	MFLBC - Downstream Sediment	Mirex	Dermal	1.09E-02	2.14E-10	4.70E-06	1.76E-11	1.29E-06
	MFLBC - Downstream Fish	Mirex Photomirex	Ingestion	4.47E-02 3.12E-03	4.63E-06	1.93E-01	6.71E-07	6.18E-02
	MFLBC - Downstream Game	Mirex Photomirex	Ingestion	3.53E-02 7.06E-04	6.26E-08	1.38E-03	7.75E-11	5.71E-06
	MFLBC - Downstream Beef	Mirex Photomirex	Ingestion	3.74E-01 7.49E-03	1.45E-05	3.20E-01	4.11E-07	3.03E-02
	MFLBC - Downstream Milk	Mirex Photomirex	Ingestion	1.57E-01 3.14E-03	6.23E-06	1.89E-01	1.78E-07	1.66E-02
				Total:	2.57E-05	7.21E-01	1.29E-06	1.12E-01

TABLE 3
SUMMARY OF CALCULATED RISKS FOR FUTURE USE SCENARIOS[1]
NEASE CHEMICAL SITE OU-3
SALEM, OHIO

Receptor	Media Analyzed	Contaminants Contributing Significant Risk	Exposure Pathways	Exposure Point Concentration (mg/kg)	Reasonable Maximum Exposure		Central Tendency	
					Cancer Risk	Hazard Index	Cancer Risk	Hazard Index
Future MFLBC Resident - Downstream	MFLBC - Downstream Soil	Mirex Photomirex	Ingestion	1.31E+00 2.84E-02	1.08E-06	8.37E-02	3.99E-07	4.18E-02
	MFLBC - Downstream Soil	Mirex Photomirex	Dermal	1.31E+00 2.84E-02	1.65E-07	3.64E-03	4.26E-08	3.14E-03
	MFLBC - Downstream Soil Dust	Mirex Photomirex	Inhalation	2.88E-10 6.28E-12	1.78E-11	3.97E-07	4.00E-12	2.97E-07
	MFLBC - Downstream Sediment	Mirex	Ingestion	1.09E-02	9.04E-10	6.97E-05	1.14E-10	1.19E-05
	MFLBC - Downstream Sediment	Mirex	Dermal	1.09E-02	2.14E-10	4.70E-06	1.76E-11	1.29E-06
	MFLBC - Downstream Fish	Mirex Photomirex	Ingestion	4.47E-02 3.12E-03	4.63E-06	1.93E-01	6.68E-07	6.15E-02
	MFLBC - Downstream Game	Mirex Photomirex	Ingestion	3.53E-02 7.06E-04	3.13E-07	6.91E-03	1.13E-09	8.33E-05
	MFLBC - Downstream Beef	Mirex Photomirex	Ingestion	3.74E-01 7.49E-03	7.25E-05	1.61E+00	6.00E-06	4.41E-01
	MFLBC - Downstream Milk	Mirex Photomirex	Ingestion	1.57E-01 3.14E-03	3.11E-05	9.44E-01	2.60E-06	2.42E-01
	MFLBC - Downstream Aboveground Vegetables, Leafy	Mirex Photomirex	Ingestion	5.26E-03 1.36E-03	6.22E-08	1.43E-03	3.93E-09	3.00E-04
	MFLBC - Downstream Aboveground Vegetables, Non-Leafy	Mirex Photomirex	Ingestion	5.26E-03 1.36E-03	5.18E-08	1.19E-03	3.19E-09	2.44E-04
	MFLBC - Downstream Belowground Vegetables	Mirex Photomirex	Ingestion	9.76E-05 2.17E-05	3.43E-08	7.81E-04	2.00E-09	1.52E-04
				Total:	1.10E-04	2.84E+00	9.72E-06	7.90E-01

1. Current use scenarios resulted in calculated risks within USEPA's acceptable risk criteria

Checked by BMC on 6/4/08

TABLE 5: Ecological Risk Assessment – Retained Chemicals

Chemical	Surface Water	Fish Tissue	Sediment	Floodplain Soil
Evaluated in the Exposure and Risk Characterization Portions of the Risk Assessment				
Anthracene			X	
Benzo(a)anthracene				X
Benzo(a)pyrene			X	X
Benzo(b)flouranthene				X
Benzo(k)flouranthene			X	X
Benzo(g,h,i)perylene			X	
Dibenzo(a,h)anthracene			X	
Flouranthene			X	
Indeno(1,2,3-cd)pyrene				X
Iron			X	
Kepone				X
4-Methylphenol			X	
Mirex		X	X	X
Phenanthrene			X	
Photomirex		X	X	X
Phenol			X	
Chemicals Addressed in the Uncertainty Section of the Risk Assessment				
Aroclor-1254		X		
Arsenic			X	
Aroclor-1260		X		
Benzo(b)flouranthene			X	
Benzoic acid		X		
Calcium			X	
Carbazole				X
Carbon disulfide		X		X
Dibenzofuran				X
Di-n-octylphthlate				X
Diphenyl sulfone	X		X	
Endrin		X	X	
Magnesium			X	
N-nitrosodiphenylamine		X		
Potassium			X	
Sodium			X	

Table 8
Potential Action and Location Specific ARARs
OU-3 Feasibility Study
Nease Site, Salem Ohio

Potential ARAR or TBC	ARAR	TBC	Retained Alternatives		
			Alternative A	Alternative B	Alternative C
State Action-Specific ARARs					
Ohio EPA Air Pollution Control					
ORC 3704.05 (A-I): Prohibitions Prohibits emission of an air contaminant in violation of ORC 3704 or any rules, permit, order or variance issued pursuant to that section of the ORC. Should be considered for virtually all sites.	x			x	x
OAC 3745-15-07 (A): Air Pollution Nuisances Prohibited Pertains to any site which causes, or may reasonably cause, air pollution nuisances. Consider for sites that will undergo excavation, demolition, cap installation, methane production, clearing and grubbing, water treatment, incineration.	x			x	x
OAC 3745-25-03: Emissions Control Action Programs Requires preparation for air pollution alerts, warnings and emergencies. Pertains to any site which is emitting or may emit air contaminants.	x			x	x
Ohio EPA Division of Surface Water					
OAC 3745-1 Water Quality Standards Pertains to discharges to surface water as a result of remediation and any on-site surface waters affected by site conditions.	x			x	x
OAC 3734-32-05: Water Quality Criteria (for Decision by the Director) Specifies substantive criteria for Section 401 Water Quality criteria for dredging, filling, obstructing or altering waters of the state.		x		x	X

Potential ARAR or TBC	ARAR	TBC	Retained Alternatives		
			Alternative A	Alternative B	Alternative C
Federal Action-Specific ARARs					
Federal requirements for National Pollution Discharge Elimination System (NPDES) discharges to surface water	x			x	x
Federal Location-Specific ARARs					
Federal Clean Water Act Section 404 Sets forth standards for discharge and actions in waters of the US including wetlands.	x			x	x
Fish and Wildlife Coordination Act (16 USC 661-666c) Requires Agency consultation for activities affecting waters of the US including wetlands that are subject to the provisions of the Federal CWA.	x			x	x
State Location-Specific ARARs					
OAC 3745-1-15 Water Use Designation for the Little Beaver Creek Drainage Basin Establishes surface water quality criteria and aquatic habitiat criteria that may be affected by remedial activities.	x			x	x
State and Federal Location-Specific ARARs					
Executive Orders on Floodplain Management and Wetlands Protection (CERCLA Floodplain and Wetlands Assessments-EO 11988 and 11990) Requires federal agencies to assess potential effects of remediation on surrounding wetlands and in the floodplain.		x		x	X
OAC 1501-15-1: Erosion and Sediment Control Establishes state standards to achieve a level of management and conservation practices which will control wind or water erosion of the soil and minimize the degradation of water resources by soil sediment in conjunction with land grading, excavating, filling, or other soil-disturbing activities on land used or being developed for non-farm commercial, industrial, residential, or other non-farm purposes, and establish criteria for determination of the acceptability of such management and conservation practices.	x			x	X

TABLE 10
COST ESTIMATE SUMMARY - ALTERNATIVE C (ALT. C)
NEASE CHEMICAL SITE OU-3
SALEM, OHIO

ACTIVITY	Initial Cost	PW of O&M
Alternative C		
Common Elements	$320,000	$0
RAO 1 & RAO 2 - MFLBC Sediment	$1,443,257	$248,250
RAO 3 & RAO 4 - MFLBC Floodplain Soil	$591,289	$0
RAO 5 - Feeder Creek	$145,066	$6,456
Subtotal	**$2,500,000**	**$260,000**
INITIAL COST TOTAL		**$2,500,000**
ENGINEERING DESIGN/CQA (15%)		**$380,000**
TOTAL PW OF O&M COST		**$260,000**
SUBTOTAL		**$3,140,000**
CONTINGENCY (20%)		**$630,000**
TOTAL NET PRESENT WORTH COST		**$3,770,000**

Notes:
Assume common earth can be used as backfill.
Based upon fuel prices of $3.96/gal for regular unleaded gas and $4.73/gal for diesel.
Geosynthetic prices have doubled in the last 12 months and cannot be reliably predicted.
These estimates are based on conceptual designs and will be subject to change based upon actual detailed engineering design and competitive bidding of construction services.

Table 11
Cost Estimate Details for Alternative C (Alt. C)
Nease Chemical Site OU-3
Salem, Ohio

Common Elements				
Activity	**Unit Costs**	**Units**	**Quantity**	**Estimated Cost**
Pre-Design Investigation/Baseline Sampling	$300,000	Lump Sum	1	$300,000
Secure Access Agreements (Legal)	$20,000	Lump Sum	1	$20,000
COMMON ELEMENTS TOTAL PRESENT WORTH				**$320,000**
Remedial Action Components to Address - RAO-1 & RAO-2 (MFLBC Sediment)				
Activity	**Unit Costs**	**Units**	**Quantity**	**Estimated Cost**
Initial Cost - Sediment Dredging				
Mobilization/Demobilization	$18,500	Station	20	$370,000
Liability Insurance, Payment and Performance Bonds (5% of Excavation Costs)	$50,422	Lump Sum	1	$50,422
Install and remove temporary sheet pile or coffer dam (or similar)	$30	sf	10,800	$324,000
Mechanical Excavation	$50	cy	4,300	$215,000
Processing/Handling/Dewatering	$35	cy	4,300	$150,500
Transportation to Staging Area	$8	cy	17,200	$137,600
Perimeter resuspension monitoring (real-time turbidity monitoring)	$400	day	40	$16,000
Backfilling (topsoil/loam + granular material, including hauling backfill to site)	$38.45	cy	4,300	$165,335
Confirmation sampling	$360	Sample	40	$14,400
RAO-1 TOTAL INITIAL COST				**$1,443,257**
Operation & Maintenance (O&M) (Sampling every 5 years)				
Fish Tissue Sample Analytical (including QA/QC)	$600	Sample	39	$23,400
Fish Tissue Sample Collection	$33,500	Lump Sum	1	$33,500
Data validation, analysis, and reporting	$20,000	Lump Sum	1	$20,000
RAO-1 & RAO-2 TOTAL ANNUAL O&M COST				**$15,380**
Long-term monitoring	30	Years		
Discount Rate	5	%		
RAO-1 & RAO-2 PRESENT WORTH OF ANNUAL O&M COST				**$248,250**
RAO-1 & RAO-2 TOTAL PRESENT WORTH				**$1,691,506**

Table 11
Cost Estimate Details for Alternative C (Alt. C)
Nease Chemical Site OU-3
Salem, Ohio

Remedial Action Components to Address - RAO-3 & RAO-4 (MFLBC Floodplain Soil)				
Activity	**Unit Costs**	**Units**	**Quantity**	**Estimated Cost**
Initial Cost - Floodplain Soil Removal				
Mobilization / Demobilization (10% of Excavation Costs)	$45,502	Lump Sum	1	$45,502
Surveying and Field Engineering (6% of Excavation Costs)	$27,301	Lump Sum	1	$27,301
Liability Insurance, Payment and Performance Bonds (5% of Excavation Costs)	$22,751	Lump Sum	1	$22,751
On-Site E&S Controls (4% of Excavation Costs)	$18,201	Lump Sum	1	$18,201
Health and Safety (4% of Excavation Costs)	$18,201	Lump Sum	1	$18,201
Clearing (ground preparation)	$0.20	sf	287,000	$57,400
16 oz/sy Non-woven geotextile	$0.17	sf	287,000	$48,790
Excavation and loading of soil	$7.80	cy	5,300	$41,340
Backfill (common earth)	$12.85	loose cy	6,360	$81,726
Haul backfill to site (from within 10 miles)	$16.10	loose cy	6,360	$102,396
Compact backfill	$2.21	cy	5,300	$11,713
Confirmation Sampling	$360	sample	12	$4,320
Revegetate	$2,500	acre	6.5	$16,250
Haul Soil to Nease Manufacturing Facility for Consolidation	$18	cy	5,300	$95,400
RAO-3 & RAO-4 TOTAL INITIAL COST				**$591,289**
RAO-3 & RAO-4 TOTAL PRESENT WORTH				**$591,289**

Table 11
Cost Estimate Details for Alternative C (Alt. C)
Nease Chemical Site OU-3
Salem, Ohio

Remedial Action Components to Address - RAO-5 (Feeder Creek)				
Activity	**Unit Costs**	**Units**	**Quantity**	**Estimated Cost**
Initial Cost - In-Situ Treatment				
Liability Insurance, Payment and Performance Bonds (5% of Excavation Costs)	$6,753	Lump Sum	1	$6,753
Redirect stream	$1,025	day	15	$15,375
Excavate stream sediments	$7.80	cy	2,600	$20,280
Transport sediment to Nease Manufacturing Facility for Consolidation	$3.45	lcy	3,380	$11,661
Channel lining - Rip-Rap and Geotextile	$22.50	sy	3,900	$87,750
Contractor Surveying and E&S Controls	$10,000	Lump Sum	1	$10,000
RAO-5 TOTAL INITIAL COST				**$145,066**
Annual Operation & Maintenance (O&M)				
Site Inspection and Maintenance	$2,000	Lump Sum	1	$2,000
RAO-5 TOTAL ANNUAL O&M COST				**$2,000**
Site Inspection and Maintenance	30	Years		$32,282
Discount Rate	5	%		
RAO-5 PRESENT WORTH OF ANNUAL O&M COST				**$6,456**
RAO-5 TOTAL PRESENT WORTH				**$151,522**

ESTIMATED TOTAL PRESENT WORTH FOR THIS ALTERNATIVE	**$2,760,000**

Notes: Assume common earth can be used as backfill.
Based upon fuel prices of $3.96/gal for regular unleaded gas and $4.73/gal for diesel.
Geosynthetic prices have doubled in the last 12 months and cannot be reliably predicted.
These estimates are based on conceptual designs and will be subject to change based upon actual detailed engineering design and competitive bidding of construction services.

FIGURES

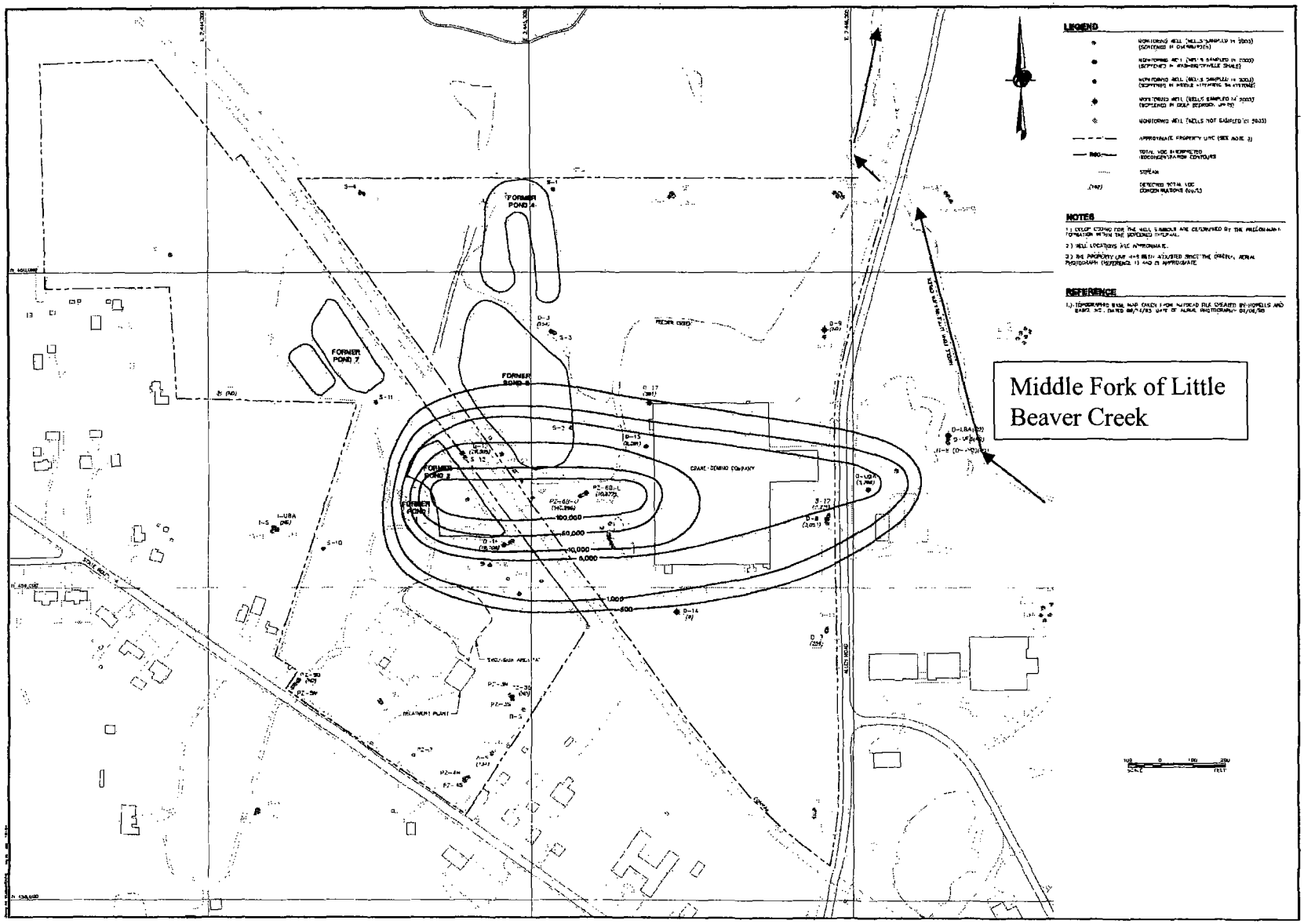
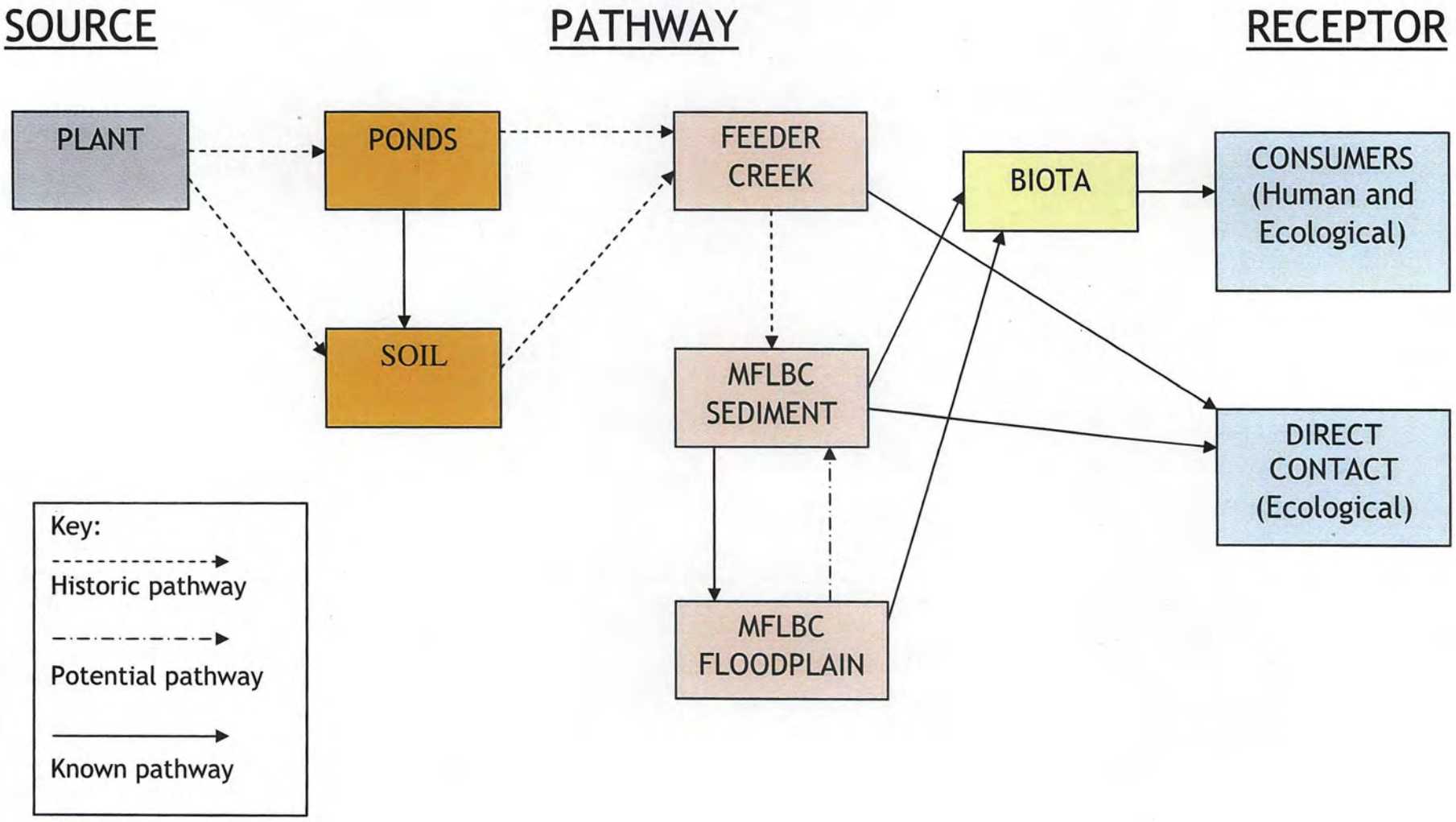


Figure 3 Bedrock Groundwater Contamination

Figure 4: Conceptual Site Model for Operable Unit 3



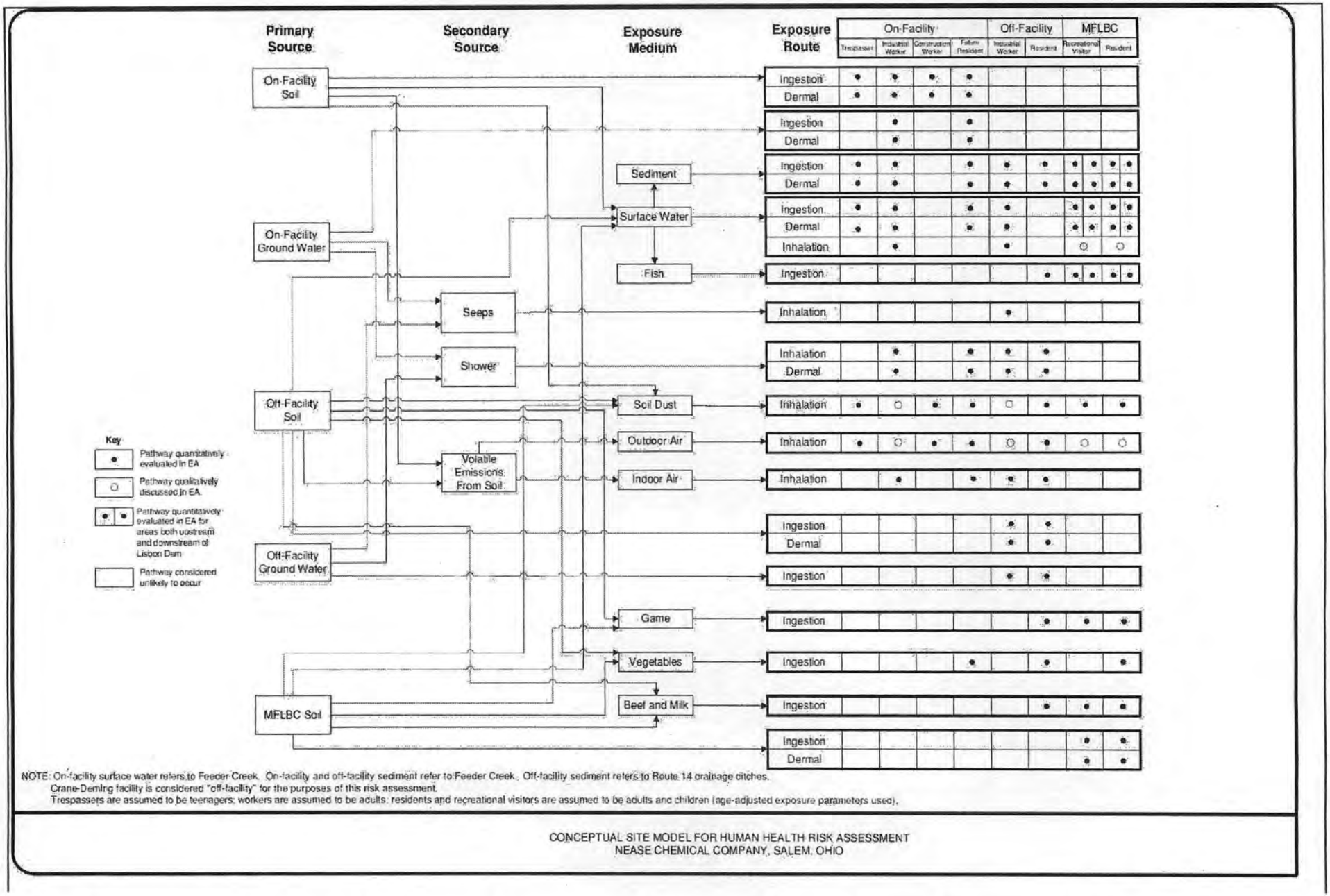
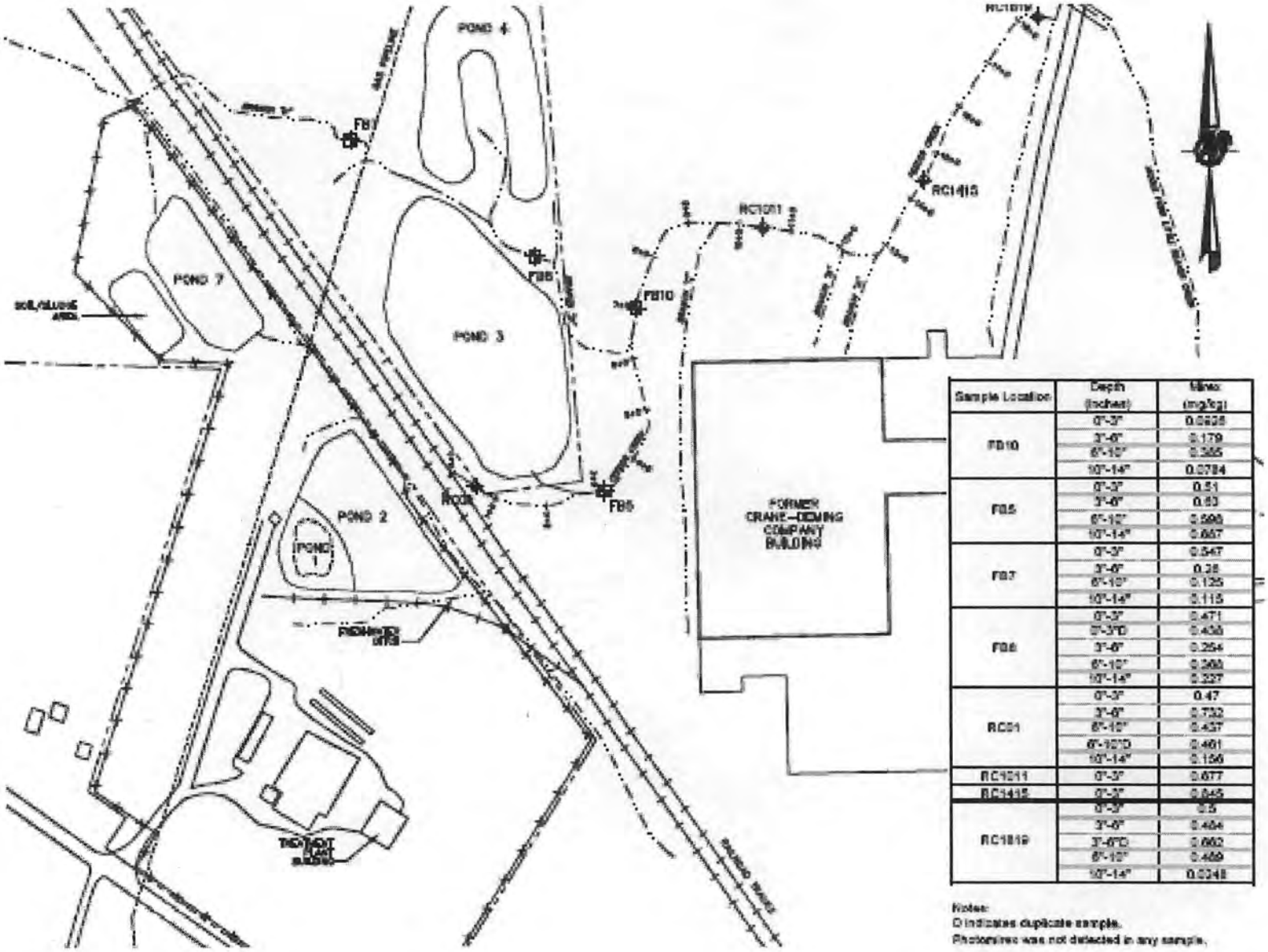


Figure 5: Conceptual Site Model for Human Health Risk Assessment, Nease Chemical Company, Salem, Ohio



Sample Location	Depth (inches)	Silver (mg/kg)
FB10	0"-3"	0.0626
	3"-6"	0.179
	6"-10"	0.385
	10"-14"	0.0784
FB5	0"-3"	0.51
	3"-6"	0.63
	6"-10"	0.598
	10"-14"	0.667
FB7	0"-3"	0.547
	3"-6"	0.38
	6"-10"	0.125
	10"-14"	0.115
FB8	0"-3"	0.471
	0"-3"D	0.438
	3"-6"	0.264
	6"-10"	0.368
	10"-14"	0.227
RC01	0"-3"	0.47
	3"-6"	0.732
	6"-10"	0.437
	6"-10"D	0.491
	10"-14"	0.156
RC1011	0"-3"	0.677
RC1415	0"-3"	0.645
RC1819	0"-3"	0.5
	3"-6"	0.484
	3"-6"D	0.662
	6"-10"	0.489
	10"-14"	0.0348

Notes:
D indicates duplicate sample.
Photosilver was not detected in any sample.

Figure 6: Feeder Creek

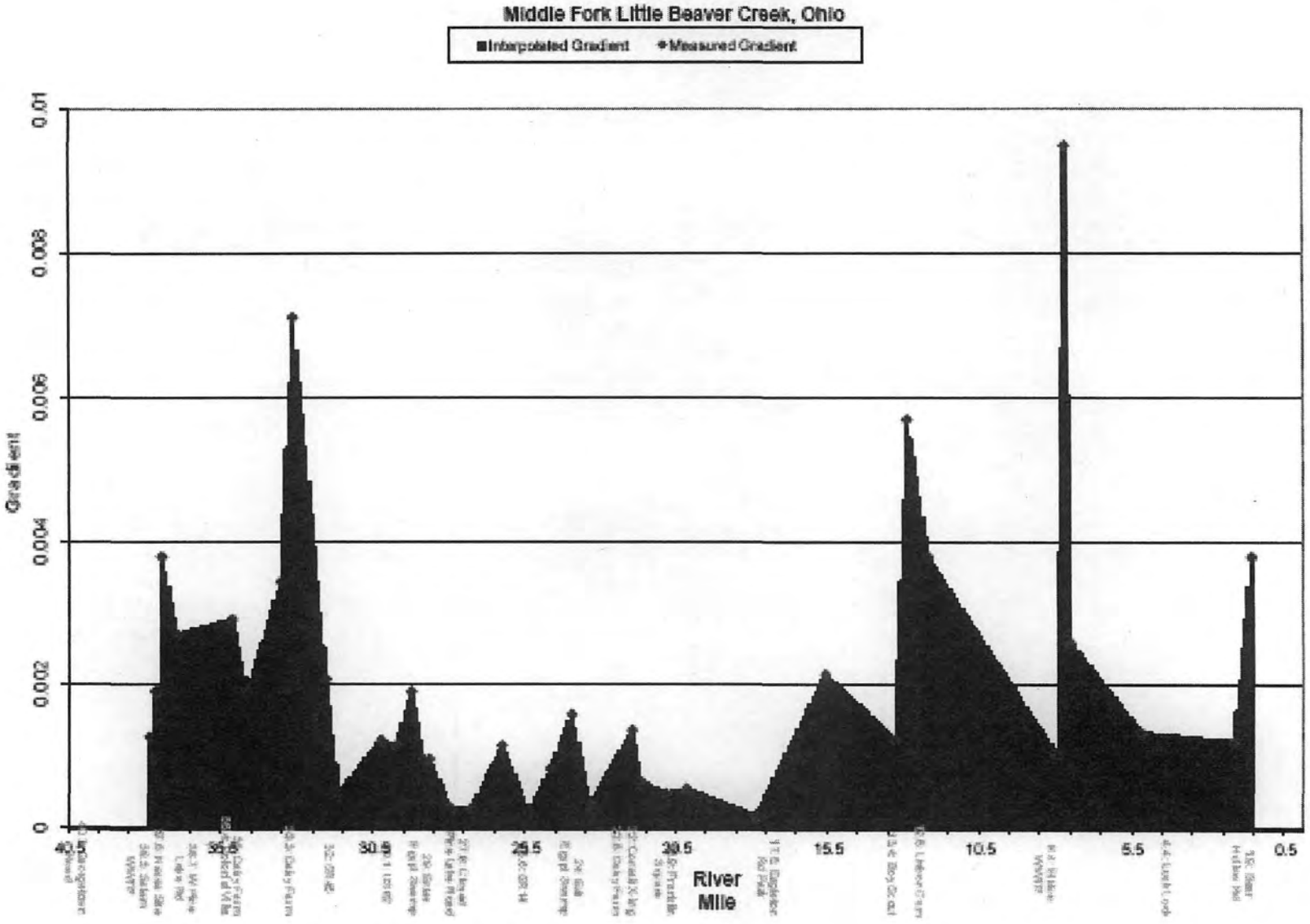


Figure 7: MFLBC Stream Gradients by River Mile

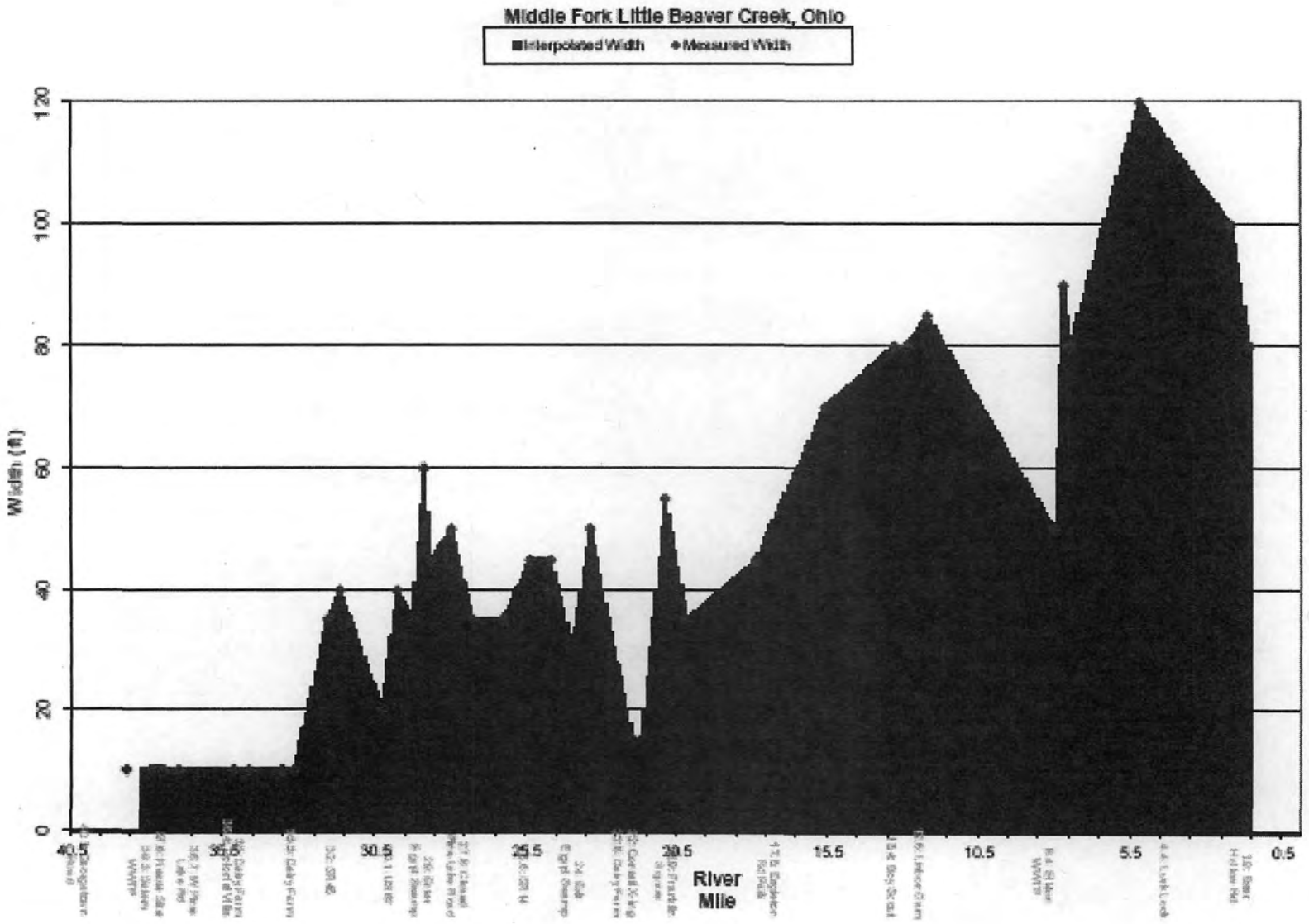


Figure 8: MFLBC Stream Widths by River Mile

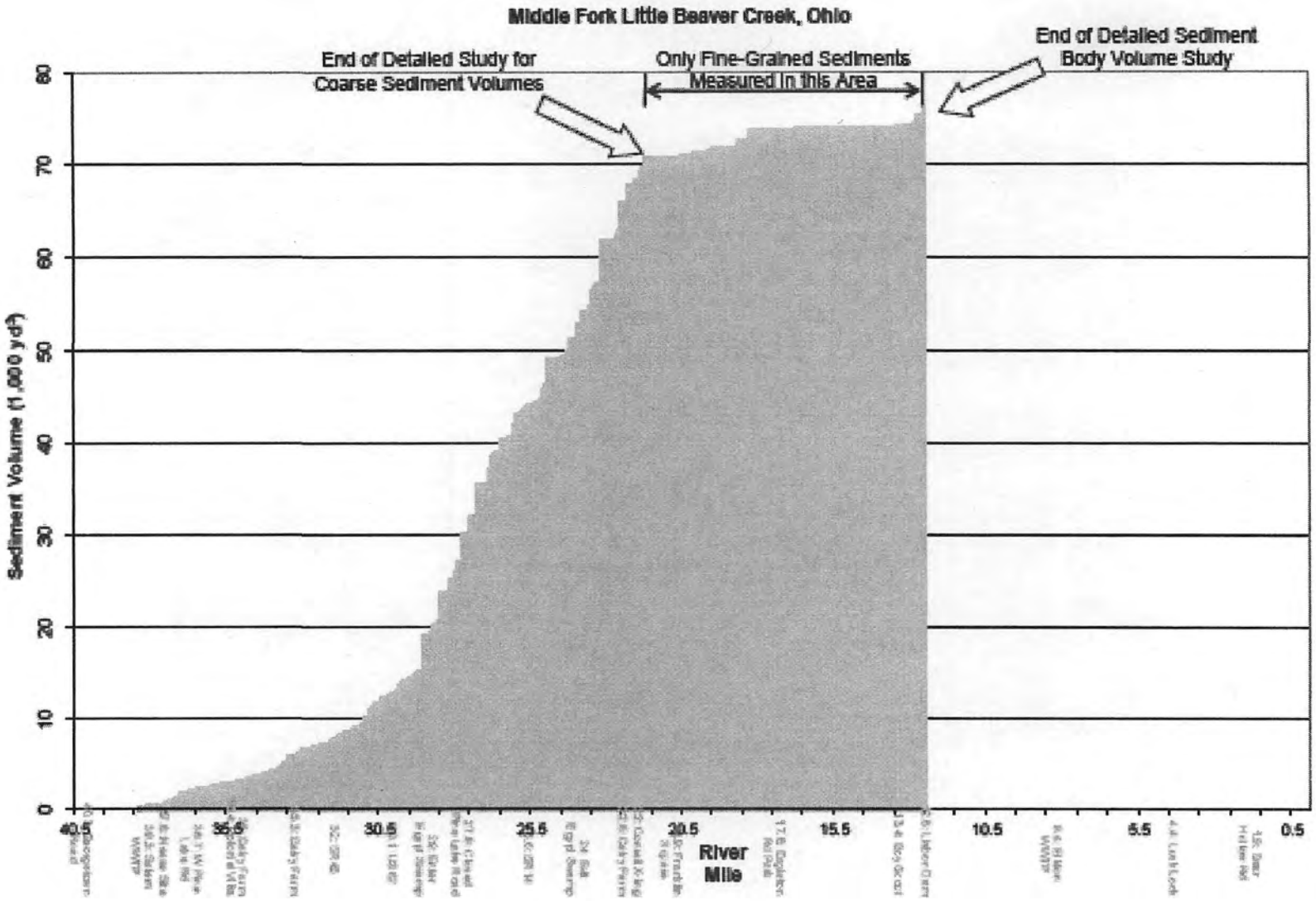


Figure 9: MFLBC Cumulative Sediment Volume by River Mile

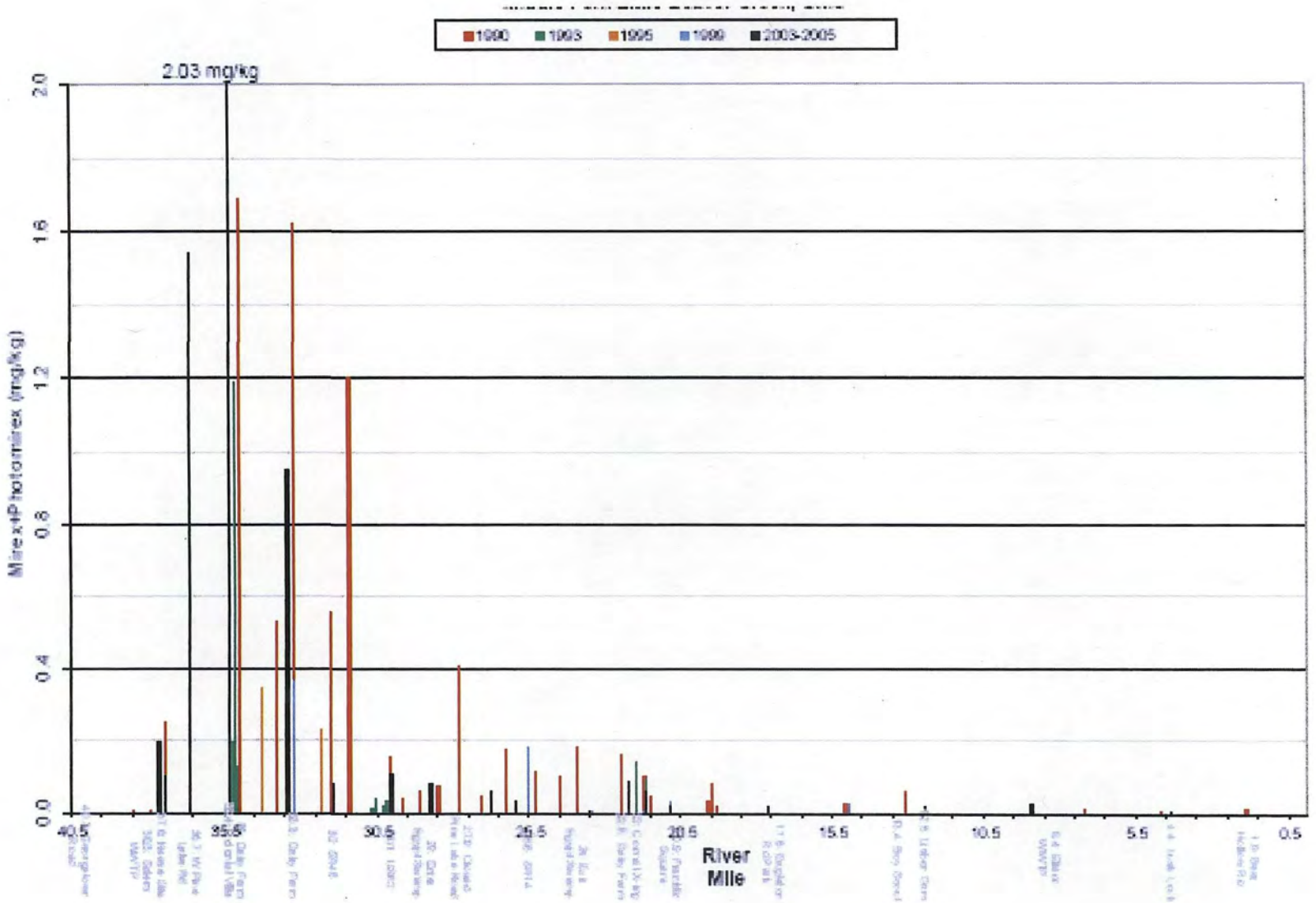


Figure 10: MFLBC Sediment Mirex Results by River Mile

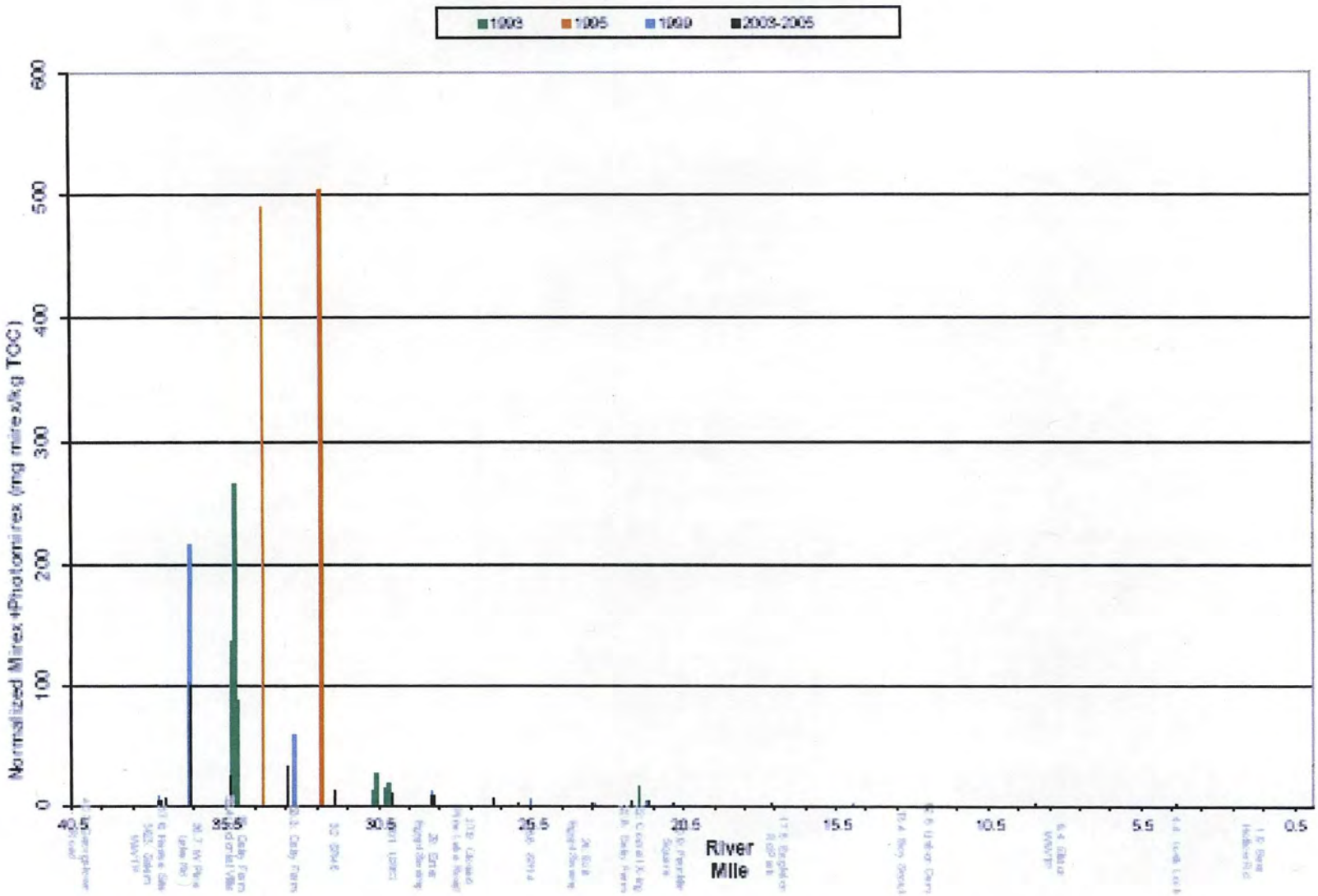


Figure 11: MFLBC Sediment Mirex Results Normalized for Total Organic Carbon by River Mile

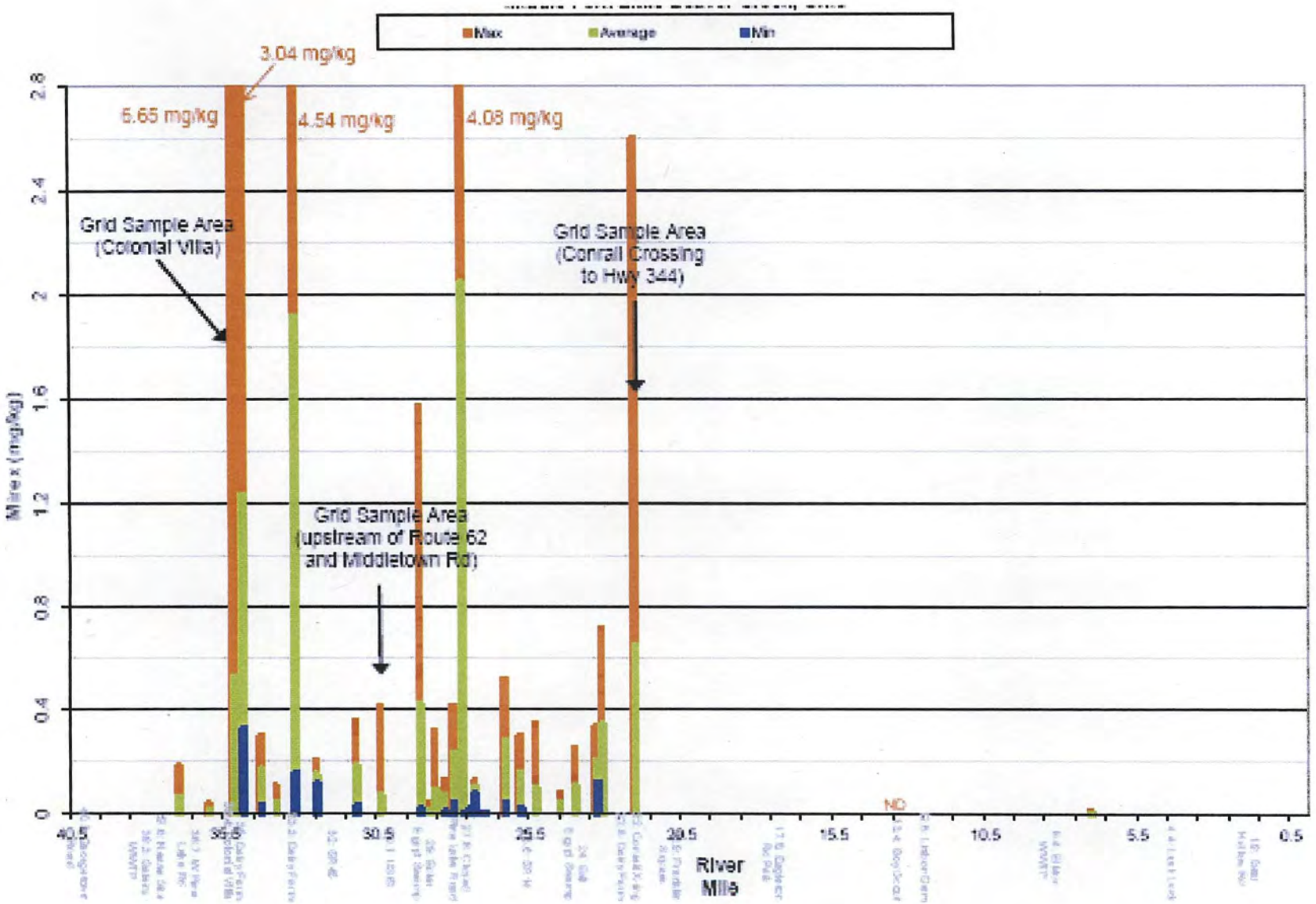


Figure 12: MFLBC Floodplain Soil Mirex Results through 2005 by River Mile

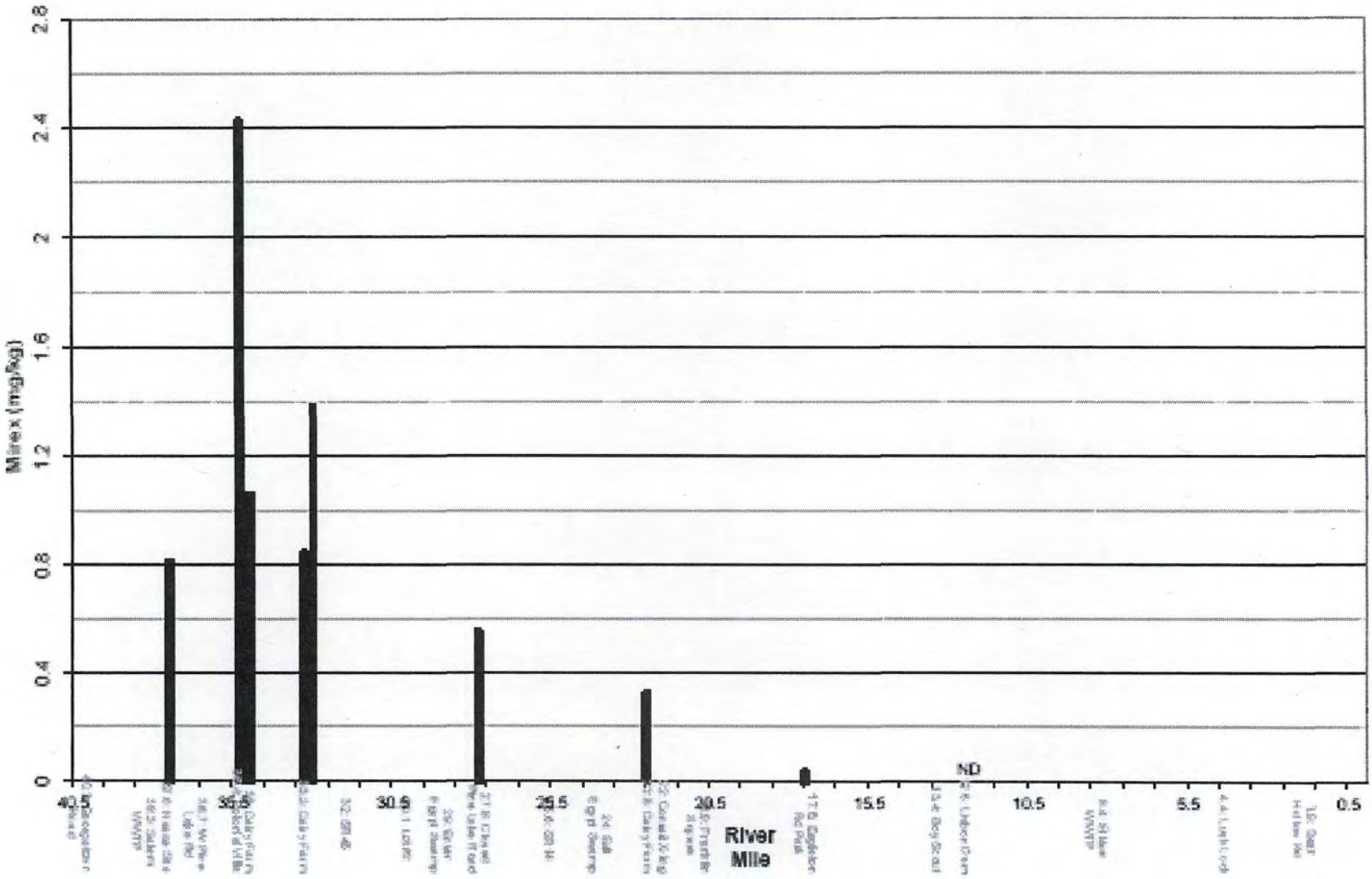


Figure 13: MFLBC Floodplain Soil Results in 2006 by River Mile

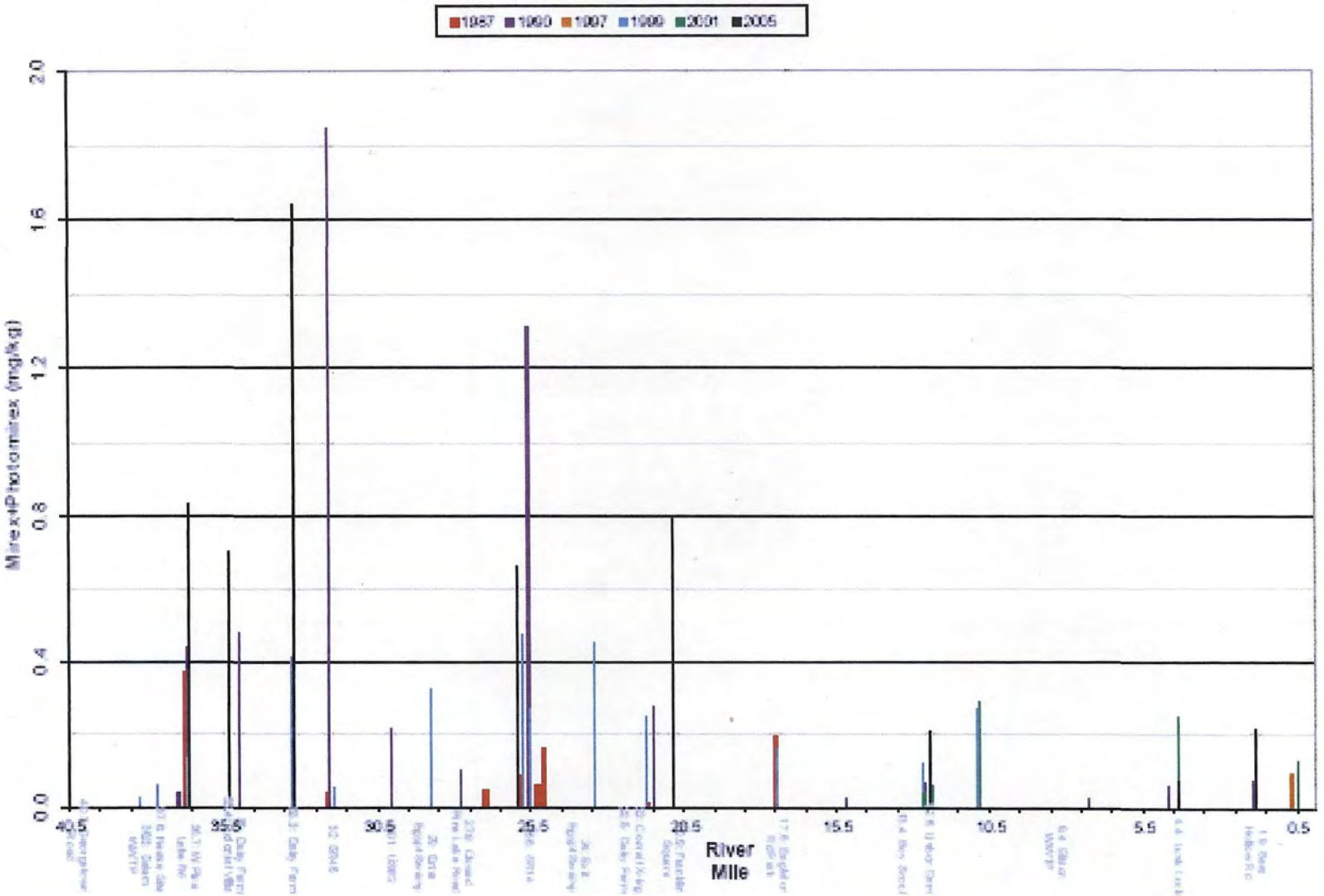


Figure 14: MFLBC Fish Fillet Mirex Results by River Mile

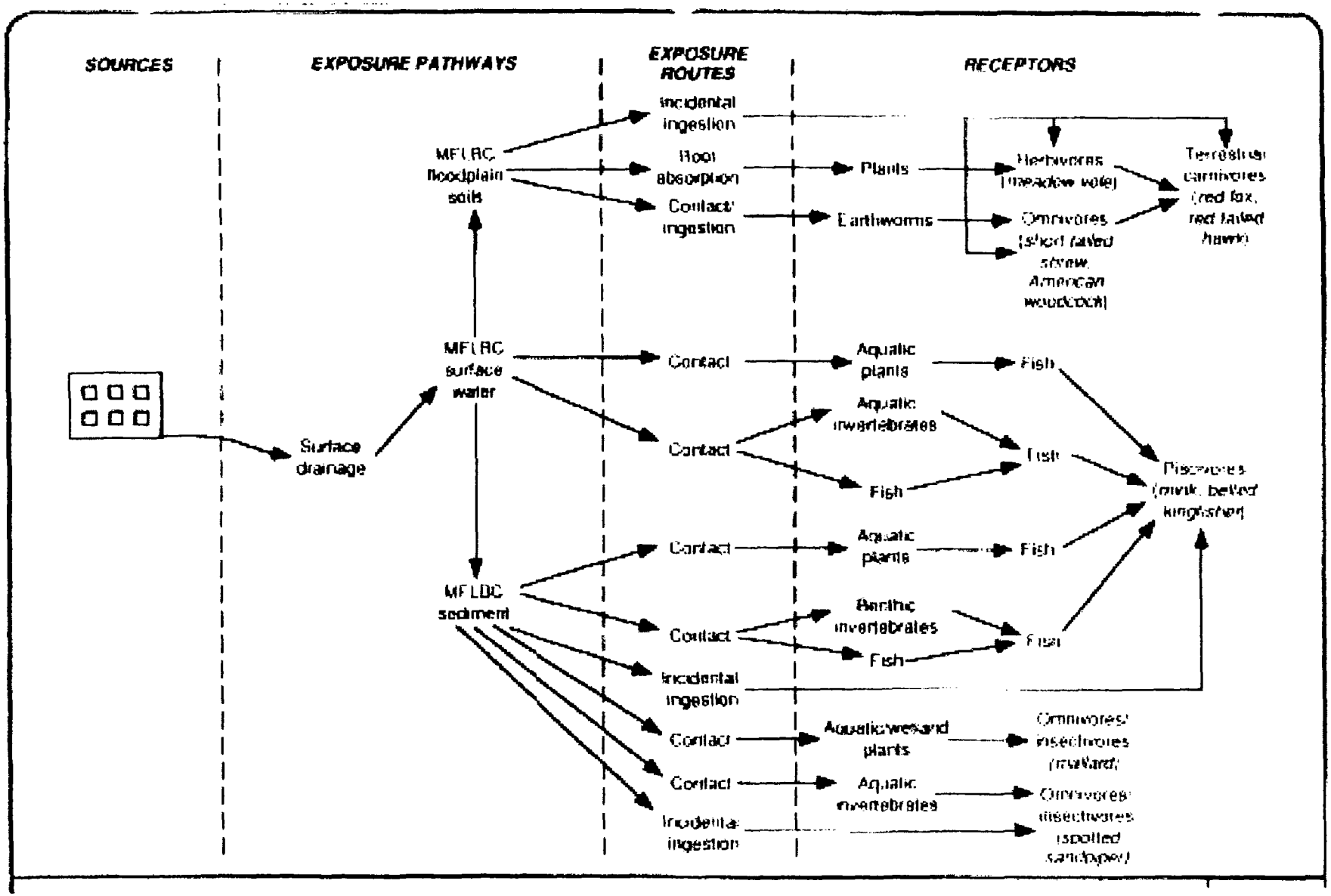


Figure 15: Conceptual Site Model for the MFLBC Ecological Risk Assessment

APPENDIX A

Responsiveness Summary

APPENDIX A – RESPONSIVENESS SUMMARY

Nease Chemical Site, Operable Unit Three

This Responsiveness Summary provides both a summary of the public comments U.S. EPA received regarding the Proposed Plan for Operable Unit 3 (OU 3) of the Nease Chemical Site and U.S. EPA's responses to those comments. The Proposed Plan was released to the public on July 9, 2008, and the public comment period ran from July 14, through August 13, 2008. Ohio EPA provided support and input on the Proposed Plan. U.S. EPA held a public meeting regarding the Proposed Plan on July 31, 2008, at the Salem Public Library in Salem, Ohio. Ohio EPA participated in the public meeting, assisted in responding to questions, and provided support at the meeting.

U.S. EPA received written comments (via regular and electronic mail) and verbal comments (at the public meeting) during the public comment period. In total, U.S. EPA received comments from approximately 12 different people. Copies of all the comments received (including the verbal comments reflected in the transcript of the public meeting) are included in the Administrative Record for the Site.

U.S. EPA also received email comments dated August 12, 2008, submitted on behalf of Rutgers Organics Corporation (ROC), the Site owner. ROC acquired the assets of Nease Chemical Company in 1977, including the non-operational Salem facility. Since 1982, ROC has conducted the work at the Site, with Ohio EPA and U.S. EPA oversight. ROC and its consultant, Golder Associates, attended the public meeting and assisted in responding to technical questions, as well as questions about ROC's future responsibilities. A summary of ROC's comments and U.S. EPA's responses is included below.

This Responsiveness Summary does not repeat verbatim each individual comment. Rather, the comments are summarized and grouped by the type of issue raised. The comments fell within several different categories: remedy options; health concerns; cleanup goals; timeliness of the clean up; floodplain property owner concerns; remedy implementation; oversight of the current work; and miscellaneous comments. U.S. EPA carefully considered all comments prior to selection of the final remedy for OU 3 documented in this Record of Decision (ROD). The remainder of this Responsiveness Summary contains a summary of the comments U.S. EPA received and U.S. EPA's responses to those comments, grouped by category.

I. COMMENTS ON REMEDY OPTIONS

A. Support For The Proposed Remedy

1. Most commenters generally supported cleanup of OU 3 and were pleased that the problem is being addressed. However, the commenters varied in the degree to which they supported U.S. EPA's proposed alternative:

a. ROC expressed support for the proposed remedy for the Site (Alternative C: removal of Feeder Creek sediment; targeted removal of floodplain soils from along the Middle Fork of Little Beaver Creek (MFLBC); and targeted removal of MFLBC sediment). ROC's comment in the August 12, 2008, email states "ROC is supportive of EPA's proposed plan and while, as EPA has noted, there are no current risks to people living near or playing in Middle Fork Little Beaver Creek, ROC believes that EPA's plan is appropriate to provide long-term protection of human health and the environment."

b. Several other commenters expressed support for the proposed cleanup of Feeder Creek and the MFLBC, but they opposed the proposal to consolidate the material with OU 2 soils at the plant site, as discussed in comment 2 below.

c. Two other commenters expressed support for the proposed remedy for the Site (Alternative C), stating that they believed that the reduction in risk outweigh the costs.

U.S. EPA acknowledges these comments.

B. Comments on On-Site Consolidation

2. Eight of the twelve commenters objected to the proposal to bring the excavated sediment and floodplain soil back to the former Nease facility, where it would be consolidated with the contaminated soils in OU 2 and capped. Many of these commenters are people who own homes near the Nease facility. There were a number of concerns raised:

a. Health effects – Several commenters were concerned that the placement of mirex contaminated sediments and soil back on the facility could cause adverse health effects for the people living near the Site. There were particular concerns for children.

The health effects and health studies related to mirex and the Site are discussed more fully in response to comment 6, below and in the ROD. The levels of mirex found in OU 3 soil and sediment do not pose an unacceptable risk from direct contact, and would not pose an unacceptable risk from direct contact at any other location. The contaminated soil and sediment from OU 3 will be brought back to the facility and placed with other contaminated soil. All contaminated soil will be covered with an engineered barrier cover, including clean soil at the surface. The cover will prevent any accidental contact with OU 3 materials consolidated on-site. Without exposure, there will be no risks from the materials.

b. Several commenters felt that this approach would create problem in the future because the contamination would leach to groundwater or runoff to adjacent properties.

U.S. EPA's does not believe that the on-site management of mirex contaminated soil and sediment will create future problems from leaching or runoff. After evaluating the nine criteria, including long-term effectiveness, U.S. EPA selected a remedy for OU 2 which requires on-site management of mirex contaminated soil. The OU 2 remedy requires an engineered barrier cover (including clean soil at the surface) over mirex contaminated areas; inspection, operation and

maintenance of the cover; five-year reviews to ensure that the remedy remains protective; and institutional controls that will prevent breaching of the cover. The remedy also requires management of surface water to prevent erosion and runoff.

After hearing concerns at the public meeting, ROC's engineering consultant submitted comments stating:

> "The engineering design of modern isolation covers is such that concern that contaminated soils will wash off the site in the future is not warranted. Covers of the type envisioned under OU-2 have been in use for decades at modern landfills and their performance is well documented. EPA will also require regular inspection and maintenance of the covers into the future to ensure proper performance." and
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> "Mirex is effectively insoluble in water and so concerns for leaching are unfounded. Previous monitoring in the floodplain has shown no evidence of leaching. Given that the soils have not leached in their current location, and they will not be mixed with other contaminated materials, they will not leach at the Nease site in the future. Furthermore, the isolation cover at the Nease site will be of a low permeability design over much of the area so as to limit infiltration of rainwater that could (theoretically) cause leaching. Finally, groundwater at the Nease site is to be cleaned up (for contaminants other than mirex) and will be monitored in the future to ensure that leaching is not occurring."

The OU 3 materials will be consolidated with the soil at the facility already to be addressed by the OU 2 remedy, and covered. Based on the requirements of the OU 2 selected remedy and the nature of mirex, U.S. EPA believes that there is no threat of unacceptable leaching or runoff of the consolidated OU 3 soil and sediment.

> *c. Two commenter were concerned because they felt that this approach would allow the Nease Site to become a dump for waste from other areas. They worried that more toxic materials would be brought in and disposed at the Site.*

The Superfund law provides for remedial decisions that allow for on-site disposal. However, in order to take waste materials from off-site, the facility would require a permit to operate as a disposal facility. There is no intention of operating the Nease Site as a disposal facility, and waste will not be brought from off-site. The contaminated soils and sediments in Feeder Creek and the MFLBC are considered part of the Nease Site.

> *d. Several commenters were concerned because they felt that their property values would be lowered.*

U.S. EPA has no information on property values in the area surrounding the Site. There are a number of factors that affect property values that are unrelated to the Superfund Site, including the current economy and the local housing market. However, U.S. EPA believes that the actions taken to date and that will be taken in the future to clean up the Nease Site should have a positive effect on property values.

e. One commenter felt that the extra soil and sediment would result in a "mountain of waste" at the Site.

U.S. EPA's selected alternative is estimated to involve the removal of approximately 12,200 cubic yards of soil and sediment from the Middle Fork Little Beaver Creek and its floodplain. This volume will not substantially change the topography of the Nease facility. After hearing concerns at the public meeting, ROC's engineering consultant submitted a comment stating:

> "The former pond areas at the site are currently low basins, which must, in any case, be filled in order to facilitate the management of surface water at the site. The OU-3 materials will assist in this regard and can be placed at the site without creating any visible mound of soil, less still a "mountain." Even if the low areas did not require filling, the estimated quantity of OU-3 soils is such that were they spread out over the area that is to be covered under OU-2 they would only amount to a thickness of about 6-inches."

U.S. EPA believes that the additional soil and sediment volume from OU 3 that will be consolidated at the Site can be managed in a safe an unobtrusive manner.

f. One commenter was concerned that the mirex-containing waste on Site could be a Homeland Security threat. She felt that access to the Site was not secure and that mirex is a very dangerous chemical.

The mirex that is found at the Nease Site is dispersed at low levels through the contaminated sediment and soils. It is not found as a pure product or in formulations that contain high levels. The health effects and health studies related to mirex and the Site are discussed more fully in response to comment 6, below and in the ROD. The levels of mirex found in OU 3 soil and sediment do not pose an unacceptable human health risk from direct contact. In the unlikely event that security was breached and someone was to remove the contaminated soil, it would not pose an unacceptable risk from direct contact at any other location. Additionally, mirex at the levels found at the Nease Site is not explosive, flammable, or reactive, so would not be a threat.

g. One commenter felt that all of the contaminated soils and material from the Site, as well as the materials from OU 3 should be removed from the Site.

U.S. EPA issued a Proposed Plan for OU 2 of the Nease Chemical Site and took comments on the proposal before selecting the final remedy for OU 2 on September 29, 2005. The Proposed Plan was released to the public on May 23, 2005, and the public comment period ran from June 1, through July 8, 2005. U.S. EPA held a public meeting regarding the Proposed Plan for OU 2 on June 22, 2005, at the Salem Public Library in Salem, Ohio. The proposed and selected remedy for OU 2 called for leaving mirex contaminated soil in place at the Site, covered by an engineered barrier (among other remedial responses). No comments objecting to this aspect of the OU 2 remedy were received during the public comment period for OU 2. No new

information has been presented that indicates that the remedy will not be protective. Therefore, U.S. EPA will not consider removing all contaminated soils and material from the Site.

3. Two other commenters expressed support for the proposal to consolidate materials on-site, and explicitly stated that they felt on-site consolidation and long-term management was the best option to protect the waste for the long-term.

U.S. EPA acknowledges these comments.

4. As noted in comment 2 above, ROC's consultant, Golder Associates submitted comments to try to address concerns expressed at the public meeting regarding on-site consolidation and management of OU3 waste. The comments expanded on some information in the FS and supported that on-site management of the materials can be conducted safely and effectively.

U.S. EPA acknowledges these comments.

C. Other Preferred Options

5. Three commenters expressed a preference for other remedial alternatives.

a. Two people preferred Alternative B because they felt that monitored natural recovery (MNR) of the MFLBC sediments would be preferable to dredging or removal of the sediments. One commenter felt that nature would take care of the problem. The other sent extensive analysis:

> *"In my opinion, the dredging should not be done. The certainty of stream habitat destruction on a short term basis far outweighs the risk of leaving the stream to recover by natural processes. There does not seem to be much risk now to people from contamination within the stream. This seems due to the long time since initial spread of contamination, to natural sedimentation processes, and to the fact that sediments have not been actively leaving the site since early work there. USEPA and OEPA have stated that there is not at this point any risk to people from stream contact, and any risk of exposure to mirex from consuming fish is already surpassed by the state-wide hazard due to mercury contamination. Further, the consumption ban from mirex is now restricted to carp from a rather small area of the stream. These rather unpalatable fish do not seem to me to be worth the certain disruption of habitat from dredging. The issue of risk from resuspension of contaminated sediments during dredging should also be considered. In addition, dredging will result under the best of circumstances in several years of recovery for the stream system, further increasing the risk of sediment movement and habitat loss. Even if that sediment is not contaminated with mirex, the sediment itself has a serious potential for stream degradation downstream."*

The commenter who sent the extensive analysis has grappled with many of the same concerns that U.S. EPA and Ohio EPA considered in identifying the preferred alternative. Monitored Natural Recovery was included in Alternative B to address sediments in the MFLBC for many of the reasons discussed by the commenter. Both U.S. EPA and Ohio EPA recognize the importance of the MFLBC habitat, and both agencies are concerned with short-term effects that will result from sediment removal. This is why the approach to removal in the selected alternative, Alternative C is "targeted removal." The targeted approach is intended to meet the cleanup goal, while minimizing destruction of valuable habitat. In choosing between MNR and targeted removal, the agencies were concerned with mirex's high resistance to degradation and persistence in nature. The selected alternative will meet the cleanup goals most quickly and reliably. Also, removal of the most highly contaminated materials provides greater long-term effectiveness and permanence.

In regard to specific concerns about resuspension and further sediment erosion from the destabilized area, U.S. EPA believes that these issues can be addressed by considering the concerns during design of the remedy and careful construction practices. The removal may be conducted "in the dry" – after water has been excluded from a stream segment to prevent resuspension. Alternatively, triggers can be established for dredging that require work practice changes based on performance measures. Once the target sediments are removed, additional erosion can be prevented by armoring or other construction practices, if needed.

b. One commenter preferred Alternative A, No Further Action, because he felt that there were no risks from the Site warranting cleanup and that the problem had solved itself.

As summarized in Section 7 of the Decision Summary of this ROD, an assessment was conducted to evaluate actual and potential risks to human health and the environment from contaminants at the Site. The risk assessment followed U.S. EPA guidance in evaluating Site conditions. Based on the findings of the risk assessment, a response action at OU 3 of the Nease Chemical Site is warranted because there are potential ecological risks and potential future human health risks. Alternative A, No Further Action, would not be protective, and therefore cannot be selected. The response action selected in this ROD is necessary to protect the public health or welfare or the environment from the actual or threatened releases of hazardous substances into the environment.

II. HEALTH CONCERNS

6. A few people made comments related to potential health issues and the risks associated with the contamination at the Site. Concerns included the toxic effects of mirex (including cancer) and its ability to build up in exposed populations.

A human health risk assessment was conducted for the Site, and is extensively documented in the *Endangerment Assessment for the Nease Chemical Company Salem, Ohio Site* (EA), completed in 2004. This risk assessment evaluated the potential risks that could result to people from exposure to the contaminants at the Site under current use scenarios and potential future use scenarios, assuming that no cleanup takes place. The risk assessment uses protective

assumptions in evaluating potential risks. The risk assessment considered the toxic effects of mirex in evaluating the cancer and non-cancer risks to potentially exposed individuals, and U.S. EPA conducted a toxicity reassessment as part of the study.

The results of the human health risk assessment are discussed in Section 7 of this ROD. In summary, none of the current use scenario exposure pathways (for either OU 2 or OU 3) resulted in potential risks exceeding U.S. EPA's acceptable risk range. For OU 3, the highest estimated risks are associated with potential future consumption of fish containing mirex and beef and/or milk from animals assumed to have access to the MFLBC. U.S. EPA has determined that the human health risk assessment has documented a basis for a response action at OU 3 of the Nease Site. However, the human health basis for action is due to potential future exposures, not current exposures.

Three previous public health assessments have been conducted at the Nease Site: a 1990 assessment conducted by the Ohio Department of Health (ODH); a 1996 assessment conducted by ODH in cooperation with the federal Agency for Toxic Substances and Disease Registry (ATSDR); and a 1997 assessment issued by ATSDR. These assessments are discussed in the EA and summarized in Section 2 of this ROD. The assessments probed into potential exposure and deliberately tried to target people most likely to have been exposed to mirex. Very few individuals had detectable mirex in their blood (despite the biased approach to sampling the most likely persons exposed). In the 1996 assessment, ODH recommended that further health studies of the general population were not needed, based on examination of potential exposure pathways and actual measured levels of mirex in blood. The 1997 assessment concluded that "contamination of MFLBC (associated with the Nease Chemical site) represents a public health hazard, because of past exposure and the possibility of future exposures." The results of the risk assessment are consistent with ATSDR's conclusion regarding potential future exposure (the baseline human health risk assessment looked at current and potential future risks, but not past exposures).

III. CLEANUP GOALS

7. ROC commented on the remediation goals:

> *"The current status of the Middle Fork Little Beaver Creek (MFLBC) as a high quality natural resource (a point emphasized by the Ohio Department of Natural Resources at the public meeting) has an important bearing on how the cleanup plan proposed by EPA should be implemented. Studies by Ohio EPA and ODNR show that MFLBC is a very high quality stream that supports a healthy aquatic community, and the natural condition of the floodplain riparian area is an important part of this system. The preliminary remediation goals for sediment and soil established in the Feasibility Study have been expressed as ranges, and their application will require appropriate balancing of the extent of soil/sediment removal to reduce mirex levels against the unavoidable damage to the ecosystem that will result from removal. A clean-up based on the conservative end of the PRG ranges will inevitably cause more damage to the ecology (at least in the short term) with no attendant benefit in terms of long-term risk reduction. As discussed in the*

Feasibility Study, ROC believes, based on multiple lines of evidence, that a mirex PRG of 1.0 mg/kg is an appropriate goal for floodplain soil, consistent with the PRG established by EPA for OU-2 soils. Similarly, ROC believes that a mirex PRG of 0.75 mg/kg is appropriate for sediment. In both cases, attainment of these goals should be based on area-weighted average values (over at least one acre and one river mile for soil and sediment, respectively) and remedy implementation should minimize collateral damage to terrestrial and aquatic habitats."

Both U.S. EPA and Ohio EPA agree that the MFLBC is high quality stream that supports a healthy aquatic community, and the natural condition of the floodplain riparian area is an important part of this system. Because of this, Alternatives B and C in the FS and the selected remedy in this ROD (Alternative C) use a "targeted removal" approach, intended to meet the remediation goals, while minimizing destruction of valuable habitat. The findings of a pre-design investigation (PDI) will be used for both MFLBC sediments and floodplain soils to further refine the areas requiring removal. The remedial design will consider the quality of habitat and the PDI data in establishing the specific areas to be removed.

In regard to the remediation goal for MFLBC floodplain soils, this ROD selects 1.0 mg/kg of mirex as the remediation goal for floodplain soils based on the desired risk reduction endpoints, using multiple lines of evidence, and considering uncertainties. This level will assure no material adverse ecological effect on the identified receptor populations and will ensure that cattle exposed to floodplain soil will not accumulate mirex at unacceptable levels. This level is also consistent with the remediation goal for soil in OU 2, which was selected to be protective of ecological receptors and potential human exposures. As discussed in this ROD, it is intended that the remediation goal is assessed as an average of surface soil values over the exposure unit, likely to be one acre.

In regard to the remediation goal for MFLBC sediment, ROC has recommended 0.75 mg/kg of mirex based on preliminary remediation goals (PRGs) established in the FS. In this ROD, U.S. EPA selects a sediment remediation goal of 0.5 mg/kg of mirex, based on the desired risk reduction endpoints, using multiple lines of evidence, and considering uncertainties. However, because portions of the MFLBC are high quality habitat, in certain cases, based on the PDI data and habitat quality, the remediation goal may be modified in remedial design to be as high as 0.75 mg/kg for those stretches. The remediation goal will prevent additional mirex contamination of the floodplain from MFLBC sediment and, over time will assure no material adverse effects from fish consumption due to mirex uptake. U.S. EPA recognizes that ROC's recommendation is within the range of protective PRGs. However, an important objective for Ohio EPA is that the remediation should clean up mirex-contaminated sediment such that the surface water resource can, at the end of the post-construction recovery period, achieve "fishable" goals. In addition to the FS, U.S. EPA considered information submitted by Ohio EPA in an email with attachments, dated September 8, 2008, in selecting the sediment remediation goal for OU 3. This document is in the Administrative Record. Analysis done by Ohio EPA indicated that a lower remediation goal within the PRG range was likely to achieve this objective more quickly. As discussed in this ROD, it is intended that the remediation goal is assessed by using a surface weighted average concentration, likely over a one mile reach.

IV. TIMELINESS OF THE CLEAN UP

8. Two people commented that the Site should have been cleaned up years ago, since the problem has been acknowledged for decades.

U.S. EPA acknowledges that studies at the Nease Chemical Site have taken longer than at many other Superfund Sites. In hindsight, there may have been opportunities to improve the schedule, however, there were circumstances at the Nease Site that added substantial time to the studies, including: the complexity of the Site; uniqueness of some of the key chemicals of concern (mirex, photomirex and kepone); and the need for a toxicity reassessment for those chemicals. Because mirex is the main contaminant of concern in OU 3, it was imperative to work through these issues. At this point, U.S. EPA believes that these issues are resolved, and that the Site will progress rapidly towards completion of cleanup.

Additionally, because contamination on the old Nease facility was the source of mirex to the MFLBC, work on the source had to precede work on the creeks and floodplains to avoid potential recontamination. The cleanup actions in the selected remedy for OU 2 will constitute source control actions for OU 3. As discussed in U.S. EPA's Directive 9285.6-08: Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites (February 12, 2002), it is important to control sources early. While some of the interim response actions have controlled Site runoff and mitigated releases to the MFLBC, those actions were not a permanent solution to control the source.

V. FLOODPLAIN PROPERTY OWNER CONCERNS

9. Two commenters own or manage property where the floodplain will require cleanup and had concerns specific to their property.

> *a. Dairy Farmer – One of the farmers whose property will need floodplain cleanup sent in several comments specific to their property. They requested to be contacted in person at their property during planning to walk the creek and floodplain and point out areas of concern. Additionally, they currently exclude their cattle from the floodplain with fencing, but might like to use the area for grazing in the future. They asked what would happen if mirex shows up in their milk after cleanup and expressed concerns with the ODH's response to any mirex in the milk from their farm.*

In regard to the request to be contacted in person, this will be done during the planning for the PDI, as well as at other times as needed to keep the property owner informed of plans and progress.

In regard to the questions and concerns about potentially using the floodplain for cattle grazing in the future and the consequences if mirex were to be detected in milk after the cleanup is complete, this is somewhat complicated. The approach to cleanup under the Superfund law is to reduce risks to levels that are considered "acceptable." As discussed in Section 8.1.1 of this

ROD, the remediation goal for floodplain soils is based on risk ranges to protect both ecological receptors and human consumers of beef and/or milk from cattle exposed to mirex while grazing. The remediation goal has not been set to ensure that there will never be any detection of mirex in beef or milk, but to ensure that uptake of mirex into grazing cattle, if it occurs, will be at levels that are protective under the Superfund law. The remediation goal is based on conservative assumptions, and uses a weight-of-evidence approach. However, as discussed in Appendix J of the Feasibility Study, there are very few studies of mirex uptake to cattle and there are uncertainties with the studies. Additionally, the Food and Drug Administration (FDA) used to have an action level of 0.1 mg/kg of mirex in beef and milk fat. There is no longer an FDA action level for mirex in beef and milk fat. The remediation goal for floodplain soil is expected to result in levels in beef and milk below the former action level. It is not clear what ODH's response would be if mirex were detected at very low levels in the milk of cattle grazing in the MFLBC floodplains in the future. U.S. EPA and Ohio EPA will work with the property owner during and after completion of the remedy to discuss the post-construction options for land use in the floodplains.

> *b. Colonial Villa – A manager from Colonial Villa, an estate of mobile homes with 300 – 400 residents, sent in comments specific to the Colonial Villa property. He stated that they had removed a playground and swimming pool because of concerns with mirex in the floodplain, and would like to have the area available again for recreational purposes. He supported the proposed cleanup plan.*

The floodplain soils adjacent to the Colonial Villa estate will be cleaned up as part of the remedy selected in this ROD. The floodplain soil cleanup goal will allow for unrestricted use and unlimited access. Upon completion of the cleanup, the area can be used for recreation and any other purposes that are allowed in floodplains. As a clarifying note, the floodplains near Colonial Villa have relatively high mirex levels compared to other areas in the MFLBC. The playground and pool were removed as a precautionary measure by Colonial Villa. The EA subsequently concluded that there was no unacceptable risk to recreational users of the MFLBC from floodplain soils or creek sediments. However, cleanup of the floodplain in this area is warranted to protect ecological receptors and to prevent potential unacceptable bioaccumulation.

VI. COMMENTS ON REMEDY IMPLEMENTATION

10. One commenter expressed concerns that the sediments and floodplain soils should be managed during drying and storing to ensure that there are no releases of contaminants to the air or into the water table.

Adverse effects of remediation are considered in the short-term effectiveness criterion discussed in this ROD. The remedy will be implemented in a manner that prevents unacceptable releases of contaminants. Typically, a remedial design will include mitigation measures such as an impermeable drying pad and collection sump to collect water coming from the sediments and soils. Also it is typical to have construction monitoring plans and contingency plans to assess and correct any potential effects from construction and implementation of the remedy. U.S. EPA intends that this remedy will be implemented in a safe and protective manner.

11. One commenter stated that because of the dynamic nature of the MFLBC, the floodplain areas can change over time. She recommended that sampling be conducted immediately prior to floodplain excavation to ensure that the appropriate areas are remediated.

U.S. EPA agrees with this comment. The remedy selected in this ROD requires a Pre-design Investigation to further delineate specific areas that will be removed to meet the remediation goal. The Pre-design Investigation is very important because both U.S. EPA and Ohio EPA recognize that the habitat along areas of the MFLBC is a valuable natural resource. The data from the Pre-design Investigation will be used to target areas to be removed, while preserving as much habitat as possible.

12. The Northeast Ohio Scenic River Manager from the Ohio Department of Natural Resources spoke extensively about the beauty and special value of the MFLBC, and made a number of suggestions on cleanup implementation:

a. He commented that because the MFLBC is such an important river at both the state and federal level, the project should be conducted by an experienced engineering firm.

U.S. EPA expects that ROC will conduct the cleanup work required by this ROD. ROC will need to submit the credentials of the engineers and other consultants that will perform the work for U.S. EPA's approval. This will ensure that competent entities are performing the work.

b. He commented on the provisions of the plan that allow for the placement of backfill, expressing concerns that the backfill would not be consolidated and armored like natural sediment, and could contribute to a solids and/or turbidity problem downstream.

U.S. EPA recognizes that backfill has different properties than naturally occurring sediment. If backfill is used, the remedial design will include provisions to ensure that it does not become significantly eroded and a surface water problem downstream. Some of these provisions might include specification of the grain size range required, placement methods, and others.

c. He expressed concerns that resuspension of mirex-contaminated sediment could be a problem and recommended that sediment be removed "in the dry."

U.S. EPA recognizes that resuspension and downstream transport of contaminated sediment is a short-term effect that must be limited. The Feasibility Study provides that MFLBC sediment may be removed by dredging or "in the dry" – after water has been excluded from a stream segment. The final method will be established in the remedial design, after pre-design investigations have provided more information on the best method. Whatever method is selected, provisions to control resuspension and downstream transport will be part of the design considerations.

d. He commented that because mirex is a contaminant that tends to stick to the sediment particles rather than move into the water, it is important to manage particles during the

dewatering of contaminated sediments. He recommended the use of mesh bags, such as were used at other projects in Ohio.

Recognizing that dewatering of contaminated sediment is an important aspect of waste management, the Feasibility Study includes process options to address sediment dewatering. The process options include the use of geotextile tubes, such as Geotubes® or similar. The final method will be established in the remedial design, after pre-design investigations have provided more information on the best method. Whatever method is selected, design provisions will require the management of particulates in water removed from the sediment.

VII. OVERSIGHT OF THE CURRENT WORK

13. One commenter expressed concern with the current work, especially that ROC is allowed to conduct the work. He felt that U.S. EPA and Ohio EPA's were not adequately "policing" the current work. He commented that the appearance of the Site needs to be cleaned up. Finally, he stated that trucks come and go early in the morning without oversight, and was concerned that more waste has been found on the Site.

U.S. EPA's policy is "enforcement first" – U.S. EPA has a strong commitment to have potentially responsible parties (PRPs) conduct the Remedial Investigation / Feasibility Study (RI/FS) wherever appropriate. This policy promotes the "polluter pays" principle and helps conserve the resources of the Hazardous Substance Response Trust Fund (Fund) for sites where no viable responsible parties exist. U.S. EPA's experience has shown that, with adequate oversight, PRPs can perform acceptable RI/FSs. Detailed and thorough work plans are required of ROC and approved by U.S. EPA and Ohio EPA. These plans ensure an adequate RI/FS by setting forth work and deliverable requirements, specifying procedures and relevant guidance documents, and establishing oversight expectations. U.S. EPA also has the ability to seek penalties under the settlement agreements with ROC, and this provides incentives for ROC to meet the requirements of the work plans. Moreover, U.S. EPA and Ohio EPA retain their rights to conduct all or a portion of the work if the ROC's work may cause an endangerment to human health or the environment or does not meet the terms and conditions of the agreement.

In regard to the appearance of the Site, the Superfund program requires remedies that address actual or potential risks, but does not require beautification of the Site. However, the selected remedy for OU 2 calls for leaving mirex contaminated soil in place at the Site, covered by an engineered barrier (among other remedial responses). To construct the cover, vegetation will be cleared and the Site will be graded to manage surface water flow. After construction, the cover will be vegetated and routine maintenance will occur. Completion of the OU 2 remedy should result in a Site that looks neater and better maintained.

In regard to the comment about truck traffic in the night, ROC and Ohio EPA explained the incident at the public meeting. There is an active groundwater treatment system capturing contaminated groundwater. Once or twice a month ROC has arranged to have some of the contaminated groundwater removed by truck to an off-site treatment facility. On one occasion, the trucker who was to pick up the load arrived at the Site early and slept in his truck until he

could pick up the load of water in the morning. Ohio EPA inspected the incident and was satisfied that waste handling was legal. ROC has directed the truck company not to allow the drivers to arrive at the Site in the night.

VIII. MISCELLANEOUS COMMENTS

14. One commenter expressed disappointment that few local government officials attended the public meeting. She hoped that they were well informed.

U.S. EPA produces a Community Involvement Plan for each Superfund site. Among other objectives, this plan provides details about how to involve effected communities in Site decision-making. For OU 3, factsheets were mailed to over 4,000 recipients, including local officials. Information was available on the Nease website. A press release was issued and local media covered the information. U.S. EPA and Ohio EPA met with the Columbiana County Health Department to discuss the proposed cleanup on July 31, 2008.

15. One commenter asked about the plans for long-term monitoring of groundwater wells on neighboring properties and what would be done about wells that are contaminated.

Groundwater contamination is being addressed by the remedial responses selected for OU 2. The selected OU 2 remedy is currently being designed and will be constructed and implemented by ROC. As part of the Pre-Design Investigation for OU 2, neighbors located downgradient of the groundwater plumes were approached to determine if they were using groundwater from wells that might be contaminated, and if so, the wells were sampled. The OU 2 remedy requires a long-term monitoring program and control over use of contaminated groundwater, but specific details of which wells will be monitored and the frequency of monitoring have yet to be determined. The final remedial design will specify how monitoring and institutional controls will be conducted.

APPENDIX B

Administrative Record Index

AR

U.S. EPA ADMINISTRATIVE RECORD
REMEDIAL ACTION
NEASE CHEMICAL COMPANY
SALEM, COLUMBIANA COUNTY, OHIO
ORIGINAL
06/26/95

DOC#	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	00/00/00	U.S. EPA		Procedures for Pesticide/PCB Determination in Fish	4
2	10/01/73	Court of Common Pleas; Columbiana County, Ohio	Litigants	Consent Judgement	6
3	12/18/80	Freese, R., Ecology and Environment, Inc.	U.S. EPA File	Off-Site Inspection Report	13
4	06/11/81	Mount, L., Ruetgers-Nease Chemical Company, Inc.	U.S. EPA	Notification of Hazardous Waste Site	3
5	10/06/82	U.S. EPA		NPL Quality Assurance Summary Sheet	3
6	10/26/82	Ecology and Environment, Inc.	U.S. EPA	Report: Air Sampling at Nease Chemical	14
7	11/09/82	U.S. EPA		HRS Scoring Package	21
8	02/02/83	Lunsford, M., Ecology and Environment, Inc.	U.S. EPA File	Preliminary Assessment	6
9	05/12/83	Ecology and Environment, Inc.	U.S. EPA	Technical Direction Document Acknowledgement of Completion re: Air Sampling at Nease Chemical w/Attached TDDs and FIT Services Request Form	6
10	07/00/83	U.S. EPA		NPL Conditions at Listing in December 1982 and Status as of July 1983	1
11	00/00/84	World Health Organization		Publication: Environmental Health Criteria #14 - Mirex	37
12	08/03/84	Jones, G., Centers for Disease Control / USPHS / USDHHS	Fabinski, L., U.S. EPA	Memorandum re: CDC's Review of (1) Health Threats by Contamination of Sediments, Soils, and Groundwater by VOCs, Mirex, and Methoxychlor and (2) Acceptable Levels of Contaminants	5
13	08/00/87	U.S. EPA	Public	Guidance: Health Effects Assessment for Mirex (EPA/600/22)	48

DOC#	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
14	09/03/87	Foard, S., Ruetgers-Nease Chemical Company, Inc.	Bicknell, D., U.S. EPA; Beals, R., Ohio EPA	Letter re: Aquatic Survey of Middle Fork of Little Beaver Creek	3
15	09/15/87	Constantelos, B., U.S. EPA	Foard, S., Ruetgers-Nease Chemical Company, Inc.	Letter re: Special Notice of Potential Liability (UNSIGNED)	3
16	10/16/87	U.S. EPA		Sampling Plan Outline: October 13-16, 1987 Collection of Fish and Sediments	4
17	01/27/88	U.S. EPA	Respondent	Administrative Order by Consent re: RI/FS	45
18	03/28/88	Constantelos, B., U.S. EPA	Adamkus, V., U.S. EPA	Action Memorandum: Authorization for Funding of PRP RI/FS Oversight Activities	3
19	11/00/88	Jacobs Engineering Group Inc.	U.S. EPA	Final Community Relations Plan	30
20	01/06/89	Black & Veatch	U.S. EPA	Summary Report of the Fall 1987 U.S. EPA Fish and Sediment Sampling Survey of the Middle Fork of Little Beaver Creek	16
21	02/03/89	Bicknell, D., U.S. EPA; and MacMillan, S., Ohio EPA	Foard, S., Ruetgers-Nease Chemical Company, Inc.; et al.	Letter re: Additional Work for the RI/FS w/Attachments	7
22	07/28/89	Black & Veatch	U.S. EPA	Quality Assurance Project Plan: RI/FS Oversight	137
23	02/28/90	Ruetgers-Nease Chemical Company, Inc.	U.S. EPA/Ohio EPA	RI/FS Volume 1: Work Plan (Revision 4)	122
24	02/28/90	Ruetgers-Nease Chemical Company, Inc.	U.S. EPA/Ohio EPA	RI/FS Volume 2: Quality Assurance Project Plan (Revison 4)	230
25	02/28/90	Ruetgers-Nease Chemical Company, Inc.	U.S. EPA/Ohio EPA	RI/FS Volume 3: Site Specific Sampling Plan (Revison 4)	324
26	02/28/90	Ruetgers-Nease Chemical Company, Inc.	U.S. EPA/Ohio EPA	RI/FS Volume 4: Health and Safety Plan (Revision 4)	143

DOC#	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
27	10/04/90	Ohio Department of Health	U.S. EPA/Ohio EPA	Report: Assessment of Exposure to Mirex Associated with the Nease Chemical Company Superfund Site (Final)	46
28	11/26/90	Shelley, T. and Mortensen, B.; Ohio Department of Health	Blumberg, A., U.S. EPA	Letter re: Wildlife Sample Results w/Attachments	6
29	05/09/94	U.S. EPA/OSWER	U.S. EPA	Considering Wetlands at CERCLA Sites (OSWER Directive 9280.0-03; EPA/540/R-94/019; PB94-963242)	45
30	10/00/94	Golder Associates Inc.	U.S. EPA	Supplemental Well Closure Plan: Production Wells P1, P2, and P3 (Revision 1) w/Response to Comments Document	302

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COMPENDIUM OF CERCLA RESPONSE SELECTION GUIDANCE DOCUMENTS

DOC NO	VOL	TITLE	DATE	AUTHORS	STATUS	PAGES	TIER	ATTACHMENTS	OSWER/EPA NUMBER
0000	1	INDEX TO COMPENDIUM OF CERCLA RESPONSE SELECTION GUIDANCE DOCUMENTS	05/01/89	- OWPE - PRC-ENVIRONMENTAL MANAGEMENT, INC	Final	8		1) DATA ELEMENT DEFINITIONS 2) ORGANIZATIONAL ABBREVIATIONS AND ACRONYMS IDENTIFIED IN INDEX	
**		Pre-Remedial							
0001	1	EXPANDED SITE INSPECTION TRANSITIONAL GUIDANCE FOR FY-88	10/01/87	- OERR	Final	74	2		OSWER #9345.1-02
0002	1	PRELIMINARY ASSESSMENT GUIDANCE FISCAL YEAR 1988	01/01/88	- OERR/HSCD	Final	83	2		OSWER #9345.0-01
**		Removal Action							
1000	1	CERCLA REMOVAL ACTIONS AT METHANE RELEASE SITES	01/23/86	- LONDEST, H L /OERR	Final	2	2		OSWER #9360.0-8
1001	1	COSTS OF REMEDIAL RESPONSE ACTIONS AT UNCONTROLLED HAZARDOUS WASTE SITES	01/01/81	- RISDEL, H L, ET AL /SCS ENGINEERS - ALBRECHT, O W /HERL	Final	164	1		
1002	1	EMERGENCY RESPONSE PROCEDURES FOR CONTROL OF HAZARDOUS SUBSTANCE RELEASES	01/01/83	- HEYWOOD, R W /ROCKWELL INTERNATIONAL - MCCARTHY, L T /HERL	Final	23	1		EPA 600/8-84-011
1003	1	ENVIRONMENTAL REVIEW REQUIREMENTS FOR REMOVAL ACTIONS	04/13/87	- OERR/ERD	Final	6	2		OSWER #9318.0-05
1004	1	GUIDANCE ON IMPLEMENTATION OF THE "CONTRIBUTE TO REMEDIAL PERFORMANCE" PROVISION	04/06/87	- OSWER	Final	6	2		OSWER #9360.0-11
1006	2	GUIDANCE ON NON-NPL REMOVAL ACTIONS INVOLVING NATIONALLY SIGNIFICANT OR PRECEDENT SETTING ISSUES	04/03/89	- LONDEST, H L /OERR	Final	9	2	1) REQUEST FOR CONCURRENCE	OSWER #9360.0-19
1005	1	INFORMATION ON DRINKING WATER ACTION LEVELS	04/19/88	- FIELDS, JR, T /OSWER/ERD	Final	17	2	1) HEXCL RELEASES FROM LAWFULLY APPLIED PESTICIDES 2) HEXCL EDCP CONTAMINATION 3) GUIDANCE FOR ETHYLENE DIBROMIDE IN DRINKING H2O	
1006	1	SUPERFUND REMOVAL PROCEDURES, REVISION #3	02/01/88	- OSWER/OERR	Final	365	1		OSWER #9360.0-03B
(1007)	1	THE ROLE OF EXPLOITED RESPONSE ACTIONS UNDER SARA	04/21/87	- LONDEST, H L /OERR	Final	3	2		OSWER #9360.0-15
4002	26	INTERIM FINAL GUIDANCE ON REMOVAL ACTION LEVELS AT CONTAMINATED DRINKING WATER SITES (Secondary Reference)	10/06/87	- OSWER/OERR	Final	9	2		OSWER #9345.1-05
4001	32	REMOVAL COST MANAGEMENT MANUAL (Secondary Reference)	04/01/88	- OSWER/OERR	Final	170	1		OSWER #9360.0-02B

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Doc No	Vol	Title	Date	Authors	Status	Pages	Tier	Attachments	OSWER/EPA Number
**		RI/FS - General							
2000	2	CASE STUDIES 1-23 REMEDIAL RESPONSE AT HAZARDOUS WASTE SITES	03/01/84	- ORD/OEET/HERL - OSWER/OERR	Final	830	1		EPA 540/2-84/002B
2001	3	EPA GUIDE FOR MINIMIZING THE ADVERSE ENVIRONMENTAL EFFECTS OF CLEANUP OF UNCONTROLLED HAZARDOUS-WASTE SITES	06/01/85	- ENVIRONMENTAL RESEARCH LABORATORY	Final	250	2		EPA/600/8-85/008
2002	3	GUIDANCE FOR CONDUCTING REMEDIAL INVESTIGATIONS AND FEASIBILITY STUDIES UNDER CERCLA	10/01/88	- OSWER/OERR	Final	390	1		OSWER 9355.3-01
2003	3	JOINT CORPS/EPA GUIDANCE	06/24/83	- OERR/PAS	Final	42	2		OSWER 9295.2-02
2004	4	MODELING REMEDIAL ACTIONS AT UNCONTROLLED HAZARDOUS WASTE SITES (VOL. I-IV)	04/01/85	- BOWNELL, S.H. ET AL./ANDERSON-NICHOLS AND CO - OSWER/OERR - AMEN, D.C AND BOWNELL, JR., T.O./HERL	Final	350	1		OSWER 9355.0-08
2005	4	POLICY ON FLOOD PLAINS AND WETLAND ASSESSMENTS FOR CERCLA ACTIONS	08/01/85	- HEDEMAN, JR., W.N./OERR - LUCERO, C./OWPE	Final	9	2		OSWER 9280.0-02
2006	4	REMEDIAL RESPONSE AT HAZARDOUS WASTE SITES SUMMARY REPORT	03/01/84	- ORD/HERL	Final	95	1		EPA 540/2-84/002A
2007	4	REVISED PROCEDURES FOR IMPLEMENTING OFF-SITE RESPONSE ACTIONS	11/13/87	- PORTER, J.W./OSWER	Final	20	2		OSWER 9834.11
2008	4	RI/FS IMPROVEMENTS	07/23/87	- LONGEST, H.L./OERR	Final	11	2	1) RI/FS IMPROVEMENTS	OSWER 9355.0-30
2009	4	RI/FS IMPROVEMENTS FOLLOW-UP	04/25/88	- LONGEST, H.L./OERR	Final	16	2	1) RI/FS IMPROVEMENTS FOLLOW-UP 2) REMEDIAL INFORMATION TRANSFER ACTIVITIES	OSWER 9355.3-05
2010	4	SUPERFUND FEDERAL-LEAD REMEDIAL PROJECT MANAGEMENT HANDBOOK	12/01/86	- OERR	Draft	179	1		OSWER 9355.1-1
2011	5	SUPERFUND REMEDIAL DESIGN AND REMEDIAL ACTION GUIDANCE	06/01/86	- OERR	Final	100	1		OSWER 9355.0-4A
2012	5	SUPERFUND STATE-LEAD REMEDIAL PROJECT MANAGEMENT HANDBOOK	12/01/86	- OERR	Final	120	1		OSWER 9355.2-1
**		RI/FS - RI Data Quality/Site & Waste Assessment							
2100	5	A COMPENDIUM OF SUPERFUND FIELD OPERATIONS METHODS	12/01/87	- OERR - OWPE	Final	550	1		OSWER 9355.0-14
2101	6	DATA QUALITY OBJECTIVES FOR REMEDIAL RESPONSE ACTIVITIES: DEVELOPMENT PROCESS	03/01/87	- CDM FEDERAL PROGRAMS CORP - OERR/OWPE	Final	150	1		OSWER 9355.0-7B

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2102	6	DATA QUALITY OBJECTIVES FOR REMEDIAL RESPONSE ACTIVITIES EXAMPLE SCENARIO: RI/FS ACTIVITIES AT A SITE W/ CONTAMINATED SOILS AND GROUNDWATER	03/01/87	- CDM FEDERAL PROGRAMS CORP - OSWER/OERR	Final	120	1		OSWER #9355.0-7B
2103	6	DESIGN AND IMPLEMENTATION OF HAZARDOUS WASTE REACTIVITY TESTING PROTOCOL	02/01/84	- VOLBACH, C.D., ET AL /ACUREX CORP - BARKLEY, N./MERL	Final	150	1		EPA-600/2-84-057
2104	6	FIELD SCREENING FOR ORGANIC CONTAMINANTS IN SAMPLES FROM HAZARDOUS WASTE SITES	04/02/86	- HOFFMAN, H.K., ET AL ANUS CORP. - CARTER, A /MICHIGAN DEPT OF NATURAL RESOURCES - THOMAS, T./EPA	Final	11	2	1) MEMO FIELD SCREENING FOR ORGANIC CONTAMINANTS	
2105	6	FIELD SCREENING METHODS CATALOG: USER'S GUIDE	09/01/88	- OSWER/OERR	Final	90	1		EPA/540/2-88/005
2106	6	FIELD STANDARD OPERATING PROCEDURES MANUAL #4-SITE ENTRY	01/01/85	- OSWER/OERR	Final	29	2		OSWER #9285.2-01
2107	7	FIELD STANDARD OPERATING PROCEDURES MANUAL #6-WORK ZONES	04/01/85	- OSWER/OERR	Final	19	2		OSWER #9285.2-04
2108	7	FIELD STANDARD OPERATING PROCEDURES MANUAL #8 AIR SURVEILLANCE	01/01/85	- OSWER/OERR	Final	24	2		OSWER #9285.2-03
2109	7	FIELD STANDARD OPERATING PROCEDURES MANUAL #9-SITE SAFETY PLAN	04/01/85	- OSWER/OERR	Final	26	2	1) SAMPLE SITE SAFETY PLAN AND ERT'A SAFETY PLAN 2) EMERGENCY OPERATION CENTER REAL TIME MONITOR 3) RESPONSE SAFETY CHECK-OFF SHEET	OSWER #9285.2-05
2110	7	GEOPHYSICAL METHODS FOR LOCATING ABANDONED WELLS	07/01/84	- FRISCHKNECHT, F.M., ET AL /U.S GEOLOGICAL SURVEY - VANEE, J.J./EMSL	Final	211	1		EPA-600/4-84-065
2111	7	GEOPHYSICAL TECHNIQUES FOR SENSING BURIED WASTES AND WASTE MIGRATION	06/01/84	- BENSON, R.C., ET AL./TECHNOS, INC - VANEE, J.J./EMSL	Final	236	1		EPA-600/7-84/064
2112	8	GUIDELINES AND SPECIFICATIONS FOR PREPARING QUALITY ASSURANCE PROGRAM DOCUMENTATION	06/01/87	- OSWER/QUALITY ASSURANCE MANAGEMENT STAFF	Final	31	2	1) MEMO GUIDANCE ON PREPARING QAPP'S DATED 6/10/87	
2113	8	LABORATORY DATA VALIDATION FUNCTIONAL GUIDELINES FOR EVALUATING INORGANICS ANALYSES	07/01/88	- EPA DATA REVIEW WORK GROUP - BLEYLER, R /VIAR AND CO./SAMPLE MGMT OFFICE - HSED	Draft	20	2		
2114	8	LABORATORY DATA VALIDATION FUNCTIONAL GUIDELINES FOR EVALUATING ORGANICS ANALYSES	02/01/88	- BLEYLER, R /VIAR AND CO /SAMPLE MGMT OFFICE - EPA DATA REVIEW WORKGROUP - HSED	Draft	45	2		

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DOC NO	VOL	TITLE	DATE	AUTHORS	STATUS	PAGES	TIER	ATTACHMENTS	OSWER/EPA NUMBER
2115	8	PRACTICAL GUIDE FOR GROUND-WATER SAMPLING	09/01/85	- BARCELONA, M J., ET AL./ILLINOIS ST WATER SURVEY - SCALF, M R./ORD/ERL	Final	175	1		EPA/600/2-85/104
2116	8	SEDIMENT SAMPLING QUALITY ASSURANCE USER'S GUIDE	07/01/85	- BARTH, D S. & STARKS, T S /UNIV OF NEV, LAS VEGAS - BROWN, K W /EMSL	Final	120	1		EPA/600/4-85/048
2117	8	SOIL SAMPLING QUALITY ASSURANCE USER'S GUIDE	05/01/84	- BARTH, D S. & MASON, B J /U OF NEVADA, LAS VEGAS - BROWN, K /ORD/EMSL	Final	104	1		EPA 600/4-84/043
2118	9+	TEST METHODS FOR EVALUATING SOLID WASTE, LABORATORY MANUAL PHYSICAL/CHEMICAL METHODS, THIRD EDITION (VOLUMES IA, IB, IC, AND II)	11/01/86	- OSWER	Final	3000	1		
2119	11	USER'S GUIDE TO THE CONTRACT LABORATORY PROGRAM	12/01/88	- OSWER/OLM SAMPLE MANAGEMENT OFFICE	Final	220	2		OSWER 9240.0-1
**		RI/FS - Land Disposal Facility Technology							
2200	12	COVERS FOR UNCONTROLLED HAZARDOUS WASTE SITES	09/01/85	- MCANENY, C C., ET AL./U S COE/WES - HOUSTON, J M /HERL	Final	475	2		EPA/540/2-85/002
2201	13	DESIGN, CONSTRUCTION, AND EVALUATION OF CLAY LINERS FOR WASTE MANAGEMENT FACILITIES	11/01/88	- COLEMAN, J L., ET AL /ALS - ROULIER, M H /RREL	Final	500	2		EPA/530/SW-86/007I
2202	13	EVALUATING COVER SYSTEMS FOR SOLID AND HAZARDOUS WASTE	09/01/82	- LUTTON, R J./U S A COE/WES - LANDRETH, R E /MERL	Final	58	2		OSWER 9476.00-1
2203	13	GUIDANCE MANUAL FOR MINIMIZING POLLUTION FROM WASTE DISPOSAL SITES	08/01/78	- TOLMAN, A L., ET AL./A.W MARTIN ASSOCIATES, INC - SANNING, D E /MERL	Final	83	1		EPA-600/2-78-142
2204	13	LAND DISPOSAL RESTRICTIONS	08/11/87	- LONDEST, H.L./OSWER - LUCERO, G./OWPE	Final	23	2	1) SUMMARY OF MAJOR LDR PROVISIONS AND CALIFORNIA LIST PROHIBITIONS 2) OTHER ATTACHS CITED ARE AVAILABLE IN	

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2205	14	LINING OF WASTE CONTAINMENT AND OTHER IMPOUNDMENT FACILITIES	09/01/88	- MAIRECON, INC - LANDRETH, R /ORD/RISK REDUCTION ENGINEERING LAB	Final	950	2	FED REG	
2206	15	LINING OF WASTE IMPOUNDMENT AND DISPOSAL FACILITIES	03/01/83	- LANDRETH, R /MERL	Final	480	2		OSWER #9480.00.4
2207	15	PROCEDURES FOR MODELING FLOW THROUGH CLAY LINERS TO DETERMINE REQUIRED LINER THICKNESS	01/01/84	- OSW	Draft	145	2		OSWER #9480.00.9B
2208	15	RCRA GUIDANCE DOCUMENT LANDFILL DESIGN LINER SYSTEMS AND FINAL COVER	07/01/82	- EPA	Draft	30	2		
2209	15	SETTLEMENT AND COVER SUBSIDENCE OF HAZARDOUS WASTE LANDFILLS: PROJECT SUMMARY	05/01/85	- MURPHY, W.L. - GILBERT, P.A.	Final	4	2		EPA-600/S2-85 035
2210	15	SUPPLEMENTARY GUIDANCE ON DETERMINING LINER/LEACHATE COLLECTION SYSTEM COMPATIBILITY	08/07/86	- MIDDLE, B.R./PERMITS AND STATE PROGRAMS DIV	Final	60	2	1) ANALYSIS AND FINDINGS REGARDING EXPOSED UNSUPPORTED & EXPOSED POLYMERIC MEMBRANE LINERS MAIRECON, INC 2) SEC 3019 EXPOSURE INFO AND RISK ASSESSMENTS	OSWER #9480.00.13
2211	15	TECHNICAL GUIDANCE DOCUMENT CONSTRUCTION QUALITY ASSURANCE FOR HAZARDOUS WASTE LAND DISPOSAL FACILITIES	10/01/86	- HERRMANN, J.G./MERL/LAND POLLUTION CONTROL DIV - OSWER	Final	88	2		OSWER #9472.001
2212	15	TREATMENT OF REACTIVE WASTES AT HAZARDOUS WASTE LANDFILLS PROJECT SUMMARY	01/01/84	- SKEEHER, D. ET AL /ARTHUR D. LITTLE, INC - LANDRETH, R /MERL	Final	4	2		EPA/600/S2-83/118
3000	25	APPLICABILITY OF THE HSWA MINIMUM TECHNICAL REQUIREMENTS RESPECTING LINERS AND LEACHATE COLLECTION SYSTEMS (Secondary Reference)	04/01/85	- SKINNER, J /OSW	Final	3	2		OSWER #9480.01(85)
**		RI/FS - Other Technologies							
2300	16	A COMPENDIUM OF TECHNOLOGIES USED IN THE TREATMENT OF HAZARDOUS WASTES	09/01/87	- ORD/CERI	Final	49	2		EPA/625/8-87/014

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2301	16	CARBON ADSORPTION ISOTHERMS FOR TOXIC ORGANICS	04/01/80	- LUBBS, R A /MERL - COHEN, J M /MERL	Final	321	2		EPA/600/8-80-023
2302	17	ENGINEERING HANDBOOK FOR HAZARDOUS WASTE INCINERATION	09/01/81	- BONNER T A , ET AL /MONSANTO RESEARCH CORP. - OBERACKER, D A /OTET	Final	445	2		OSWER 69480 00 5
2303	17	EPA GUIDE FOR IDENTIFYING CLEANUP ALTERNATIVES AT HAZARDOUS WASTE SITES AND SPILLS BIOLOGICAL TREATMENT	—	- PACIFIC NORTHWEST LABORATORY - RAINERE, L C./CORVALLIS ENVIRONMENTAL RESEARCH LAB	Final	120	2		EPA-600/3-81-061
2304	17	EPA GUIDE FOR INFECTIOUS WASTE MANAGEMENT	05/01/86	- OSWER/OSW	Final	75	2		OSWER 69410 00 1
2305	17	GUIDANCE DOCUMENT FOR CLEANUP OF SURFACE IMPOUNDMENT SITES	06/01/86	- COM/WOODWARD-CLYDE/ROY F WESTON - BARTH, E /OSWR	Final	39	1		EPA/540/G-86/006
2306	17	GUIDANCE DOCUMENT FOR CLEANUP OF SURFACE TANK AND DRUM SITES	05/30/85	- COM/WOODWARD-CLYDE/ROY F WESTON/C C JOHNSON - BARTH, E AND BIXLER, B /OSWR	Final	135	1		OSWER 69380 0 01
2307	18	HANDBOOK FOR EVALUATING REMEDIAL ACTION TECHNOLOGY PLANS	08/01/83	- BRENFIELD, J AND BASS, J /ARTHUR D LITTLE INC - PAIREN, H R /MERL	Final	439	1		EPA-600/2-83-076
2308	18	HANDBOOK FOR STABILIZATION/SOLIDIFICATION OF HAZARDOUS WASTE	06/01/86	- CULLINANE JR , M J ET AL /U S CE/WES - LOFTCOFD, J M /ORDA/MERL	Final	135	1		EPA/540/2-86-001
2309	19	HANDBOOK REMEDIAL ACTION AT WASTE DISPOSAL SITES (REVISED)	10/01/85	- ORD/MERL - OSWER/OERR	Final	560	1		EPA/625/6-85/006
2310	20	LEACHATE PLUME MANAGEMENT	11/01/85	- REPO, E AND ROES, C /JRB ASSOCIATES - BARKLEY, M /EPA	Final	590	1		EPA/540/2-85/004
2311	20	MOBILE TREATMENT TECHNOLOGIES FOR SUPERFUND WASTES	09/01/86	- CAMP, DRESSER, AND MCKEE INC - CALER, L D./ARSD	Final	130	1		EPA/540/2-86-003
2312	21	PRACTICAL GUIDE-TRIAL BURNS FOR HAZARDOUS WASTE INCINERATORS	04/01/86	- CORMAN, P., ET AL /MIDWEST RESEARCH INSTITUTE - OBERACKER, D A /MERL	Final	63	2		EPA/600/2-86/050
2313	21	PRACTICAL GUIDE-TRIAL BURNS FOR HAZARDOUS WASTE INCINERATORS, PROJECT SUMMARY	07/01/86	- CORMAN, P , ET AL /MIDWEST RESEARCH INSTITUTE - OBERACKER, D A /MERL	Final	2	1		EPA/600/S3-86/050

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2314	21	PROHIBITION ON THE PLACEMENT OF BULK LIQUID HAZARDOUS WASTE IN LANDFILLS-STATUTORY INTERPRETIVE GUIDANCE	06/11/86	- OSWER/OSW	Final	35	1	1) MEMO RE SAME SUBJECT FROM WILLIAMS, M E /OSW	OSWER #9487.00-2A
2315	21	REVIEW OF IN-PLACE TREATMENT TECHNIQUES FOR CONTAMINATED SURFACE SOILS-VOL 2: BACKGROUND INFORMATION FOR IN-SITU TREATMENT	11/01/84	- SIMS, R C, ET AL /R S ASSOCIATES - BARKLEY, N /MERL	Final	350	1		EPA-540/2-84-003b
2316	21	REVIEW OF IN-PLACE TREATMENT TECHNIQUES FOR CONTAMINATED SURFACE SOILS-VOL 1 TECHNICAL EVALUATION	09/19/84	- OSWER/OERR - ORD/MERL	Final	165	1		EPA/540/2-84-003a
2317	22	SLURRY WALL CONSTRUCTION FOR POLLUTION MIGRATION CONTROL	02/01/84	- OERR - ORD/MERL	Final	220	1		EPA/540/2-84-001
2318	22	SYSTEMS TO ACCELERATE IN SITU STABILIZATION OF WASTE DEPOSITS	09/01/86	- MALLER, M, ET AL /ENVIROSPHERE CO. - CRUSE, W /MERL	Final	285	1		EPA 540/2-86/002
2319	22	TECHNOLOGY SCREENING GUIDE FOR TREATMENT OF CERCLA SOILS AND SLUDGES	09/01/88	- OSWER/OERR	Final	130	1		EPA 540/2-88/004
2320	22	TREATMENT TECHNOLOGY BRIEFS ALTERNATIVES TO HAZARDOUS WASTE LANDFILLS	07/01/86	- MERL	Final	35	2		EPA/600/8-86/017
**		RI/FS - Ground-Water Monitoring & Protection							
2400	23	CRITERIA FOR IDENTIFYING AREAS OF VULNERABLE HYDROGEOLOGY UNDER RCRA STATUTORY INTERPRETIVE GUIDANCE	07/01/86	- OSWER/OSW	Final	950	2		OSWER #9472.00-2A
2401	24	FINAL RCRA COMPREHENSIVE GROUND-WATER MONITORING EVALUATION (CME) GUIDANCE DOCUMENT	12/19/86	- LUCERO, C A /OWPE	Final	55	2	1) RELATIONSHIP OF TECHNICAL INADEQUACIES TO GROUND-WATER PERFORMANCE STANDARDS	OSWER #9950.2
2402	24	GROUND-WATER MONITORING AT CLEAN-CLOSING SURFACE IMPOUNDMENT AND WASTE PILE UNITS	03/31/88	- PORTER, J W /OSWER	Final	3	2		OSWER #9476.00-14
2403	24	GROUND-WATER PROTECTION STRATEGY	08/01/84	- OFFICE OF GROUND-WATER PROTECTION	Final	65	2		EPA/440/6-84-002
2404	24	GUIDELINES FOR GROUND-WATER CLASSIFICATION UNDER THE EPA GROUND-WATER PROTECTION STRATEGY	12/01/86	- OFFICE OF GROUND-WATER PROTECTION	Draft	600	2		
2405	24	OPERATION AND MAINTENANCE INSPECTION GUIDE (RCRA GROUND-WATER MONITORING SYSTEMS)	03/30/88	- OSWER/OWPE/RCRA ENFORCEMENT DIVISION	Final	50	2	1) TRANSMITTAL MEMO RE SAME SUBJECT	OSWER #9950.3

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2406	24	PROTOCOL FOR GROUND-WATER EVALUATIONS	09/01/86	- HAZARDOUS WASTE GROUND WATER TASK FORCE	Final	200	2		OSWER #9080 0-1
2407	25	RCRA GROUND-WATER MONITORING TECHNICAL ENFORCEMENT GUIDANCE DOCUMENT(TEGD)	09/01/86	- EPA	Final	270	2		OSWER #9950 1
2408	25	RCRA GROUND-WATER MONITORING TECHNICAL ENFORCEMENT GUIDANCE DOCUMENT, TEGD: EXECUTIVE SUMMARY	07/01/87	- LUCERO, C A /OMPE	Final	8	1		OSWER #9950 1-A
**		ARARs							
3000	25	APPLICABILITY OF THE RCRA MINIMUM TECHNICAL REQUIREMENTS RESPECTING LINERS AND LEACHATE COLLECTION SYSTEMS	04/01/85	- SKINNER, J /OSW	Final	3	2		OSWER #9480 01(85)
3001	25	CERCLA COMPLIANCE WITH OTHER ENVIRONMENTAL STATUTES	10/02/85	- PORTER, J W /OSWER	Final	19	1	1) POTENTIALLY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS	OSWER #9234 0-2
3002	25	CERCLA COMPLIANCE WITH OTHER LAWS MANUAL	08/08/88	- OSWER	Draft	245	2		OSWER #9234 1-01
3003	25	EPA'S IMPLEMENTATION OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986	05/21/87	- THOMAS, L M /EPA	Final	4	2		
3004	25	GUIDANCE MANUAL ON THE RCRA REGULATION OF RECYCLED HAZARDOUS WASTES	03/01/86	- INDUSTRIAL ECONOMICS, INC - OSW	Final	350	2		OSWER #9441 00 2
3005	25	INTERIM RCRA/CERCLA GUIDANCE ON NON-CONTIGUOUS SITES AND ON-SITE MANAGEMENT OF WASTE AND TREATMENT RESIDUE	03/27/86	- PORTER, J W /OSWER	Final	8	2	1) COMBINING HAZARDOUS WASTE SITES FOR REM ACTION	OSWER #9347 0-1
2400	23	CRITERIA FOR IDENTIFYING AREAS OF VULNERABLE HYDROGEOLOGY UNDER RCRA. STATUTORY INTERPRETIVE GUIDANCE [Secondary Reference]	07/01/86	- OSWER/OSW	Final	950	2		OSWER #9472 00 2A
2401	24	FINAL RCRA COMPREHENSIVE GROUND-WATER MONITORING EVALUATION (CME) GUIDANCE DOCUMENT [Secondary Reference]	12/19/86	- LUCERO, C A /OMPE	Final	55	2	1) RELATIONSHIP OF TECHNICAL INADEQUACIES TO GROUND-WATER PERFORMANCE STANDARDS	OSWER #9950 2
2405	24	OPERATION AND MAINTENANCE INSPECTION GUIDE (RCRA GROUND-WATER MONITORING SYSTEMS) [Secondary Reference]	03/30/88	- OSWER/OMPE/RCRA ENFORCEMENT DIVISION	Final	50	2	1) TRANSMITTAL MEMO RE SAME SUBJECT	OSWER #9950 3
2407	25	RCRA GROUND-WATER MONITORING TECHNICAL ENFORCEMENT GUIDANCE DOCUMENT(TEGD) [Secondary Reference]	09/01/86	- EPA	Final	270	2		OSWER #9950 1
2408	25	RCRA GROUND-WATER MONITORING TECHNICAL ENFORCEMENT GUIDANCE DOCUMENT, TEGD: EXECUTIVE SUMMARY [Secondary Reference]	07/01/87	- LUCERO, C A /OMPE	Final	8	1		OSWER #9950 1-A

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2308	15	RCRA GUIDANCE DOCUMENT - LANDFILL DESIGN LINER SYSTEMS AND FINAL COVER (Secondary Reference)	07/01/82	- EPA	Draft	30	2		
9001	32	RCRA/CERCLA DECISIONS MADE ON REMEDY SELECTION (Secondary Reference)	06/24/85	- KILPATRICK, M /COMPLIANCE BRANCH, OWPE	Final	3	2		
**		Water Quality							
4000	26	ALTERNATE CONCENTRATION LIMIT GUIDANCE PART 1, ACL POLICY AND INFORMATION REQUIREMENTS	07/01/87	- OSW/HWD	Final	124	2		OSWER #9481.00-6C
4001	26	GUIDANCE DOCUMENT FOR PROVIDING ALTERNATE WATER SUPPLIES	02/01/88	- OSWER	Final	64	2		OSWER #9355.3-01
4002	26	INTERIM FINAL GUIDANCE ON REMOVAL ACTION LEVELS AT CONTAMINATED DRINKING WATER SITES	10/06/87	- OSWER/OERR	Final	9	2		OSWER #9360.1-01
4003	26	QUALITY CRITERIA FOR WATER 1986	05/01/87	- OFFICE OF WATER REGULATIONS AND STANDARDS	Final	325	2		EPA/440/5-86-001
2301	16	CARBON ADSORPTION ISOTHERMS FOR TOXIC ORGANICS (Secondary Reference)	04/01/80	- DOBBS, R A /MERL - COHEN, J M /MERL	Final	321	2		EPA/600/8-80-023
1005	1	INFORMATION ON DRINKING WATER ACTION LEVELS (Secondary Reference)	04/19/88	- FIELDS, JR., T /OSWER/ERD	Final	17	2	1) MEMO RELEASES FROM LAWFULLY APPLIED PESTICIDES 2) MEMO DBCP CONTAMINATION 3) GUIDANCE FOR ETHYLENE DIBROMIDE IN DRINKING H2O	
**		Risk Assessment							
5000	27	ATSDR HEALTH ASSESSMENTS ON NPL SITES	06/16/84	- DEPT OF HEALTH AND HUMAN SERVICES/ATSDR	Draft	14	2		
5001	27	CHEMICAL, PHYSICAL & BIOLOGICAL PROPERTIES OF COMPOUNDS PRESENT AT HAZARDOUS WASTE SITES	09/27/85	- CLEMENT ASSOCIATES, INC	Final	320	2		OSWER #9850.3
5002	27	FINAL GUIDANCE FOR THE COORDINATION OF ATSDR HEALTH ASSESSMENT ACTIVITIES WITH THE SUPERFUND REMEDIAL PROCESS	05/14/87	- PORTER, J W /OSWER/OERR - ATSDR	Final	22	2	1) SAME TITLE, DATED 4/22/87	OSWER #9285.4-02
5003	27	GUIDELINES FOR CARCINOGEN RISK ASSESSMENT (FEDERAL REGISTER, SEPTEMBER 24, 1986, p 33992)	09/24/86	- EPA	Final	13	2		

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5004	27	GUIDELINES FOR EXPOSURE ASSESSMENT (FEDERAL REGISTER, SEPTEMBER 24, 1986, p 34042)	09/24/86	- EPA	Final	14	2		
5005	27	GUIDELINES FOR HEALTH ASSESSMENT OF SUSPECT DEVELOPMENTAL TOXICANTS (FEDERAL REGISTER, SEPTEMBER 24, 1986, p. 34028)	09/24/86	- EPA	Final	14	2		
5006	27	GUIDELINES FOR MUTAGENICITY RISK ASSESSMENT (FEDERAL REGISTER, SEPTEMBER, 24, p 34006)	09/24/86	- EPA	Final	8	2		
5007	27	GUIDELINES FOR THE HEALTH RISK ASSESSMENT OF CHEMICAL MIXTURES (FEDERAL REGISTER, SEPTEMBER 24, 1986, p. 34014)	09/24/86	- EPA	Final	13	2		
5008	28+	HEALTH EFFECTS ASSESSMENT DOCUMENTS (58 CHEMICAL PROFILES) VOL 28: ACETONE, ARSENIC, ASBESTOS, BARIUM, BENZO(A)PYRENE, CADMIUM, CARBON TETRACHLORIDE, CHLOROBENZENE, CHLORDANE, CHLOROFORM, COAL TARS, COPPER, CRESOLS, CYANIDE, DDT, 1,1-DICHLOROETHANE, 1,2-DICHLOROETHANE, VOL 29: 1,1-DICHLOROETHYLENE, 1,2-DICHLOROETHYLENE, CIS-1,2-DICHLOROETHYLENE, ETHYLBENZENE, GLYCOL ETHERS, HEXACHLOROBENZENE, HEXACHLOROBUTADIENE, HEXACHLOROCYCLOPENTADIENE, HEXAVALENT CHROMIUM, IRON (AND COMPOUNDS), LEAD, LINDANE, MANGANESE (AND COMPOUNDS), MERCURY, METHYL ETHYL KETONE, METHYLENE CHLORIDE, NAPHTHALENE, NICKEL, PENTACHLOROPHENOL, PHENOL, PHENANTHRENE, VOL 30: POLYCHLORINATED BIPHENYLS (PCBS), POLYCYCLIC AROMATIC HYDROCARBONS (PAHS), PYRENE, SELENIUM (AND COMPOUNDS), SODIUM CYANIDE, SULFURIC ACID, 2,3,7,8-TETRACHLORODIBENZO-p-DIOXIN, 1,1,2,2-TETRACHLOROETHANE, TETRACHLOROETHYLENE, TOLUENE, 1,1,2-TRICHLOROETHANE, 1,1,1-TRICHLOROETHANE, TRICHLOROETHYLENE, 2,4,5-TRICHLOROPHENOL, 2,4,6-TRICHLOROPHENOL, TRIVALENT CHROMIUM, VINYL CHLORIDE, XYLENE, ZINC (AND COMPOUNDS)	09/01/84	- ORD/OHEA/ECAO - OSWER/OERR	Final	1750	2		EPA/540/1-86/001-058
5009	31	INTEGRATED RISK INFORMATION SYSTEM (IRIS) [A COMPUTER-BASED HEALTH RISK INFORMATION SYSTEM AVAILABLE THROUGH E-MAIL--PROCEDURE ON ACCESS IS INCLUDED]	-	- OHEA	Final	-	2		

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5010	31	INTERIM POLICY FOR ASSESSING RISKS OF "DIOXINS" OTHER THAN 2,3,7,8-TCDD	01/07/87	- THOMAS, L M /EPA	Final	50	2	1) INTERIM PROCEDURES FOR ESTIMATING RISKS ASSOCIATED WITH EXPOSURES TO MIXTURES. 10/86	
5011	31	PUBLIC HEALTH RISK EVALUATION DATABASE (PHRED) [USER'S MANUAL AND TWO DISKETTES CONTAINING THE DBASE III PLUS SYSTEM ARE INCLUDED]	09/16/88	- OERR/TOXICS INTEGRATION BRANCH	Final	-	2		
5012	31	ROLE OF ACUTE TOXICITY BIOASSAYS IN THE REMEDIAL ACTION PROCESS AT HAZARDOUS WASTE SITES	08/01/87	- ARNEY, L A., ET AL /PACIFIC NORTHWEST LABORATORY - MILLER, W.E. /CORVALLIS ENVIRONMENTAL RESEARCH LAB	Final	106	2		EPA/600/8-87/044
9013	31	SUPERFUND EXPOSURE ASSESSMENT MANUAL	04/01/88	- OERR	Final	140	1		OSWER #9285.5-1
9014	31	SUPERFUND PUBLIC HEALTH EVALUATION MANUAL	10/01/86	- OERR - OSWER	Final	500	1		OSWER #9285.4-1
5015	31	TOXICOLOGY HANDBOOK	08/01/85	- LIFE SYSTEMS, INC - TYBURSKI, T E /COMPE	Draft	136	2		OSWER #9850.2
8000	32	ENDANGERMENT ASSESSMENT GUIDANCE [Secondary Reference]	11/22/85	- PORTER, J W /OSWER	Final	11	2		OSWER #9850.0-1
**		Cost Analysis							
6000	32	REMEDIAL ACTION COSTING PROCEDURES MANUAL	10/01/87	- JRB ASSOCIATES/O'DONNELL - OHD/MERL - OSWER/OERR	Final	56	1		
6001	32	REMOVAL COST MANAGEMENT MANUAL	04/01/88	- OSWER/OERR	Final	170	1		OSWER #9360.0-02A
1003	1	ENVIRONMENTAL REVIEW REQUIREMENTS FOR REMOVAL ACTIONS [Secondary Reference]	04/13/87	- OERR/ERD	Final	6	2		OSWER #9318.0-05
**		Community Relations							
7000	32	COMMUNITY RELATIONS IN SUPERFUND A HANDBOOK (INTERIM VERSION)	06/01/88	- OERR	Final	188	2	1) CHAP 6 OF THE COMMUNITY HANDBOOK 11/03/88	OSWER #9230.0-03

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**		Enforcement							
8000	32	ENDANGERMENT ASSESSMENT GUIDANCE	11/22/85	- PORTER, J W /OSWER	Final	11	2		OSWER #9850.0-1
8001	32	INTERIM GUIDANCE ON POTENTIALLY RESPONSIBLE PARTY PARTICIPATION IN REMEDIAL INVESTIGATIONS AND FEASIBILITY STUDIES	05/16/88	- PORTER, J W /OSWER	Final	37	2		OSWER #9835.1a
**		Selection of Remedy/Decision Documents							
9000	32	INTERIM GUIDANCE ON SUPERFUND SELECTION OF REMEDY	12/24/86	- PORTER, J W./OSWER	Final	10	2		OSWER #9355.0-19
9001	32	RURA/CERCLA DECISIONS MADE ON REMEDY SELECTION	08/24/88	- KILPATRICK, M /COMPLIANCE BRANCH, OWR	Final	3	2		

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U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR
NEASE CHEMICAL COMPANY SITE
SALEM, COLUMBIANA COUNTY, OHIO

UPDATE #1
AUGUST 17, 1998

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	04/05/91	Ruetgers-Nease Corporation	U.S. EPA	*Remedial Investigation Report: Volume 2 of 4 (Appendix A)* for the Nease Chemical Site	209
2	04/05/91	Ruetgers-Nease Corporation	U.S. EPA	*Remedial Investigation Report: Volume 3 of 4 (Appendices B-J)* for the Nease Chemical Site	600
3	04/05/91	Ruetgers-Nease Corporation	U.S. EPA	*Remedial Investigation Report: Volume 4 of 4 [1 of 2] (Appendix K: Laboratory Analytical Results)* for the Nease Chemical Site	743
4	04/05/91	Ruetgers-Nease Corporation	U.S. EPA	*Remedial Investigation Report: Volume 4 of 4 [2 of 2] (Appendix K: Laboratory Analytical Results)* for the Nease Chemical Site (Revision 1: July 6, 1993)	567
5	01/31/96	Ruetgers-Nease Corporation	U.S. EPA/ Ohio EPA	*Final Remedial Investigation Report: Volume 1 of 4* (Text, Tables, and Figures) for the Nease Chemical Site	499
6	01/31/96	Ruetgers-Nease Corporation	U.S. EPA/ Ohio EPA	*Final Remedial Investigation Report: Volume 1A of 4 (Plates)* for the Nease Chemical Site (Plates #1-16 May be Viewed at U.S. EPA Region 5)	4
7	02/00/96	U.S. EPA		*Revised Community Involvement Plan* for the Nease Chemical Site	38

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR
NEASE CHEMICAL SITE
SALEM, OHIO

UPDATE #2
SEPTEMBER 23, 2005

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	03/28/90	Blumberg, A., U.S. EPA & S. MacMillan, Ohio EPA	Foard, S., Ruetgers-Nease Chemical Company & W. Kennedy, Deckert, Price & Rhoads	Letter re: U.S. EPA/ Ohio EPA Approval of the Method Validation Study for the Nease Chemical Site	2
2	04/00/90	U.S. EPA	Public	Fact Sheet: "Environmental Investigation to Begin" at the Nease Chemical Site	6
3	04/05/91	Ruetgers-Nease Chemical Company, Inc.	U.S. EPA/ Ohio EPA	Appendices B-J of the RI Report for the Nease Chemical Site (Volume 3 of 4)	612
4	04/05/91	Ruetgers-Nease Chemical Company, Inc.	U.S. EPA/ Ohio EPA	Appendix K of RI Report (Laboratory Analytical Results) for the Nease Chemical Site (Volume 4 of 4)	736
5	07/00/92	U.S. EPA	Public	Fact Sheet: "Nease Chemical Superfund Site Update"	12
6	11/00/92	U.S. EPA	Public	Fact Sheet: "Mirex"	12
7	07/06/93	Ruetgers-Nease Chemical Company, Inc.	U.S. EPA/ Ohio EPA	Endangerment Assessment Report for the Nease Chemical Company Site (Appendix A to RI Report, Volume 2 of 4) [Revision 1 to April 5, 1991 Original Submittal)	673
8	07/06/93	Ruetgers-Nease Chemical Company, Inc.	U.S. EPA/ Ohio EPA	Appendix K of RI Report (Laboratory Analytical Results) for the Nease Chemical Site (Volume 4) [Volume 2 of 2 - Revision 1]	567

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9	01/00/94	U.S. EPA	Public	Fact Sheet: "Nease Chemical Superfund Site Update"	8
10	01/00/94	U.S. EPA	Public	Fact Sheet: Correction to the "Nease Chemical Superfund Site Update"	2
11	08/18/94	Golder Associates Inc.	Ruetgers-Nease Corporation	Additional Remedial Investigation for the Middle Fork of Little Beaver Creek at the Nease Chemical Site (Volume 1 of 2: Text, Tables and Figures)	69
12	08/18/94	Golder Associates Inc.	Ruetgers-Nease Corporation	Additional Remedial Investigation for the Middle Fork of Little Beaver Creek at the Nease Chemical Site (Volume 2 of 2: Appendix A)	574
13	10/06/94	Golder Associates Inc.	Ruetgers-Nease Corporation	Supplemental Well Closure Plan for Production Wells P1, P2 and P3 at the Nease Chemical Site (Revision 1)	256
14	11/00/94	Ruetgers-Nease Corporation	U.S. EPA/ Ohio EPA	Insert Package for Volumes 1A, 3 and 4 of the Remedial Investigation Report for the Nease Chemical Site	135
15	02/16/95	Golder Associates Inc.	U.S. EPA/ Ohio EPA	Removal Action Work Plan Addendum for the Nease Chemical Site (Appendix C to Section 1, Volume 1 of the May 1994 Work Plan)	194
16	09/00/95	U.S. EPA	Public	Fact Sheet: "On-Site Treatment Underway" Modifications Complete at the Nease Chemical Superfund Site	4
17	03/00/96	U.S. EPA	Public	Fact Sheet: "Site Update" Progress To Date; Plans for 1996/1997 for the Nease Chemical Superfund Site	8

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18	05/00/96	Ruetgers-Nease Corporation	U.S. EPA/ Ohio EPA	Remedial Investigation Report Volume 5 (Appendix N: Middle Fork of Little Beaver Creek - Binder 1 of 3)	223
19	05/00/96	Ruetgers-Nease Corporation	U.S. EPA/ Ohio EPA	Remedial Investigation Report Volume 5 (Appendix N: Middle Fork of Little Beaver Creek - Binder 2 of 3)	457
20	05/00/96	Ruetgers-Nease Corporation	U.S. EPA/ Ohio EPA	Remedial Investigation Report Volume 5 (Appendix N: Middle Fork of Little Beaver Creek - Binder 3 of 3)	403
21	11/00/96	U.S. EPA	Public	Fact Sheet: "Community Update" for the Nease Chemical Superfund Site	8
22	12/00/06	Ohio Department of Health	File	Final Report: An Assessment of Exposure to Mirex from the Ruetgers-Nease Superfund Site	29
23	02/06/97	Ohio Department of Health	File	Public Health Assessment Report for the Nease Chemical Site	71
24	08/04/98	Golder Associates Inc.	Rutgers Organics Corporation	Eastern Plume/DNAPL Investigation Report for the Nease Chemical Site	227
25	03/31/00	Golder Associates Inc.	Rutgers Organics Corporation	Impact Assessment Report for the Middle Fork of Little Beaver Creek in Mahoning and Columbiana Counties, OH	196
26	10/31/03	White, R. & P. Finn, Golder Associates	O'Grady, J., U.S. EPA	Letter: Operable Unit 2 Feasibility Study for the Nease Chemical Site	274
27	04/00/04	ENVIRON International Corporation	Rutgers Organics Corporation	Endangerment Assessment Report for the Nease Chemical Site	2407
28	08/30/04	Logan, M., U.S. EPA & J. Trocchio Ohio EPA	Domalski, R., Rutgers Organics Corporation	U.S. EPA/Ohio EPA Review and Approval of the Endangerment Assessment for the Nease Chemical Site	6

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29	12/00/04	U.S. EPA	Public	Fact Sheet: "Health Risks Studied; Cleanup Plan is Next Step" for the Nease Chemical Site	4
30	04/21/05	Logan, M., U.S. EPA & S. Abraham, Ohio EPA	Domalski, R., Rutgers Organics Corporation	Letter re: U.S. EPA/ Ohio EPA Approval of the Revised Feasibility Study for Operable Unit 2 of the Nease Chemical Site	9
31	05/11/05	Golder Associates Inc.	Rutgers Organics Corporation	Feasibility Study fo Operable Unit 2 at the Nease Chemical Company Site	414
32	05/28/05	Morning Journal (Lisbon, OH)	Public	Public Notice re: Announcement of June 22, 2005 U.S. EPA Public Meeting and Acceptance of Public Comments on the Feasibilty Study and Proposed Plan for the Nease Chemical Site	1
33	06/00/05	U.S. EPA	Public	Fact Sheet: "Cutting-Edge Techniques Proposed for Nease Cleanup"	8
34	06/22/05	Corsillo & Grandillo Court Reporters	U.S. EPA	Transcript of the June 22, 2005 Proposed Plan Public Meeting for the Nease Chemical Site	198
35	06/30/05	Finn, P., Golder Associates	Logan, M., U.S. EPA	Letter re: Rutgers Organics Comments on the Proposed Cleanup Plan for the Nease Chemical Site	3

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ADMINISTRATIVE RECORD
FOR
NEASE CHEMICAL SITE
SALEM, COLUMBIANA COUNTY, OHIO

UPDATE #3
JULY 29, 2008
(SDMS ID: 299732)

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	03/00/00	Golder Associates, Inc.	Rutgers Organics Corporation	Middle Fork of Little Beaver Creek Mahoning and Columbiana Counties, Ohio Impact Assessment Report **(SDMS ID: 238537)**	196
2	12/17/02	Domalski, R., Rutgers Organics Corporation	Cranner, D., Columbiana County Commissioner	Letter re: Middle Fork of Little Beaver Creek - Sand Bank Removal **(SDMS ID: 299733)**	1
3	02/07/03	Finn, S., Golder Associates, Inc.	O'Grady, J., U.S. EPA & J. Trocchio, Ohio EPA	Letter re: Middle Fork of Little Beaver Creek Sand Bar Investigation Work Plan **(SDMS ID: 299734)**	2
4	06/18/03	O'Grady, J., U.S. EPA & J. Trocchio, Ohio EPA	Finn, S., Golder Associates, Inc.	Letter re: Agency Comments to Sediment Sampling for the Middle Fork of Little Beaver Creek Sand Bar Investigation Work Plan **(SDMS ID: 299735)**	1
5	09/26/03	Finn, S., Golder Associates, Inc.	O'Grade, J., U.S. EPA & J. Trocchio, Ohio EPA	Letter re: Results of Sediment Sampling for the Middle Fork of Little Beaver Creek Sand Bar Investigation Work Plan **(SDMS ID: 299736)**	2
6	08/30/04	Logan, M., U.S. EPA & J. Trocchio, Ohio EPA	Domalski, R., Rutgers Organics Corporation	Letter re: Approval of the Endangerment Assessment for the Nease Chemical Site w/Attachment **(SDMS ID: 238533)**	6
7	12/07/04	Finn, S., Golder Associates, Inc.	Abraham, S., Ohio EPA	Memorandum re: State Route 165 Drainage Ditches at the Middle Fork of Little Beaver Creek **(SDMS ID: 299737)**	3
8	05/12/05	Finn, S., Golder Associates, Inc.	Abraham, S., Ohio EPA	Memorandum re: Proposed Floodplain Soil Sampling at the Scout Camp Area, Lisbon, Ohio w/Attachments **(SDMS ID: 299738)**	7

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
9	07/08/05	Finn, S., Golder Associates, Inc.	Abraham, S., Ohio EPA	Memorandum re: Floodplain Soil Sampling Results for the Scout Camp Area, Lisbon, Ohio w/Attachments **(SDMS ID: 299739)**	6
10	07/21/05	Finn, S. & A. Joslyn, Golder Associates, Inc.	Abraham, S., Ohio EPA	Memorandum re: Review of Direct Contact Advisory at the Middle Fork of Little Beaver Creek **(SDMS ID: 299740)**	16
11	09/19/05	Logan, M., U.S. EPA & S. Abraham, Ohio EPA	Frey, B., Ohio Dept. of Health	Letter re: Reassessment of Existing Direct Contact Advisory at the Middle Fork of Little Beaver Creek **(SDMS ID: 299741)**	2
12	10/06/05	Golder Associates, Inc	File	2005 Sediment, Surface Water, and Fish Tissue Sampling Draft Work Plan at the Middle Fork of Little Beaver Creek **(SDMS ID: 299742)**	8
13	08/00/06	Golder Associates, Inc.	Rutgers Organics Corporation	2006 Floodplain Soil Sampling Work Plan for the Middle Fork of Little Beaver Creek OU-3 **(SDMS ID: 299743)**	1
14	09/14/06	Logan, M., U.S. EPA & S. Abraham, Ohio EPA	Domalski, R., Rutgers Organics Corporation	Letter re: Additional Investigatory Work for Operable Unit 3 at the Nease Chemical Site **(SDMS ID: 299744)**	2
15	03/26/07	Chapman, J., U.S. EPA	Logan, M., U.S. EPA	Memorandum re: Bioaccumulation of Mirex in Fish, Preliminary Remedial Goals for Sediment, and the Horizontal Pattern of Sediment Mirex in the Middle Fork of Little Beaver Creek **(SDMS ID: 299745)**	28
16	11/07/07	Logan. M., U.S. EPA & S. Abraham. Ohio EPA	Addressees	Letter re: Transmittal of Floodplain Soil Sampling at the Nease Chemical Site w/Attachments **(SDMS ID: 299746)**	30

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17	01/23/08	Abraham, S., Ohio EPA & M. Logan, U.S. EPA	Domalski, R., Rutgers Organics Corporation	Letter re: Ohio EPA Comments on the Draft Nov. 2007 Interim Deliverable for the Feasibility Study for OU-3 of the Nease Chemical Site w/Attachments **(SDMS ID: 299747)**	15
18	02/28/08	Lehrman, J. & S. Finn, Golder Associates, Inc.	Logan, M., U.S. EPA	Memorandum re: Analytical Laboratories for Mirex Testing at the Nease Chemical Site **(SDMS ID: 299748)**	11
19	03/00/08	Golder Associates, Inc.	File	Responses to Agency Review Comments on the Draft Feasibility Study for OU-3 of the Nease Chemical Site **(SDMS ID: 299479)**	23
20	03/17/08	Logan, M., U.S. EPA	Domalski, R., Rutgers Organics Corporation	Letter re: Proposal to Use Additional Laboratory for Mirex Analysis at the Nease Chemical Site **(SDMS ID: 299750)**	1
21	05/01/08	Chapman, J., U.S. EPA	Logan, M., U.S. EPA	Memorandum re: Preliminary Remedial Goals for Soil Mirex Based on Beef and Milk from Cows in Floodplain Areas Downstream of the Nease Chemical Site **(SDMS ID: 299751)**	19
22	05/06/08	Abraham, S., Ohio EPA	Logan, M., U.S. EPA	Letter re: Ohio EPA Comments on the Nease Chemical Site OU-3 (March 2008) Feasibility Study **(SDMS ID: 299752)**	12
23	05/07/08	Logan, M., U.S. EPA & S. Abraham, Ohio EPA	Domalski, R., Rutgers Organics Corporation	Letter re: Transmittal of Agency Review Comments on Draft Feasibility Study for OU-3 of the Nease Chemical Site (Dated March 2008) **(SDMS ID:299753)**	16
24	06/06/08	Golder Associates, Inc.	Rutgers Organics Corporation	Feasibility Study for OU-3 (Revision 1) of the Nease Chemical Site **(SDMS ID: 299731)**	374

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25	06/30/08	Logan, M., U.S. EPA & S. Abraham, Ohio EPA	Domalski, R., Rutgers Organics Corporation	Letter re: Transmittal of Errata in the Feasibility Study for OU-3 of the Nease Chemical Site (Dated June 2008) **(SDMS ID: 299754)**	3
26	07/00/08	U.S. EPA	Public	Proposed Plan Fact Sheet: EPA Proposes Plan to Clean Up Two Creeks **(SDMS ID: 299755)**	8

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR
NEASE CHEMICAL SITE
SALEM, COLUMBIANA COUNTY, OHIO

UPDATE #4
SEPTEMBER 24, 2008

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1	06/02/05	Finn, S., Golder Associates	Abraham, S. Ohio EPA	Memorandum re: Sampling Results from State Route 165 Drainage Ditches near the Middle fork of Beaver Creek w/Attachments	3
2	09/16/05	Golder Associates	Rutgers Organics Corporation	Middle Fork Little Beaver Creek River Mile Designation Maps for the Nease Chemical Site	4
3	09/29/05	U.S. EPA	Public	Record of Decision (ROD) for the Nease Chemical Site OU2	144
4	11/23/05	Koncelik, J., Ohio EPA	Karl, R., U.S. EPA	Letter re: Ohio EPA Concurs with U.S. EPA's Selected Remedy for OU2 of the Nease Site	2
5	09/00/06	U.S. EPA	Public	Technology Update #1: Nanotechnology	2
6	06/00/07	U.S. EPA	Public	Technology Update #2: Nanotechnology	2
7	11/00/07	Golder Associates	Rutgers Organics Corporation	Draft Interim Deliverable Feasibility Study for OU-3 at the Nease Chemical Company	116
8	12/12/07	Rutgers Organics Corporation	U.S. EPA	MFLBC Database Version 03 December, 2007 for the Nease Chemical Site	
9	07/00/08	Golder Associates	U.S. EPA	Responses to Agency Comments on the Draft Feasibility Study for Nease Chemical Company OU-3	23
10	07/14/08	Lloyd, K., Lloyd Dermatology & Laser Center	Pastor, S., U.S. EPA	Fax Transmission: Comments for the Proposed Cleanup Plan at the Nease Chemical Site w/Cover Sheet	2

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
11	07/31/08	Corsillo & Grandillo Court Reporters	U.S. EPA	July 31, 2008 Proposed Plan Public Meeting Transcript for the Nease Chemical Site w/Attached Presentation Materials	53
12	08/12/08	Finn, S., Golder Associates	U.S. EPA	Electronic Transmission re: Rutgers Organics Corporation Comments on the Proposed Cleanup Plan for the Nease Chemical Site OU3	2
13	08/13/08	Residents of Salem, Ohio	U.S. EPA	Electronic Transmissions: Four Resident Comments on the Proposed Plan for the Nease Chemical Site	6
14	08/13/08	Residents of Salem, Ohio	Pastor, S., U.S. EPA	Six U.S. EPA Comment Sheets on the Proposed Cleanup Plan for the Nease Chemical Site	12
15	08/18/08	Resident of Salem, Ohio	Pastor, S., U.S. EPA	Letter re: Resident Comments on the Proposed Cleanup Plan for the Nease Chemical Site	1
16	09/08/08	Abraham, S., Ohio EPA	Logan, M., U.S. EPA	Electronic Transmission re: Human Health Fish Fillet Targets at the Nease Chemical Site w/Attachments	9

United States v. Rutgers Organics Corporation (N.D. Ohio)

Consent Decree
Appendix C

Operable Unit 2 Explanation of Significant Differences

Explanation of Significant Differences

Nease Chemical Site
Salem, Ohio
August 2011

I. Introduction to the Site and Statement of Purpose

The United States Environmental Protection Agency is issuing this Explanation of Significant Differences (ESD) for the Nease Chemical Site (Site) pursuant to Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA/Superfund) and Section 300.435(c)(2)(i) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) to document a significant change to a portion of the remedy selected in the Record of Decision (ROD) issued on September 29, 2005 for Operable Unit 2 (OU2) of the Site. This ESD is being issued to describe and explain the following significant modifications to the OU2 ROD:

Original remedy for eastern and southern shallow groundwater from OU2 ROD

The OU2 ROD calls for the collection and treatment of the Site's shallow groundwater contamination east of the former Nease property and treatment by injection of slurry of nanoscale zero-valent iron (NZVI) for the southern shallow groundwater contamination.

Modified remedy

The modified remedy provides for the extension of the planned groundwater collection system for the eastern component of the Site's shallow groundwater contamination to additionally cover the southern property boundary to capture recently detected groundwater contamination in the south/southeasterly direction. The remedy for the additional area of coverage will include the same design options as the OU2 ROD remedy for the eastern shallow groundwater contamination. The original remedy includes collection and either above-ground treatment or in-situ treatment. The in-situ treatment option includes additional NZVI injection points, a shallow groundwater interceptor trench along the southern site boundary, and/or installation of a reactive barrier along the southern site boundary.

Original remedy component for vapor extraction from OU2 ROD

None.

Modified remedy

The modified remedy provides for installing and operating soil vapor mitigation systems at two off-site residential properties located south of the Site. This includes monitoring groundwater

and soil gas near other properties and, if necessary, installation of additional vapor mitigation systems, if exceedances of generic screening levels for residential exposure as presented in the OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance) (EPA 2002) are encountered.

Original remedy component for surficial cover for mirex contamination from OU2 ROD

The OU2 ROD calls for a surficial clean soil cover of approximately 2 acres to cover surficial mirex contamination exceeding the mirex remediation goal that will not otherwise be covered by an impermeable geosynthetic membrane as provided under the OU2 ROD.

Modified remedy

The modified remedy provides for the enlargement of the clean soil cover over surficial mirex contamination exceeding the mirex remediation goal near the former production area from approximately 2 acres to 7 acres to account for additional surficial mirex contamination that was recently discovered.

The need for these modifications was identified during the pre-design investigation (PDI) of OU2 Remedial Design (RD) at the Site. As required by the OU2 ROD and an Administrative Order on Consent dated May 10, 2006, a PDI was performed by Rutgers Organics Corporation to develop the OU2 RD.

EPA Region 5 is the lead Agency for the Site, working with Ohio Environmental Protection Agency (OEPA) as the support Agency. In accordance with the NCP Section 300.825(a) (2), this ESD and all of the technical information and data relating to it shall become part of the administrative record for the Site. The Site's administrative record is available to the public at the following locations:

Salem Public Library
821 East State Street
Salem, Ohio
Hours: Mon-Thurs 9:00am-8:30pm,
Fri-Sat 9:00am-6:00pm
Sunday 1:00pm-5:00pm

Lisbon Library
303 East Lincoln Way
Lisbon, Ohio
Hours: Mon & Thu 9:00am-8:00pm
Tues & Wed 9:00am-6:00pm
Fri & Sat 9:00am-5:00pm

U.S. EPA Region 5
77 W. Jackson Blvd
Chicago, IL 60604
Hours: Mon-Fri 8:15am-4:45pm

Site information can also be found online at:
http://www.epa.gov/region5/sites/nease/index.htm

II. Site History, Contamination and Selected Remedy

A. Site History

The Nease Chemical Site is located two and a half miles northwest of Salem, Ohio in Columbiana and Mahoning Counties. Between 1961 and 1973, Nease Chemical operated a facility at the Site that produced various chemical compounds including household cleaning compounds, fire retardants and pesticides. Most notably, a chlorinated pesticide product called mirex, a probable human carcinogen banned in the United States in 1978, was manufactured at the Nease facility in large quantities. Mirex contamination is one of the principal contaminants of concern to be addressed through the remedy for this Site.

The former Nease plant is approximately one-quarter mile northwest of the intersection of State Route 14 and Allen Road. The former plant property is located in a rural area with light industrial and residential properties, bounded by small light industrial operations along Allen Road to the east and northeast, residential homes along State Route 14, and wooded areas and pasture lands to the north. Conrail railroad tracks traverse the former plant property. The Salem Wastewater Treatment Plant is situated approximately 2,400 feet east of the facility.

Nease manufactured products and chemical intermediates in batch processes and stored raw materials and finished products in warehouses, bulk storage, and tanks. Some wastes from the plant processes were put in 55-gallon drums, which were buried on-site (particularly in Exclusion Area A). Five unlined ponds (designated Ponds 1, 2, 3, 4, and 7) were used for the treatment and storage of acidic plant wastes or lime slurries from the neutralization of acidic wastes. These ponds were constructed so that the base of the ponds is below the water table. After the waste settled in these ponds, Nease discharged neutralized liquids to the Salem Wastewater Plant.

During the facility's operation, hazardous substances, including mirex, were released to the soils and overburden (shallow) and bedrock (deep) groundwater through the five unlined ponds on-site, as well as from drums that had been buried on-site. The groundwater contamination includes areas where dense non-aqueous phase liquid (DNAPL) is found, and this DNAPL may be acting as a continuing source of contamination to the groundwater.

In addition, contamination from the Nease plant, particularly mirex, migrated to the nearby Middle Fork of Little Beaver Creek (MFLBC) to the east by way of surface water runoff from the ponds and soil into a tributary of the MFLBC (Feeder Creek) that runs through the old facility property. Mirex has accumulated in the sediments, floodplain soils, and fish populations along a thirty mile reach of the MFLBC. In the past, cows from nearby farms that pastured in the floodplain and riverbank were found to have elevated levels of mirex. Subsequently, fencing was installed to prevent livestock from grazing in contaminated areas. The MFLBC, its ecological corridor, and associated wetlands are considered an important natural resource to this region with certain stretches designated as wild and scenic.

Following notification by OEPA of wastewater discharge violations, Nease agreed in a Consent Judgment in 1973 to discontinue manufacturing operations at the facility until such time as it obtained a new wastewater permit from OEPA. Ultimately, Nease decided to close the facility. Nease neutralized and removed water in the various ponds to the Salem Wastewater Treatment Plant and filled/graded the ponds by December 31, 1975. In addition, Nease removed the majority of the buildings and manufacturing equipment during decommissioning activities. Only one building remains at the former manufacturing facility, which currently houses the groundwater treatment system. Although drums, some contaminated soil, and liquids in Ponds 2, 3, 4 and 7 have been removed, chemical contamination remains in the surface soil and in the soil/fill within the ponds. These remaining chemicals continue to act as a source of groundwater contamination, especially the waste in Ponds 1 and 2.

On December 30, 1977, the assets of the Nease Chemical Company (including the non-operational Salem facility) were acquired and the company merged with Ruetgers Chemical Inc. to form Ruetgers-Nease Chemical Company, Inc., now known as Rutgers Organics Corporation (ROC). The Nease Site was added to the National Priorities List (NPL) on September 30, 1983. ROC began a Remedial Investigation/Feasibility Study (RI/FS) at the Nease Site in 1988. Subsequently, the Nease Site was divided into three operable units (OUs). OU1 consists of a long term removal action to mitigate the further migration of contamination. OU2 consists of the former facility area and groundwater. OU3 consists of Feeder Creek and the contaminated stretch of the MFLBC and its floodplain.

ROC completed the RI Report for the Site in 1996, the Feasibility Study (FS) for OU2 in 2005, and the FS for OU3 in 2008. In addition, in 2004, ROC completed the Endangerment Assessment (EA) for the Site, which included the human health and ecological risk assessments.

In addition to the RI/FS activities described above, ROC has taken a number of interim response actions to address migration of contamination at the Site. In 1983, ROC voluntarily implemented various steps including the removal of drums and associated affected soils. ROC removed a total of 114 drums from a former production area known as Exclusion Area A. Additionally, more than 9,500 cubic yards of contaminated soils were removed from Exclusion Area A and several other areas known as Exclusion Area B, Pond 1, and a nearby ditch. ROC disposed of the soil and drums at an off-site hazardous waste landfill. At the same time, ROC made various efforts to control contamination from leaving the Site. Later, under a long-term removal AOC with EPA entered into in 1993, ROC took measures to control leachate releases and seeps. To reduce the potential discharge of shallow groundwater to the ground surface, a collection trench and aggregate drain downgradient from Exclusion Area A and Ponds 1 and 2 (leachate collection system, called LCS-1) and a collection drain and recovery well immediately downgradient of Pond 2 (LCS-2) were constructed. Shallow groundwater from LCS-1 is presently pumped to the on-site treatment plant. Shallow groundwater from LCS-2 is transported off-site for treatment and disposal (due to elevated VOC levels).

EPA issued a ROD in September 2005 for OU2 and a ROD for OU3 in September 2008. On May 10, 2006, EPA and ROC entered into an AOC to conduct a RD and PDI for OU2. EPA and ROC also entered an AOC for RD and a PDI for OU3 on June 30, 2009.

As part of the OU2 RD AOC, ROC has been required to implement an extensive PDI as called for in the OU2 ROD. The PDI consists of a series of investigations and pilot studies that ROC must undertake to collect data necessary to support the RD and the Remedial Action (RA). The PDI tasks that are relevant to this ESD include:

- Focused investigation of the presence and recoverability of DNAPL in the vicinity of Former Ponds 1 and 2 source area;
- Additional groundwater sampling downgradient of Ponds 4 and 7 to evaluate the potential for these ponds to act as sources of groundwater impacts;
- Baseline shallow groundwater monitoring to establish pre-construction conditions, involving new wells in addition to existing wells;
- Field hydraulic testing of the eastern shallow groundwater to determine flow rates for design of the groundwater collection trench called for in the OU2 ROD and;
- Evaluation of potential impacts to residents from southern shallow groundwater including additional residential well sampling and a soil gas study (with possible follow-up vapor intrusion assessment).

In accordance with the OU2 RD AOC, ROC completed a PDI workplan dated September 2006, which was subsequently approved by EPA. In June 2007, ROC provided results of PDI work up to that point in a Baseline Conditions Technical Memorandum (BCTM), and after additional investigations, provided updated PDI information in a BCTM Addendum, dated April 26, 2010.

As indicated in the 2007 BCTM, collection of data during the initial PDI work led EPA, OEPA and ROC to agree on the need to expand or modify the scope of several of the PDI tasks, including, as relevant to this ESD:

- The southern area shallow groundwater investigation was expanded to include over 30 wells, implemented in four phases, rather than the single phase of seven wells originally scoped;
- An off property soil vapor investigation was added as a result of the southern shallow groundwater data findings. This necessitated securing off property access agreements, and conducting additional fieldwork.

The BCTM southern shallow groundwater investigation found that VOC impacts are more widespread than previously estimated at the time of the OU2 ROD, particularly in the off-property area in the south/southeasterly direction. Other areas where elevated VOC concentrations were detected on-site include areas within and to the southeast of the former production area.

Based on the recommendations for additional delineation of Site related impacts proposed in the BCTM and to address data gaps and comments to the BCTM from EPA, ROC implemented a second phase of PDI field work starting in June 2009, the results of which are reported in the 2010 BCTM Addendum. Additional wells were installed off-site, downgradient of the southern edge of the former Nease property, to complete delineation of the extent of shallow groundwater impacts in the southern part of the Site. Figure 1 of this ESD shows the delineation of shallow groundwater impacts based on data gathered to date.

With respect to the off-property soil investigation, ROC assessed potential impacts of vapor intrusion from the Site at nearby residences to the south due to the presence of off-property groundwater contamination in this area. Exceedances of generic screening levels for residential exposure as presented in the Draft Subsurface Vapor Intrusion Guidance (EPA 2002) were determined for both residences. Exceedances of the EPA risk range of 10(-4) to 10(-6) were determined for trichloroethane, trichloroethene, 1,2-dichloroethane and benzene. ROC voluntarily installed sub-slab vapor intrusion collection systems at these two residences, and those systems are incorporated into the Site remedy through this ESD. The results of ROC's vapor intrusion assessment were reported in two reports, "Vapor Intrusion Assessment and Mitigation" dated February 2008, and "Vapor Intrusion Assessment and Mitigation Addendum" dated May 2009.

OU2 Physical Characteristics

The surface area of OU2 includes the former Nease plant's five wastewater treatment ponds, Exclusion Areas A and B, other on-property areas with contaminated soil, and some areas on the west side of the Crane-Deming Company building southeast of ROC's property.

The land elevation in the central portion of OU2 is approximately 1,200 feet above Mean Sea Level (MSL). From here, the land slopes gently southwestward to State Route 14 and northeastward to the Conrail tracks at about elevation 1,180 feet MSL. Across the Conrail tracks the land slopes steeply further to the east-northeast where it flattens in the area surrounding the Crane-Deming building and the Feeder Creek drainage system at an elevation of about 1,160 feet MSL. Surface water drains from the property along the Feeder Creek system and the Route 14 drainage ditch.

The geology in the OU2 area can generally be described as consisting of glacial till overburden deposits of the Kent Moraine lying above various sedimentary bedrock units consisting of, in descending order, the Washingtonville Shale (and associated coal seam and underclay) and the Middle Kittanning Sandstone (MKS). Deeper bedrock units below the MKS appear to be hydraulically isolated by the Columbiana Shale. The glacial till has a predominantly silty clay character and is interspersed with locally discrete zones of sandier material. Glacial till in the vicinity of the former ponds and Exclusion Areas ranges from a few feet to about 39 feet, with the average till thickness of about 20 feet.

The bedrock surface is highest in the western portion of OU2, and generally slopes steeply away from the facility in an east-northeastern direction towards the MFLBC. The upper portion of the Washingtonville Shale unit is weathered, highly fractured and thinly bedded. The deeper portions of the shale are less fractured. The Washingtonville Shale appears to have been eroded east of the Conrail tracks where the MKS unit is the uppermost bedrock unit. The erosional contact between the Washingtonville Shale and the MKS appears to be near the Crane-Deming building. The MKS consists of a fine to medium grain and cross bedded sandstone. The MKS is characterized by fractures comprised of bedding plane partings interspersed with vertical joints. The thickness of the MKS at OU2 ranges from 21 to 53 feet. No outcrops of bedrock are present, although bedrock is found within a few feet of the ground surface east of the Conrail tracks where the overburden had been excavated for construction of the Crane-Deming building.

In broad terms, the hydrogeological units of OU2 consist of the overburden (shallow) and bedrock (deep) units. The units are separated by transition bedrock (Washingtonville Shale and associated coal seam and underclay). The transition bedrock, while having low permeability in some areas, does not provide a complete aquitard and contamination has moved from the overburden to the bedrock.

Groundwater within the overburden follows two flow regimes. The primary flow is to the east-northeast towards the MFLBC, and a second, less significant flow in the southern part of the Site is towards the south-southeast. Horizontal hydraulic gradients are steep in the overburden. Groundwater flow velocity in the overburden ranges from 1-30 ft/year. Depth to groundwater is a few feet to about nine feet below ground surface.

Groundwater flow within the bedrock is predominantly eastward and occurs primarily through the bedding plane partings. As flow within the bedrock approaches the MFLBC, it encounters overburden that has filled an eroded glacial valley. Groundwater flows into the MFLBC valley from the south, east, and west and below resulting in significant dilution of the groundwater. Regional flow within the MFLBC valley is northerly. As a result of the increased flow and direction change, deep Site groundwater does not appear to discharge to the MFLBC. Groundwater flow velocity in the bedrock aquifer is about 65 ft/year.

SUMMARY OF OU2 CONTAMINATION

Contaminants of Concern

Since the Nease Site housed an old chemical manufacturing facility that operated in an era before there was much regulation or sound waste handling practices, it is not surprising that there is a large array of chemical contaminants found in several media. At the Nease Site, air, surface water, groundwater, sediment and soil were analyzed for a variety of contaminants. The investigations detected 155 chemicals at least once in the sampled media on-site. The EA evaluated which of these chemicals and affected media were most important in driving potential Site risk. A full description of the RI activities and sampling results is contained in the January 1996 RI Report. Additional descriptions of the extent of contamination at the Site are found in

the EA, FS, the 2007 BCTM, the 2010 BCTM Addendum and other documents which are included in the Administrative Record for the Site.

There are two types of contaminants that are the major drivers of risk for OU2 of the Site, VOCs and mirex.

Mirex

Mirex, a chlorinated hydrocarbon, was extensively manufactured at the Nease Chemical facility. Mirex is an odorless, white, crystalline solid. It was used in pesticide formulations and was especially common in the southern United States, where it was frequently applied to control fire ants. It was also used as a flame retardant in products such as plastics, rubber, paint, paper and electrical goods. Mirex is a very uncommon contaminant of concern at Superfund sites and has been identified at only a few other sites.

Mirex was banned in the United States in 1978. Like other chlorinated pesticides, it breaks down very slowly in the environment and can persist for years. Its breakdown product, photomirex, is also toxic and persistent. Mirex is highly sorptive and has a very low solubility. These physical properties mean that mirex is likely to bind to particulate matter and is unlikely to travel in a dissolved state in water. Mirex can also bioaccumulate in biota in the food chain.

Mirex has been found in several media at the Site. Within the OU2 area, it is found in surface soils and in the waste materials within the former ponds (especially Ponds 1 and 2). Mirex has been detected in some groundwater samples near Ponds 1 and 2, although some of the results may be associated with particulate matter. However, mirex is not a contaminant of concern in the groundwater based on the data collected at the Site and it was not identified as a principal threat waste for groundwater in the OU2 ROD.

VOCs

VOCs are a class of chemicals that are commonly found in OU2 at the Site. There is a large array of VOCs that have been found in groundwater, soils and source areas. More detail on all of the chemicals identified is found in the EA, the RI and FS reports and other documents included in the Site Administrative Record. The constituents that comprise much of the bedrock groundwater plume include the chlorinated ethene class of compounds: perchloroethene (PCE), trichloroethylene (TCE) and the daughter products 1,2-dichloroethene and vinyl chloride.

Wastewater Neutralization Ponds

During operations, Nease used a series of five unlined wastewater neutralization ponds. It is believed that wastewater was first discharged to former Pond 1, neutralized, and then conveyed to former Pond 2, and from there pumped to former Pond 3, 4, or 7. Each of the ponds has been filled with soil and, except for a small portion of Pond 1, they no longer contain water.

Ponds 1 and 2

Due to their close proximity and similar use, former Ponds 1 and 2 are addressed as a single area. Combined, former Ponds 1 and 2 cover approximately 1.5 acres. Groundwater is encountered 3 to 8 feet below the ground surface at Ponds 1 and 2, and the groundwater permeates some of the waste landfill. The ponds contain about 24,000 cubic yards of waste landfill and about 25,000 cubic yards of underlying contaminated soil. High levels of VOCs and semi-volatile organic compounds (SVOCs), as well as mirex, have been detected in the fill and underlying soil.

Total VOCs detected in the fill and underlying soil ranged up to 53,519 milligrams per kilogram (mg/kg), with PCE as the primary VOC in the till deposits (PCE up to 38,000 mg/kg). Total SVOCs ranged up to 10,924 mg/kg, with diphenyl sulphone and 1, 2,-dichlorobenzene as the primary SVOCs. Mirex and other pesticide chemicals were found at concentrations up to 938 mg/kg. Higher concentrations are found at depth and oil sheens have been observed in soil borings. Ponds 1 and 2 are considered to be major, ongoing sources of contaminant migration to groundwater.

Pond 3

Former Pond 3 covers about 2.9 acres and contains approximately 69,000 cubic yards of waste landfill. Neutralized sludge materials within the former pond range from 1 to 4 feet thick, and the materials have a low hydraulic conductivity. Groundwater is encountered 2 to 5 feet below ground surface and permeates some of the fill. Total VOCs detected in the fill and underlying soil ranged up to 17 mg/kg, with PCE as the primary VOC in the till deposits. Total SVOCs ranged up to 12 mg/kg, with diphenyl sulphone, phenol, and benzoic acid being found. Mirex and other pesticide chemicals were found at concentrations up to 4 mg/kg. Pond 3 is not believed to be a major ongoing source of contaminant migration to groundwater.

Pond 4

Former Pond 4 covers about 1.3 acres and contains approximately 19,100 cubic yards of waste landfill. Neutralized sludge materials within the former pond range from 1 to 9 feet thick, and most of the pond has a thick soil cover. Groundwater is encountered 3 to 7 feet below ground surface and permeates some of the fill. Total VOCs detected in the fill and underlying soil ranged up to 98 mg/kg, with acetone as the primary VOC in the till deposits, along with PCE and benzene. Total SVOCs ranged up to 29 mg/kg, with diphenyl sulphone, 1,2,-dichlorobenzene, and benzoic acid as the primary SVOCs. Mirex was found at concentrations less than 1 mg/kg. Pond 4 currently is not believed to be a major ongoing source of contaminant migration to groundwater, although additional downgradient groundwater sampling is planned during RD.

Pond 7

Former Pond 7 covers about 0.8 acres and contains approximately 10,600 cubic yards of waste landfill. Neutralized sludge materials within the former pond range from 2.5 to 9 feet thick. The

sludge materials are found at or near the surface of the former pond because Nease Chemical was unable to completely cover and fill Pond 7 due to the low bearing strength of the sludge. Groundwater is encountered 2 to 5 feet below ground surface and permeates some of the waste. Total VOCs detected in the fill and underlying soil ranged up to 164 mg/kg, with benzene as the primary VOC in the sludge. Total SVOCs ranged up to 1,200 mg/kg, with diphenyl sulphone as the primary SVOC. Mirex and other pesticide chemicals were found at concentrations up to 22 mg/kg, greater than the ROD cleanup levels. Pond 7 currently is not believed to be a major ongoing source of contaminant migration to groundwater, although additional downgradient groundwater sampling is planned during RD.

More detailed information about the organic mass, mass in the underlying till, fill thickness and volume, and other physical and chemical characteristics for the former ponds can be found in the OU2 ROD, RI Report, and the BCTM and BCTM Addendum Reports.

Soil (Including Exclusion Areas)

Soil data was collected from test pits and soil borings during the RI. The soil in Exclusion Areas A and B was extensively investigated because these areas were historically suspected source areas and previous response actions resulted in the removal of highly contaminated soil and drums from these areas.

The highest contaminant concentrations in soils (outside of the former neutralization ponds) were found in Exclusion Areas A and B (despite the previous response actions, there are some residual contaminants in these areas), and the former production area (especially northwest of Ponds 1 and 2). VOCs in these areas appear to increase with depth. The primary VOCs detected were PCE, 1,1,2,2-tetrachloroethane, and benzene.

Mirex was detected, primarily in shallow soil. Mirex detected below 0.5 feet is primarily limited to Exclusion Areas A and B, and the former production area (especially northwest of Ponds 1 and 2).

Further details concerning the soil investigation at the former Nease property and off-property sampling can be found in the OU2 ROD, RI Report and the BCTM and BCTM Addendum Reports.

Overburden Groundwater

There are two overburden groundwater plumes, one extending to the east and one to the south/southeast. While SVOCs have also been detected in groundwater, VOCs are the primary risk-drivers. The eastern VOC plume is about 750 feet in length and centers around and downgradient of Ponds 1 and 2. The eastern extent of the plume is limited by the relatively low permeability and the thinning of the overburden on the former Crane-Deming property, where bedrock approaches the surface and the shallow groundwater discharges at the Crane-Deming seep. Contaminant concentrations near Ponds 1 and 2 have been detected at levels greater than

100 parts per million (ppm) of total VOCs. The southern VOC plume is about 100 feet in length to the south and 300 feet in length to the southeast. The extent of this plume was confirmed during the OU2 PDI investigations and is the subject of this ESD (See Figure 1 for map of shallow groundwater impacts). It is not anticipated at this time that there will be any further downgradient impacts from the southern plume, as confirmed by the PDI sampling, and this will be confirmed through the groundwater monitoring program called for under the OU2 ROD.

Bedrock Groundwater

The VOCs in the MKS extend for about 1,700 feet from the source areas towards the east. The downgradient extent of the plume appears to be limited because the deep flow turns north as it enters and mixes with flow in the buried bedrock valley of the MFLBC (See Figure 1).

Like the overburden groundwater, concentrations in the bedrock groundwater are highest near Ponds 1 and 2, where they exceed 100 ppm of total VOCs. Numerous VOCs have been found in bedrock groundwater at the Site. The most significant constituents in the bedrock groundwater plume include the chlorinated ethene and ethane classes of compounds, as well as benzene and chlorobenzene. These contaminants seem to comprise well over 90% of the mass of organic compounds found.

DNAPL

DNAPL has been observed in several wells on-site that are located in proximity to Ponds 1 and 2 in the overburden aquifer. The DNAPL does not appear in discrete pools, rather it appears more sporadically. Horizontal and/or vertical migration of DNAPL may have occurred through the bedding planes or fractures. Additionally, concentrations of DNAPL chemicals have been detected at greater than 1% of their solubility in other wells. DNAPL has also been detected in the southern plume area, also in the overburden aquifer.

Selected Remedy for OU2

A summary of the selected remedy, as provided in the OU2 ROD, is provided below

Ponds 1 and 2 - Ponds 1 and 2 will be treated in-situ with a process called Soil mixing/stripping, Stabilization and Solidification (S/S/S). Treatment of the contaminated matrix will include all materials above bedrock. The fill/sludge will be mixed with large augers or paddles that are moved through the soil column. Due to the heat generated by the large air compressors used, the injected air is warmer than ambient air, which enhances volatilization. The lower volatility chemicals that are not stripped will be stabilized and solidified by mixing the remaining soils and any residual contaminants with reagents (e.g., cement, bentonite, kiln dust). Treatability testing will be conducted during the PDI and the results will be used to determine design parameters and performance standards in the OU2 RD.

Remaining ponds and soil - The remaining ponds (Ponds 3, 4, and 7) and soil exceeding

the mirex remediation goal (including drainage ditch soil) will be contained using either an impermeable geosynthetic membrane covered with clean soil, or only clean soil. It is estimated that about 11 acres will be covered with the combined impermeable membrane/soil cap. Most of this area would be to the west of the Conrail tracks and would include the treated Ponds 1 and 2, Pond 7, Exclusion Areas A and B and the soil areas around them to provide a continuous cover. The impermeable cap would also cover a small area east of the rail tracks, near the Crane-Deming seep. The goals of the combined cap are to prevent direct contact and to reduce rainwater infiltration, which will limit the volume of shallow groundwater to be treated. Other areas, such as Ponds 3 and 4 and soils that exceed the mirex remediation goal, will be covered with clean soil to prevent contact. The OU 2 ROD anticipated approximately 2 acres would be covered by clean soil, but, as discussed in the "Description of Significant Differences" section of this ESD below, the area needed to be covered with clean soil is approximately 7 acres. All components of the impermeable cap and soil cover will be finalized in design. It is anticipated that soil modifications to improve bearing strength may be needed in some areas (e.g., Ponds 3 and 7), before the cover is placed.

Eastern shallow groundwater - The eastward component of the shallow groundwater will be captured in a new collection trench (expected to be located east of the Conrail tracks and about 600 feet in length) and pumped above ground for on-site treatment. Because the impermeable membrane may reduce infiltration sufficiently, the OU2 ROD provides an option that allows a design modification (based on results of the PDI) for in-situ treatment through a series of cells in the trench that may consist of reactive iron, biotreatment, and carbon.

Southern shallow groundwater – The OU2 ROD calls for the southern component of the shallow groundwater to be treated by injection of a slurry of NZVI. This ESD adds collection for the southern shallow groundwater component as described further below.

Deep groundwater - The deep groundwater would be treated by injection of NZVI in the core of the plume. A series of injection wells will be constructed within the source areas. It is anticipated that injections of NZVI will occur on a quarterly basis until the treatment zone expands throughout the MKS source area. The location and design of the injection wells and the amount and frequency of NZVI injections will be determined in RD, based on results of treatability testing during the PDI.

Deep groundwater - Should NZVI injections not be sufficiently effective in treating all organic compounds, then accelerated biological treatment may be implemented. If needed, nutrient injections (with or without bioaugmentation) will be utilized. The decision to implement accelerated biological treatment will be made if monitoring during the first few rounds of NZVI injections indicates that design performance standards and the OU2 ROD's Remedial Action Objectives might not be met by NZVI alone.

Deep groundwater - Monitored natural attenuation will be implemented for the far downgradient portion of the plume, which is outside the treatment zone. Natural conditions at

the Site support natural attenuation, and conditions that will be created by NZVI (and accelerated biological treatment) will enhance natural conditions.

The OU2 FS contains an extensive evaluation of natural attenuation. It assesses the degradation chemistry of the contaminants of concern (including examining "parent" and "daughter" compounds, and their relationships along the length of the plume), and evaluates biodegradation mechanisms. Historical data trends were reviewed and biodegradation modeling was conducted. Additionally, geochemical indicators (dissolved oxygen, oxidation-reduction potential, nitrate, sulfate, chloride, etc.) were evaluated. With the additional data collected during the PDI, the lines of evidence presented in the FS support that natural attenuation is occurring in the OU2 plume area.

The common elements discussed in Section 9.2 of the OU2 ROD (institutional controls; PDI; operation, monitoring and maintenance; and surface water management) are included as components of the remedy.

BASIS FOR THE DOCUMENT

Description of Significant Differences

The purpose of this document is to explain modifications to the remedy selected in the September 29, 2005 ROD for OU2, based on information obtained during the PDI investigations at the Site. Specifically, this document addresses: 1) the need for and installation of off-site vapor intrusion systems in two off property residences; 2) the need to extend the perimeter shallow groundwater collection system to the south to control groundwater migration in that direction; and 3) the need to increase the acreage for the clean soil cover over surficial mirex contamination.

Vapor intrusion

As discussed previously, during the PDI work called for by the OU2 ROD to augment the data collected during the RI/FS, additional shallow groundwater sampling to the south and southeast occurred. This sampling determined that shallow groundwater impacted by the site in exceedance of Maximum Contaminant Levels (MCLs) was not being captured by the current groundwater extraction system. Due to the potential for soil gas generation from this groundwater contamination, the PRP agreed to evaluate the vapor intrusion (VI) pathway in this direction in February 2007 as part of the PDI. Sub-slab VI sampling was initially conducted at two residences using EPA's modified method TO-15 for VOCs. Exceedances of generic screening levels for residential exposure as presented in the Draft Subsurface Vapor Intrusion Guidance (EPA 2002) were determined for both residences. Exceedances of the EPA risk range of 10(-4) to 10(-6) were determined for trichloroethane, trichloroethene, 1,2- dichloroethane and benzene.

Indoor air was voluntarily sampled by the PRP at the industrial facility located at 1453 Allen Road in November 2005 (as part of a property transfer transaction). Sampling results were compared to Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PEL) expressed as a time-weighted average values for occupational exposures and the EPA's generic screening levels for residential exposures as presented in the Draft Subsurface Vapor Intrusion Guidance (EPA 2002). Results of this sampling indicate that levels detected were below either OSHA limits for occupational exposure and EPA generic residential screening levels.

As a result of the February 2007 sampling, the PRP voluntarily installed sub-slab depressurization systems at the two residences. These systems were installed in June 2007, as summarized in the Revised Vapor Intrusion Assessment and Mitigation Report (February 2009). In both cases, depressurization was achieved throughout the basement floor slab, effectively preventing sub-slab vapors from entering the basement.

An additional residence was sampled in 2009 and ROC reported that results did not indicate any exceedances of the aforementioned criteria. An additional (fourth) residence was sampled in January 2011 and ROC reported that results again indicated no exceedances of criteria. The data collected from these two residences will be submitted as part of the OU2 RD 30% Design Report expected this fall.

These two sub-slab systems are currently operating as intended. Operation and maintenance (O&M) monitoring for the OU2 remedy will include groundwater and soil gas sampling in the area of these homes to determine if any additional VI monitoring is necessary in the future. O&M of the VI systems will be required to ensure that the systems continue operating as intended.

Shallow Groundwater

The OU2 ROD calls for shallow groundwater collection and treatment to the east of the former Nease property and in-situ NZVI treatment to the south. During the PDI, the area of impacted shallow groundwater to the south was determined to be more extensive than reported in the RI Report. This ESD modifies the remedy as stated in the OU2 ROD to require that the eastern shallow groundwater collection-and-treatment system be extended to cover the southern shallow groundwater plume, as documented in the PDI investigation.

Due to the identification of DNAPL in the former production area, further delineation and recoverability of the DNAPL was conducted in 2009 and 2010. Further delineation of the southern shallow plume south of the former facility production area was also conducted. In general, the shallow overburden sediments are made up of clayey silts with fine sand lenses. Water levels in the unit are typically 5 to 7 feet below grade. The VOC impacts were determined to be more widespread than originally anticipated with the highest concentrations located south/southwest of the former production area. Total VOCs generally ranged from 300,000 ppb to 400,000 ppb near the areas where the DNAPL was identified. Concentrations of total VOCs

decrease substantially downgradient from these locations. The OU2 RD/RA will include recovery and off-site disposal of DNAPL in the area of Ponds 1 and 2, as described in Section 9.2.3 of the OU2 ROD.

The design for the OU2 groundwater system has been modified to include additional coverage to the south, as is outlined in the EPA-approved RD Workplan for OU2, submitted May 20, 2011, pursuant to the OU2 RD AOC. This groundwater plume to the south and southeast is approximately 100 feet by 300 feet as documented in the approved RD Workplan. The remedy for the additional area of coverage will include the same design options as the original remedy, either collection and above- ground treatment or in-situ treatment (i.e. additional NZVI injection points, a shallow groundwater interceptor trench along the southern site boundary, and/or installation of a reactive barrier along the southern site boundary). The Applicable and Relevant or Appropriate Requirements (ARARs) and performance standards for groundwater compliance and collection system treatment will be identical to those in the OU2 ROD. Consistent with the OU2 ROD, ICs will need to be in place to ensure no disturbance of the groundwater collection and treatment system, and to restrict the use of contaminated groundwater.

Soil Cover

The original acreage to be covered with clean soil was estimated in the OU2 FS Report and in the OU2 ROD as approximately 2 acres. This area to be covered was immediately adjacent to the former production areas and was contaminated with mirex above the ROD mirex remediation performance standard. Additional delineation for mirex was completed as part of the PDI work and the extent of the surficial mirex is more extensive than originally known at the time of the OU2 ROD. As a result of the PDI investigation, the area to be covered with clean soil has increased from the original 2 acres to approximately 7 acres. This is documented in the OU2 RD Workplan and will be included in the final OU2 design for this area.

Changes to Estimated Remedy Costs Due to ESD

The OU2 ROD provided an initial estimate of the OU2 remedy cost of approximately $19 million. It is estimated that these changes to the OU2 remedy will increase remedy costs by approximately $420,000 (approximately $260,000 for groundwater system and $160,000 for the soil cover) due to increased materials and labor costs to extend the groundwater collection to the south and to extend the soil cover over the additional surficial mirex contamination. The two VI sub-slab depressurization systems called for by this ESD have already been installed and are in operation, and therefore only modest additional O&M costs are expected for implementation of the VI remedy component of this ESD.

Support Agency Comments

The OEPA has been intimately involved with the Site, including attendance at all technical progress meetings and review and commentary on all Site technical documents. As such, they are intimately familiar with the proposed remedy modifications and State concurrence with the

ESD is anticipated. Their concurrence letter will be added to the Administrative Record when received.

Statutory Determinations

The EPA believes the remedy for the Nease Chemical Site, as modified by this ESD, satisfies CERCLA Section 121 and remains protective of human health and the environment, complies with federal and State requirements as identified in the OU2 ROD as applicable, or relevant and appropriate to the remedial action at the time of the OU2 ROD, is cost effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

Public participation compliance

The EPA will send out a postcard and publish a notice in the local newspaper in accordance with the requirements set out in NCP Section 300.435(c) (2) (i).

Authorizing Signature

Richard C. Karl, Director
Superfund Division

8-26-11
Date

Table 1 - Maximum Groundwater Concentrations at Nease Chemical Site

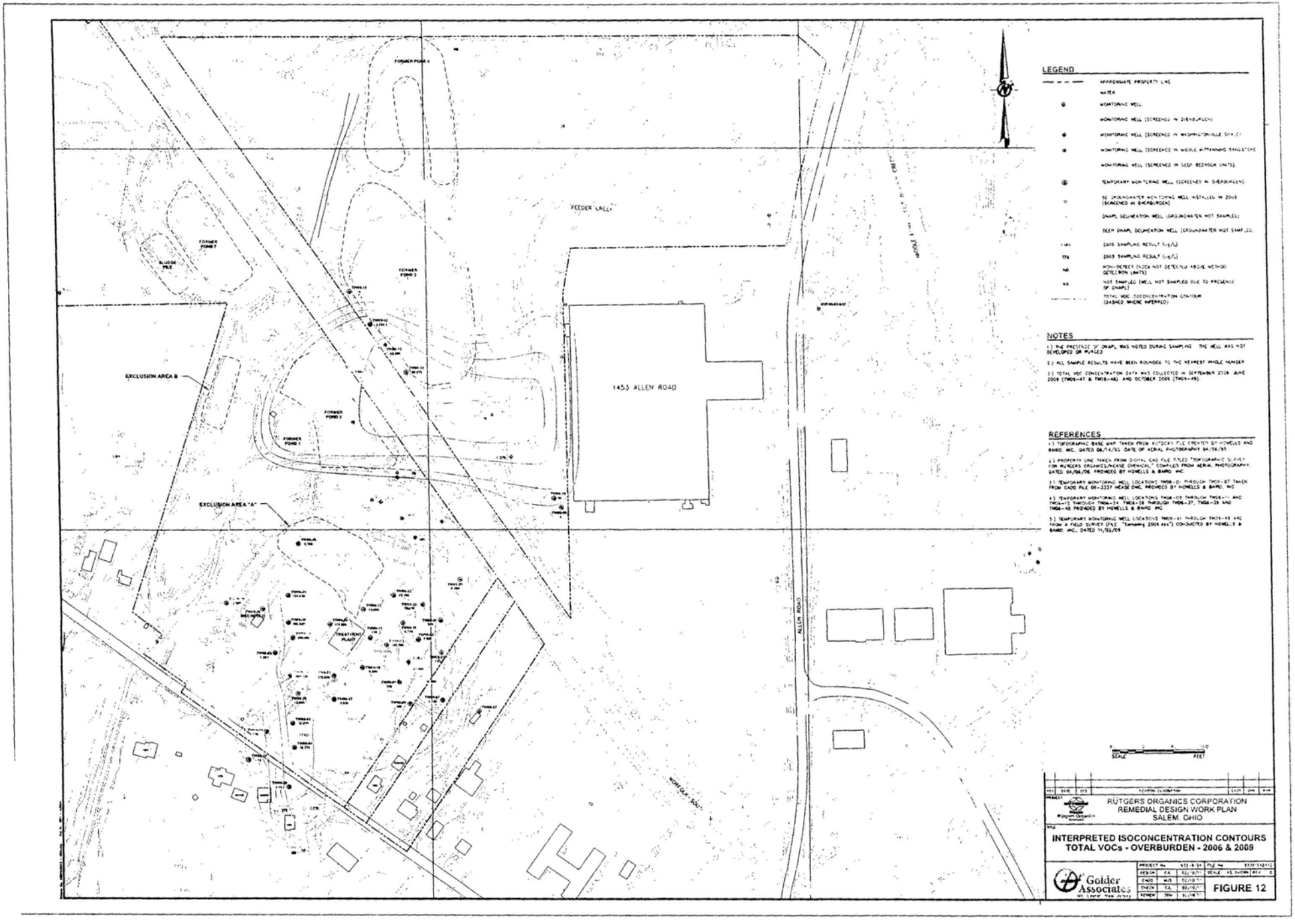
February 2011 933-6154-005

TABLE 3
MAXIMUM GROUNDWATER CONCENTRATIONS 2006 - 2009
NEASE CHEMICAL SITE
SALEM, OHIO

Chemical	Eastern Shallow Groundwater Plume		SouthernShallow Groundwater Plume[1]		MKS Plume	
	Max Concentration [ug/l]	Date and Location of Max	Max Concentration [ug/l]	Date and Location of Max	Max Concentration [ug/l]	Date and Location of Max
Benzene	12,000	S-12 (7/2003)	8,700	TW06-03 (8/2006)	11,000	PZ-6B-U (7/2003)
Chlorobenzene	1,000 J	TW06-14 (10/2006)	5,200	TW06-34 (12/2006)	600	PZ-6B-U (7/2003)
1,2-Dichlorobenzene	35,000	TW06-13 (10/2006)	78,000	TW06-03 (8/2006)	24,000	NZVI-5 (6/2009)
1,2-Dichloroethane	4,800	S-12 (7/2003)	5,800	TW06-33 (12/2006)	2,200	PZ-6B-U (7/2003)
1,1-Dichloroethene	12	S-12 (9/2006)	80	B-S (7/2003)	540 J	PZ-6B-U (10/2009)
cis-1,2-Dichloroethene	50,000	TW06-14 (10/2006)	17,000	B-S (9/2006)	76,000	NZVI-2 (8/2009)
trans-1,2-Dichloroethene	1,000	S-12 (7/2003)	420	B-S (7/2003)	3,300	PZ-6B-U (7/2003)
1,1,2,2-Tetrachloroethane	9,000	S-12 (7/2003)	140,000	TW06-24 (11/2006)	9,800	D-12 (7/2003)
Tetrachloroethene	6,300	S-12 (7/2003)	200,000	TW06-24 (11/2006)	85,000	PZ-6B-U (9/2006)
Trichloroethene	5,300	TW06-13 (10/2006)	140,000	TW06-26 (11/2006)	28,000	PZ-6B-U (7/2003)
Vinyl Chloride	980	S-12 (7/2003)	970	B-S (7/2003)	2,400	NZVI-4 (10/2009)
Chloroform	510 J	TW06-14 (10/2006)	760 J	TW06-35 (12/2006)	54	D-12 (7/2003)
Phenyl Sulfone	7.5 J	S-20 (9/2006)	85	PZ-7 (9/2006)	15,000	PZ-6B-U (2/2007)

[1] Excluding NAPL impacted wells TW06-21 and TW06-36

Figure 1 Groundwater Plume Map



Final Natural Resource Restoration Plan
&
Environmental Assessment
for the
Nease Chemical Assessment Area

Prepared by:

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TRUSTEES:	State of Ohio acting through the Ohio Environmental Protection Agency and U.S. Department of the Interior acting through the U.S. Fish and Wildlife Service
LEGAL AUTHORITY:	Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (as amended), 42 U.S.C. § 9601, *et seq*. Federal Water Pollution Control Act (Clean Water Act) (as amended), 33 U.S.C. § 1251, *et seq*. Natural Resource Damage Assessments (NRDA), 43 C.F.R. Part 11 National Environmental Policy Act (NEPA) of 1970 (as amended), 42 U.S.C. § 4321, *et seq*.
RESPONSIBLE FEDERAL AGENCIES:	Region 3, U.S. Fish and Wildlife Service, Lead Agency
RESPONSIBLE STATE AGENCIES:	Ohio Environmental Protection Agency, Lead Administrative Trustee Ohio Department of Natural Resources
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SECTION 1

INTRODUCTION AND SUMMARY

This Final Restoration Plan and Environmental Assessment (RP/EA) has been prepared by the State and Federal natural resource Trustees to address natural resources injured and ecological services lost due to releases of hazardous substances from the former Nease Chemical facility near Salem, Ohio.

The Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. § 9601, *et seq*. [CERCLA, or more commonly known as the federal "Superfund" law], and the Federal Water Pollution Control Act, 33 U.S.C. § 1251, *et seq*. [more commonly known as the Clean Water Act or (CWA)] authorize States, Indian Tribes, and certain Federal agencies that have authority to manage or control natural resources, to act as "Trustees" on behalf of the public, to restore, rehabilitate, replace, and/or acquire natural resources equivalent to those injured by hazardous substance releases. The Department of the Interior's Natural Resource Damage Assessments (NRDA) regulations are set forth in 43 C.F.R Part 11.

The State of Ohio, acting through the Ohio Environmental Protection Agency (Ohio EPA) and the United States Department of the Interior (DOI or the Department), acting through the United States Fish and Wildlife Service (USFWS) (collectively referred to as the Trustees) have worked together, in a cooperative process, to determine what is necessary to address natural resource injuries caused by releases of hazardous substances including, but not limited to: mirex, chlordecone (kepone), hexachlorocyclopentadiene, chlorinated ethenes, and chlorinated benzenes from the former Nease Chemical facility.

A Draft RP/EA with the preferred alternative to restore, replace, rehabilitate or acquire the equivalent of the injured natural resources and the services provided by those resources was prepared by the Trustees and public comment solicited. The Trustees also held an information session and public meeting during which public comments were accepted. All of the public comments (summarized in Section 7 along with the Trustees' responses to the comments) supported the preferred alternative, Alternative B. The Trustees have prepared this Final RP/EA to present the alternative selected by the Trustees for natural resource restoration, after consideration of the public comments.

Further, after consideration of the comments received and the environmental assessment prepared in the Draft RP/EA, the USFWS, on behalf of the Trustees, has issued a Finding of No Significant Impact (FONSI) for the Selected Alternative.

SECTION 2

PURPOSE AND NEED FOR RESTORATION

2.1 The Nease Chemical Facility – Summary of Release History

The former Nease Chemical facility is located in Columbiana County, Ohio, approximately 2.5 miles northwest of the town of Salem. The Nease Chemical site[1] (Site) includes the former Nease Chemical facility (approximately 44 acres); portions of the adjoining former Crane-Deming facility (approximately 35 acres), Feeder Creek, and portions of Middle Fork Little Beaver Creek (MFLBC). Environmental media have been contaminated by hazardous substances including, but not necessarily limited to, chlorinated benzene compounds, chlorinated ethenes, mirex, photomirex, and kepone, as well as other synthetic pesticides. Contamination from the former Nease Chemical facility traveled via Feeder Creek, a tributary draining the former facility areas, and possibly other routes, contaminating environmental media, including, but not limited to, soil, ground water, surface water, sediments, flood plain/wetland areas, as well as biota in MFLBC in Columbiana and Mahoning Counties, Ohio. Site-related contamination has been detected in almost 35 river miles (RM) of MFLBC, from RM 36.7, where Feeder Creek enters MFLBC, downstream to RM 1.9.

2.2 Natural Resource Injuries

Natural resources or resources means land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States, any State, or local government. These natural resources have been categorized into the following five groups: surface water resources, ground water resources, air resources, geologic resources, and biological resources. Injuries occurred or likely occurred to surface water resources (including bed, bottom and bank sediments), and the following biological resources, including their supporting ecosystems: fish, migratory birds, fish eating birds, wading birds, aquatic organisms and fish eating mammals. Based on Trustee estimates, approximately 280 acres of aquatic habitat have been contaminated by hazardous substances. Injured habitats include, but are not limited to, forested, submergent, and emergent wetlands, as well as surface waters and bottom sediments of the MFLBC.

Toxic contaminants have wide ranging effects on aquatic and terrestrial life. Acute (short term) effects may include the death of birds, fish and other animals, and death or low growth rate in plants. Chronic (long term) effects on aquatic life may include shortened lifespan, reproductive problems, lower fertility, and changes in appearance or behavior. Many site-

[1] The United States Environmental Protection Agency (U.S. EPA) placed the Nease Chemical site (Site) on the National Priorities List for clean-up in 1983 and remedial activities are currently underway at the Site.

related hazardous substances are categorized as persistent bioaccumulative toxics. They degrade very slowly in the environment, accumulate in living things, and bioaccumulate as they move up the food chain. General information on potential effects of the hazardous substances detected can be found in the Agency for Toxic Substances and Disease Registry (ATSDR) fact sheets (www.atsdr.cdc.gov) and the U.S. EPA ECOTOX database (www.epa.gov/ecotox).

In addition to the injuries to surface water, and biological resources noted above, injuries to ground water have been identified and evaluated. Based on Trustee estimates, over 400 million gallons of ground water may be injured over time as the result of releases of hazardous substances from the former Nease Chemical facility.

2.3 Authority and Legal Requirements

This Final RP/EA has been prepared jointly by Ohio EPA and the USFWS. Each of these Agencies is a designated natural resources Trustee under Section 107(f) of CERCLA, 42 U.S.C. § 9607(f), Section 311 of the CWA, 33 U.S.C. § 1321, and other applicable law, including Subpart G of the National Contingency Plan (NCP), 40 C.F.R. §§ 300.600-300.615. As a Trustee, each Agency is authorized to act on behalf of the public to assess natural resource injuries and recover damages for injuries to natural resources and losses of natural resource services attributed to releases of hazardous substances. The Federal Authorized Official is the DOI official delegated the authority to act on behalf of the Secretary of the U.S. DOI to conduct a natural resource damage assessment and restoration. The Authorized Official is the Region 3 Regional Director for the U.S. FWS, and represents the interests of the Department, including all affected Bureaus**.** In accordance with 42 U.S.C. § 9607(f)(2)(B), the Director of Ohio EPA has been designated the natural resource Trustee by the Governor of Ohio, pursuant to letter dated June 30, 2011.

The purpose of the Final RP/EA is to consider alternative actions to restore, rehabilitate, replace, and/or acquire the equivalent of natural resources injured and natural resource services lost as a result of releases of hazardous substances from the former Nease Chemical facility, pursuant to applicable State and Federal laws and regulations. This document will also serve as the Restoration Plan (RP) for implementing the selected Alternative as required under the NRDA regulations.

Any restoration of natural resources under the CERCLA and CWA must comply with the National Environmental Policy Act (NEPA), as amended (42 U.S. C. §4321, et seq.), the Council on Environmental Quality regulations (40 CFR parts 1500-1508) and DOI's implementing NEPA regulations at 40 C.F.R. Part 6. In compliance with NEPA and its regulations, this Environmental Assessment (EA) summarizes the current environmental setting, describes the purpose and need for action, identifies alternative actions, assesses their applicability and environmental consequences, and summarizes opportunities for public

participation in the decision making process. For the actions proposed in this EA, the appropriate context for considering potential significance of the actions is local, as opposed to national or worldwide.

The Alternative selected in the RP must be consistent with statutory mandates and regulatory procedures that specify that recovered damages are used to undertake feasible, safe, and cost-effective projects that address injured natural resources, consider actual and anticipated conditions, have a reasonable likelihood of success, and are consistent with applicable laws and policies.

2.4 Overview of Damage Determination

DOI has adopted regulations under CERCLA and the CWA establishing procedures for assessing natural resource damages. The NRDA regulations are codified at 43 C.F.R. Part 11. As defined in the NRDA regulations, injury is an adverse biological, chemical, or physical effect on natural resources, such as death, decreased population or lost services (*e.g.,* fishing or hunting opportunities, ecosystem functions). Damages are the estimated value of the injured resources from the time injury began until the resources and services they provide are restored. The objective of the NRDA process is to compensate the public through environmental restoration for injuries to natural resources that have been caused by releases of hazardous substances into the environment. Under Section 107(f)(1) of CERCLA, damage settlements can only be used to restore, rehabilitate, replace, and/or acquire the equivalent of trust resources injured, destroyed, or lost as a result of the release of hazardous substances**.**

Accordingly, this Final RP/EA has been developed to evaluate and, ultimately, select restoration projects designed to compensate the public for damages that occurred to natural resources in the Assessment Area. This Final RP/EA is being developed prior to final resolution of damage claims. The Final RP/EA is not intended to completely quantify the extent of restoration needed. The scale of restoration activity that will be undertaken as a result of this document will depend upon the funds, property, and services made available through resolution of natural resource damage claims. Implementation of selected restoration projects will occur over a period of time, dependent upon the project type.

The NRDA regulations provide that restoration plans should consider ten factors when evaluating and selecting projects to restore or replace injured natural resources. The following factors will be used to select an Alternative and to compare projects within an Alternative. (See 43 C.F.R. § 11.82.)

1. Technical feasibility.
2. The relationship of the expected costs of the Alternative to the expected benefits.
3. Cost-effectiveness.
4. The results of actual or planned response actions.

5. The potential for additional injury resulting from the proposed actions.
6. The natural recovery period.
7. Ability of the resources to recover with or without alternative actions.
8. Potential effects of the action on human health and safety.
9. Consistency with relevant Federal, State, and Tribal policies.
10. Compliance with applicable Federal, State, and Tribal laws.

As discussed, the selected Alternative must achieve the restoration goals to restore, rehabilitate, replace and/or acquire the equivalent of those natural resources injured by the discharge or release of hazardous substances from the former Nease Chemical facility**.**

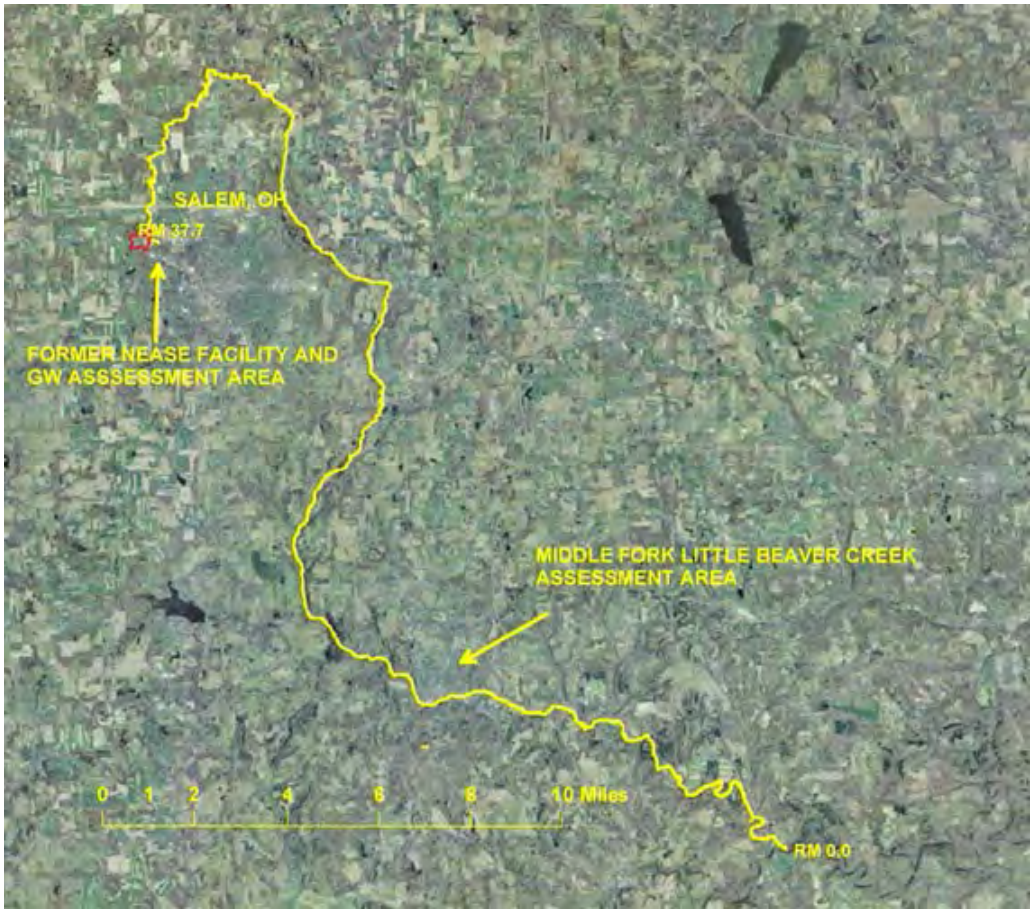
Based on the recommendations of the Trustees and input from the public, the USFWS Authorized Official has selected one of the Alternatives and has determined, based on the facts and recommendations contained herein, and public comment, that this EA is adequate to support a Finding of No Significant Impact, and an Environmental Impact Statement is not required.

SECTION 3

ASSESSMENT AREA AND SUMMARY OF INJURED RESOURCES

The Assessment Area means the former Nease Property, portions of the Former Crane-Deming Property, the underlying ground water aquifers, Feeder Creek, portions of MFLBC, and supporting ecosystems, where natural resources have been affected directly or indirectly by the release of hazardous substances from the former Nease Chemical facility. The Assessment Area serves as the geographic basis for the injury assessment, and is generally depicted on Figure 1. Within the Assessment Area, the Trustees have focused injury and damage determinations on ground water, surface water (aquatic habitat) and biological resources to scale restoration projects.

Figure 1: Nease Assessment Area



Ground and surface water resources in the Assessment Area are important for providing potable water and have other intrinsic values worth protecting and restoring. In addition, ground water resources often have connections to, and provide services and support to, wetland and aquatic habitats and biological resources. The terrestrial, wetland, and aquatic habitats of the MFLBC watershed support a wide diversity of birds, fish, and mammals, including rare, threatened, and endangered species. The health of the ecosystem and the quality of its habitats are vital to the invertebrates, plants, fish, and wildlife of the area. Public uses of these resources also depend on the health and quality of the watershed.

For a detailed discussion of the physical characteristics and biological environment of the Assessment Area, including the habitat and wildlife as well as the listed, proposed and candidate species in the area, see Appendix A.

SECTION 4

RESTORATION ALTERNATIVES

4.1 Alternative A: No Action

The No Action Alternative, required by NEPA, consists of expected conditions under current programs pursued outside the NRDA process. It is the baseline against which other actions can be compared. If this Alternative were implemented, the Trustees would not initiate specific actions to restore injured natural resources or compensate the public for ongoing natural resource injuries caused by releases of hazardous substances into the environment. Existing environmental degradation not directly related to hazardous substance releases would continue to occur (land development, shoreline hardening, etc.), and perhaps worsen under Alternative A. The State and Federal agencies would continue to manage, conserve, and protect the natural resources as outlined in current programs and regulations and within current budget constraints. The public would not be compensated for injuries to natural resources. The No Action Alternative provides no significant positive benefits to the local community.

4.2 Alternative B: Natural Resource Based Restoration in the MFLBC and/or Little Beaver Creek Watersheds (Selected Alternative)

Alternative B involves projects that would restore and replace injured and lost natural resources, while concurrently providing enhanced ecosystem services to compensate for injuries caused by releases of hazardous substances. Projects within this Alternative could be implemented anywhere in the State of Ohio with a preference for projects in the watersheds of MFLBC and/or Little Beaver Creek. Alternative B projects are focused on maintaining the important linkages between the physical, chemical, and biological properties of the overall ecosystem and the services it provides. These category of projects and/or their restoration goals include the following: (1) enhancement and preservation of riparian, wetland, and upland habitat providing benefits to avian species and fisheries; (2) enhancement, preservation and reestablishment of wetlands; (3) improvement of aquatic habitat; and, (4) providing clean recharge to ground water aquifers and potable use surface water. Each of these categories of projects is expected to improve and enhance the ecosystem to benefit injured natural resources. Concomitantly, these projects would benefit the public by enhancing outdoor recreational opportunities. These goals would be accomplished through the acquisition, preservation, and restoration of contiguous tracts of valuable habitat where feasible, some of which could be made available to the public for recreational use. This holistic approach supports the goal of restoring, replacing and rehabilitating injured resources, and enhancing outdoor recreational activities.

The Trustees anticipate that priorities for all restoration project categories under Alternative B will be influenced primarily by the following key factors:

1) Relationship to injuries (restoration opportunities that address services and values

similar to those lost due to the release of hazardous substances are preferred).

2) Quality of restoration opportunities (projects with substantial ecological opportunities are preferred).
3) Ecological function/hydraulic connectivity (areas in the MFLBC and/or Little Beaver Creek watersheds are preferred).
4) Cost and cost-effectiveness (projects with lower cost per restored or replaced services or values are preferred).

Prior to the selection and implementation of any site-specific actions, the Trustees will review the specific projects to determine if they comply with all applicable requirements: NEPA, Historic Preservation Act, Endangered Species Act, etc.

4.2.1 Wetland, Flood Plain, Riparian and Associated Upland Habitat Preservation, Reestablishment or Enhancement Projects

Restoration projects under this Alternative B would concentrate on preserving and enhancing areas which provide ecological services similar to those lost in the MFLBC. Protection and restoration of wetlands and associated riparian habitat and ecologically associated uplands would foster and promote increased spawning and nursery habitats for fish, as well as nesting and foraging opportunities for a wide variety of birds and other wildlife. Such projects will enhance clean recharge water to local aquifers and reduce erosion and resultant sediment and pesticide loading to MFLBC and/or Little Beaver Creek. Restoration projects described in Alternative B would provide ecological functions similar to, but not necessarily the same as, those injured by hazardous substances.

Wetland, flood plain, riparian, and ecologically associated upland protection and enhancement would help replace habitats that have been impaired or destroyed in the MFLBC watershed. The Trustee's wetland, flood plain, riparian, and upland habitat reestablishment and enhancement strategy would include active restoration projects, such as improving existing flood plain, establishing and/or preserving wetlands, establishing interconnections between surface water and wetlands**,** and removing invasive plant species. Techniques such as acquiring environmental easements and/or covenants, fencing cattle out of riparian corridors, restoring natural stream geomorphology, and reestablishing wetland and flood plain plants and other native vegetation would be utilized, as appropriate. The Trustees intend to target restoration of wetland, riparian, and upland habitats located within flood plains, and adjacent to existing valuable natural areas. Wetland, flood plain, riparian, and ecologically associated upland reestablishment and enhancement projects that will improve water quality in MFLBC and/or Little Beaver Creek (including reducing loadings of suspended sediments, nutrients, and pesticides) and provide habitat for biological resources are preferred.

4.2.1.1 ***Acquisition/Protection of Natural Areas***

Alternative B recognizes the significance of preserving the riparian, wetland, flood plain and upland habitat of the MFLBC and/or Little Beaver Creek watershed. To achieve this goal, efforts will be focused on identifying, acquiring and preserving parcels of land with the following attributes: (1) areas with agricultural, commercial and/or residential development pressure; (2) contiguous parcels; (3) areas of exceptional stream, riparian and floodplain habitat; and (4) high quality wetlands. These areas or "natural areas" are those parcels of land that significantly contribute to the ecological qualities of the MFLBC and/or Little Beaver Creek watersheds. Once those natural areas are preserved and protected, lost and injured resources and public recreational activities are likely to improve.

Specific areas for preservation will be selected based upon the following criteria: (1) the ecological value of the habitat and ground water recharge potential; (2) the ability to improve the habitat; (3) the ability to preserve the habitat; (4) the geographical and ecological diversity of the parcel; (5) local and regional development plans; (6) the ability to find willing landowners; and, (7) citizens' concerns and comments. Preservation of properties would be achieved through acquisition from willing land owners of Environmental Covenants, Conservation Easements and/or General Warranty Deeds. Those properties that could be preserved in perpetuity will be considered a higher priority than those with a fixed duration. Land acquired will be conveyed to individual State, Federal or local governmental agencies, land trusts, or non-governmental conservation organizations following specific procedures and standards for each entity.

While the primary purpose of the preservation and enhancement is to protect and preserve fish and wildlife habitats, and ground water recharge, portions of the acquired properties may be available to the public for passive and/or active recreational opportunities (*e.g.*, fishing, wildlife viewing, hiking or hunting).

4.2.1.2 ***Reestablishment/ Enhancement of Natural Areas***

Restoration projects under Alternative B may include the replanting and reestablishment of native species on properties acquired through Environmental Covenants, Conservation Easements and/or General Warranty Deeds. Reestablishment efforts will focus on restoring natural areas that are currently in a somewhat degraded natural condition. Native species will be reestablished once non-native species have been removed, eradicated and/or controlled. The removal of non-native species and planting of native species will enhance ecosystem function and, as a result, enhance the ecosystem services provided to the natural resources and the public.

4.2.1.3 ***Dam Removal***

Lisbon Dam and similar low head dams throughout the State of Ohio are significant obstacles to movement and colonization by both fish and invertebrate species. As a result, they limit the ability of rivers and streams, including MFLBC, to reach full attainment of water quality standards. Removal of such obstacles results in significant improvements in water quality and ecological habitat both above and below the dams. In addition, fish and invertebrate species gain access to new riparian and wetland habitats, which results in greater numbers of fish and invertebrate species and individuals. Low head dams can also be dangerous to humans and can pose a drowning threat due to the current that is generated as water flows over the dam. The Trustees therefore will seek to remove the Lisbon, or similar low head dams elsewhere in MFLBC and/or Little Beaver Creek watershed. Local communities will be consulted prior to dam removals.

4.2.2 *Protection of Local Potable (Drinking) Water Resources*

Alternative B recognizes the importance of protecting surface and ground water resources in the MFLBC and/or Little Beaver Creek area to help restore natural resources that have been injured by releases from the former Nease facility. To achieve this goal, Alternative B will focus on protecting potable (drinking) water source area(s) for local communities through appropriate mechanisms (*e.g.*, conservation easements and/or environmental covenants). Initial surface water and ground water resource protection efforts will be targeted to source water assessment and protection (SWAP) areas that have already been identified in the MFLBC and/or Little Beaver Creek areas, to help protect sources of potable water from contamination. Other areas such as local well fields and surface water reservoirs (outside identified SWAP areas) will be considered for protection if such projects are appropriate. See: http://www.epa.state.oh.us/ddagw/swap.aspx for additional information on SWAPs.

4.3 Alternative C: Natural Resource Based Restoration Outside the MFLBC and/or the Little Beaver Creek Watershed

Alternative C involves projects of the type described in Alternative B, above. However, those projects would be implemented in the State of Ohio outside the MFLBC and/or Little Beaver Creek watersheds. Projects outside of the MFLBC and/or Little Beaver Creek watersheds would provide services similar to those in Alternative B, but may benefit species other than those injured by hazardous substance releases in the Assessment Area.

4.4 Alternatives B and C: Criteria and Priorities for Restoration Project Categories

4.4.1 *Technical Feasibility*

Projects that use reliable, proven methods are preferred to those that rely on experimental or untested methods. Other factors that can affect project success, such as validity of assumptions inherent to the project approach, will also be considered by the Trustees.

Lands with known or suspected hazardous substances or hazardous waste will not be considered by the Trustees. Additionally, lands with easements, rights of entry, interests, or other encumbrances that may conflict with the restoration goals described herein will not be typically considered by the Trustees.

4.4.2 *Benefit Scope*

Restoration projects that provide a broad scope of measurable ecological and ground water benefits to a wide range of geographic areas and numerous fish or wildlife populations are favored over those that are focused on a limited set of benefits to a limited area or population. Restoration projects benefiting fish and wildlife species and populations of the type known, or believed to have been injured in the Assessment Area will be favored over those benefitting other species or populations. Restoration projects with a high ratio of expected ecological and ground water benefits to expected cost are preferred. Projects that provide natural resource services through protection and/or enhancement of the natural resources providing those services are preferred over projects designed solely to provide services. Projects that benefit more than one injured natural resource are expected to be given priority. Wherever possible, natural habitat functions which are self-sustaining and essential to maintain the habitat will be restored, enhanced and/or protected. If projects provide equal benefits, at equal costs, those closest to the injuries with minimal operation and maintenance activities will be preferred.

4.4.3 *Quantifiable Benefits*

Projects expected to provide quantifiable benefits and likely to achieve success will have a higher priority than projects that do not. Restoration projects should include an evaluation of success and a monitoring component if required to determine the effectiveness of restoration actions in providing the public with similar services and values to those lost because of releases of hazardous substances into the environment. Success and completion of the projects will be determined by completion of tasks outlined in accordance with applicable timeframes set forth in an enforceable document.

4.4.4 *Implementation Injuries*

Preference will be given to projects that avoid or minimize additional natural resource injury or environmental degradation. The Trustees will require that requisite permits are obtained and comply with applicable regulations. All projects selected for implementation will be expected to comply with applicable and relevant laws, policies and regulations. To assure that Federally- and State-listed threatened or endangered species will not be adversely affected, or proposed species are not jeopardized, the Trustees will require that the guidelines outlined in Appendix B are followed during implementation of NRD restoration activities.

4.4.5 *Other Project Support*

Preference is expected to be given to projects or aspects of Trustee approved projects that are not already being implemented or have insufficient funding under other programs. Although the Trustees may use restoration planning efforts completed by other programs, preference is given to projects that would not otherwise be implemented without NRD restoration funds.

4.4.6 *Voluntary Land Acquisition/Easements*

Preservation of habitats through acquisition of land, Environmental Covenants, or Conservation Easements will only be from willing sellers or participants. Landowners are, and will be, under no pressure or obligation to sell, or put a Conservation Easement or Environmental Covenant on their land. Neighbors adjacent to land purchased for preservation under this RP will retain all of their current rights to their land. The acquiring entities are required to pay fair market value for land purchased. Fair market value would be determined through established appraisal procedures.

4.4.7 *Tribal Cultural Resources*

The preservation or restoration of specific areas or resources that have appreciable cultural value to Indian tribes are important to the Trustees. A search of the Native American Consultant Database maintained by the National Park Service identified no Indian tribes with relevant interest in the restoration area.

4.5 Selected Alternative

The Trustees have selected Alternative B as the Alternative. Natural resource based restoration outside the MFLBC and/or Little Beaver Creek watersheds (Alternative C) may provide services similar to those within the MFLBC and/or Little Beaver Creek watersheds. However, such projects would not necessarily benefit the same ground water resources or species assemblages that were injured in the Assessment Area. The final decision on the selected Alternative was made by the State and Federal Authorized Officials based on recommendations from the Trustees' staff and input from the public.

4.6 Summary of Alternative Actions

Table 1: Comparison of Alternatives A, B & C

Actions	Alternative A No Action	Alternative B Natural Resource Based Restoration in the MFLBC/Little Beaver Creek Watershed (Selected Action)	Alternative C Natural Resource Based Restoration outside the MFLBC/Little Beaver Creek Watershed
Restore, rehabilitate, replace and/or acquire the equivalent of natural resources injured from the release of hazardous substances into the environment and services those resources provide	No	Yes	Partial. Species assemblages and ground water resources would not necessarily be the same as those injured.
Rehabilitate wetlands, flood plains, riparian and associated upland habitat	No	Yes	Partial. Habitat rehabilitated may be different from that affected by hazardous substance release.
Improve aquatic habitat and riparian habitat	No	Yes	Partial. Habitat improved may be different from that affected by hazardous substance release.
Provide for enhancement of abundance and diversity of self-sustaining fish populations	No	Yes	Partial. Species assemblages could be different from those injured.
Preservation of wetlands, flood plain, riparian and associated upland habitat	No	Yes	Yes
Improve outdoor recreational opportunities/enhance public awareness	No	Yes	Yes
Protection of potable (surface and ground) water resources	No	Yes.	Partial. Water resources protected may be different from those injured.

SECTION 5

ENVIRONMENTAL CONSEQUENCES OF PROPOSED RESTORATION ACTIVITIES

5.1 Alternative A: No Action

5.1.1 *Habitat Benefits*

Under Alternative A, no habitat would be restored, enhanced, or preserved beyond what the Trustees are currently doing within mandates, policies and restricted budgets. Loss of habitat due to development and other sources of environmental degradation not related to hazardous substance releases are expected to continue to occur. The public would not be compensated for injuries to natural resources from the releases of hazardous substances into the environment.

5.1.2 *Biological Benefits*

Fish and wildlife injured by releases of hazardous substances into the environment would not be restored, rehabilitated, replaced and/or the equivalent acquired. Populations of fish and wildlife species that rely on wetlands for spawning and nurseries would not increase sufficiently to compensate for past losses**.**

5.1.3 *Listed, Proposed, and Candidate Species*

Negative adverse effects to listed species would not be reduced under this Alternative.

5.1.4 *Potable (Drinking) Water Resources*

As no action would be taken, potable (ground and surface) water resources would not be afforded additional protection beyond what is already afforded by other existing programs.

5.1.5 *Cultural Resources*

As no action would be taken, cultural resources would not be adversely affected beyond what would occur under other existing programs and development.

5.1.6 *Environmental Justice*

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 Federal Register 7629 (1994)), directs Federal agencies to incorporate environmental justice in their decision making process. Federal agencies are directed to identify and address as appropriate, any disproportionately high and adverse environmental effects of their programs, policies and activities on minority or low-income populations.

Under the No Action Alternative, wildlife viewing and environmental education opportunities would not improve through enhancement projects. While affluent individuals can afford travel and pay for alternatives, low-income individuals are less capable of doing so.

5.1.7 *Socioeconomic Effects*

This Alternative would not result in any positive direct or indirect effects on the local economy. This Alternative would not result in additional lands that could provide increased recreational opportunities and related economic development in the area.

5.1.8 *Cumulative Effects*

If this Alternative was implemented, the cumulative effects would be adverse to the environment. The exclusive reliance on regulations and policies does not necessarily provide for long term preservation of valuable wetland and upland habitats. The watershed of the MFLBC includes many different habitats, such as flood plain forests, dry upland forests and wetlands (emergent, submergent, and forested). Degradation to these and other resources would continue due to historical and on-going development. No fishery resource enhancement projects would be implemented under the No Action Alternative, thus further harming the fishery. The loss and degradation of riparian wetlands could contribute to instability of the fish community. The continued loss of habitat could also adversely affect migratory birds that use the area for resting grounds, and nesting area for those species that remain for the nesting season.

5.2 Alternative B: Natural Resource Based Restoration in the MFLBC and/or Little Beaver Creek Watershed (Selected Alternative)

5.2.1 *Habitat Benefits*

Preserving, restoring or enhancing riparian, wetland, flood plain, and upland habitats along MFLBC and/or Little Beaver Creek will improve ecological functions that are essential for many fish and wildlife species. In addition, habitat restoration and preservation will improve public use and enjoyment of these resources. Benefits of aquatic and riparian improvements or enhancement would include improved water quality, reduced nutrient, sediment, and pesticide loadings, restored habitat for fish and wildlife species, and increased ecological productivity. Improving the quality of vegetation and habitat for fish and birds would provide similar, though not identical, ecological functions as those injured by hazardous substances.

These and other long-term benefits outweigh any adverse effects associated with specific habitat restoration or enhancement methods.

Under Alternative B, there would be minimal short-term disruptions to habitat due to the manipulation of soil required to complete wetland and aquatic habitat restoration and enhancement projects. Minor amounts of carbon monoxide or other air pollutants associated with heavy machinery may be temporarily associated with the proposed restoration activities during the construction phase. Construction activities would have no long term air quality impacts on the restoration area or surrounding environment. There may be a temporary increase in water turbidity during removal of the dam. It is anticipated that removal of the dam would have no long term negative water quality effects.

5.2.2 *Biological Benefits*

The restoration alternatives would benefit many different species of fish and wildlife found in the area. Preservation, reestablishment and enhancement of wetland, flood plain, riparian, associated upland, and aquatic habitats would benefit such species as waterfowl, rails, terns, songbirds, osprey, mink and beaver. Fishery resource enhancement projects would benefit species such as black redhorse, rock bass, and smallmouth bass leading to the development of a balanced, healthy fish community. Through the habitat quality improvement projects there would be an increase in shallow waters and beds of submergent and emergent vegetation providing habitat for migrating waterfowl and feeding areas for shorebirds, waterbirds, and many species of fish found in the area. There would be minimal negative effects to biological resources from human disturbance in relation to use of preserved areas and natural resource based public use projects.

5.2.3 *Listed, Proposed, and Candidate Species*

Federal and State-listed or endangered species would receive further protection and aid in the recovery of the species when this Alternative is implemented. Wetland, flood plain, riparian, associated upland, and aquatic habitat preservation would likely benefit the entire range of federal and state listed and endangered species. Protective measures (Appendix B) will be taken during implementation of any projects. Adherence to the restrictions should provide for no adverse effects on the listed species.

5.2.4 *Potable (Drinking) Water Resources*

Potable (drinking) ground water and surface water resources will receive additional protection through appropriate mechanisms (*e.g.*, conservation easements and/or environmental covenants) when this Alternative is implemented. Currently, some local communities in the MFLBC and/or Little Beaver Creek area have identified source water areas that would benefit from protection. Placing protection on such areas may involve public entities and/or private landowners and transactions would only be completed with willing land owners who would

accept fair market value. There would be little or no impact on the market price. There would be minimal effects on the local economy and tax base because the areas identified for protection are currently undeveloped.

5.2.5 *Cultural Resources*

Projects covered under this document such as removing low head dams, stabilizing stream banks, and acquiring wetlands have the potential to affect properties meeting the criteria for the Natural Register of Historic Places and other cultural resources. The Trustees are in the process of determining specific areas for restorations and land acquisition. When these project areas have been determined, and prior to making final decisions about these projects, the Field Supervisor, Columbus Ecological Field Office of the USFWS, will initiate consultation with the Ohio State Historic Preservation Officer and, with the assistance of the USFWS Regional Historic Preservation Officer, will complete the Section 106 (54 U.S.C. §306108) process as described in 36 Code of Federal Regulations Part 800.

5.2.6 *Environmental Justice*

Wetland, flood plain, riparian, and upland preservation would involve transactions with willing landowners. No minority or low-income populations would be displaced or negatively affected in any way. While the primary purpose of the restoration of this land is for fish and wildlife, portions of the acquired properties may be used by the public for natural resource based recreational and educational activities, such as fishing, hunting, and/or wildlife viewing.

5.2.7 *Socioeconomic Effects*

The overall quality of life for the surrounding communities would improve with the restoration of the area. Protection of wetlands, riparian, flood plains, and uplands would provide wildlife viewing, fishing and hunting opportunities, and help create positive economic impacts on the local economy. Aquatic habitat improvements or enhancements would provide more opportunities for public enjoyment of natural resources.

Land acquisition procedures would involve transactions with willing sellers who would be paid fair market value. There would be little or no changes on the market price or on landowners in the area who choose not to sell. There would be minimal effects on the local economy and tax base because the areas identified for preservation are currently undeveloped.

Aesthetic values could temporarily be reduced during the construction phase due to the presence of construction equipment and vehicles, as well as due to the construction process. There would be a minor increase in noise levels associated with construction in any immediate project area due to vehicle and construction equipment. These effects are anticipated to be minimal, short term, and limited to active periods of construction. There are no long term noise level increases associated with this Alternative.

5.2.8 *Cumulative Benefits*

Cumulative benefits from habitat restoration or enhancement implemented under Alternative B will positively affect the region as a whole. Despite the existence of laws and regulations designed to minimize wetland and aquatic habitat losses and degradation, threats to wetlands and aquatic habitat from indirect sources, cumulative small scale damage, or surrounding land use changes still exist. Partnering with various State and Federal programs (EPA's Section 319 Clean Water Act State Grants etc.) that already contribute to improving the health of the ecosystems and watersheds could aid in restoring more habitats and increasing fish and wildlife populations.

Migratory birds will benefit from this Alternative because there would be more undisturbed areas for spring and fall migration resting and feeding stopovers, as well as nesting habitat for other bird species. This Alternative will contribute to the stabilization of fish communities by implementing appropriate fishery resource projects, such as restoring fish spawning and nursery habitats.

5.3 Alternative C: Natural Resource Based Restoration outside the MFLBC and/or Little Beaver Creek Watershed

5.3.1 *Habitat Benefits*

Under this Alternative, there would be improvement of habitats for fish and wildlife. However, those improvements would accrue to species and populations different from those injured in the Assessment Area. Habitat losses within the MFLBC and/or Little Beaver Creek watershed would likely continue.

5.3.2 *Biological Benefits*

Under this Alternative, biological productivity would potentially be increased. However, the increases would involve species and populations which may be different from those injured.

5.3.3 *Listed, Proposed, and Candidate Species*

Listed, proposed, or candidate species in MFLBC and/or Little Beaver Creek watershed may or may not benefit.

5.3.4 *Potable (Drinking) Water Resources*

Under this Alternative, additional protection would be afforded for potable (drinking) water resources. However, the additional protection would include ground water and surface water resources outside the injured area.

5.3.5 *Cultural Resources*

Projects covered under this document have the potential to affect properties meeting the criteria for the Natural Register of Historic Places and other cultural resources. The specific project locations have not been determined. When these project areas have been determined, and prior to making final decisions about these projects, the Field Supervisor, Columbus Ecological Field Office of the USFWS, will initiate consultation with the Ohio State Historic Preservation Officer and, with the assistance of the USFWS Regional Historic Preservation Officer, will complete the Section 106 (54 U.S.C. §306108) process as described in 36 Code of Federal Regulations Part 800.

5.3.6 *Environmental Justice*

Land acquisitions and other activities would involve transactions with willing landowners. No minority or low-income populations would be displaced or negatively affected in any way. Provision of fishing piers and other structures could improve access for lower income individuals. Moreover, any such environmental justice impacts could extend outside the injured area.

5.3.7 *Socioeconomic Effects*

The overall quality of life for the surrounding communities would improve with the restoration of the area. Augmentation of human use related services would help create positive economic benefits to the local economy. Moreover, the benefits could accrue to natural resources outside the injured area.

5.3.8 *Cumulative Benefits*

Cumulative benefits under this Alternative would positively affect the areas and possibly the regions where habitat restoration or enhancement would be implemented. However, the benefits would accrue to natural resources outside the injured area.

5.4 Summary of Environmental Consequences for Each Alternative

Table 2: Comparison of Alternative A, B & C Environmental Consequences

Attributes	**Alternative A** No Action	**Alternative B** Natural Resource Based Restoration in the MFLBC/Little Beaver Creek Watershed (Selected Alternative)	**Alternative C** Natural Resource based Restoration outside the MFLBC/Little Beaver Creek Watershed
Wetlands	Expected continued net loss of habitat	Increase of wetland habitat	Potential increase of wetland habitat
Uplands associated with wetlands	Expected continued net loss of habitat	Increase of upland habitat associated with wetlands	Potential increase of upland habitat associated with wetlands
Aquatic and near-shore habitat	Expected continued degradation and loss of habitat	Increase of aquatic habitat	Potential increase of aquatic habitat
Fish resources	Expected populations would remain unbalanced for a greater length of time	Expected increase diversity of fish community and populations	Expected increase diversity of fish community and populations. Communities and population would be different from those injured
Wildlife resources	Expected continued harm and decrease of numbers	Expected increase in populations	Expected increase in populations. Populations would differ from those injured.
Listed threatened or endangered species	Expected negative impacts would continue	Expected to provide further recovery of species in the area	May or may not assist recovery of species in the Assessment Area
Potable (drinking) water resources	Expected negative impacts would continue	Expected to provide protection of potable (ground and surface) water resources	Expected to provide protection of potable (ground and surface) water resources but may not be in MFLBC/ Little Beaver Creek
Cultural resources	N/A	Adverse impacts are possible	Adverse impacts are possible
Surface water	Expected to remain degraded due to sediment and nutrient loading and historic pollution in sediment	Temporary water turbidity during construction. Expected increase in surface water quality	Temporary water turbidity during construction. Expected increase in surface water quality, but may not be in MFLBC/Little Beaver Creek
Environmental justice issues	No opportunities for increased quality of life	Expected increased quality of life in the MFLBC/Little Beaver	Possible increased quality of life, but not necessarily in the MFLBC/Little Beaver

		Creek area	Creek area
Socioeconomic issues	Expected local economy would remain the same or decrease due to continued injury without restoration	Short term aesthetic and noise affects during construction. Local economy could potentially increase due to restoration	Short term aesthetic and noise affects during construction. Local economy could potentially increase due to restoration
Recreational use Environmental education and resource enjoyment	No enhancement or increase of low impact recreational opportunities or environmental education	Increase opportunities for wildlife/bird viewing, fishing, as well as enhancement of understanding of the ecosystem	Increase opportunities for wildlife/bird viewing, fishing, as well as enhancement of understanding of the ecosystem, but outside of the injured area
Cumulative effects	Potential decrease in populations of migratory birds, continued degraded fishery and continued loss of wetland and associated upland habitat in the area	Expected increased populations of migratory birds and greater diversity in fish community; some ecosystem functions restored or compensated	Expected increased populations of migratory birds and greater diversity in the fish community; ecosystem functions in the area of injury would not be addressed

SECTION 6

CONSULTATION AND COORDINATION WITH THE PUBLIC AND OTHERS

6.1 National Historic Preservation Act Compliance

The USFWS' Project Leader for Columbus Ecological Services will provide the State Historic Preservation Officers with this Final RP/EA as part of the public review and comment process.

6.2 Endangered Species Act Compliance

This Final RP/EA complies with Section 7 of the Endangered Species Act (ESA) of 1973 as amended, 16 U.S.C. § 1531, *et seq.,* and its implementing regulation (50 C.F.R. 402, Subpart A).

6.3 Public Participation

Public review of the Draft RP/EA is an integral component of the assessment and restoration planning process. Through the public review process, the Trustees sought public comment on the actions proposed to restore injured natural resources or replace lost resource services. The Draft RP/EA was available for review and comment by the public. A public meeting was held to present the restoration actions proposed to compensate the public for injuries to those natural resources covered herein. Notice of the meeting date and time was published in the local newspaper.

SECTION 7

PUBLIC COMMENT ON DRAFT RP/EA

This section summarizes public comments received on the Draft RP/EA, and provides the Trustees' responses to the comments. The Draft RP/EA was released to the public on March 5, 2015. Comments were received during the public comment period through April17, 2015.

In total 6 written comments were received on the Draft RP/EA. The commenters included both private individuals and those representing various organizations with an interest in the Middle Fork of Little Beaver Creek and the surrounding watershed, including the Columbiana County Park Board on behalf of the Columbiana County Park District; Little Beaver Creek Wild and Scenic River Advisory Council; the Boy Scouts of America, Buckeye Council; and Golder Associates, on behalf of the PRP, Rütgers Organics Corporation (ROC). One individual provided comments during the April 9, 2015 public meeting.

The Responsiveness Summary does not repeat each comment verbatim. Rather, the comments are summarized and grouped into categories. Copies of the original comments are provided in Appendix D of the Final RP/EA.

- Comments on Alternative B: All the written comments expressed support of Alternate B, as the plan that would best protect and/or restore natural resources in the Middle Fork of Little Beaver Creek area (MFLBC). One of the commenters, Golder Associates, was generally supportive of Alternative B. However, Golder's comments discuss a tentative settlement with the United States and the State of Ohio which has not yet been finalized and approved by the court, and therefore the Trustees cannot respond to that comment.

  Response: The Trustees agree that Alternate B would protect and restore natural

resources in the area and would best meet the requirement that any settlement be used to restore, rehabilitate, replace, and/or acquire the equivalent of trust resources injured, destroyed, or lost as a result of the release of hazardous substances.

- Comment on dam removal: The Boy Scouts of America, Buckeye Council, expressed support of removal of the dam at Willow Grove, and has expressed interest in providing property adjacent to the MFLBC for protection under a Conservation Easement.

  Response: The Trustees agree that removal of the dam at Willow Grove as part of Alternative B will result in significant improvements in water quality and ecological habitat both above and below the dam. In addition, the Trustees are willing to consider preserving portions of the MFLBC and associated habitat through Conservation Easements.

- Comment during the public meeting on protection of ground water: One individual expressed concern regarding protection of ground water resources during remedial activities.

  Response: The Trustees and U.S. EPA clarified during the public meeting that ground water protection is part of the US EPA approved remedy and not part of the NRD restoration. A component of the remedy is a containment system for the groundwater and long-term monitoring of the ground water to insure that the containment system is performing as it should.

SECTION 8

2016 TRUSTEE TEAM:

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Ohio Environmental Protection Agency Approval of the Final Natural Resource Restoration Plan & Environmental Assessment for the Nease Chemical Assessment Area

Approved:

Craig W. Butler, Director
Ohio Environmental Protection Agency

Date

DECISION MEMORANDUM

FROM: Dan Everson, Field Supervisor, Ohio Ecological Services, Columbus, OH 614-416-8993

SUBJECT: Inform the Authorized Official for DOI and seek Final Resotration Plan approval and concurrence on the proposed settlement of the Natural Resource Damage claim with Rutgers Organics Corporation (ROC).

REGIONAL DIRECTOR'S DECISION

✓ APPROVE

____ DISAPPROVE

____ DISCUSS

DATE 6 / 30 / 16

THOMAS O. MELIUS

Charles M. Wooley
Acting Regional Director

APPENDIX A

INJURED ENVIRONMENTS/RESOURCES

APPENDIX A

INJURED ENVIRONMENTS/RESOURCES

The characteristics of the injured environments and resources identified or suspected in the Assessment Area are detailed below.

1. Biological Environment

1.1 *Habitat/Vegetation*

Mahoning County and the northern half of Columbiana County are in the Glaciated Appalachian (or Allegheny) Plateau. Natural systems including forests, bogs, old fields and water bodies have survived because of the physiography of the plateau. The southern half of Columbiana County lies in the Unglaciated Allegheny (or Appalachian) Plateau. The dominant forest types in Mahoning County are oak-hickory and elm-ash-red maple. Similarly, dominant forest types in Columbiana County are northern hardwoods and oak-hickory.

MFLBC originates upstream of the former Nease facility in Salem in Columbiana County, Ohio. The stream receives run-off from the facility via the Feeder Creek tributary system. From Salem, MFLBC flows north for about 5 miles into Mahoning County, then turns and flows eastward and then southward through Lisbon, Ohio in Columbiana County. MFLBC has a length of 40.6 river miles and an average slope of 11.8 feet per mile[2]. MFLBC eventually joins West Fork and other tributaries to form Little Beaver Creek. Little Beaver Creek flows into the Ohio River near East Liverpool, Ohio. Portions of the LBC basin (approximately 36 river miles) have been designated as a State Wild and Scenic River and a National Scenic River.

Aquatic habitat in MLFBC consists of a series of riffles and pools. Stream width ranges from approximately 4 to 8 meters above Lisbon Dam to 15 to 35 meters below the dam. Creek substrate ranges from bedrock outcrops and cobble-gravel-boulders in some areas, to sand, silt and clay in the forested and emergent wetlands. Wetland and riparian habitat in the MFLBC area include: forested wetlands, scrub/shrub wetlands, emergent wetlands, forested uplands, upland fields and agriculture/pasture, as well as developed habitat. [3]

Hydrogeologically, in the former Nease facility area, the glacial till materials are primarily composed of till, sand and minor lake clays. The primary bedrock units in this area are the Middle Kittaning Sandstone and Vanport Limestone/Putnam Hill Shale Zone. The two bedrock units are separated by the Washingtonville Shale.

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[2] Source: Total Maximum Daily Loads for the Little Beaver Creek Watershed, Ohio EPA, 2005. See: http://www.epa.state.oh.us/portals/35/tmdl/Little%20Beaver_final.pdf\

[3] Source for aquatic and riparian habitat descriptions: Nease Site April 2004 Final Endangerment Assessment

1.2 *Listed, Proposed, and Candidate Species*

The Assessment Area falls within range of the Indiana bat (*Myotis sodalis*), as well as the sheepnose (*Plethobasus cyphyus*) and snuffbox (*Epioblasma triguetra*) mussels, which are Federally-listed endangered species. An endangered species is any species that is in danger of extinction throughout all or a significant portion of its range. The Assessment Area is within the ranges of the northern long-eared bat (*Myotis septentrionalis) (*proposed listing*),*eastern massasauga rattlesnake (*Sistrurus catenatus catenatus*) (candidate species) and the eastern hellbender (*Crytpobranchus alleganiensis)* (species of concern). A proposed species is a species for which listing as endangered under the Endangered Species Act is under development; a candidate species is a species for which the USFWS has sufficient information on their biological status and threats to propose listing them as endangered or threatened under the Endangered Species Act, but for which development of a proposed listing regulation is precluded by other higher priority listing activities.

Since the **Indiana bat** (*Myotis sodalis*) was first listed as endangered in 1967, their population has declined by nearly 60%. Several factors have contributed to the decline of the Indiana bat, including the loss and degradation of suitable hibernacula, human disturbance during hibernation, pesticides, and the loss and degradation of forested habitat, particularly stands of large, mature trees. Fragmentation of forest habitat may also contribute to declines. Most recently white-nose syndrome (WNS), a novel fungal pathogen, has caused serious declines in the Indiana bat population in the northeastern U.S. WNS has also been documented in Ohio and declines of Indiana bats during winter censuses have been noted, but the full extent of the effects from WNS in Ohio are not yet known.

During winter, Indiana bats hibernate in caves and abandoned mines. Summer habitat requirements for the species are not well defined but the following are considered important:

1) Dead or live trees and snags with peeling or exfoliating bark, split tree trunk and/or branches, or cavities, which may be used as maternity roost areas.
2) Live trees (such as shagbark hickory and oaks) which have exfoliating bark.
3) Stream corridors, riparian areas, and upland woodlots which provide forage sites.

It appears that habitat exhibiting the characteristics described above may be present at the proposed project site. Should the proposed site contain trees or associated habitats exhibiting any of the characteristics listed above, we recommend that the habitat and surrounding trees be saved wherever possible. If <u>any</u> trees must be cut, they should only be cut between October 1 and March 31.

The **northern long-eared bat** (*Myotis septentrionalis*), is currently listed as endangered under the Endangered Species Act (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*). See, 81 Fed. Reg. (January 15, 2016). No critical habitat has been proposed

at this time. Recently WNS has caused serious declines in the northern long-eared bat population in the northeastern U.S. WNS has also been documented in Ohio, but the full extent of the impacts from WNS in Ohio is not yet known.

During winter, northern long-eared bats hibernate in caves and abandoned mines. Summer habitat requirements for the species are not well defined but the following are considered important:

1) Roosting habitat in dead or live trees and snags with cavities, peeling or exfoliating bark, split tree trunk and/or branches, which may be used as maternity roost areas.
2) Foraging habitat in upland and lowland woodlots and tree lined corridors.
3) Occasionally they may roost in structures like barns and sheds.

Pursuant to section 7(a)(4) of the ESA, federal action agencies are required to confer with the USFWS if their proposed action is likely to jeopardize the continued existence of the northern long-eared bat (50 CFR 402.10(a)). Nevertheless, species proposed for listing are not afforded protection under the ESA; however as soon as a listing becomes effective, the prohibition against jeopardizing its continued existence and "take" applies regardless of an action's stage of completion. If the federal agency retains any discretionary involvement or control over on-the-ground actions that may affect the species after listing, section 7 applies.

Since it appears that habitat exhibiting the characteristics described above may be present at the proposed project site, the Trustee Council recommends that trees exhibiting any of the characteristics listed above, as well as any wooded areas or tree lined corridors be saved wherever possible. If tree removal is unavoidable, we recommend that any tree removal occur between October 1 and March 31 to avoid impacts to northern long-eared bats.

The **sheepnose mussel** (*Plethobasus cyphyus*) is primarily known from larger streams. It typically occurs in shallow shoal habitats with moderate to swift currents over coarse sand and gravel. Habitats with sheepnose mussels may also have mud, cobble, and boulders. The sheepnose mussel occurs in swift currents of riffles and shoals over gravel and sand with occasional cobble and boulders.

The **eastern hellbender** (*Cryptobranchus a. alleganiensis*), is a salamander which conducts most of its respiration through its skin. In Ohio, most of its range is limited to the unglaciated areas of the state, where it inhabits perennial streams with large, flat rocks. Sedimentation is a major threat to this species, as sediment modifies stream habitat by increasing turbidity, increasing water temperature, and reducing the space between rocks. The eastern hellbender utilizes areas between rocks for refuge during high stream flows. In addition, these areas provide habitat for aquatic insects which provide food for immature individuals, as well as crayfish, which are an adult food source. Another threat to the hellbender is impoundment of streams. Dams reduce flow, increase sediment deposition, and create fragmentation of stream habitat by isolating

populations of aquatic organisms. Upstream of impoundments, the reduced flow creates areas of reduced dissolved oxygen which could harm hellbender eggs, adults, and prey.

Currently there is no systematic monitoring of the eastern hellbender, making it difficult to determine long-term trends in population and distribution. Recent surveys in Ohio have documented an approximately 80% decline in abundance since the 1980's and have detected very few juveniles, suggesting very limited recruitment. The USFWS is conducting a Candidate Assessment to determine if the eastern hellbender should be listed under the Endangered Species Act.

The **eastern massasauga rattlesnake** (*Sistrurus catenatus catenatus*) has been reduced to isolated populations. Several factors have contributed to the decline of the eastern massasauga including habitat loss and fragmentation, indiscriminate killing, collection, gene pool contamination and incompatible land use practices. Eastern massasaugas use both upland and wetland habitat and these habitats differ by season. During the winter, massasaugas hibernate in low wet areas, primarily in crayfish burrows, but may use other structures. Presence of a water table near the surface is important for a suitable hibernaculum. In the summer, massasaugas use drier, open areas that contain a mix of grasses and forbs such as goldenrods and other prairie plants that may be intermixed with trees or shrubs. Adjoining lowland and upland habitat with variable elevations between are critical for the species to travel back and forth seasonally.

The Federally-listed species discussed above are potentially present in the restoration area boundaries for both Alternative B and C.

In addition to Federally-listed, proposed and candidate species, there are State species of concern in the restoration area. Two State endangered plant species, prairie tick-foil and pale straw hedge have been identified in the area. In addition, there are nine State threatened and 14 State potentially threatened plant species. Three State endangered and three State special interest bird species have also been documented in the MFLBC corridor. A State endangered amphibian, the eastern hellbender, and a State special interest species, the wavy rayed lamp mussel (*Lampsilis fasiola*) have been documented in the MFLBC corridor.

1.3 *Other Fish and Wildlife Species*[4]

The Assessment Area is located on the Atlantic flyway (Figure 2) with numerous avian species using the area seasonally. These include, but are not limited to, the osprey *(Pandion haliaetus)*, wood duck *(Aix sponsa)*, Canada goose *(Branta canadensis)*, common merganser *(Mergus merganser)*, great blue heron *(Ardea herodias)*, mallard duck *(Anas platyrhynchus)*, mourning dove *(Zenaida macroura)*, northern harrier *(Circus cyaneus)*, sharp shinned hawk *(Accipiter striatus)*, Cooper's hawk (*Accipiter cooperii*), and kingfisher *(Ceryle alcyon)*. Numerous species of migratory neotropical songbirds inhabit the area seasonally.

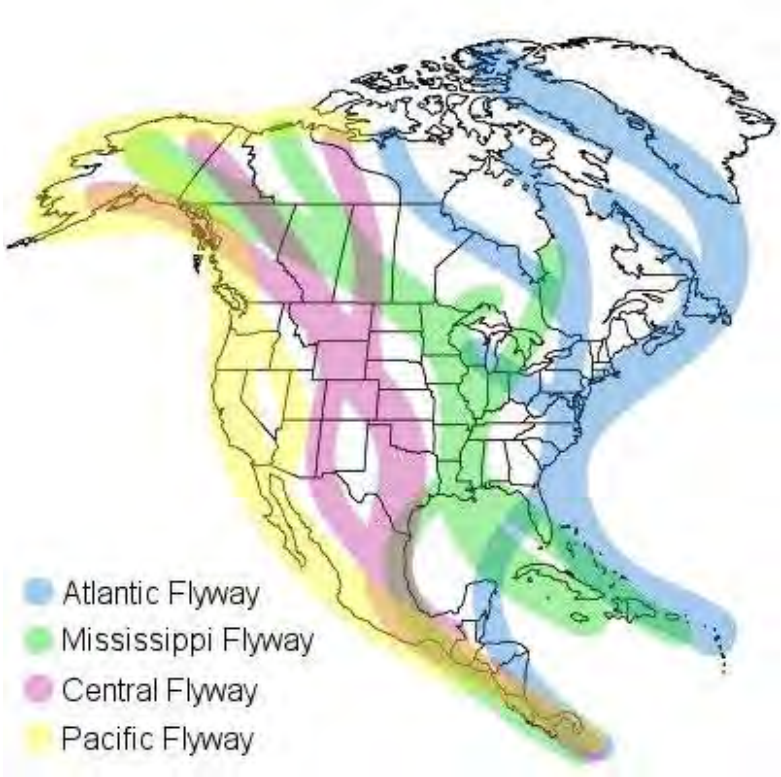
Smaller mammals observed in the area include Virginia opossum *(Didelphis virginiana)*, eastern cottontail rabbit *(Sylvilvagus floridanus)*, eastern chipmunk *(Tamias striatus)*, woodchuck *(Marmota monax)*, gray squirrel *(Sciurus carolensis)*, red fox *(Vulpes fulva)*, striped skunk *(Mephitis mephitis)*, beaver (*Castor Canadensis*), mink (*Mustela vision*), muskrat (*Ondatra zibethicus*) and raccoon *(Procyon lotor)*.

Amphibians observed in the area include the bullfrog (*Rana catesbeiana*), eastern American toad (*Bufo a. americanus*), green frog (*Rana clamitans melonata*), and spring peeper (*Pseudacris crucifer*). Reptiles observed include the common map turtle (*Graptemys geographica*), common snapping turtle (*Chelydra s. serpentina*), eastern garter snake (*Thamnophis s. sirtalis*), midland painted turtle (*Chrysemys picta marginata*), northern black racer (*Coluber c. constrictor*), northern brown snake (*Storeria d. dekayi*), northern water snake (*Nerodia s. sipedon*), and ribbon snake (*Thamnophis sauritis*).

Fish species found in MFLBC include, but are not necessarily limited to, white sucker (*Catostomus commersoni*), rainbow darter (*Etheostoma caeruleum*), Johnny darter (*Etheostoma nigrum*), green side darter *(Etheostoma blennioides)*, log perch (*Percina caprodes*), yellow perch (*Perca flavescens*), smallmouth bass (*Micropterus dolomieui*), white crappie (*Pomoxis annularis*), common carp (*Cyprinus carpio*), brown bullhead (*Ictalurus nebulosus*), freshwater drum (*Aplodinotus grunniens*), northern hogsucker *(Hypentelium nigricans)*, golden redhorse *(Moxostoma erythrurum)*, gizzard shad (*Dorosoma cepedianum*), pumpkinseed (*Lepomis gibbosus*), and stonecat madtom *(Noturus flavus).*

[4] A detailed list of all species associated with the Site is provided in the Nease site Remedial Investigation Report. See: http://www.epa.gov/region5/cleanup/nease/pdfs/remedial-invstig-report1996.pdf

Figure 2: North American Migration Flyways



2. Land Use

Land use in the area is primarily agricultural and residential, with some industrial development. The towns of Salem and Lisbon with populations[5] of 12,161 and 2,783, respectively, are the only significant urban centers in the restoration area. Although there is business and residential development along MFLBC in Salem and in Lisbon, there is still undeveloped land, including hydraulically connected wetland complexes within the MFLBC watershed.

3. Cultural Resources

Archaeological sites and other cultural resources will be identified prior to restoration and appropriate State and federal rules and regulations will be followed.

[5] Source for population(s): most recent statistics from City-Data.com

APPENDIX B

USFWS INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

Intra-Service Section 7 Biological Evaluation Form

Region 3

Originating Person: Deborah Millsap Date Submitted: 06/27/2013

Telephone Number: 614-416-8993 ext 14

For assistance with section 7 reviews, go to Region 3's Section 7 Technical Assistance website: http://www.fws.gov/midwest/endangered/section7/s7process/

I. Service Program and Geographic Area or Station Name:

U.S. Fish and Wildlife Service, Ohio Ecological Services Field Office, Columbus, OH

II. Location: Location of the project including County, State and TSR (township, section & range):

Nease Chemical NRDA site, Columbiana and Mahoning Counties, Little Beaver Creek Watershed, Ohio

III. Species/Critical Habitat: List federally-listed, proposed, and candidate species or designated or proposed critical habitat that may occur within the action area:

- Indiana bat (*Myotis sodalis*) E
- Northern long-eared bat (*Myotis septentrionalis*) PE
- Sheepnose mussel (*Plethobasus cyphyus*) E
- Snuffbox mussel (*Epioblasma triguetra*) E
- Eastern massasauga rattlesnake (*Sistrums catenatus catenatus*) C
- Eastern hellbender (*Crytpobranchus alleganiensis*) SC
- Bald eagle (*Haliaeetus leucocephalus*) SC

These species occur within Columbiana and Mahoning Counties but with the exception of the eastern Hellbender, have not been documented within the watershed. Limited forested habitat is present within the watershed and may provide habitat for the Indiana bat and the northern long-eared bat. Therefore this project will have no effect on these species other than the Indiana bat, northern long-eared bat, and the eastern hellbender.

IV. Project Description: Describe the proposed project or action, including all conservation elements. If referencing other documents, prepare an executive summary. Include map and photos of site, if possible. (Attach additional pages as needed):

This is a settlement of claims brought by U.S. FWS and Ohio EPA for injuries to natural resources in and around the Nease Chemical facility resulting from

unpermitted releases of hazardous substances. The project will consist of acquisition, restoration, and protection of riparian and wetland habitat in the Little Beaver Creek watershed, including the removal of a lowhead dam located on the Middle Fork Little Beaver Creek. A limited number of trees may need to be removal to conduct dam removal. Impacts to potential roost tress will be avoided. Properties will be acquired from willing sellers and transferred to local public entities. Restoration will include controlling exotic species, planting native species, and restoring hydraulic connections of historically connected streams and wetlands with the Little Beaver Creek. All acquired properties will be protected by Environmental Covenants. Specific project plans are not available at this time.

V. Determination of Effects:

A. Description of Effects: Describe how the action(s) will affect the species and critical habitats listed in item III, including how Part IV conservation elements benefit or avoid adverse effects. Your rationale for the Section 7 determinations made below (VB.) should be fully described here.

Wetland, riparian, and aquatic habitat preservation would most likely benefit the eastern hellbender which is found within the Middle Beaver Creek watershed.

Projects implemented through the Restoration Plan and Environmental Assessment are not likely to adversely affect federally listed species and critical habitat and are not likely to jeopardize candidate species because:

1. No listed species have been documented to occur within the watershed,
2. Potential roost trees will be avoided,
3. For the eastern hellbender, a species of concern which occurs within the watershed there will be coordination with the U.S. Fish and Wildlife Service prior to implementing any on-the-ground work,
4. An extensive survey for the eastern hellbender was conducted by the U.S. Fish and Wildlife Service and no individuals were found.
5. Avoidance measures will be implemented to eliminate any potential adverse effects,
6. If the restoration plan is changed or avoidance measures cannot be adhered to for a particular project, the U.S. Fish and Wildlife Service will be coordinated with prior to conducting further work.

For assistance with making appropriate Section 7 determinations, go to Region 3's Section 7 Technical Assistance website: http://www.fws.gov/midwest/endangered/section7/s7process/Determination

No Effect: This determination is appropriate when the proposed project will not directly or indirectly affect (neither negatively nor beneficially) individuals of listed/proposed/candidate species or designated/proposed critical habitat of such species. No concurrence from ESFO required. — X

- Sheepnose mussel (*Plethobasus cyphyus*) E
- Snuffbox mussel (*Epioblasma triguetra*) E
- Eastern Massasauga rattlesnake (*Sistrums catenatus catenatus*) C
- Bald eagle (*Haliaeetus leucocephalus*) SC

May Affect but Not Likely to Adversely Affect: This determination is appropriate when the proposed project is likely to cause insignificant, discountable, or wholly beneficial effects to individuals and designated critical habitat. Concurrence from ESFO required. — X

- Indiana Bat (*Myotis sodalis*) E
- Northern long-eared bat (*Myotis septentrionalis*) PE
- Eastern hellbender (*Crytpobranchus alleganiensis*) SC

May Affect and Likely to Adversely Affect: This determination is appropriate when the proposed project is likely to adversely impact individuals of listed species or designated critical habitat of such species. Concurrence from ESFO required. — _____

Not Likely to Jeopardize candidate or proposed species/critical habitat: This determination is appropriate when the proposed project is not expected to jeopardize the continued existence of a species proposed for listing or a candidate species, or adversely modify an area proposed for designation as critical habitat. Concurrence from ESFO required. — _____

Likely to Jeopardize candidate or proposed species/critical habitat: This determination is appropriate when the proposed project is reasonably expected to jeopardize the continued existence of a species proposed for listing or a candidate species, or adversely modify an area proposed for designation as critical habitat. Concurrence from ESFO required. — _____

Reviewing Ecological Services Office Evaluation (check all that apply):

A. **Concurrence** X **Nonconcurrence**
Explanation for nonconcurrence:

B. Formal consultation required _____ List species or critical habitat unit

C. Conference required _____ List species or critical habitat

Name of Reviewing ES Office Columbus Ohio Field Office
Columbus Ohio Field Office

Signature Jennifer L Pinkera Date 6/27/2013

Signature [Supervisor at originating station] 6-27-13

APPENDIX C

U.S. Department of the Interior Approval
Environmental Action Statement and Finding of No Significant Impact

FINDING OF NO SIGNIFICANT IMPACT

Restoration Plan and Environmental Assessment for the Nease Chemical Assessment Area, Salem, Columbiana County, Ohio

The U.S. Fish and Wildlife Service (the "Service"), representing the U.S. Department of the Interior (DOI), is a cooperating agency pursuant to the National Environmental Policy Act (NEPA) for the final Restoration Plan and Environmental Assessment (RP/EA) for the Nease Chemical Assessment Area Natural Resource Damage Assessment (NRDA) . The Service and the Ohio Environmental Protection Agency (Ohio EPA) propose to implement restoration to benefit natural resources injured by the release of hazardous substances into and near the Little Beaver Creek (LBC) and the Middle Fork of Little Beaver Creek (MFLBC). The Service and Ohio EPA (the "Trustees") initiated an NRDA to assess damages under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), for natural resource injuries resulting from exposure to hazardous substances, primarily, mirex.

The release of hazardous substances injured natural resources under the trusteeship of the Service and Ohio EPA, including but not limited to, ground and surface water, migratory birds, fish, and their supporting ecosystems. The recovered natural resource damages compensate for these injuries to trust resources at and near LBC and MFLBC. Compensation will include preserving, rehabilitating, replacing, and acquiring equivalent natural resources at various locations within the LBC and MFLBC watershed depending upon the availability and participation of willing landowners.

Under CERCLA, damages recovered from parties responsible for natural resource injuries are used to "restore, replace, rehabilitate and/or acquire the equivalent of the injured natural resources. *See*, 42 U.S.C. 9607(f)(1). Any funds used by the Federal Trustee (DOI) to implement restoration activities are subject to the requirements of NEPA , 42 U.S.C. 4321. Accordingly, the Trustees developed the RP/EA to identify restoration alternatives that address the resources injured and ecosystem services lost due to the release of hazardous substances, and to analyze the effects of those alternatives on the human environment. The RP/EA lists and describes three alternatives. The preferred alternative consists of preservation of wetlands, riparian corridors, adjacent uplands, and restoration of wetland habitat. In addition, the removal of the low head Lisbon Dam will improve water quality in the stream and improve aquatic habitat for fish and macroinvertebrates above and below the dam.

The acquisition and/or preservation of selected sites is an essential first step in meeting the Trustees' restoration goals. Selection of potential properties will be determined by participation of willing landowners. These actions will compensate for injuries to natural resources by preserving aquatic, wetland, riparian and upland habitat for affected natural resources including migratory birds and fish.

DETERMINATION

Based upon an environmental review and evaluation of the Final Restoration Plan and Environmental Assessment for the Nease Chemical Assessment Area NRDA, I have determined that restoring, rehabilitating, replacing and/or acquiring the equivalent of injured resources within the natural resource damage assessment area as described under Alternative B in the Final RP/EA for the Nease Chemical Assessment Area is not a major Federal action which would significantly affect the quality of human environment within the meaning of Section 102(2)(c) of the National Environmental Policy Act of 1969,. Accordingly, an Environmental Impact Statement will not be prepared.

Reasons:

1 A number of federally listed threatened or endangered and candidate species would receive further protection and benefit through wetland, associated upland and aquatic habitat preservation and improvement. Specific restoration projects will be evaluated for impacts to federally listed species under section 7 of the Endangered Species act prior to implementation. Protective measures (Appendix A), which should provide for no adverse effects, would be taken during implementation of all projects.

2 Implementation of the proposed action may result in minimal short-term impacts to habitat due to removal of the Lisbon dam and physical manipulation needed to restore and enhance ecological systems. These projects would also protect and improve the quality of natural resources by improving water quality in the stream(s) and improving aquatic habitat. All necessary permits will be obtained and regulations, policies and laws followed.

3 During preparation of the Restoration Work Plan for the removal of the Lisbon dam, the Field Supervisor, Columbus Ecological Field Office and the contractor for the Responsible Party, will initiate consultation with the Ohio State Historic Preservation Officer and, with the assistance of the FWS Regional Historic Preservation Officer, will complete the Section 106 process as described in 36 Code of Federal Regulations Part 800. (Section 6.1)

4 Preservation of habitats through acquisition of land, Environmental Covenants, or Conservation Easements will only be from willing sellers or participants. Neighbors adjacent to land purchased for preservation under this restoration will retain all of their current rights to their land. Since habitat preservation would be through fee title or easements with willing sellers who would be paid fair market value, acquisition procedures would have little or no impact on the market price, or on landowners who choose not to sell.

5 A Notice of Availability was published in the local media outlets. Copies of the RP/EA were available for review at the offices of the Ohio Environmental Protection Agency (OEPA), Twinsburg, Ohio. The Restoration Plan and EA were available on the OEPA website. Comments were accepted from March 5 through April 9, 2015. A public

meeting was held on April 7, 2015 in Lisbon, Ohio. The Trustees gave a presentation on the restoration alternatives, and a formal question and answer period followed. Six written comments were considered during and after the comment period and have been addressed in the Final RP/EA. The public comments received did not identify any significant environmental issues or impacts. No written comments were received that required substantive modification of the RP/EA, and comments received indicate an acceptance and approval of the proposed action. As indicated in the RP/EA, the proposed alternative will have no or inconsequential effects on social, economic, recreational, biological, and cultural resources. Conversely, over the long term, restoration projects are expected to benefit trust resources.

Supporting References:

1. Natural Resource Restoration Plan and Environment Assessment for the Nease Chemical Assessment Area
2. Section 7 Endangered Species Consultation (Appendix B of Restoration Plan and EA)
3. Public Comments (Section 7 of Restoration Plan and Environmental Assessment for the Nease Chemical Assessment Area)

ACTING Regional Director, FWS, Region 3

Date: 5/16/16

UNITED STATES FISH & WILDLIFE SERVICE

ENVIRONMENTAL ACTION STATEMENT

Within the spirit and intent of the Council of Environmental Quality's regulations for implementing the National Environmental Policy Act (NEPA) and other statutes, orders, and policies that protect fish and wildlife resources, the Trustees have established the following administrative record and have determined that the action of (describe action):

____ is a categorical exclusion as provided by 516 DM 6, Appendix 1 and 516 DM 2, Appendix 1. No further documentation will therefore be made.

__X__ is found not to have significant environmental effects as determined by the attached Environmental Assessment and Finding of No Significant Impact.

____ is found to have significant effects, and therefore further consideration of this action will require a notice of intent to be published in the Federal Register announcing the decision to prepare an EIS.

____ is not approved because of unacceptable environmental damage, or violation of Fish and Wildlife Service mandates, policy, regulations, or procedures.

____ is an emergency action within the context of 40 CFR 1506.11. Only those actions necessary to control the immediate impacts of the emergency will be taken. Other related actions remain subject to NEPA review.

Other supporting documents (list):

__✓__ Environmental Assessment and FONSI

__✓__ Public comments

5-3-2016
Initiator Date

5/16/16
ARD Date

ACTING RD 5/16/16
Date

Charles M. Wooley
Acting Regional Director

APPENDIX D

PUBLIC COMMENTS ON THE DRAFT RP/EA AND TRANSCRIPT OF THE APRIL 9, 2015 PUBLIC MEETING

LIST OF PUBLIC COMENTATORS

BOY SCOUTS OF AMERICA (David Truax, Scout Executive)

COLUMBIANA COUNTY PARK DISTRICT (Dorothea Betz, Chair)

COLUMBIANA COUNTY PARK DISTRICT (Michael West, Co-Chair)

GOLDER ASSOCIATES, INC. (On behalf of Rütgers Organics Corporation)

LITTLE BEAVER CREEK WILD and SCENIC RIVER ADVISORY COUNCIL (Bradley Bosley, Chair)

Ms. SHEILA JACKSON (Local resident)

AT PUBLIC MEETING: Mr. JIM GREENAMEYER (See Public Meeting Transcript)

BOY SCOUTS OF AMERICA
BUCKEYE COUNCIL

April 14, 2015

Sheila Abraham
Project Coordinator
Ohio Environmental Protection Agency
Northeast District Office
2110 East Aurora Road
Twinsburg, Ohio 44087

Dear Ms. Abraham

I am writing to provide comment to the Draft Natural Resources Restoration Plan & Environmental Assessment for the Nease Chemical Assessment Area which was published on March 5, 2015 and the source for the public meeting I was invited to attend this past week.

Thank you for providing an opportunity to hear a brief overview of the Draft Natural Resources Restoration Plan & Environmental Assessment for the Nease Chemical Assessment Area at the Salem Library. It was very beneficial to me.

I have since downloaded and reviewed the draft. While the Scout council does not have the expertise to properly evaluate all aspects of this plan we are excited to hear about the potential outcomes of the plan if enacted:

> First and foremost the removal of the dam just south of our Camp McKinley property near Lisbon sounds like a great idea if it will improve/restore the fish population. We believe too that this will provide for better stream management practices and will improve the recreation potential for the stream for our Scouts.
>
> Second, we are very interested in the potential for a Conservation Easement for this property that has one mile of this stream within it's boundaries. The Boy Scouts of America have long been a proponent of making lands available for outdoor education and recreation and the ability of a conservation easement will help us to ensure this for future generations.

If I can provide any additional information or you need any assistance with this for our property please contact me.

Sincerely

David Truax
Scout Executive

From: Dorothea Betz
Sent: Friday, April 17, 2015 8:35 AM
To: Abraham, Sheila
Subject: Nease NRD: Draft Restoration Plan

Sheila,

The Columbiana County Park District is very interested in the Nease Restoration Plan. It is the opinion of the Park District that the 5.2 Alternative B plan would be to our satisfaction. Restoration of this area or enhancing the riparian corridor is of the utmost importance.

We greatly appreciate the efforts of the EPA with regards to this issue.

Yours truly,
Dorothea Betz, Chairwoman
Columbiana County Park District
130 Maple Street
Lisbon, OH 44432
[Personal cell number redacted]

From: Michael West
Sent: Friday, April 17, 2015 9:23 AM
To: Abraham, Sheila
Subject: Public Comment

Sheila ,
Please note that the Columbiana County Park Board have endorsed Alternative B . Our four members Chairman Dottie Betz , Tom Butch ,Eileen Dray- Barton and myself Vice-chairman Michael West have determined that the Natural Resources Based Restoration in the MFLBC and/ or Little Beaver Creek Watershed would benefit the resource and the community.
Michael West , Vice- Chairman Columbiana County Park District

Golder Associates

April 17, 2015 Project No. 933-6154.005

Sheila Abraham
Ohio EPA
Northeast District Office
2210 East Aurora Road
Twinsburg, OH 44087

RE: NATURAL RESOURCE RESTORATION PLAN & ENVIRONMENTAL ASSESSMENT NEASE CHEMICAL ASSESSMENT AREA, OHIO

Dear Sheila

On behalf of RÜTGERS Organics Corporation, (ROC) this letter provides comments on the Draft Natural Resource Restoration Plan & Environmental Assessment (RP/EA) for the Nease Chemical Assessment Area dated March 5, 2015, prepared by Ohio EPA and U.S. Fish and Wildlife Service (collectively "Trustees").

1. We support the Trustee's preferred alternative (Alternative B) as detailed in the draft Consent Decree that has been negotiated between ROC and the Trustees. As you know, the Consent Decree scope emphasizes certain elements of the preferred alternative, for example:

    a. Restoration projects will focus on the Lisbon Dam removal and on conservation of habitats, rather than enhancement.

    b. Increased recreational and/or educational opportunities associated with restoration projects are not a major focus.

    c. Land will be conserved via easements or covenants that limit use, rather than acquisition of property, and so the references in the RP/EA to fair market value are not applicable.

2. We believe that the Trustee's Environmental Assessment (included in the RP/EA) is adequate to support a Finding of No Significant Impact under NEPA, and therefore an Environmental Impact Statement is not required.

Thank you for the opportunity to submit comments and we look forward to the finalization of the RP/EA and execution of the Consent Decree so that restoration work may proceed.

Sincerely,

GOLDER ASSOCIATES INC.

P. Stephen Finn, C. Eng.
Principal

cc: Deborah Millsap, USFWS
Rainer Domalski, ROC
Heidi Goldstein, Thompson Hine

PSF/kt

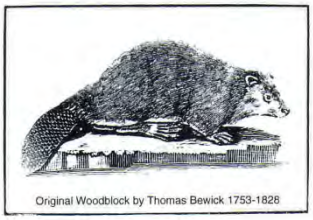
Golder Associates Inc.
200 Century Parkway, Suite C
Mt. Laurel, NJ 08054 USA
Tel: (856) 793-2005 Fax: (856) 793-2006 www.golder.com

Little Beaver Creek Wild and Scenic River Advisory Council

50900 Pancake Clarkson Rd.
Negley, Ohio 44441

Bradley R. Bosley, Chairman
Home Telephone: (330) 227-2432
email: brbosley@gmx.com

Rex Underwood, Vice Chairman
Home Telephone: (330) 870-4043
email: rexford64@neo.rr.com



Date: April 17, 2015

re: Ohio EPA – public comment submittal *(page 1/2)*
Draft Natural Resource Restoration Plan & Environmental Assessment
for the Nease Chemical Assessment Area

Sheila Abraham
Ohio EPA, NE District Office
2110 East Aurora Road
Twinsburg, OH 44087

The Little Beaver Creek Wild & Scenic Advisory Council would like to address the "Trustees" of the previously mentioned draft plan for the Middle Fork of Little Beaver and/or Little Beaver Creek Watershed.

Section 4 – Restoration Alternatives

4.2 Alternate B: Natural Resource Based Restoration in the MFLBC and/or Little Beaver Creek Watersheds (Preferred Alternative)

The council would like to issue a public comment that we are in support of Alternative "B" as the preferred option to protecting and/or restoring the MFLBC as is noted in the draft plan and is also the preferred alternative of the "Trustees" as stated in Section 4.5.

Alternate A which is No Action and Alternate C is for Natural Resource Based Restoration outside the MFLBC/Little Beaver Creek Watershed according to Section 4.6 Summary of Alternative Actions, Table -1 are not considered as a viable option by the Advisory Council.

It is in the opinion of the advisory council that the actions to restore, rehabilitate, improve, protect, and enhancement actions to the MFLBC or the Little Beaver Creek Watershed would be the best alternative for the interests of the general public affected by the actions of the PRP. Other actions to protect Little Beaver Creek such as land acquisition/easements along the MFLBC would hopefully provide the general public the option to use and enjoy what Little Beaver Creek has to offer. We fully support the efforts to include any low-head dam removal along the navigable waters in the restoration efforts or proposed actions to help improve the habitat of the stream's ecosystem and natural areas.

re: Ohio EPA – public comment submittal *(page 2/2)*
Draft Natural Resource Restoration Plan & Environmental Assessment
for the Nease Chemical Assessment Area

Note: One effort by the North Country Trail Association here in Columbiana County has been to use the MFLBC corridor as the main route for this National Hiking Trail. The MFLBC was included in the NCTA study, which was approved in 1997, as the best route for the trail and to show hikers the beauty of Little Beaver Creek. Any easements or voluntary land acquisitions along the MFLBC acquired through the proposed preferred Alternate "B" would greatly help with completing sections of the NCT if it is in the scope of the plan to be used for such purpose. The State of Ohio has a trail-way plan for such use and is to benefit the public for providing access to hiking trails and could be the public entity to hold the easements and/or land acquisitions. Although this potential use of the corridor along the MFLBC for trails should be considered as a viable option that would benefit the general public.

In conclusion the LBCWSR Advisory Council supports Alternative "B" as the preferred choice for the Restoration Alternatives to be implemented for the Nease Chemical Assessment Area by the EPA and or "Trustees"

Sincerely,

Bradley R. Bosley - Chairman
Little Beaver Creek Advisory Council

cc: Mathew J. Smith
NE Ohio Scenic River Manager

File: docments/scenicriver/ epacomments

From: Sheila Jackson
Sent: Thursday, April 16, 2015 9:41 PM
To: Abraham, Sheila
Subject: Nease/Willow Grove dam

Ms. Abraham:

Please remove the dam at Willow Grove in Lisbon.

As a woman who loves fly-fishing, we need fish upsteam. There are spots for fish to hide upstream from the dam, sure, but why restrict their travel to only the southern part of the county? I live in Winona and work in Lisbon. I travel Eagleton road every week day. I go right past a large pool near the covered bridge. Often in the summer, there are spin casters sitting on the shore fishing. Only a couple, as there isn't the supply of fish that there could be. Not to mention the health of the waterlife. It would be a good thing to have access to prime fishing in my own back yard so to speak. My son (Vice President of the Buckeye United Fly Fishers), my brother and I trek to Pennsylvania to catch trout. We have a gem right here. We fish catch and release, in the interest of increasing population of the fish we have.
I also need to mention I caught (and released) a nice bass just south of the dam. He could have been upstream in one of those pools. But it was fun.

We need education about our steams and how to protect them; access to them through parking and parks; and good environmental techniques education.

I appreciate the opportunity to give input and your willingness to act.

Sincerely,

Sheila Jackson
[Personal contact information redacted]

APRIL 9, 2015 PUBLIC MEETING COMMENTS: TRANSCRIPT

OHIO ENVIRONMENTAL PROTECTION AGENCY
PUBLIC HEARING

In Re:

Nease Chemical Site
Draft Natural Resource
Restoration Plan
Acceptance of Public Comments

Transcript of proceedings before the Ohio Environmental Protection Agency, taken at Salem Public Library, 821 E. State Street, Salem, Ohio 44060 on Thursday, April 9, 2015, commencing at 7:02 p.m.

APPEARANCES:

Mike Settles, Ohio EPA Public Involvement Center

Sheila Abraham, Ohio EPA Project Coordinator

Bill Zawiski, Ohio EPA Division of Surface Water

Dion Novak, US EPA Remedial Project Manager

Deborah Millsap, Natural Resource Damages, U.S. Fish and Wildlife Service

- - -

PROCEEDINGS

MR. SETTLES: Ohio EPA and the U.S. Fish and Wildlife Service, which are the Natural Research Trustees for the Nease Site, welcome you to this evening's meeting concerning the draft natural resource restoration plan and environmental assessment for the Nease Chemical Site. The trustees are accepting public comments concerning the draft plan and will consider all comments prior to finalizing the plan.

You may present oral and written comments tonight or you may submit written comments through April 17, 2015. Comments may be mailed to one of two people. The first is Sheila Abraham, Ohio EPA, 2110 East Aurora Road, Twinsburg, Ohio 44087 or sheila.abraham@epa.ohio.gov. The second person is Deborah Millsap, U.S. Fish and Wildlife Service, 4625 Morse Road, Suite 104, Columbus, Ohio 43230 or deborah.millsap@fws.gov.

The mail and email addresses for both ladies are on the agenda at the back of the table.

Comments submitted by April 17, 2015, will become part of the official public comment record for this proceeding. Comments submitted after the 17th may be considered as time and circumstances permit.

If you have brought along written copy of any comment you want to present tonight, it is helpful if you can provide it to our court reporter here with us.

I asked that you try to limit your comments around five minutes or so and if you can't complete your comments during those five minutes, you can submit any additional comments in writing by the 17th.

Having said that, is there anyone this evening that would like to get some comments on the record?

MS. ~~ABRAHAM~~ MILLSAP: I need to make a correction.

MR. SETTLES: Did I mess up your address?

MS. ~~ABRAHAM~~ MILLSAP: Yes.

MR. SETTLES: Can you correct it, Deborah?

MS. MILLSAP: It's Deborah_Millsap

instead of dot.

MR. SETTLES: Thank you. Deborah, that it did I have it wrong on the agenda, also?

MS. MILLSAP: Yes.

MS. ABRAHAM: I'm sorry. I should have looked at that. I missed it too.

MS. MILLSAP: Deborah_Millsap@fws.gov.

MR. SETTLES: Everybody got that? If you want to submit the comments it can go to one or the other. It doesn't have to go to both but, I apologize for the underscore error.

Anyone want to put comments on the record tonight? Come on up.

MR. GREENAMYER: I'm not much of a speaker.

MR. SETTLES: That's okay. We just want to make sure we get everything on the record. So if you could just state your name and spell it for us, that would be fine.

MR. GREENAMYER: My name is Jim Greenamyer, G-r-e-e-n-a-m-y-e-r. I have property an eighth mile south of the Nease

Chemical Site. My question -- I listened to creek deal, taking out the dam, restoring the water. The second part of that, I believe, is to dredge the sediment from the creek and bring it back to the Nease Chemical Site and bury it there and cultivate it and I'm not sure of what all the process is. He said something about the second part of the process was Rutger tests to do, whatever they're going to do with that.

I guess my question is if you're going to bring the sediment back up, is there anything that is going to take place to check or protect the groundwater, well water of the areas around the Nease Chemical? I know Mr. ~~Flacker~~ SLANKER (sic) he's got a well over there and I've got a well right there and I believe I asked you a year-and-a-half ago to see if we could get it tested for mirex and you said the answer was no. I don't know why. I live an eight of a mile downhill. I grew up there. I grew up when Nease Chemical was producing. I'm very familiar.

I just want to know if there's any provisions for checking well water and

groundwater in the immediate area of the Nease Plant.

MR. SETTLES: Thank you.

MR. GREENAMYER: Thank you.

MR. SETTLES: Sheila, is this something we want to address tonight or you want to look into it and respond in writing at some point.

MS. ABRAHAM: I can talk about it. Mr. Greenamyer, I do remember your call and Steve actually has some discussions about it.

I looked at the area where your home and your well is. Let me backup. There will be controls in place at Nease. There will be monitoring of the groundwater at the Nease Site as part of the remedy, not as part of the natural resource restoration, as part of the remedy. The sediment that is coming, is going to be excavated and brought back to the site as part of that.

Speaking specifically to mirex, we have really not found mirex beyond the confines of the Nease facility in anybody's ground water wells. We've been sampling the wells closest to the facility and have not

found mirex in those wells. We have found chlorinated solvents but not in drinking water wells because that is the major contaminant that's at the Nease facility. But there will be protections in place to ensure that anything that happens at the Nease facility as part of the remedy is monitored through a site-wide groundwater plan and we have already seen to that.

MR. NOVAK: One of the components of the site remedy is to contain the groundwater and then to monitor it to make sure it remains contained. So that's one of the things that will be done as part of the remedy. One of the things that we built as part of the remedy is that groundwater contaminant around the site itself. And then there will be long-term monitoring of the groundwater, again, to monitor the performance of that containment system.

MR. SETTLES: Thanks Dion.

Thank you for your question.

Any other comments for the record tonight? Going once. If not, we will conclude the meeting. Again, the place to

State of Ohio,)
) SS:
County of Cuyahoga.)

C E R T I F I C A T E

This certifies that the foregoing is a true and correct transcript of the proceedings had before the State of Ohio, Environmental Protection Agency, at the Salem Public Library, 821 E. State Street, Salem, Ohio 44460, on Thursday, April 9, 2015, commencing at 7:00 p.m.

In Re:

Nease Chemical Site
Draft Natural Resource Restoration Plan
Acceptance of Public Comments

COURT REPORTER

FINCUN-MANCINI COURT REPORTERS
1801 East Ninth Street
Suite 1720
Cleveland, Ohio 44114
(216) 696-2272
(216) 696-2275 FAX

send your comments after tonight is on the agenda and keep in mind Deborah's email address is underscore, not dot and you should be in good shape.

I want to thank you guys for coming out tonight on kind of a rough evening but it's good to get this update and please feel free to stay in touch with any of us as things move forward. Thank you.

(Meeting concluded at 7:10 p.m.)

- - -

United States v. Rutgers Organics Corporation (N.D. Ohio)

Consent Decree
Appendix E

Remedial Statement of Work

STATEMENT OF WORK FOR THE REMEDIAL DESIGN, REMEDIAL ACTION, AND IMPLEMENTATION OF OPERATION AND MAINTENANCE AT THE NEASE CHEMICAL SITE COLUMBIANA AND MAHONING COUNTIES, OHIO

I. PURPOSE

The purpose of this Remedial Statement of Work (Remedial SOW) is to set forth requirements for implementation of the remedial actions set forth in the Record of Decision (ROD) for Operable Unit 2 (OU 2), which was signed by the Regional Administrator of EPA Region 5 on September 29, 2005, and for implementation of the remedial actions set forth in the ROD for Operable Unit 3 (OU 3), which was signed by the Regional Administrator of EPA Region 5 on September 24, 2008, and the Explanation of Significant Differences (ESD) for OU 2, issued by EPA Region 5 on August 26, 2011, for the Nease Chemical Site (Site). The Settling Defendant shall follow: the OU 2 and OU 3 RODs; the OU 2 ESD; this Remedial SOW; the Final OU 2 Remedial Design (RD), the Final OU 3 RD; the OU 2 Remedial Action Work Plan; the OU 3 Remedial Action Work Plan; EPA Superfund Remedial Design and Remedial Action Guidance; and any additional guidance provided by EPA in submitting deliverables for designing and implementing the remedial actions at the Site.

II. DESCRIPTION OF THE REMEDIAL ACTION/PERFORMANCE STANDARDS

The Settling Defendant shall design and implement the RAs to meet the performance standards and specifications set forth in the OU 2 ROD, the OU 3 ROD, the OU 2 ESD, this Remedial SOW, the Final OU 2 RD, the Final OU 3 RD, the OU 2 Remedial Action Work Plan, and the OU 3 Remedial Action Work Plan. Performance standards shall include cleanup standards, standards of control, quality criteria and other substantive requirements, criteria or limitations including all Applicable or Relevant and Appropriate Requirements (ARARs) set forth in the OU 2 ROD, the OU 3 ROD, the OU 2 ESD, this Remedial SOW, and the Consent Decree.

A. Operable Unit 2

1. Site Security

Settling Defendant shall install and maintain a fence at the Site as specified in the Final OU 2 RD to prevent access and vandalism to the Site and any remedy components. Fencing of the Site shall consist of a chain link fence around the perimeter that is a minimum of six feet high with a minimum of three strand barbed wire. Warning signs shall be posted at 200 foot intervals along the fence and at all gates. The warning signs shall advise that the area is a Superfund site that is being cleaned up with oversight from USEPA and Ohio EPA. The signs shall also provide a telephone number to call for further information. The fence shall be completed by the time of the pre-final inspection.

2. Construction, Installation, and Operation of a Containment System for Remedial Action

a. Soil Cover

The Settling Defendant shall construct and maintain a soil and impermeable geosynthetic membrane cover in accordance with the OU 2 ROD, the OU 2 ESD, and the Final OU 2 RD. All surface soil at the facility exceeding the mirex remediation goal of 1 mg/kg, and former waste Ponds 3, 4, and 7 will be contained using either an impermeable geosynthetic membrane covered with clean soil, or only clean soil as specified by the Final OU 2 RD. In addition, soil delineation for mirex was completed as part of the Pre-Design Investigation (PDI) work done in accordance with the OU 2 RD AOC. This soil delineation identified the extent of surficial mirex above the mirex remediation goal established in the OU 2 ROD to be more extensive than originally known at the time of the OU 2 ROD. As specified in the OU 2 ESD, the remedy was modified to provide for the enlargement of the clean soil cover over surficial mirex contamination exceeding the remediation goal near the former production area, and will be constructed in accordance with the Final OU 2 RD.

The goals of the combined cap (i.e., the impermeable geosynthetic membrane cover and the soil cap) are to prevent direct contact and to reduce rainwater infiltration, which will limit the volume of shallow groundwater to be treated. The goal of the soil-only cap is to prevent direct contact. In addition, as discussed more fully in Section II.B below, mirex-contaminated sediment and floodplain soil removed under OU 3 will be consolidated under the impermeable geosynthetic membrane cover. After consolidation of all OU 3 materials, the Settling Defendant shall complete construction of the cover and plant vegetation in accordance with the Final OU 2 RD.

The Settling Defendant shall conduct routine maintenance of the soil cover system as part of the long-term requirements to be established in the OU 2 Remedial Operation and Maintenance (O&M) Plan.

b. Surface Water Management

The Settling Defendant shall implement a facility-wide surface water management system in accordance with the OU 2 ROD and the Final OU 2 RD to provide for the effective control of surface water runoff and to minimize future erosion of the soil cover and uncovered areas. The facility-wide surface water management system shall include:

- A grading plan that integrates the final surface topography in the remedial areas into the surrounding areas.

- Use of proper slopes, berms, channels, etc., and surface armoring using natural vegetation and/or other materials to effectively convey surface water runoff from the covered areas and provide erosion protection.

- A program of regular inspection, maintenance and repair to be established in the OU 2 Remedial O&M Plan.

3. Construction, Installation and Operation of a Treatment System for Remedial Action

a. Groundwater Restoration System (Throughout the Plume)

The Settling Defendant shall install a multi-part groundwater collection, treatment, and monitoring system to restore groundwater to performance standards in accordance with the Final OU 2 RD, the OU 2 ROD, and the OU 2 ESD. The Settling Defendant shall operate and/or monitor the groundwater collection and treatment system until the groundwater performance standards are met throughout the shallow eastern and southern/southeastern contaminated plumes and deep groundwater. The groundwater performance standards are specified as the remediation goals in Section 8.1.1 of the OU 2 ROD, which include: (i) the federal and state Maximum Contaminant Levels (MCLs) specified in Table 6 of the OU 2 ROD; and (2) an evaluation of the cumulative residual risk posed by mixtures of constituents in accordance with Section 8.1.1 of the OU 2 ROD. The cumulative residual risk assessment shall be conducted and submitted for EPA review and approval upon demonstration of achievement of the federal and state MCLs throughout the contaminated plumes.

The Settling Defendant shall install, operate and monitor:

- Shallow (overburden) groundwater – the eastern shallow groundwater contamination plume will be captured in a new collection trench and pumped above ground (extracted) for on-site treatment, or in-situ treatment through a series of cells in the trench that may consist of reactive iron, biotreatment, and carbon, in accordance with the Final OU 2 RD and the OU 2 ROD. The OU 2 ESD expands the remedy for the eastern plume to the southern/southeastern plume, and includes the same design options as the remedy for the eastern plume -- either collection and above-ground treatment or in-situ treatment (i.e. additional NZVI injection points, a shallow groundwater interceptor trench along the southern/southeastern property boundary, and/or installation of a reactive barrier along the southern/southeastern property boundary). The final option will be chosen in the Final OU 2 RD. If above-ground treatment is ultimately selected, Settling Defendant shall pump the extracted groundwater to the on-site groundwater treatment system for removal of chemicals to their discharge performance standards prior to discharge to Feeder Creek. These discharge performance standards will be established in the Final OU 2 RD, but may be amended in accordance with the O&M Plan. The groundwater treatment processes and management of treatment residuals shall be in accordance with the Final OU 2 RD.

- Deep (bedrock) groundwater – the deep groundwater will be treated in-situ by injection of nanoscale zero-valent iron (NZVI) in the core of the plume. The

location and design of the injection wells, the amount and frequency of NZVI injections, and monitoring of the injections shall be in accordance with the OU 2 ROD and the Final OU 2 RD.

- Deep (bedrock) groundwater – should NZVI injections not be sufficiently effective in treating all organic compounds to meet performance standards, accelerated in-situ biological treatment shall be implemented in the core of the plume and monitored in accordance with the OU 2 ROD, the Final OU 2 RD and the OU 2 Remedial O&M Plan.

- Deep (bedrock) groundwater – monitored natural attenuation will be implemented for the downgradient portion of the plume that is outside of the treatment zone, in accordance with the OU 2 ROD, Final OU 2 RD, and the OU 2 Remedial O&M Plan.

- Dense non-aqueous phase liquids (DNAPL) will be removed in accordance with the OU 2 ROD, the OU 2 ESD, and the Final OU 2 RD. All extracted DNAPL will be shipped off-site for proper treatment and disposal.

The Settling Defendant shall monitor the system's performance on a regular basis, to be established in the approved OU 2 Remedial O&M Plan, and EPA may require adjustments to the system as warranted by the performance data collected during operation. Examples of adjustments which EPA may require are additional NZVI injection wells and/or increased NZVI mass to be injected.

The Settling Defendant may petition EPA to terminate the groundwater collection and treatment system after a demonstration that the groundwater performance standards have been met throughout the entire contaminated plume. If multiple contaminants are detected in groundwater below their respective performance standards, the Settling Defendant shall include an evaluation of the cumulative residual risk in the demonstration petition, in accordance with Section 8.1.1 of the OU2 ROD. Monitoring shall be for parameters as specified in the OU 2 Remedial O&M Plan. Upon EPA's approval of the petition, the Settling Defendant may terminate the groundwater collection and treatment system. Review of the petition shall be undertaken in accordance with Section XIV (Approval of Plans, Reports, and Other Deliverables) of the Consent Decree.

After termination of the operation of the groundwater collection and treatment system, the Settling Defendant shall implement the verification sampling procedures in the OU 2 Remedial O&M Plan, if groundwater monitoring indicates that the groundwater performance standards are exceeded in any part of the contaminated plume. If the verification sampling procedures confirm that any groundwater exceeds the groundwater performance standards in any part of the contaminated plume, then the Settling Defendant shall immediately reactivate the groundwater collection and treatment system or take other corrective measures required by the O&M Plan. Petition for termination of the reactivated system shall follow procedures outlined in this section.

b. Treatment of Contaminated Soil/Sediment/Sludge/Waste

The Settling Defendant shall treat all waste and underlying contaminated soil above bedrock in former Ponds 1 and 2 by in-situ stripping, stabilization and solidification (S/S/S) in accordance with the OU 2 ROD and the Final OU 2 RD. The Settling Defendant shall treat the contaminated waste to meet the performance standards established in the Final OU 2 RD.

c. Vapor Intrusion Mitigation

The OU 2 ESD calls for continued operation of two sub-slab vapor intrusion mitigation systems currently installed in residences on two properties south of the former Nease property area. O&M of the vapor intrusion systems will be required to ensure that the systems continue operating as intended. These O&M requirements shall be included in the OU 2 Remedial O&M Plan. Termination of vapor intrusion mitigation activities in these residences is contingent on demonstrating that chemical-specific clean up levels for the source media (sub-slab soil gas) as presented in the OSWER Technical Guidance for Addressing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air (EPA 2015) and generated using methodology approved by U.S. EPA such as the vapor intrusion screening level (VISL) calculator have been attained.

If new residences or other occupied structures are constructed on these properties, a demonstration must be made, prior to human occupancy, that the new structures meet acceptable levels of risk for the vapor intrusion to indoor air exposure pathway without implementation of additional remedial actions to the extent Settling Defendant is aware of such occupancy and access has been secured pursuant to paragraph 81 of the Consent Decree. If such a demonstration cannot be made, a remedy that eliminates indoor air vapor intrusion exposure to hazardous substances in soil, soil gas and/ or ground water in excess of acceptable levels of risk in the new occupied structures shall be installed, operated and maintained as an engineering control under an O&M plan approved by U.S. EPA.

As specified in the OU 2 ESD, O&M monitoring for the OU 2 remedy will include groundwater and soil gas sampling in the area of the homes to determine if any additional vapor intrusion monitoring is necessary at other properties in the future. Sampling results shall be interpreted consistent with OSWER Technical Guidance for Addressing and Mitigating the Vapor Intrusion Pathway from subsurface vapor sources to Indoor Air. If necessary, Settling Defendant shall install and operate additional vapor mitigation systems as necessary to address the exceedances.

4. Installation and Operation of Monitoring Program for OU 2 Remedial Action

The Settling Defendant shall implement a monitoring program to evaluate and ensure that the construction and implementation of the OU 2 RA complies with approved plans and design documents and performance standards. The Settling Defendant shall implement the monitoring program in accordance with the Final OU 2 RD and the OU 2 Remedial O&M Plan.

a. Groundwater Monitoring

The Settling Defendant shall implement a groundwater monitoring program as identified in the OU 2 ROD, the Final OU 2 RD, and the OU 2 Remedial O&M Plan, or as otherwise approved by EPA. The Settling Defendant shall implement a groundwater monitoring program capable of detecting changes in the chemical concentrations of the groundwater at and adjacent to the Site, both during treatment of the former Ponds 1 and 2, the eastern and south/southeastern shallow plumes and deep groundwater, and after such treatments have been completed.

Upon the schedule in the Final OU 2 RD or OU 2 Remedial O&M Plan, the Settling Defendant shall sample the monitoring wells identified, at the frequency specified, and shall analyze the samples for the parameters specified in the Final OU2 RD or OU 2 Remedial O&M Plan to ensure the groundwater performance standards are met and continue to be attained. Settling Defendant may request approval from EPA to reduce monitoring requirements, and such approval may be granted as warranted by the performance data collected during operation of the OU 2 RA.

If additional information indicates that the groundwater monitoring program is inadequate to monitor the Site plume or to demonstrate attainment of the groundwater performance standards, EPA may require additional groundwater monitoring wells and/or laboratory analysis of additional parameters.

b. Air

At all times during the performance of the Remedial Action, the Settling Defendant shall ensure that air emissions do not exceed any ARARs set forth in the OU 2 ROD. If air emissions exceed these levels, the Settling Defendant shall take corrective measures as developed in the Final OU 2 RD. Residuals from air emissions control processes shall be treated or disposed off-site in accordance with the Final OU 2 RD.

c. Groundwater Collection and Treatment System Monitoring

The Settling Defendant shall initiate a monitoring program for the groundwater collection and treatment system as identified in the Final OU 2 RD, or as otherwise approved by EPA. The monitoring program shall be designed to detect any conditions that may interfere with the proper operation and function of the system as well as monitoring treatment performance. System monitoring shall include collection and field and/or laboratory analysis of influent and effluent samples to determine the effectiveness of the treatment system. Sampling shall occur on the schedule established in the Final OU 2 RD, or as otherwise approved by EPA. Once the remedial action is determined to be both operational and functional, the Settling Defendant shall follow the sampling procedures and frequencies established in the OU 2 Remedial O&M Plan.

d. Points of Compliance

To monitor and evaluate the remedial actions throughout the Site, certain locations at which there are, or will be, groundwater monitoring wells shall be selected as points of compliance, pursuant to Section II.A.4 of this Remedial SOW. Wells designated as representing the points of compliance, and which shall be sampled will be established in the Final OU 2 RD. All such designated wells shall be considered as groundwater points of compliance. If any of the wells are destroyed or in any way become unusable, the Settling Defendant shall repair or replace each such well. Additional wells may be included during the development of the OU 2 Remedial O&M Plan. The location of any additional wells installed pursuant to the Consent Decree or this Remedial SOW shall be approved by EPA.

e. Soil Cover Monitoring

The long-term performance of the integrity of the soil cover system shall be monitored in accordance with the OU2 Remedial O&M Plan.

5. Institutional Control Implementation and Assurance Plan (ICIAP)

Within 30 days after EPA approval of the Final OU 2 Remedial Design, Settling Defendant shall submit to EPA, for review and approval, a proposed ICIAP that will require the implementation and maintenance of Institutional Controls (IC) to impose land and groundwater activity and use limitations over areas that do not support Unlimited Use/Unrestricted Exposure (UU/UE) as set forth in the OU 2 ROD and OU 2 ESD. The ICIAP shall include, but shall not be limited to: (a) a description of the pathways for potential human exposure to Waste Material that may remain during and/or after completion of construction of the Remedial Action; (b) a description of the areas where human activities should be restricted, including legal descriptions for such properties, sample maps, and a plan for preparing final survey maps and legal descriptions; (c) a list of properties where Remedial Proprietary Controls are needed; (d) a description of the proposed ICs and their purpose; (e) a description of the proposed duration of each IC and an explanation for such duration; (f) a schedule describing best efforts to implement each IC; (g) a schedule for completing any necessary title work; (h) draft Remedial Proprietary Controls enforceable under state law to implement proposed land/groundwater use restrictions; (i) a description of the authority of each affected property owner to implement each Remedial Proprietary Control, including title insurance commitments or other title evidence acceptable to EPA for proposed Remedial Proprietary Controls; (j) a description of all prior liens and encumbrances (unless EPA waives the release or subordination of such liens or encumbrances); (k) a plan for monitoring, maintaining, reporting on, and ensuring the continued efficacy of the ICs and a contingency plan in the event ICs are ineffective; and (l) a schedule for annual certifications regarding whether the ICs remain in place and have been complied with, and regarding enforcement of the ICs. The final ICIAP shall be submitted to EPA prior to the pre-final construction inspection for OU 2, and, as set forth in subparagraph c.iii of this paragraph, any Remedial Proprietary Controls specified by the ICIAP shall be filed with the Columbiana County Recorder. The ICIAP shall comply with EPA IC guidance and shall include the

following minimum requirements:

a. Non-UU/UE Areas - Activity and Use Limitations

i. Containment Systems: Settling Defendant shall implement and maintain Remedial Proprietary Controls to prohibit interference with the containment systems set forth in Section II.A.2 of this Remedial SOW. Settling Defendant shall develop and propose a plan to ensure that the boundaries of the remediation areas and the containment systems that support the remedial objectives are clearly delineated and protected from disturbance and damage that could threaten the viability of the remedy. Settling Defendant shall integrate appropriate O&M measures into the plan to support the ICIAP. Settling Defendant shall survey the area covered by the final containment systems and shall install "capped iron (set)" permanent markers placed at the boundaries of the containment systems. Settling Defendant shall implement Remedial Proprietary Controls that are enforceable in the State of Ohio and be substantially in the form set forth in Appendix G-1 and Appendix G-2 of the Consent Decree.

ii. Limited Land Uses: For those areas that do not support UU/UE at the Site, Settling Defendant shall implement and maintain Remedial Proprietary Controls that are enforceable in the State of Ohio and substantially in the form set forth in Appendix G-1 and Appendix G-2 of the Consent Decree.

iii. Limited Groundwater Use: Settling Defendant shall implement and maintain ICs to prohibit construction of wells and to prohibit any activity that extracts, consumes, or otherwise uses any groundwater at the Site, except for the purposes of an EPA approved activity until groundwater performance standards are achieved throughout the plume.

iv. Vapor Intrusion: Settling Defendant shall implement and maintain ICs to prohibit construction of occupied structures at the Site, except for the purposes of an EPA approved activity, including vapor intrusion monitoring/mitigation demonstrating that indoor air standards are achieved in these structures.

v. Treatment Systems: Settling Defendant shall implement and maintain ICs to prohibit interference with the treatment systems set forth in Section II.A.3 of this Remedial SOW.

vi. Monitoring Systems: Settling Defendant shall implement and maintain ICs (i.e., restrictive covenants) to prohibit interference with the monitoring systems set forth in Section II.A.4 of this Remedial SOW.

b. Demonstration that ICs cover all physical areas that do not support UU/UE

The ICIAP shall demonstrate that ICs cover all physical areas that do not support UU/UE based on current conditions for the entire Site. The ICIAP shall include a methodology for mapping of all non-UU/UE areas during and after completion of construction, including preparing final survey maps and legal descriptions of non - UU/UE areas.

c. Proprietary Controls

For Proprietary Controls, the ICIAP shall include:

i. A current title insurance commitment in the form of ALTA Commitment form – 1982 (as amended) from a title company, which shows that the current owner and that title to the non-UU/UE areas are free and clear of all prior liens and encumbrances. If Settling Defendant requests that EPA waive this requirement pursuant to Paragraphs 80 and 81 of the Consent Decree, Settling Defendant must demonstrate and certify that such preexisting liens, encumbrances, or other property interests will not interfere with the remedy or cause undue exposure. Such a demonstration must include: a) copies of encumbrances referenced in the title commitment; b) identification of encumbrances that impact the non UU/UE areas; c) copies of requests for subrogation agreements for such encumbrances; d) identification of the encumbrances on maps that depict parcel numbers and the area impacted by the encumbrance; and e) discussion of how use of existing encumbrances will impact the Site.

ii. An arrangement for the execution and recording of such executed proprietary controls with the Columbiana County Recorder in accordance with the Consent Decree.

d. Long Term Stewardship

The ICIAP shall provide for long-term maintenance and stewardship of the ICs. Settling Defendant shall maintain and ensure compliance with all ICs at the Site.

e. Inspections and Certification

The ICIAP shall require that Settling Defendant inspect the Site at least annually to evaluate compliance with the activity and use limitations set forth above in Section II.A.5.a. The ICIAP shall require that Settling Defendant submit an annual report to EPA and Ohio as identified in Section XXXI (Notices and Submissions) of the Consent Decree within 20 days after completing the annual evaluation of compliance with the activity and use limitations set forth above. In the annual report, Settling Defendant shall certify compliance with the activity and use restrictions set forth in Section II.A.5.a.

f. Groundwater IC Requirements

The ICIAP shall require as part of the annual report that Settling Defendant submit the following information regarding compliance with groundwater use limitations:

- A map showing the boundaries of the restricted groundwater area in Perry Township and Salem ordinance and proprietary controls related to the Site;
- A map showing the location of existing and any new wells located in and around the Site;
- The current boundaries of the contaminated groundwater plume detected above performance standards;
- Potentiometric maps;
- Comparison of the current boundaries of the plume and the boundaries of the restricted area in the ICs;
- Discussion of whether the boundaries of restricted areas under the ICs are sufficient to prevent exposure to contaminated groundwater;
- Contingency plans if the ICs are not sufficient to prevent exposure to contaminated groundwater.

g. Soil Management Plan Requirements

The ICIAP shall include a Soil Management Plan (SMP). The SMP shall identify the process for ensuring that future land use at the Site, including utility installation and repair and foundation installation, is protective of human health and the environment. The SMP shall establish standardized procedures for any future construction at the Site. The SMP shall identity the volumes and locations of soil that require management and establish management procedures for handling and disposing of impacted soil. The SMP would also control exposure to construction workers during future work that may involve handling impacted soil by establishing engineering controls and other health and safety procedures.

B. Operable Unit 3

1. Construction, Installation, and Operation of a Containment System for Remedial Action

a. Floodplain Soil

The Settling Defendant shall remove floodplain soils along the Middle Fork of Little Beaver Creek (MFLBC) by excavation in accordance with the OU 3 ROD and the Final OU 3 RD, to meet the floodplain soil remediation goal of 1 mg/kg of mirex, calculated as

a Surface-Weighted Average Concentration (SWAC). The SWAC will be calculated over an area of one acre, or as specified in the Final OU 3 RD. Excavated floodplain areas will be backfilled and graded, as determined in the Final OU 3 RD. Targeted removal of floodplain soils will occur to meet the remediation goal while minimizing short-term impacts to riparian habitats. The Settling Defendant shall transport the excavated floodplain soil to the Former Nease Property to be consolidated with OU 2 contaminated soils, and capped and covered as called for in the OU 2 ROD, the Final OU 2 RD, the Final OU 3 RD, and this Remedial SOW.

b. MFLBC Sediment

The Settling Defendant shall remove sediments from the MFLBC by dredging or dry excavation in accordance with the OU 3 ROD and the Final OU 3 RD, to meet the MFLBC sediment remediation goal of 0.5 mg/kg of mirex, calculated as a SWAC. The SWAC will be calculated over one river mile (RM) in the MFLBC, or as specified in the Final OU 3 RD. Targeted sediment removal will be conducted in more highly contaminated areas to achieve the remediation goal while minimizing short-term impacts to aquatic and riparian habitats. The Settling Defendant shall place backfill after sediment removal in accordance with the Final OU 3 RD, to achieve the sediment remediation goal. The Settling Defendant shall transport the removed sediment to the Former Nease Property to be consolidated with OU 2 contaminated soils, and capped and covered as called for in the OU 2 ROD, the Final OU 2 RD, the Final OU 3 RD, and this Remedial SOW.

c. Feeder Creek Sediment

The Settling Defendant shall remove contaminated sediment from Feeder Creek and residuals (if any) shall be covered to mitigate potential future releases of mirex into the MFLBC in accordance with the OU 3 ROD and the Final OU 3 RD. It is anticipated that Sediment shall be removed to a 2 foot depth along the entire creek, unless coarse material or bedrock is encountered first. The Settling Defendant shall consolidate the removed sediment with OU 2 contaminated soils, to be capped and covered as called for in the OU 2 ROD, the Final OU 2 RD, the Final OU 3 RD, and this Remedial SOW. The OU 3 ROD provides that, following excavation of Feeder Creek sediment, a cover of geotextile and rip-rap substrate would be placed. In the event that the removal of sediment eliminates all mirex contamination from Feeder Creek, as demonstrated by confirmation sampling, the geotextile/rip-rap cover may not be necessary or may be modified for erosion control purposes.

d. Consolidation with OU 2 Soil

The Settling Defendant shall consolidate mirex-contaminated sediment and floodplain soil removed in accordance with the Final OU 3 RD with the contaminated soils to be contained in accordance with the Final OU 2 RD under the impermeable geosynthetic membrane cap. After consolidation of all OU 3 materials, the Settling Defendant shall complete construction of the cover and plant vegetation in accordance with the approved

Final OU 2 RD. The Settling Defendant shall conduct routine maintenance of the cover as part of the long-term requirements to be established in the OU 2 Remedial O&M Plan.

2. Installation and Operation of Monitoring Program for Remedial Action

The Settling Defendant shall implement monitoring program(s) to evaluate and ensure that the construction and implementation of the OU 3 Remedial Action complies with approved plans and design documents and performance standards. As part of the Final OU 3 RD, Settling Defendant shall submit monitoring programs, which shall address the specific components of the OU 3 Remedial Action listed below. Each sample shall be analyzed for mirex and for other parameters approved by EPA during design. The Settling Defendant shall implement the monitoring program in accordance with the Final OU 3 RD and OU 3 Remedial O&M Plan.

a. Fish

The Settling Defendant shall implement a fish-monitoring program in accordance with the Final OU 3 RD and the OU3 Remedial O&M Plan. Upon the schedule in the Final OU 3 RD or OU 3 Remedial O&M Plan, the Settling Defendant shall implement the fish-monitoring program to detect changes in mirex levels in the fish in the MFLBC after sediment removal has been completed.

b. Surface Water

Section 13.2 of the OU 3 ROD provides that Ohio EPA's water quality criteria for mirex in the Ohio River drainage basin may be ARARs for Feeder Creek and MFLBC if there are discharges of mirex to those water bodies as a result of the Remedial Action. The Settling Defendant shall measure mirex levels in surface water at least once after the post-construction recovery period, as part of a surface water monitoring plan identified in the Final OU 3 RD.

c. Sediment and Floodplain Soil

The Settling Defendant shall implement a monitoring program to evaluate and ensure that MFLBC sediment and floodplain soils meet the remediation goals and comply with approved plans and design documents. During construction of the remedy for OU 3, the Settling Defendant shall implement a sediment and soil monitoring program as identified in the Final OU 3 RD to ensure that the remediation goals are met.

d. Air

At all times during the performance of the Remedial Action, the Settling Defendant shall ensure that air emissions do not exceed any ARARs set forth in Table 8 of the OU 3 ROD. If air emissions exceed these levels, the Settling Defendant shall take corrective measures as developed in the Final OU 3 RD.

III. REMEDIAL DESIGN FOR OU 2 AND OU 3

A. Introduction

The RD for OU 2 and OU 3 each consist of four phases: (1) pre-design planning; (2) pre-design investigation; (3) remedial design planning; and (4) preparation of remedial design documents. Prior to the Effective Date of the Consent Decree, Settling Defendant has conducted RD work pursuant to the RD Administrative Orders on Consent (AOC) for OU 2 and OU 3 entered in 2006 and 2009, respectively. As of the Effective Date of the Consent Decree, all remaining RD work will be conducted in accordance with the Consent Decree and this Remedial SOW.

The Settling Defendant shall submit all documents required under this Section in accordance with Sections VII (Performance of the Remedial Design/Remedial Action) and XIV (Approval of Plans, Reports, and Other Deliverables) of the Consent Decree and Section VI of this Remedial SOW. Copies of all documents will be sent to Ohio EPA for an opportunity to review. Review and approval by EPA will be in accordance with Section XIV (Approval of Plans, Reports, and Other Deliverables) of the Consent Decree.

This Remedial SOW is intended to achieve an expedited, cost-effective RD for OU 2 and OU 3 that builds on prior work is protective of human health and the environment, is consistent with the National Contingency Plan, and complies with the RODs for OU 2 and OU 3 and the OU 2 ESD. All phases of the RD are intended to be a collaborative and cooperative process between the Respondent, EPA and Ohio EPA. The parties will meet and confer on a regular basis and seek to anticipate and resolve key issues in advance of document development and completion. The RD will be conducted so pertinent information will be taken into account as it becomes available.

B. Pre-Design Planning and Investigation

For OU 2, Settling Defendant submitted Pre-Design Investigation ("PDI") Reports pursuant to the OU 2 RD AOC. For OU 3, Settling Defendant has submitted a PDI Report pursuant to the OU 3 RD AOC.

C. Remedial Design Planning

For OU 2 and OU 3, Settling Defendant has submitted and EPA has approved an RD Workplan for each OU. Settling Defendant shall conduct and complete the remaining RD deliverables in accordance with the approved RD Workplans and schedule contained in Section VI below.

D. Phase IV - Preparation of Remedial Design Documents

The Settling Defendant shall prepare construction plans and specifications to implement the OU 2 and OU 3 RAs at the Site as described in the OU 2 ROD, OU 3 ROD, OU 2 ESD, and this Remedial SOW. Plans and specifications shall be submitted in accordance with the schedule set forth in Section VI below. Subject to approval by EPA, Settling Defendant may submit more than one set of design submittals reflecting different components of the OU 2 and OU 3 RA. All

plans and specifications shall be developed in accordance with U.S. EPA's Superfund Remedial Design and Remedial Action Guidance (OSWER Directive No. 9355.0-4A) and shall demonstrate that the OU 2 and OU 3 RAs shall meet all objectives of the OU 2 ROD, the OU 3 ROD, the OU 2 ESD, the OU 2 RD, the OU 3 RD, the Consent Decree, and this Remedial SOW, including all Performance Standards.

1. Preliminary Design Documents

For OU 2, Settling Defendant has submitted the OU 2 Preliminary Design Document pursuant to the OU 2 RD AOC, and EPA has commented on the report.
For OU 3, the Settling Defendant has submitted the Preliminary Design pursuant to the OU 3 RD AOC and U.S. EPA has commented on the report. The Preliminary Design submittal included or discussed, at a minimum, the following:

a. Preliminary plans, drawings and sketches, including design calculations;

b. Results of studies and additional field sampling and analysis, if any, not discussed in previous submissions;

c. Design assumptions and parameters, including design restrictions, process performance criteria, appropriate unit processes for the treatment train(s), and expected removal or treatment efficiencies for both the process and waste (concentration and volume), as applicable;

d. Draft Performance Standard Verification Plan;

e. Outline Construction Quality Assurance Plan (CQAP), including proposed cleanup verification methods, including compliance with ARARs;

f. Outline of required specifications;

g. Proposed siting/locations of processes/construction activities;

h. Real estate, easement, and substantive permit equivalency (or permit) requirements;

i. Expected long-term monitoring and operation requirements; and

j. Preliminary construction schedule, including contracting strategy.

2. Pre-final and Final Design Documents

For each OU (OU 2 and OU 3), the Settling Defendant has submitted Pre-final Design Documents, and shall submit the Final Design for each OU when the design effort for the OU is 100% complete. EPA has extensively commented on the submitted Pre-final Design Documents. Settling Defendant must fully address the Agency comments and resubmit the Pre-final Design Documents for each OU in accordance with the schedule in Section VI. The

Final Design shall fully address all comments made to the Pre-final Design and shall consider integration of the construction, O&M and monitoring requirements for both OUs consistent with section IV.B. The Pre-final Design shall serve as the Final Design if EPA has no further comments and issues the notice to proceed.

The Pre-final and Final Design submittals shall include those elements listed for the Preliminary Design, as well as, the following:

a. Reproducible drawings and specifications suitable for bid advertisement including details on the substantive permit equivalency requirements such as the surface water National Pollutant Elimination Discharge System (NPDES);

b. Final Performance Standard Verification Plan (including documenting compliance with the substantive permit equivalency requirements);

c. Final CQAP, including the following:

- Protocols for sampling and testing to monitor construction of the remedial action;
- Identification of proposed quality assurance sampling activities including the sample size, locations, frequency of testing, acceptance and rejection data sheets, problem identification and corrective measures reports, and final documentation; and
- Reporting requirements for CQAP activities, including such items as daily summary reports, inspection data sheets, problem identification and corrective measures reports, design acceptance reports, and final documentation;

d. Draft Remedial O&M Plan;

e. Project Schedule for construction and implementation of the remedial action; and

f. The following supporting plans (which may build upon the plans developed for the PDI, or other previously approved plans):
- Health and Safety Plan (HSP); and
- Contingency Plan.

IV. REMEDIAL ACTION FOR OU 2 AND OU 3

A. **Introduction**

The RAs for OU 2 and OU 3 will consist of four tasks: (1) remedial action work planning; (2) remedial action construction; (3) operation and maintenance; and (4) performance monitoring. The work to be performed in each of these tasks is described below in Subsections B through E.

The Settling Defendant shall submit all documents required under this Section in accordance with Sections VII (Performance of the Remedial Design/Remedial Action) and XIV (Approval of Plans, Reports, and Other Deliverables) of the Consent Decree and Section VI of this SOW. Copies of all documents will be sent to Ohio EPA for an opportunity to review. Review and approval by U.S. EPA will be in accordance with Section XIV (Approval of Plans, Reports, and Other Deliverables) of the Consent Decree.

B. **Task 1: Remedial Action Work Plan**

The Settling Defendant shall submit a Remedial Action Work Plan consistent with Paragraphs 44 and 45 of the Consent Decree, which includes a detailed description of the remediation and construction activities, while ensuring the integration of the work required for OU 2 and OU 3. The Remedial Action Work Plan shall include a project schedule for each major activity and submission of deliverables generated during the Remedial Actions. The Remedial Action Work Plan shall include a schedule to submit the Final ICIAP for the Pre-final Inspection of the Remedial Action for OU 2.

C. **Task 2: Remedial Action Construction**

The Settling Defendant shall implement the Remedial Actions as detailed in the approved Final Designs. The following activities shall be completed in constructing the Remedial Actions.

1. Preconstruction Inspection and Meeting

The Settling Defendant shall participate with EPA, with an invitation to Ohio EPA, in a preconstruction inspection and meeting to:

a. Review methods for documenting and reporting inspection data;

b. Review methods for distributing and storing documents and reports;

c. Review work area security and safety protocol;

d. Discuss any appropriate modifications of the CQAP to ensure that site-specific considerations are addressed; and

e. 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 meeting shall be documented by a designated person and minutes shall be transmitted to all parties.

2. Pre-final Inspection

Within 15 days after the Settling Defendant makes a preliminary determination that construction is complete, the Settling Defendant shall notify EPA, with an invitation to Ohio

EPA, for the purposes of conducting a pre-final inspection. The pre-final inspection shall consist of a walk-through inspection of the entire facility with EPA. The inspection is to determine whether the project is complete and consistent with the contract documents and the Remedial Action. Any outstanding construction items discovered during the inspection shall be identified and noted. Additionally, treatment equipment shall be operationally tested by the Settling Defendant. The Settling Defendant shall certify that the equipment has performed to meet the purpose and intent of the specifications. Retesting shall be completed where deficiencies are revealed. The Pre-final Inspection Report shall outline the outstanding construction items, actions required to resolve items, completion date for these items, and a proposed date for final inspection.

3. Final Inspection

Within 15 days after completion of any work identified in the pre-final inspection report, the Settling Defendant shall notify EPA, with an invitation to Ohio EPA, of Settling Defendant's desire to meet for the purposes of conducting a final inspection. The final inspection shall consist of a walk-through inspection of the facility by EPA and the Settling Defendant. The pre-final inspection report shall be used as a checklist with the final inspection focusing on the outstanding construction items identified in the pre-final inspection. Confirmation shall be made that any outstanding items have been resolved.

4. Reports

The Settling Defendant shall submit the following reports:

a. Completion of Construction Report

Within 60 days of a successful final inspection, the Settling Defendant shall submit a Completion of Construction Report. In the report, a registered professional engineer and the Settling Defendant's Project Coordinator shall state that the Remedial Action has been constructed in accordance with the designs and specifications. The written report shall include as-built drawings signed and stamped by a professional engineer, and a determination that the remedy is operational and functional (O& F). The report shall contain the following statement, signed by a responsible corporate official of a Settling Defendant or the Settling Defendant's Project Coordinator:

> To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

b. Completion of Remedial Action Report

Within 30 days of a successful final inspection, the Settling Defendant shall submit a Completion of Remedial Action Report to EPA requesting EPA's certification of

Remedial Action Completion. The report must: (1) include certifications by a registered professional engineer and by Settling Defendant's Project Coordinator that the Remedial Action is complete; (2) be prepared in accordance with Section 2.5 (Preparing the RA Report) of EPA's *Close Out Procedures for NPL Sites* guidance (May 2011); (3) contain monitoring data to demonstrate that Performance Standards have been achieved; and (4) contain the following statement, signed by a responsible corporate official of the Settling Defendant or the Settling Defendant's Project Coordinator:

> To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

c. Completion of Work Report

Within 30 days of completion of the long term remedial action and all performance standards being met, the Settling Defendant shall submit a Completion of Work Report. In the report, a registered professional engineer and the Settling Defendant's Project Coordinator shall state that the Remedial Action has been completed in full satisfaction of the requirements of this Consent Decree. The written report shall include as-built drawings, if not previously submitted, signed and stamped by a professional engineer. The report shall contain the following statement, signed by a responsible corporate official of a Settling Defendant or the Settling Defendant's Project Coordinator:

> To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

d. Combining Completion Report Submissions

If the Settling Defendant concludes that it has completed all phases of the Remedial Work at the same time it concludes that the Remedial Action has been fully performed, then the Settling Defendant may petition EPA to combine the submission of the Completion of Remedial Action Report and the Completion of Work Report pursuant to paragraph 125 of the Consent Decree.

D. **Task 3: Performance Monitoring**

For each OU (OU 2 and OU 3), Settling Defendant shall conduct performance monitoring to ensure that all Performance Standards are met. Settling Defendant shall prepare a Performance Standard Verification Plan that addresses OU 2 and OU 3. The purpose of the Performance Standard Verification Plan is to provide a mechanism to ensure that both short-term and long-term Performance Standards for the Remedial Action are met. The draft Performance Standards

Verification Plan for each OU shall be submitted with the Preliminary Design for that OU. Once approved, the Performance Standards Verification Plan shall be implemented on the approved schedule. The Performance Standards Verification Plan shall include: Quality Assurance Project Plan; Health and Safety Plan; and Field Sampling Plan. These plans may be submitted new or may reference or modify an existing site-specific approved plan, as appropriate.

E. **Task 4: Operation and Maintenance**

The Settling Defendant shall prepare a Remedial O&M Plan to cover both implementation and long-term maintenance of the Remedial Action. An initial draft Remedial O&M Plan for each OU shall be submitted as a Pre-final Design document submission. The final Remedial O&M Plan for each OU shall be submitted to EPA prior to the pre-final construction inspection for that OU, in accordance with the approved schedule included as part of the Remedial Action Work Plan. The final Remedial O&M Plans for OU2 and OU3 may be integrated. The plan shall be composed of the following elements:

1. Description of normal operation and maintenance
   a. Description of tasks for operation;
   b. Description of tasks for maintenance;
   c. Description of prescribed treatment or operation conditions; and
   d. Schedule showing frequency of each O&M task.

2. Description of potential operating problems
   a. Description and analysis of potential operation problems;
   b. Sources of information regarding problems; and
   c. Common and/or anticipated remedies.

3. Description of routine monitoring and laboratory testing
   a. Description of monitoring tasks including but not limited to ground water monitoring, performance of the soil cover system and the Site surface water management system;
   b. Description of required data collection, laboratory tests and their interpretation;
   c. Required quality assurance, and quality control;
   d. Schedule of monitoring frequency and procedures for requesting U.S. EPA to approve the reduction of the frequency or discontinuation of monitoring; and
   e. Description of verification sampling procedures if performance standards are exceeded in routine monitoring.

4. Description of alternate O&M
   a. Should any systems or components of systems fail, identification of alternate procedures to prevent release or threatened releases of hazardous substances, pollutants or contaminants which may endanger public health and the environment or exceed performance standards; and
   b. Analysis of vulnerability and additional resource requirements should a failure occur.

5. Corrective Action
   a. Description of corrective actions to be implemented in the event that performance standards are exceeded; and

b. Schedule for implementing these corrective actions.

6. Safety plan
   a. Description of precautions, of necessary equipment, etc., for Site personnel; and
   b. Safety tasks required in event of systems failures.

7. Description of equipment
   a. Equipment identification;
   b. Installation of monitoring components;
   c. Maintenance of Site equipment; and
   d. Replacement schedule for equipment and installed components.

8. Records and reporting mechanisms required
   a. Periodic operating logs (e.g., daily, weekly monthly);
   b. Laboratory records;
   c. Records for operating costs;
   d. Mechanism for reporting emergencies;
   e. Personnel and maintenance records; and
   f. Monthly/annual reports to agencies.

V. CONTENT OF SUPPORTING PLANS

The documents listed in this section – the Quality Assurance Project Plan, the Field Sampling Plan, the Health and Safety Plan, the Contingency Plan and the Construction Quality Assurance Plan – are documents which must be prepared and submitted as outlined in Section III of this Remedial SOW. The following section describes the required contents of each of these supporting plans. The supporting plans may build on existing, approved site-specific plans. With EPA's approval, the supporting plans may be combined or incorporated into other documents subject to review and approval pursuant to Section XIV (Approval of Plans, Reports, and Other Deliverables) of the Consent Decree.

A. **Quality Assurance Project Plan (QAPP)**

Settling Defendant shall develop and/or update a site-specific QAPP, covering sample analysis and data handling for samples collected in all phases of future Site work, based upon the Consent Decree and guidance provided by EPA. The QAPP shall be consistent with the requirements of the EPA Contract Lab Program (CLP) for laboratories proposed outside the CLP. Settling Defendant shall prepare the QAPP in accordance with "EPA Requirements of Quality Assurance Project Plans (QA/R-5)" (EPA/240/B-01/003, March 2001) and "EPA Guidance for Quality Assurance Project Plans (QA/G-5)" (EPA/600/R-02/009, December 2002). The QAPP may include Field-Based Analytical Methods, if appropriate and scientifically defensible. EPA encourages the Settling Defendant to develop a QAPP that follows the Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP). Information on the UFP-QAPP can be found at http://www.epa.gov/fedfac/documents/qualityassurance.htm.

The QAPP shall at a minimum include:

1. Project Description
   a. Facility Location History
   b. Past Data Collection Activity
   c. Project Scope
   d. Sample Network Design
   e. Parameters to be Tested and Frequency
   f. Project Schedule

2. Project Organization and Responsibility
   a. Project Organization
   b. Responsibilities of all key personnel involved in the design and implementation of the QAPP.

3. Quality Assurance Objective for Measurement Data
   a. Level of Quality Control Effort
   b. Accuracy, Precision and Sensitivity of Analysis
   c. Completeness, Representativeness and Comparability

4. Sampling Procedures (reference Field Sampling Plan as described in section V.D)

5. Sample Custody
   a. Field Specific Custody Procedures
   b. Laboratory Chain of Custody Procedures

6. Calibration Procedures and Frequency
   a. Field Instruments/Equipment
   b. Laboratory Instruments

7. Analytical Procedures
   a. Non-Contract Laboratory Program Analytical Methods
   b. Field Screening and Analytical Protocol
   c. Laboratory Procedures

8. Internal Quality Control Checks
   a. Field Measurements
   b. Laboratory Analysis

9. Data Reduction, Validation, and Reporting
   a. Data Reduction
   b. Data Validation
   c. Data Reporting

10. Performance and System Audits
    a. Internal Audits of Field Activity
    b. Internal Laboratory Audit

c. External Field Audit
d. External Laboratory Audit

11. Preventative Maintenance
    a. Routine Preventative Maintenance Procedures and Schedules
    b. Field Instruments/Equipment
    c. Laboratory Instruments

12. Specific Routine Procedures to Assess Data Precision, Accuracy, and Completeness
    a. Field Measurement Data
    b. Laboratory Data

13. Corrective Action
    a. Sample Collection/Field Measurement
    b. Laboratory Analysis

14. Quality Assurance Reports to Management

If requested by EPA, the Settling Defendant shall attend a pre-QAPP meeting with EPA.

B. **Health and Safety Plan (HSP)**

The Settling Defendant shall develop a health and safety plan which is designed to protect on-site personnel and area residents from physical, chemical and all other hazards posed by this Remedial Action. The safety plan shall develop the performance levels and criteria necessary to address the following areas.

1. Facility description
2. Personnel
3. Levels of protection
4. Safe work practices and safe guards
5. Medical surveillance
6. Personal and environmental air monitoring
7. Personal protective equipment
8. Personal hygiene
9. Decontamination - personal and equipment

10. Site work zones

11. Contaminant control

12. Contingency and emergency planning

13. Logs, reports and record keeping

The safety plan shall follow EPA guidance and all OSHA requirements as outlined in 29 C.F.R. Parts 1910 and 1926.

C. **Contingency Plan**

The Settling Defendant shall submit a Contingency Plan describing procedures to be used in the event of an accident or emergency at the Site. The Contingency Plan shall include, at a minimum, the following:

1. Name of the person or entity responsible for responding in the event of an emergency incident.

2. Plan and date(s) for meeting(s) with the local community, including local, State and federal agencies involved in the cleanup, as well as local emergency squads and hospitals.

3. First aid medical information.

4. Air Monitoring Plan (if applicable).

5. A Spill Prevention, Control, and Countermeasures (SPCC) Plan (if applicable), as specified in 40 C.F.R. Part 109 describing measures to prevent and contingency plans for potential spills and discharges from materials handling and transportation.

D. **Field Sampling Plan**

The Settling Defendant shall develop a field sampling plan (as described in "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA," October 1988). The Field Sampling Plan should supplement the QAPP and address all sample collection activities.

E. **Construction Quality Assurance Plan (CQAP)**

The Settling Defendant shall submit a CQAP which describes the site-specific components of the quality assurance program which shall ensure that the completed project meets or exceeds all design criteria, plans, and specifications. The CQAP shall contain, at a minimum, the following elements:

1. Responsibilities and authorities of all organizations and key personnel involved in the design and construction of the Remedial Action.

2. Qualifications of the Quality Assurance Official to demonstrate he possesses the training and experience necessary to fulfill his identified responsibilities.

3. Protocols for sampling and testing used to monitor construction.

4. Identification of proposed quality assurance sampling activities including the sample size, locations, frequency of testing, acceptance and rejection data sheets, problem identification and corrective measures reports, evaluation reports, acceptance reports, and final documentation. A description of the provisions for final storage of all records consistent with the requirements of the Consent Decree shall be included.

5. Reporting requirements for CQA activities shall be described in detail in the CQA plan. This shall include such items as daily summary reports, inspection data sheets, problem identification and corrective measures reports, design acceptance reports, and final documentation. Provisions for the final storage of all records shall be presented in the CQA plan.

VI. SUMMARY OF MAJOR DELIVERABLES / MILESTONES SCHEDULE

A summary of the project schedule and reporting requirements contained in this Remedial SOW is presented below:

DELIVERABLE/MILESTONE	DUE DATE
Proposed ICIAP	30 days after EPA approval of the Final OU2 Remedial Design
OU 2 Revised Pre-final Remedial Design (95%)	30 days after Lodging of the Consent Decree.
OU 3 Revised Pre-final Design (95%)	30 days after Lodging of the Consent Decree
OU 2 Final Design (100%)	45 days after receipt of EPA's comments on the OU 2 Prefinal Remedial Design or such longer period as EPA may approve.
OU 3 Final Design (100%)	45 days after receipt of U.S. EPA's comments on the OU 3 Prefinal Design or such longer period as EPA may approve.
Draft Remedial Action Work Plan	60 days after approval or modification of the OU 2 and OU3 Final Designs or such longer period as EPA may approve
Final Remedial Action Work Plan	30 days after receipt of EPA's comments on the Draft RA Workplan or such longer period as EPA may approve.
Notice of Authorization to Proceed with RA	10 days after approval or modification of the

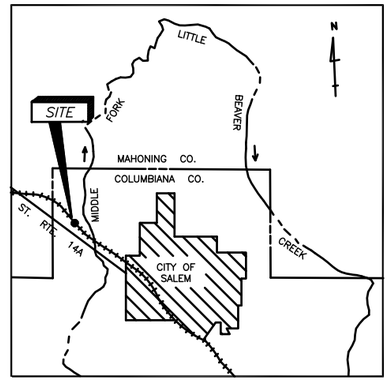
DELIVERABLE/MILESTONE	DUE DATE
	RA Workplan.
Award Remedial Action of Contract(s)	30 days after receipt of U.S. EPA's Notice of Authorization to Proceed with RA
Pre-Construction Inspection and Meeting(s)	15 days after Award of RA Contract(s)
Initiate Construction of OU 2 Remedial Action	15 days after Pre-Construction Inspection and Meeting(s)
Final OU 2 Remedial O&M Plan	No later than OU 2 prefinal inspection
Final OU 3 Remedial O&M Plan	No later than OU 3 prefinal inspection
Final ICIAP	No later than the OU 2 prefinal inspection
OU 2 Pre-final Inspection	No later than 15 days after OU 2 completion of construction
OU 3 Pre-final Inspection	No later than 15 days after OU 3 completion of construction
OU 2 Pre-final Inspection Report	15 days after completion of OU 2 prefinal inspection
OU 3 Pre-final Inspection Report	15 days after completion of OU 3 prefinal inspection
OU 2 Final Inspection	15 days after completion of work identified in the OU 2 prefinal inspection
OU 3 Final Inspection	15 days after completion of work identified in the OU 3 prefinal inspection
Completion of OU 2 Construction Report	60 days after OU 2 final inspection
Completion of OU 3 Construction Report	60 days after OU 3 final inspection
Completion of Remedial Action Report	See Consent Decree Section XVII
Completion of Remedial Work Report	See Consent Decree Section XVII

United States v. Rutgers Organics Corporation (N.D. Ohio)

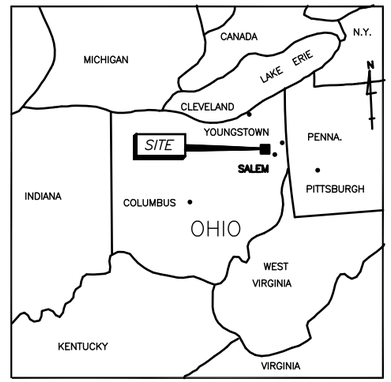
Consent Decree
Appendix F

Maps of Site and Assessment Area

BEECHWOOD ROAD
GAS PIPELINE
FORMER POND 4
FEEDER CREEK
SOIL/SLUDGE AREA
FORMER POND 1
FORMER POND 3
EXCLUSION AREA "B"
FORMER POND 2
(POND)
CRANE-DEMING COMPANY
CRANE-DEMING MARSH AREA (OFF-FACILITY SEEP)
INACTIVE (APPROX. LOCATION) LANDFILL
MIDDLE FORK OF LITTLE BEAVER CREEK
ALLEN ROAD
GARFIELD RD.
(EXCLUSION AREA "A")
STATE ROUTE 14
CONRAIL
PENNSYLVANIA AVENUE
SALEM WASTE WATER TREATMENT PLANT



LOCAL SETTING



REGIONAL SETTING

LEGEND

- FENCE
- RAILROAD TRACKS
- SURFACE WATER DRAINAGE
- WOODS

400 0 400
SCALE FEET

Golder Associates
Philadelphia USA

FILE No.	9336154E068
PROJECT No.	933-6154 REV. 0

SCALE	AS SHOWN
DATE	02/18/16
DESIGN	PSF
CADD	AM
CHECK	
REVIEW	

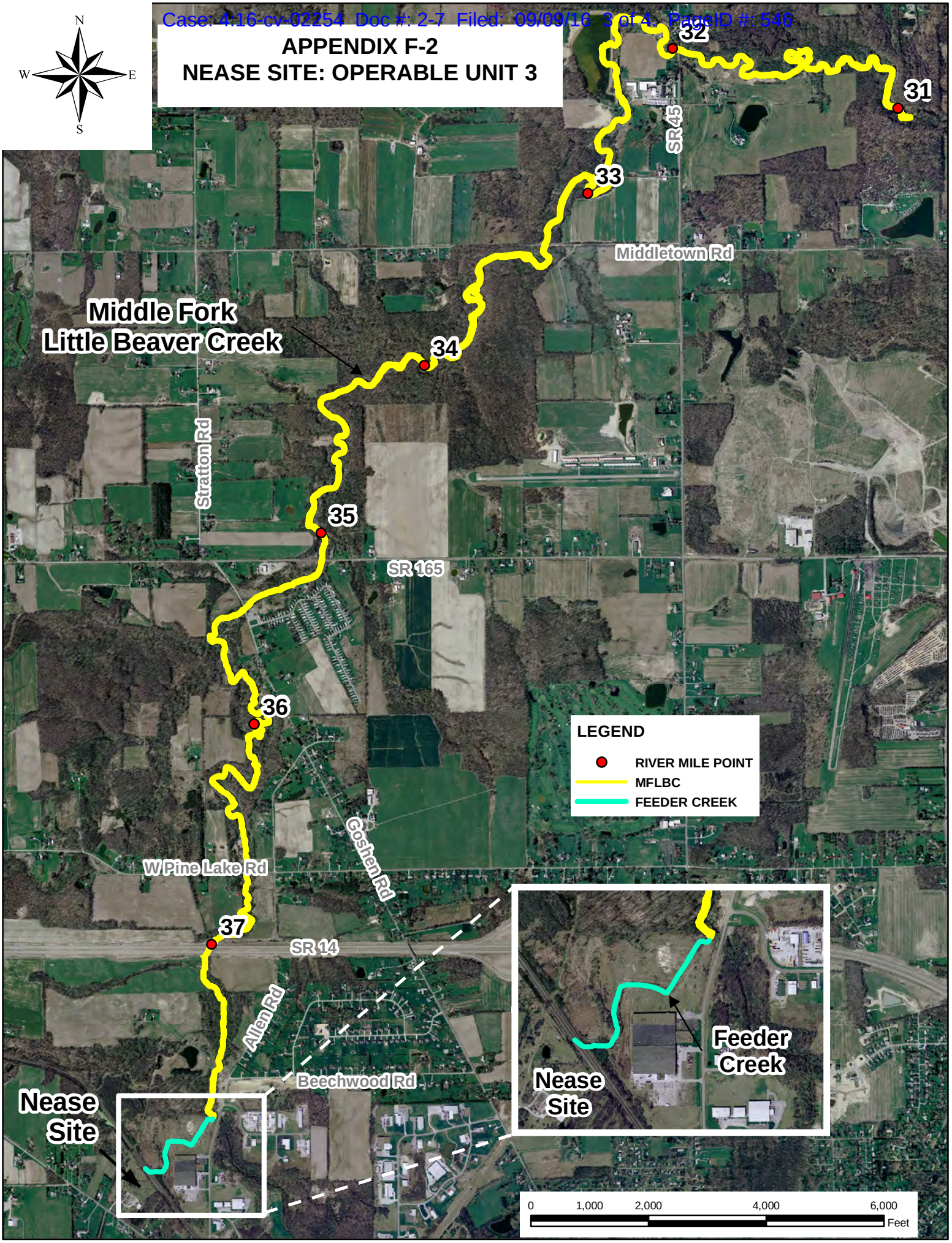
TITLE

APPENDIX F-1
NEASE SITE: OPERABLE UNIT 2

RUTGERS ORGANICS CORPORATION

Drawing file: 9336154E068.DWG Feb 18, 2016 - 4:31pm

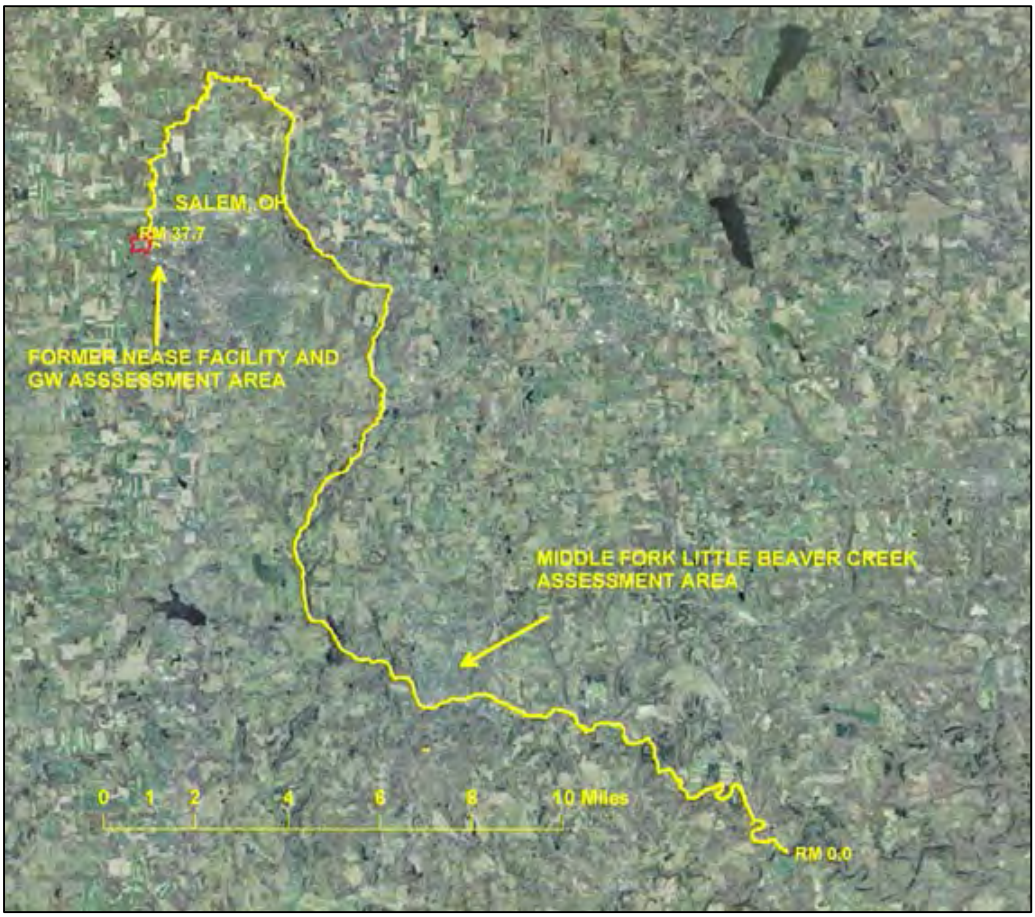
APPENDIX F-2
NEASE SITE: OPERABLE UNIT 3



Document Path: \\mtlaurel\gis\Projects\1993\933-6154\REPORT_FILES\R_-_AOC\MXD\9336154R001-rev3.mxd

APPENDIX F-3

NEASE SITE: NATURAL RESOURCE ASSESSMENT AREA



United States v. Rutgers Organics Corporation (N.D. Ohio)

Consent Decree
Appendix G-1

Draft Form of Proprietary Controls for Property Owned by Rutgers Organics Corporation

Appendix G-1
To Consent Decree, *United States v. Rutgers Organics Corporation* (N.D. Ohio)
Draft Form of Proprietary Controls

To be recorded with Deed Records - ORC § 317.08

ENVIRONMENTAL COVENANT

This Environmental Covenant is made as of the _____ day of _____, 2___, by and among Owner Rutgers Organics Corporation ("Owner" or "ROC") (as further identified below) and the United States Environmental Protection Agency ("EPA") pursuant to Ohio Revised Code ("ORC") §§ 5301.80 to 5301.92 for the purpose of subjecting the Property (described below) to the Activity and Use Limitations and to the rights of access described below.

Whereas, pursuant to Section 105 of the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), 42 U.S.C. § 9605, EPA placed the Nease Chemical Site ("Site") on the National Priorities List, set forth at 40 C.F.R. Part 300, Appendix B, by publication in the Federal Register, 48 Fed. Reg. 40658 (September 8, 1983); and,

Whereas, hazardous substances found at the Site included volatile organic compounds (VOCs) (such as benzene, perchloroethylene, and vinyl chloride), semi-volatile organic compounds (SVOCs) (such as diphenyl sulphone and 1,2,-dichlorobenzene), and mirex. Five unlined former wastewater treatment ponds at the Site contain VOCs, SVOCs, and mirex. Soil in areas of the Site also contains contaminants. In addition, both overburden (shallow) and bedrock (deep) groundwater are contaminated beneath and downgradient of the Site. VOCs are the primary risk-drivers in groundwater at the Site (although mirex and SVOCs have also been detected); and,

Whereas, the EPA approved a plan for environmental remediation of the Site in a Record of Decision for Operable Unit 2 (OU2 ROD) signed by the EPA Region 5 Superfund Division Director on September 29, 2005, with concurrence by the Director of Ohio EPA; a Record of Decision for Operable Unit 3 (OU3 ROD) signed by the EPA Region 5 Superfund Division Director on September 24, 2008, with concurrence by the Director of Ohio EPA; and, an Explanation of Significant Differences for Operable Unit 2 (OU2 ESD) signed by the EPA Region 5 Superfund Division Director on August 26, 2011. In a Consent Decree (and workplans developed pursuant to the Consent Decree, all of which are collectively referred to as "Consent Decree") entered into with the EPA and Ohio EPA, ROC agreed to implement a remedial action plan described in the OU2 ROD, OU3 ROD, and OU2 ESD; and,

Whereas, the Consent Decree requires implementation and compliance with activity and use limitations on the Site in order to prevent unacceptable exposures from remaining hazardous substances; and,

Whereas, the parties hereto have agreed: 1) to allow the Access Parties (as hereafter defined) a permanent right of access to the Property for purposes of implementing, facilitating and monitoring the Remedial Action, and 2) to impose Activity and Use Limitations on the Property

as covenants that will run with the land for the purpose of protecting human health and the environment; and,

Now therefore, Owner and EPA agree to the following:

1. Environmental Covenant. This instrument is an environmental covenant executed and delivered pursuant to ORC §§ 5301.80 to 5301.92.

2. Property. This Environmental Covenant concerns a _____ acre tract of real property located between Allen Road and Benton Road in Columbiana County, Salem, Ohio. The Property is more particularly described in Exhibit A attached hereto and hereby incorporated by reference.

3. Owner. The Property is owned by ROC ("Owner"). The mailing address of ROC is 2151 E College Avenue, State College, Pennsylvania 16801. Owner is the Settling Owner/Operator Defendant ("Settling Defendant") named in the Consent Decree.

4. Holder. Pursuant to ORC § 5301.81, the Holder of this Environmental Covenant is the Owner, ROC, whose address appears in Paragraph 3 above.

5. Agency. EPA and Ohio EPA are each the "Agency," as defined by ORC §5301.80(B), that determined or approved the Environmental Response Project, as set forth in the OU2 ROD, OU3 ROD, and OU2 ESD and confirmed by the Consent Decree, pursuant to which this Environmental Covenant is created.

6. Other Defined Terms. All capitalized terms in this Environmental Covenant which are not defined herein shall have the same meaning as set forth in the Consent Decree and, for terms not defined in the Consent Decree, the meaning set forth in ORC §§ 5301.80 to 5301.90.

7. Running with the Land. This Environmental Covenant shall be binding upon the Owner and 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.

8. Activity and Use Limitations on the Property. The following Activity and Use Limitations apply to the Property:

(a) Land Use Restrictions. The Property shall not be used for Residential Uses and Other Prohibited Uses. The term "Residential Uses and Other Prohibited Uses" means: (i) single and multi-family dwellings and transient residential units; (ii) occupancy on a 24-hour basis; (iii) uses to house, educate, or provide care for children, the elderly, the infirm, or other sensitive subpopulations; and (iv) agricultural uses. The Property shall also not be used in any manner that would interfere with or adversely affect the integrity or protectiveness of the Remedial Action which has been implemented or which will be implemented pursuant to the

Consent Decree unless the written consent of the EPA to such use is first obtained. Further, no Waste Material shall be brought onto the Property, except in accordance with any federal, state or local permit or the Consent Decree.

(b) No Interference with Cover. Except as provided in a plan approved in writing by EPA, the following activities are prohibited in any cover installed pursuant to the requirements of the Consent Decree: 1) any excavation or other intrusive activity that could affect the integrity of the cover; and 2) any disturbance of the materials underneath the cover.

(c) Groundwater Restrictions. Except as required as part of an EPA approved activity, or upon written certification by EPA that all applicable performance standards have been met, construction of wells and activities that extract, consume, or otherwise use any groundwater are prohibited on the Property.

(d) Restrictions on Construction. Construction over areas where a vapor intrusion pathway may occur is prohibited unless such construction includes adequate mitigation measures for the vapors, as demonstrated in a plan approved in writing by EPA.

(e) Fencing and Security. Fences and signs to secure the Property shall be maintained until the written consent of the EPA is obtained to modify such features.

9. Access Agreement. Owner agrees that EPA, Ohio EPA, and ROC, its successors and assigns, and its respective officers, employees, agents, contractors and its other invitees (collectively, "Access Parties") shall have an unrestricted right of access to the Property to undertake the Permitted Activities described in Paragraph 10 below. The right of access shall be irrevocable while this Environmental Covenant remains in effect.

10. Permitted Activities. At all reasonable times, the Access Parties shall have access to the Property for the purpose of conducting any activity related to the Consent Decree including, but not limited to, the following activities:

a) Monitoring the Remedial Work;

b) Verifying any data or information submitted to the EPA or Ohio EPA;

c) Conducting investigations relating to contamination at or near the Property;

d) Obtaining samples;

e) Assessing the need for, planning, or implementing response actions at or near the Property;

f) Assessing implementation of quality assurance and quality control practices as defined in the approved construction quality assurance plan (CQAP);

g) Implementing the Remedial Work pursuant to the Consent Decree;

h) Inspecting and copying records, operating logs, contracts, or other documents maintained or generated by Owner or its agents, consistent with Section XXIX (Access to Information) of the Consent Decree;

i) Assessing ROC's compliance with the Consent Decree;

j) Determining whether the Property or other property is being used in a manner that is prohibited or restricted or that may need to be prohibited or restricted under the Consent Decree; and,

k) Implementing, monitoring, maintaining, reporting on, and enforcing any Institutional Controls and the requirements of the Institutional Control Implementation and Assurance Plan (ICIAP).

11. Notice Upon Conveyance.

a) Each instrument conveying any interest in the Property shall contain a notice substantially in the form set forth in Exhibit C.

b) At least 60 days prior to the proposed conveyance of any interest in the Property, including, but not limited to, fee interests, leasehold interests, and mortgage interests, the Owner conveying the interest shall give written notice to EPA and Ohio EPA of the conveyance, including the name and address of the Transferee. The notice to EPA and Ohio EPA must include the date on which notice of the Consent Decree, this Environmental Covenant, and the rights of access set forth herein was given to the grantee of any interest in the Property.

12. Administrative Record. Owner is the Settling Defendant in an action filed by EPA under federal programs governing environmental remediation of the Site under CERCLA in the United States District Court for the Northern District of Ohio, Eastern Division, Civil Action No. _____ and has executed and delivered a Consent Decree dated _____ settling such lawsuit. A certified copy of the Consent Decree has been recorded in the Office of the Columbiana County Recorder at OR Book _____, Pages _____. The Consent Decree constitutes an Environmental Response Project as defined by ORC § 5301.80(E) and requires certain Remedial Action to be taken by the Owner. Copies of the EPA administrative record for the Site are maintained at the following locations:

EPA Region 5
Superfund Records Center (7th Floor)
77 W. Jackson Boulevard
Chicago, Illinois 60604

Lepper Library
303 E. Lincoln Way
Lisbon, Ohio

Salem Public Library
821 E. State Street
Salem, Ohio

13. Amendments; Early Termination. This Environmental Covenant may be modified or amended or terminated while Owner owns the property only by a writing signed by Owner and EPA, with the formalities required for the execution of a deed in Ohio which is recorded in the Office of the Recorder of Columbiana County, Ohio. Upon transfer of all or any portion of the Property, Owner waives any rights that it might otherwise have under ORC § 5301.90 to withhold its consent to any amendments, modifications, or termination of this Environmental Covenant, to the extent that Owner has transferred its interest in that portion of the Property affected by said modification, amendment or termination. The rights of Owner's successors in interest as to a modification, amendment or termination of this Environmental Covenant are governed by the provisions of ORC § 5301.90.

14. Other Matters.

(a) Representations and Warranties of Owner. Owner represents and warrants: that Owner is the sole owner of the Property; that Owner holds fee simple title to the Property which is free, clear and unencumbered except for the Consent Decree, and except for the interests which have been disclosed to EPA, and that EPA has determined that these interests do not impinge upon the efficacy of this Environmental Covenant.

(b) Right to Enforce; Equitable Remedies. This Environmental Covenant may be enforced through a civil action for injunctive or other equitable relief for any violation of any term or condition of this Environmental Covenant, including violation of the Activity and Use Limitations under Paragraph 8 and denial of the Permitted Activities under Paragraph 10. Such an action may be brought individually or jointly by EPA, Ohio EPA, and the Holder of this Environmental Covenant.

(c) Future Cooperation; Execution of Supplemental Instruments. Owner agrees to cooperate fully with EPA, Ohio EPA, and ROC to assist it in implementing the agreements made in this Environmental Covenant and, in furtherance thereof, agrees to execute and deliver such further documents as may be requested by EPA or Ohio EPA to confirm the agreements made hereunder.

(d) Cumulative Remedies; No Waiver. All remedies available hereunder shall be in addition to any and all other remedies at law or in equity, including CERCLA. Nothing in this Environmental Covenant affects EPA's authority to take or require performance of response actions to address releases or

threatened releases of hazardous substances or pollutants or contaminants at or from the Property, or to enforce a consent order, consent decree or other settlement agreement entered into by EPA. The failure to enforce any rights hereunder, to take action to remedy any violation by Owner of the terms hereof, or to exercise any remedy provided herein, shall not be deemed to be a waiver of any such right or remedy. No forbearance on the part of EPA, and no extension of the time for performance of any obligations of Owner, shall operate to release or in any manner affect EPA's rights.

(e) Severability. 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.

(f) Recordation. Within thirty (30) days after the date of the final required signature upon this Environmental Covenant, Owner shall file this Environmental Covenant for recording, in the same manner as a deed to the Property, with the Columbiana County Recorder's Office.

(g) Effective Date. 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 Columbiana County Recorder.

(h) Distribution of Environmental Covenant/Other Notices. The Owner shall distribute a file-stamped and date-stamped copy of the recorded Environmental Covenant to: EPA, Ohio EPA, Columbiana County, and each person holding a recorded interest in the Property. Within 30 days after recording a termination, amendment or modification of this Environmental Covenant, the owner in fee shall transmit a copy of the document in recorded form to: EPA, Ohio EPA, Columbiana County, and each person holding a recorded interest in the Property.

(i) Notices. All notices, requests, demands or other communications required or permitted under this Environmental Covenant shall be given in the manner and with the effect set forth in Section XXXI of the Consent Decree.

(j) Governing Law. Except as provided herein, the laws of the State of Ohio shall be the governing law. Federal law shall govern issues related to environmental remediation, the Environmental Response Project, the adequacy of the institutional controls to protect human health and the environment, and issues involving or relating to the authority of EPA. The federal court for the appropriate judicial district shall have jurisdiction of any action involving the EPA.

(k) Captions. All paragraph captions are for convenience of reference only and shall not affect the construction of any provision of this Environmental Covenant.

(l) Time of the Essence. Time is of the essence for each and every performance obligation of Owner under this Environmental Covenant.

[SIGNATURE PAGES TO FOLLOW]

IN WITNESS WHEREOF, Owner and EPA have executed and delivered this Environmental Covenant as of the date first above written.

FOR THE OWNER:

RUTGERS ORGANICS CORPORATION

By_____ (signature)

[Name of signer] _____ (print)

[Title] _____ (print)

State of Ohio)
) SS.
County of _____)

On _____, 20 __, this instrument was acknowledged before me by, <Name>, [use following when Grantor is an organization] [<Title> of <Name of Grantor>, on behalf of <Grantor>].

_____(signature)
Notary Public

My Commissioner Expires _____

FOR THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

On behalf of the Administrator of the
United States Environmental Protection Agency

By: _____
Richard C. Karl, Director,
Superfund Division, Region 5

STATE OF ILLINOIS)
) SS.
COUNTY OF COOK)

The foregoing instrument was acknowledged before me this ___ day of _____, 20__, by Richard C. Karl, Director, Superfund Division, Region 5 of the United States Environmental Protection Agency, on behalf of the United States of America.

_____(signature)
Notary Public

My Commissioner Expires _____

EXHIBIT A

Legal Description of the "Property"

EXHIBIT B

Drawing of Property

EXHIBIT C

Notice upon Conveyance of Property or any Portion Thereof

THE INTEREST CONVEYED HEREBY IS SUBJECT TO A CONSENT DECREE DATED _____, WHICH WAS RECORDED IN THE OFFICE OF THE COLUMBIANA COUNTY RECORDER, OR BOOK _____, Pages _____, AND WHICH RESTRICTS THE INTEREST CONVEYED AS SET FORTH IN THIS NOTICE AND AN ENVIRONMENTAL COVENANT, DATED _____, 200__, RECORDED IN THE DEED OR OFFICIAL RECORDS OF THE COLUMBIANA COUNTY RECORDER ON _____, 200__, in BOOK _____, Page _____. THE ENVIRONMENTAL COVENANT CONTAINS THE FOLLOWING ACTIVITY AND USE LIMITATIONS AND ACCESS RIGHTS:

Activity and Use Limitations on the Property. The following Activity and Use Limitations apply to the Property:

(a) Land Use Restrictions. The Property shall not be used for Residential Uses and Other Prohibited Uses. The term "Residential Uses and Other Prohibited Uses" means: (i) single and multi-family dwellings and transient residential units; (ii) occupancy on a 24-hour basis; (iii) uses to house, educate, or provide care for children, the elderly, the infirm, or other sensitive subpopulations; and (iv) agricultural uses. The Property shall also not be used in any manner that would interfere with or adversely affect the integrity or protectiveness of the Remedial Action which has been implemented or which will be implemented pursuant to the Consent Decree unless the written consent of the EPA to such use is first obtained. Further, no Waste Material shall be brought onto the Property, except in accordance with any federal, state or local permit or the Consent Decree.

(b) No Interference with Cover. Except as provided in a plan approved in writing by EPA, the following activities are prohibited in any cover installed pursuant to the requirements of the Consent Decree: 1) any excavation or other intrusive activity that could affect the integrity of the cover; and 2) any disturbance of the materials underneath the cover.

(c) Groundwater Restrictions. Except as required as part of an EPA approved activity, or upon written certification by EPA that all applicable performance standards have been met, construction of wells and activities that extract, consume, or otherwise use any groundwater are prohibited on the Property.

(d) Restrictions on Construction. Construction over areas where a vapor intrusion pathway may occur is prohibited unless such construction includes adequate mitigation measures for the vapors, as demonstrated in a plan approved in writing by EPA.

(e) Fencing and Security. Fences and signs to secure the Property shall be maintained until the written consent of the EPA is obtained to modify such features.

Access Agreement. Owner agrees that EPA, Ohio EPA, and ROC, its successors and assigns, and its respective officers, employees, agents, contractors and its other invitees (collectively, "Access Parties") shall have an unrestricted right of access to the Property to undertake the Permitted Activities described below. The right of access shall be irrevocable while this Environmental Covenant remains in effect.

Permitted Activities. At all reasonable times, the Access Parties shall have access to the Property for the purpose of conducting any activity related to the Consent Decree including, but not limited to, the following activities:

a) Monitoring the Remedial Work;

b) Verifying any data or information submitted to the EPA or Ohio EPA;

c) Conducting investigations relating to contamination at or near the Property;

d) Obtaining samples;

e) Assessing the need for, planning, or implementing response actions at or near the Property;

f) Assessing implementation of quality assurance and quality control practices as defined in the approved construction quality assurance plan (CQAP);

g) Implementing the Remedial Work pursuant to the Consent Decree;

h) Inspecting and copying records, operating logs, contracts, or other documents maintained or generated by Owner or its agents, consistent with Section XXIX (Access to Information) of the Consent Decree;

i) Assessing ROC's compliance with the Consent Decree;

j) Determining whether the Property or other property is being used in a manner that is prohibited or restricted or that may need to be prohibited or restricted under the Consent Decree; and,

k) Implementing, monitoring, maintaining, reporting on, and enforcing any Institutional Controls and the requirements of the Institutional Control Implementation and Assurance Plan (ICIAP).

United States v. Rutgers Organics Corporation (N.D. Ohio)

Consent Decree
Appendix G-2

Draft Form of Proprietary Controls for Property Not Owned by Rutgers Organics Corporation

Appendix G-2
To Consent Decree, *United States v. Rutgers Organics Corporation* (N.D. Ohio)
Draft Form of Proprietary Controls

To be recorded with Deed Records - ORC § 317.08

ENVIRONMENTAL COVENANT

This Environmental Covenant is made as of the _____ day of _____, 2___, by and among Owner _____ ("Owner") (as further identified below) and the United States Environmental Protection Agency ("EPA") pursuant to Ohio Revised Code ("ORC") §§ 5301.80 to 5301.92 for the purpose of subjecting the Property (described below) to the Activity and Use Limitations and to the rights of access described below.

Whereas, pursuant to Section 105 of the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), 42 U.S.C. § 9605, EPA placed the Nease Chemical Site ("Site") on the National Priorities List, set forth at 40 C.F.R. Part 300, Appendix B, by publication in the Federal Register, 48 Fed. Reg. 40658 (September 8, 1983); and,

Whereas, hazardous substances found at the Site included volatile organic compounds (VOCs) (such as benzene, perchloroethylene, and vinyl chloride), semi-volatile organic compounds (SVOCs) (such as diphenyl sulphone and 1,2,-dichlorobenzene), and mirex. Five unlined former wastewater treatment ponds at the Site contain VOCs, SVOCs, and mirex. Soil in areas of the Site also contains contaminants. In addition, both overburden (shallow) and bedrock (deep) groundwater are contaminated beneath and downgradient of the Site. VOCs are the primary risk-drivers in groundwater at the Site (although mirex and SVOCs have also been detected); and,

Whereas, the EPA approved a plan for environmental remediation of the Site in a Record of Decision for Operable Unit 2 (OU2 ROD) signed by the EPA Region 5 Superfund Division Director on September 29, 2005, with concurrence by the Director of Ohio EPA; a Record of Decision for Operable Unit 3 (OU3 ROD) signed by the EPA Region 5 Superfund Division Director on September 24, 2008, with concurrence by the Director of Ohio EPA; and, an Explanation of Significant Differences for Operable Unit 2 (OU2 ESD) signed by the EPA Region 5 Superfund Division Director on August 26, 2011. In a Consent Decree (and workplans developed pursuant to the Consent Decree, all of which are collectively referred to as "Consent Decree") entered into with the EPA and Ohio EPA, Rutgers Organics Corporation ("ROC") agreed to implement a remedial action plan described in the OU2 ROD, OU3 ROD, and OU2 ESD; and,

Whereas, the Consent Decree requires implementation and compliance with activity and use limitations on the Site in order to prevent unacceptable exposures from remaining hazardous substances; and,

Whereas, the parties hereto have agreed: 1) to allow the Access Parties (as hereafter defined) a permanent right of access to the Property for purposes of implementing, facilitating and monitoring the Remedial Action, and 2) to impose Activity and Use Limitations on the Property

as covenants that will run with the land for the purpose of protecting human health and the environment; and,

Now therefore, Owner and EPA agree to the following:

1. Environmental Covenant. This instrument is an environmental covenant executed and delivered pursuant to ORC §§ 5301.80 to 5301.92.

2. Property. This Environmental Covenant concerns a _____ acre tract of real property located near the intersection of _____ and _____ in Columbiana County, Salem, Ohio. The Property is more particularly described in Exhibit A attached hereto and hereby incorporated by reference.

3. Owner. The Property is owned by _____ ("Owner"), who resides at _____.

4. Holder. Pursuant to ORC § 5301.81, the Holder of this Environmental Covenant is the Owner, whose address appears in Paragraph 3 above [AND, IF APPROPRIATE: ROC, whose address is 2151 E College Avenue, State College, Pennsylvania, 16801. ROC is the Settling Defendant named in the Consent Decree].

5. Agency. EPA and Ohio EPA are each the "Agency," as defined by ORC § 5301.80(B), that determined or approved the Environmental Response Project, as set forth in the OU2 ROD, OU3 ROD, and OU2 ESD and confirmed by the Consent Decree, pursuant to which this Environmental Covenant is created.

6. Other Defined Terms. All capitalized terms in this Environmental Covenant which are not defined herein shall have the same meaning as set forth in the Consent Decree and, for terms not defined in the Consent Decree, the meaning set forth in ORC §§ 5301.80 to 5301.90.

7. Running with the Land. This Environmental Covenant shall be binding upon the Owner and 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.

8. Activity and Use Limitations on the Property. The following Activity and Use Limitations apply to the Property:

(a) Land Use Restrictions. [FILL IN WITH APPROPRIATE LAND USE RESTRICTIONS FOR THE PROPERTY – E.G., FOR 1435 ALLEN ROAD, THE EC SHOULD PROHIBIT "RESIDENTIAL AND OTHER PROHIBITED USES" AS THAT TERM IS USED IN APPENDIX G-1.]. The Property shall also not be used in any manner that would interfere with or adversely affect the integrity or protectiveness of the Remedial Action which has been implemented or which will be implemented pursuant to the Consent Decree unless the written consent of the

EPA to such use is first obtained. Further, no Waste Material shall be brought onto the Property, except in accordance with any federal, state or local permit or the Consent Decree.

[NB: DEPENDING ON THE PARTICULAR PROPERTY AT ISSUE, THE FOLLOWING RESTRICTIONS MAY OR MAY NOT APPLY]:

(b) No Interference with Cover. Except as provided in a plan approved in writing by EPA, the following activities are prohibited in any cover installed pursuant to the requirements of the Consent Decree: 1) any excavation or other intrusive activity that could affect the integrity of the cover; and 2) any disturbance of the materials underneath the cover.

(c) Groundwater Restrictions. Except as required as part of an EPA approved activity, or upon written certification by EPA that all applicable performance standards have been met, construction of wells and activities that extract, consume, or otherwise use any groundwater are prohibited on the Property.

(d) Restrictions on Construction. Construction over areas where a vapor intrusion pathway may occur is prohibited unless such construction includes adequate mitigation measures for the vapors, as demonstrated in a plan approved in writing by EPA.

(e) [OTHER RESTRICTIONS AS APPROPRIATE TO THE PROPERTY]

9. Access Agreement. Owner agrees that EPA, Ohio EPA, and ROC, its successors and assigns, and its respective officers, employees, agents, contractors (collectively, "Access Parties") shall have an unrestricted right of access to the Property to undertake the Permitted Activities described in Paragraph 10 below. The right of access shall be irrevocable while this Environmental Covenant remains in effect.

10. Permitted Activities. At all reasonable times, the Access Parties shall have access to the Property for the purpose of conducting any activity related to the Consent Decree including, but not limited to, the following activities:

a) Monitoring the Remedial Work;

b) Verifying any data or information submitted to the EPA or Ohio EPA;

c) Conducting investigations relating to contamination at or near the Property;

d) Obtaining samples;

e) Assessing the need for, planning, or implementing response actions at or near the Property;

f) Assessing implementation of quality assurance and quality control practices as defined in the approved construction quality assurance plan (CQAP);

g) Implementing the Remedial Work pursuant to the Consent Decree;

h) Inspecting and copying records, operating logs, contracts, or other documents maintained or generated by Owner or its agents, consistent with Section XXIX (Access to Information) of the Consent Decree;

i) Assessing ROC's compliance with the Consent Decree;

j) Determining whether the Property or other property is being used in a manner that is prohibited or restricted or that may need to be prohibited or restricted under the Consent Decree; and,

k) Implementing, monitoring, maintaining, reporting on, and enforcing any Institutional Controls and the requirements of the Institutional Control Implementation and Assurance Plan (ICIAP).

11. Notice Upon Conveyance.

a) Each instrument conveying any interest in the Property shall contain a notice substantially in the form set forth in Exhibit C.

b) At least 60 days prior to the proposed conveyance of any interest in the Property, including, but not limited to, fee interests, leasehold interests, and mortgage interests, the Owner conveying the interest shall give written notice to EPA, Ohio EPA, and ROC of the conveyance, including the name and address of the Transferee. The notice to EPA, Ohio EPA, and ROC must include the date on which notice of the Consent Decree, this Environmental Covenant, and the rights of access set forth herein was given to the grantee of any interest in the Property.

12. Administrative Record. ROC is the Settling Defendant in an action filed by EPA under federal programs governing environmental remediation of the Site under CERCLA in the United States District Court for the Northern District of Ohio, Eastern Division, Civil Action No. _____ and has executed and delivered a Consent Decree dated _____ settling such lawsuit. A certified copy of the Consent Decree has been recorded in the Office of the Columbiana County Recorder at OR Book _____, Pages _____. The Consent Decree constitutes an Environmental Response Project as defined by ORC § 5301.80(E) and requires certain Remedial Action to be taken by the ROC. Copies of the EPA administrative record for the Site are maintained at the following locations:

EPA Region 5
Superfund Records Center (7th Floor)
77 W. Jackson Boulevard
Chicago, Illinois 60604

Lepper Library
303 E. Lincoln Way
Lisbon, Ohio

Salem Public Library
821 E. State Street
Salem, Ohio

13. Amendments; Early Termination. This Environmental Covenant may be modified or amended or terminated while Owner owns the property only by a writing signed by Owner and EPA, with the formalities required for the execution of a deed in Ohio which is recorded in the Office of the Recorder of Columbiana County, Ohio. Upon transfer of all or any portion of the Property, Owner waives any rights that it might otherwise have under ORC § 5301.90 to withhold its consent to any amendments, modifications, or termination of this Environmental Covenant, to the extent that Owner has transferred its interest in that portion of the Property affected by said modification, amendment or termination. The rights of Owner's successors in interest as to a modification, amendment or termination of this Environmental Covenant are governed by the provisions of ORC § 5301.90.

14. Other Matters.

(a) Representations and Warranties of Owner. Owner represents and warrants: that Owner is the sole owner of the Property; that Owner holds fee simple title to the Property which is free, clear and unencumbered except for the Consent Decree, and except for the interests which have been disclosed to EPA, and that EPA has determined that these interests do not impinge upon the efficacy of this Environmental Covenant.

(b) Right to Enforce; Equitable Remedies. This Environmental Covenant may be enforced through a civil action for injunctive or other equitable relief for any violation of any term or condition of this Environmental Covenant, including violation of the Activity and Use Limitations under Paragraph 8 and denial of the Permitted Activities under Paragraph 10. Such an action may be brought individually or jointly by EPA, Ohio EPA, and the Holder of this Environmental Covenant.

(c) Future Cooperation; Execution of Supplemental Instruments. Owner agrees to cooperate fully with EPA, Ohio EPA, and ROC to assist it in implementing the agreements made in this Environmental Covenant and, in furtherance thereof, agrees to execute and deliver such further documents as may be requested by EPA or Ohio EPA to confirm the agreements made hereunder.

(d) Cumulative Remedies; No Waiver. All remedies available hereunder shall be in addition to any and all other remedies at law or in equity, including

CERCLA. Nothing in this Environmental Covenant affects EPA's authority to take or require performance of response actions to address releases or threatened releases of hazardous substances or pollutants or contaminants at or from the Property, or to enforce a consent order, consent decree or other settlement agreement entered into by EPA. The failure to enforce any rights hereunder, to take action to remedy any violation by Owner of the terms hereof, or to exercise any remedy provided herein, shall not be deemed to be a waiver of any such right or remedy. No forbearance on the part of EPA, and no extension of the time for performance of any obligations of Owner, shall operate to release or in any manner affect EPA's rights.

(e) Severability. 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.

(f) Recordation. Within thirty (30) days after the date of the final required signature upon this Environmental Covenant, Owner shall file this Environmental Covenant for recording, in the same manner as a deed to the Property, with the Columbiana County Recorder's Office.

(g) Effective Date. 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 Columbiana County Recorder.

(h) Distribution of Environmental Covenant/Other Notices. The Owner shall distribute a file-stamped and date-stamped copy of the recorded Environmental Covenant to: EPA, Ohio EPA, Columbiana County, and each person holding a recorded interest in the Property. Within 30 days after recording a termination, amendment or modification of this Environmental Covenant, the Owner in fee shall transmit a copy of the document in recorded form to: EPA, Ohio EPA, Columbiana County, and each person holding a recorded interest in the Property.

(i) Notices. All notices, requests, demands or other communications required or permitted under this Environmental Covenant shall be given in the manner and with the effect set forth in Section XXXI of the Consent Decree.

(j) Governing Law. Except as provided herein, the laws of the State of Ohio shall be the governing law. Federal law shall govern issues related to environmental remediation, the Environmental Response Project, the adequacy of the institutional controls to protect human health and the environment, and issues involving or relating to the authority of EPA. The federal court for the appropriate judicial district shall have jurisdiction of any action involving the EPA.

(k) Captions. All paragraph captions are for convenience of reference only and shall not affect the construction of any provision of this Environmental Covenant.

(l) Time of the Essence. Time is of the essence for each and every performance obligation of Owner under this Environmental Covenant.

[SIGNATURE PAGES TO FOLLOW]

IN WITNESS WHEREOF, Owner and EPA have executed and delivered this Environmental Covenant as of the date first above written.

FOR THE OWNER:

By_____ (signature)

[Name of signer] _____ (print)

[Title] _____ (print)

State of Ohio)
) SS.
County of _____)

On _____, 20 __, this instrument was acknowledged before me by, <Name>, [use following when Grantor is an organization] [<Title> of <Name of Grantor>, on behalf of <Grantor>].

_____(signature)
Notary Public

My Commissioner Expires _____

FOR THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

On behalf of the Administrator of the
United States Environmental Protection Agency

By: _____
Richard C. Karl, Director,
Superfund Division, Region 5

STATE OF ILLINOIS)
) SS.
COUNTY OF COOK)

The foregoing instrument was acknowledged before me this ___ day of _____, 20__, by Richard C. Karl, Director, Superfund Division, Region 5 of the United States Environmental Protection Agency, on behalf of the United States of America.

_____(signature)
Notary Public

My Commissioner Expires _____

EXHIBIT A

Legal Description of the Property

EXHIBIT B

Drawing of Property

EXHIBIT C

Notice upon Conveyance of Property or any Portion Thereof

THE INTEREST CONVEYED HEREBY IS SUBJECT TO A CONSENT DECREE DATED _____, WHICH WAS RECORDED IN THE OFFICE OF THE COLUMBIANA COUNTY RECORDER, OR BOOK _____, Pages _____, AND WHICH RESTRICTS THE INTEREST CONVEYED AS SET FORTH IN THIS NOTICE AND AN ENVIRONMENTAL COVENANT, DATED _____, 200__, RECORDED IN THE DEED OR OFFICIAL RECORDS OF THE COLUMBIANA COUNTY RECORDER ON _____, 200__, in BOOK _____, Page _____. THE ENVIRONMENTAL COVENANT CONTAINS THE FOLLOWING ACTIVITY AND USE LIMITATIONS AND ACCESS RIGHTS:

Activity and Use Limitations on the Property. The following Activity and Use Limitations apply to the Property:

(a) Land Use Restrictions. [FILL IN WITH APPROPRIATE LAND USE RESTRICTIONS FOR THE PROPERTY – E.G., FOR 1435 ALLEN ROAD, THE EC SHOULD PROHIBIT "RESIDENTIAL AND OTHER PROHIBITED USES" AS THAT TERM IS USED IN APPENDIX G-1.]. The Property shall also not be used in any manner that would interfere with or adversely affect the integrity or protectiveness of the Remedial Action which has been implemented or which will be implemented pursuant to the Consent Decree unless the written consent of the EPA to such use is first obtained. Further, no Waste Material shall be brought onto the Property, except in accordance with any federal, state or local permit or the Consent Decree.

[NB: DEPENDING ON THE PARTICULAR PROPERTY AT ISSUE, THE FOLLOWING RESTRICTIONS MAY OR MAY NOT APPLY]:

(b) No Interference with Cover. Except as provided in a plan approved in writing by EPA, the following activities are prohibited in any cover installed pursuant to the requirements of the Consent Decree: 1) any excavation or other intrusive activity that could affect the integrity of the cover; and 2) any disturbance of the materials underneath the cover.

(c) Groundwater Restrictions. Except as required as part of an EPA approved activity, or upon written certification by EPA that all applicable performance standards have been met, construction of wells and activities that extract, consume, or otherwise use any groundwater are prohibited on the Property.

(d) Restrictions on Construction. Construction over areas where a vapor intrusion pathway may occur is prohibited unless such construction includes adequate mitigation measures for the vapors, as demonstrated in a plan approved in writing by EPA.

(e) [OTHER RESTRICTIONS AS APPROPRIATE TO THE PROPERTY]

Access Agreement. Owner agrees that EPA, Ohio EPA, and ROC, its successors and assigns, and its respective officers, employees, agents, contractors (collectively, "Access Parties") shall have an unrestricted right of access to the Property to undertake the Permitted Activities described below. The right of access shall be irrevocable while this Environmental Covenant remains in effect.

Permitted Activities. At all reasonable times, the Access Parties shall have access to the Property for the purpose of conducting any activity related to the Consent Decree including, but not limited to, the following activities:

a) Monitoring the Remedial Work;

b) Verifying any data or information submitted to the EPA or Ohio EPA;

c) Conducting investigations relating to contamination at or near the Property;

d) Obtaining samples;

e) Assessing the need for, planning, or implementing response actions at or near the Property;

f) Assessing implementation of quality assurance and quality control practices as defined in the approved construction quality assurance plan (CQAP);

g) Implementing the Remedial Work pursuant to the Consent Decree;

h) Inspecting and copying records, operating logs, contracts, or other documents maintained or generated by Owner or its agents, consistent with Section XXIX (Access to Information) of the Consent Decree;

i) Assessing ROC's compliance with the Consent Decree;

j) Determining whether the Property or other property is being used in a manner that is prohibited or restricted or that may need to be prohibited or restricted under the Consent Decree; and,

k) Implementing, monitoring, maintaining, reporting on, and enforcing any Institutional Controls and the requirements of the Institutional Control Implementation and Assurance Plan (ICIAP).

United States v. Rutgers Organics Corporation (N.D. Ohio)

Consent Decree
Appendix H

Restoration Statement of Work

Restoration Statement of Work for the
Natural Resource Damage Settlement with Rütgers Organics Corporation for
Injuries Related to the Former Nease Chemical Facility

I. Purpose

The purpose of this Statement of Work is to describe the general requirements for Restoration Work Plans to be developed by Rütgers Organics Corporation (ROC) to implement restoration for the projects listed below. Two Restoration Work Plans are anticipated, one for the Lisbon Dam removal and one for the Conserved Lands. If Trustees believe that additional or supplemental work plans are needed, Trustees will so inform ROC. The Restoration Work Plans are to be submitted to the Trustees for their review and approval prior to initiating the restoration.

II. Restoration Projects

The Restoration Projects agreed to by the Trustees and ROC include the removal of Lisbon Dam or "Dam" and the conservation of a minimum of 153 acres of suitable habitat within the Little Beaver Creek watershed and the City of Salem drinking water source areas (*i.e.*, Priority Properties[1] and/or Alternate Properties selected in accordance with the Alternate Properties Screening Criteria established in the Consent Decree as Appendix K) as well as an existing 7-acre wetland and adjacent habitat in the northwest portion of the Former Nease facility. The role of the Restoration Work Plans is to provide detailed information on the restoration activities to be conducted for the Restoration Projects and to specify how ROC will achieve the Restoration Performance Standards in full satisfaction of the requirements of the Consent Decree.

III. Restoration Work Plans Requirements (General)

General Restoration Work Plan requirements are provided below and reflect the scope of the Restoration Projects agreed to by ROC and the Trustees.

a. Removal of Lisbon Dam

The Dam Restoration Work Plan shall describe in detail the proposed removal of Lisbon Dam. This information should include:

1. A topographic map showing the location of the Lisbon Dam in relation to the Former Nease Chemical Facility.

[1] The "Priority Properties" are: riparian and forested land at river mile 35 and river mile 33.3 of the Middle Fork of the Little Beaver Creek (estimated acreage of 72 acres), Egypt Swamp riparian land (estimated acreage of 18 acres), riparian and forested land around river mile 31 of the Middle Fork of the Little Beaver Creek (estimated acreage of 20 acres), and protection of the City of Salem water resource areas (estimated acreage of 40 acres) as well as 3 acres of riparian habitat at the Lisbon Dam location.

2. Preliminary (30% level) plans or designs to remove the main span of the Dam, including the use or disposal of the concrete rubble resulting from the Dam removal. Plans shall include:
   (i) any restoration activities required or anticipated as the result of the dam removal activities (*e.*g., bank repair/stabilization, one-time removal of invasive species, seeding of grass or replacement of removed trees/vegetation).
   (ii) Locations of equipment and material staging areas.
   (iii) Locations of ingress and egress rights of way.
   (iv) Potential locations(s) of disposal sites(s) for Dam material (if necessary).
3. The contracting approach (for example, design/build) proposed by ROC to complete the Dam removal, including provisions for oversight by ROC and the Trustees.
4. A draft Conservation Instrument as per Paragraph 76 of the Consent Decree for the three (3) acres of riparian habitat at the Dam location that will be pursued by ROC.
5. Location of the three (3) acres described above and a description of the intended restoration (*e.g.*, one-time removal of invasive species and one-time planting of native species of plants and shrubs to enhance the riparian habitat, if needed).
6. Identification of any permits[2] necessary for the Dam removal and restoration activities, and description of any activities necessary to comply with such permits.
7. A proposed schedule for the completion of the Dam removal project. The schedule should identify all stages of the Dam removal (*e.g.*, obtaining access; clearing and grubbing; breaching the Dam; demolition sequence, disposal of Dam materials, post-removal activities) and the submission of a Restoration Completion Report summarizing the work completed.

b. Conserved Lands

ROC shall prepare a Conserved Lands Restoration Work Plan that describes the process to be used to conserve a minimum of 153 acres (*i.e.*, Priority Properties and/or Alternate Properties) of appropriate habitat. As provided in the Consent Decree, Alternate Properties may be implemented under certain circumstances. In such cases, Work Plan Supplements may be required. The Conserved Lands Restoration Work Plan and/or Work Plan Supplements shall include:

1. A description of the ROC Conservation Trust or "Trust" and its goals, specifically for conserving a minimum of 153 acres in the Little Beaver Creek watershed and the City of Salem drinking water source areas. The

[2] ROC, with the assistance of the Trustees, will obtain any necessary permits for the removal of Lisbon Dam. The permits may be provided as attachments to the Restoration Completion Report (*i.e.*, not required in the Restoration Work Plan).

total initial value of the Trust ($366,000) and an outline of how the Trust funds will be expended should be included.

2. Identification of the Grantee of the Trust.
3. A brief description of the type of properties targeted for conservation, including their habitat type and quality.
4. A description of the Grantee's process for acquiring land and/or Conservation Instruments as per Paragraph 76 of the Consent Decree and the selection process to be used for identifying and acquiring the Conserved Lands. In the case of Alternate Properties, the selection process shall be in accordance with the Alternate Properties Screening Criteria provided in Appendix K of the Consent Decree.
5. Conservation Instruments, including prohibitions and activity and use limitations anticipated for the Conserved Lands, based upon the applicable template attached to the Consent Decree as Appendix I.
6. A proposed schedule to acquire the minimum acreage required by the Consent Decree and additional acres conserved until the Trust money is exhausted.
7. Topographic maps showing the location(s) and estimated acreage of the properties to be targeted for conservation, as available at the time of Work Plan submission.
8. Identification of any necessary one-time removal of invasive species and replanting with native species, if necessary to prevent unacceptable soil erosion or storm water run-off, on the targeted Conserved Lands.
9. A proposed schedule for completion of the acquisition of interests in the Conserved Lands, identifying all stages of the land acquisition as per number 4 above.

c. Donation of Wetland

ROC will donate an existing seven (7) acre wetland and adjacent habitat in the Northwest portion of the Former Nease Facility to the Grantee of the ROC Conservation Trust for perpetual conservation. The Conserved Lands Restoration Work Plan shall include the following:

1. Topographic map showing the location and boundaries of the area to be donated.
2. A brief description of the area targeted for conservation, including the habitat type and quality.
3. Draft Conservation Instrument including prohibitions and activity and use limitations anticipated for the Conserved Land, based upon the applicable template attached to the Consent Decree as Appendix I.
4. Identification of the Grantee.
5. A proposed schedule for completion of the donation of the Site wetland.

IV. Restoration Performance Standards

The Restoration Work Plans shall specify how ROC will achieve the following restoration performance standards consistent with Section X of the Consent Decree:

- Removal of the main span of the Lisbon Dam, which will enhance habitat quality and the movement and colonization by fish and invertebrate species.
- Protection of 40 acres of potable water source areas from contamination, by means of Conservation Instruments as per Paragraph 76 of the Consent Decree.
- Protection of at least 120 acres of wetlands, associated riparian habitat and ecologically associated uplands, by means of Conservation Instruments, which will foster and promote increased spawning and nursery habitats for fish, as well as nesting and foraging opportunities for a wide variety of birds and other wildlife. [3]

V. Restoration Completion Report

Restoration Completion Report(s), including the following components, shall be submitted per the deliverables schedule in the Work Plans.

1. For Lisbon Dam, the Restoration Completion Report shall include a detailed summary of the work completed, including the disposition of removed materials and any stabilization and/or any restoration activities conducted in conjunction with the Dam removal.

2. For the Conserved Lands, a map showing the location and acreage of the properties acquired, and a brief summary of their ecological value and any restoration activities conducted.

3. A certification that interests in the Conserved Lands have been acquired and/or transferred to the Grantee, and that the associated Conservation Instruments have been recorded.

4. A summary of the costs incurred by ROC for the acquisition of the Conserved Lands.

VI. Progress Reports

During the period of the development and implementation of the Restoration Work Plans, ROC shall submit brief (1 to 2 page) monthly progress reports delineating the status of the various Restoration Projects. The Progress Report for each month shall be submitted by the 10th day of the following month. The frequency of the Progress Reports may be reduced as agreed to by the Trustees. The progress reports shall include:

[3] As detailed in Section X of the Consent Decree, the 120 acres includes 110 acres of Conserved Lands, 7 acres of wetlands donated by ROC, and 3 acres of riparian habitat in the Lisbon Dam area.

1. Activities conducted during the period.
2. Problems encountered during the period.
3. Schedule variances and corrective actions, if necessary.
4. Projected activities for the next month.
5. As specific restoration properties are identified for conservation, a brief description of their value from a natural resource restoration standpoint. This should include a brief summary of the ecological habitat and restoration activities, if any.
6. Documents related to or appertaining to Conservation Instruments.
7. Status of permits and applications, as applicable.
8. An accounting of the funds remaining in the Trust on a quarterly basis.

VII. Deliverables

The following deliverables will be generated and submitted to the Trustee representatives for approval as per the schedule below. Note that some specific deliverables may be streamlined or waived at the discretion of the Trustees.

DELIVERABLE (UNLESS WAIVED BY THE TRUSTEES)	**DUE DATE**
Restoration Work Plans	60 days after the effective date of the Consent Decree
Progress Reports	The 10th day of the subsequent month following the effective date of the Consent Decree, unless the due date is modified or the requirement is waived by the Trustees
Restoration Completion Report(s)	In accordance with the Consent Decree

In addition to the requirements of Section XXXI of the Consent Decree, deliverables shall also be submitted via electronic mail to the Trustee Project Coordinators at the addresses specified below, unless those individuals or their successors give notice of a change to ROC in writing:

- Deborah Millsap, U.S. Fish and Wildlife Service, deborah_millsap@fws.gov
- Sheila Abraham, Ohio EPA North East District Office, sheila.abraham@epa.ohio.gov

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Consent Decree
Appendix I

Conservation Instruments Templates

CONSERVATION EASEMENT TEMPLATE

To be used when there are three parties: (i) the Grantor of the Conservation Easement; (ii) the Grantee for the Conservation Easement and (iii) the Natural Resource Trustees

CONSERVATION EASEMENT

This Conservation Easement (hereinafter referred to as the "Easement") is made and entered into this ____ day of _____, 20XX, by (Insert Grantor's name(s)), whose address is (Insert full address) (hereinafter referred to as "Grantor(s)"), and the (Insert Grantee's name), an Ohio nonprofit corporation, whose address is (Insert full address), together with its successors and assigns, (hereinafter referred to as "Grantee"), in cooperation with the Ohio Environmental Protection Agency ("Ohio EPA") and the United States acting through the United States Department of the Interior, United States Fish & Wildlife Service ("U.S. FWS") on behalf of the Nease Natural Resource Damage Trustees, which consist of authorized representatives of the U.S. FWS and the Ohio EPA (hereinafter referred to as the "Nease Trustees"). The Grantor, the Grantee, and the Nease Trustees are hereinafter collectively referred to as the "Parties." The terms Grantor and Grantee as used herein include heirs, successors and assigns of each.

This is an agreement for the granting of a conservation easement by Grantor and the monitoring and enforcement of such Easement by Grantee. Specifically, Grantee agrees to purchase the Easement from the Grantor for (insert amount) provided by (funds source) pursuant to the United States' and the State of Ohio's natural resource damage settlement with Rutgers Organics Corporation (ROC) filed as a consent decree on (insert Consent Decree date, United States District Court, Northern District of Ohio, Eastern Division, case caption and number). Grantee agrees to monitor and enforce the Easement in perpetuity.

RECITALS

A. Conserved Land

Whereas, Grantor is the owner in fee simple of approximately (insert property acreage) of real property located at (insert full address, including county and parcel Nos) (hereinafter referred to as the "Conserved Land"), legally described on Exhibit A attached hereto and to which this Easement applies. Grantor has full authority to convey this Easement and has a good and indefeasible fee simple title to the Conserved Land, which Grantor hereby warrants is free and clear of all liens and encumbrances not beneficial to the conservation of natural resources or otherwise impacting the enforceability of this Easement.

B. Current Conditions Report

In particular, the Conserved Land consists of land that is devoted predominantly to the conservation of natural resources. See Sections 5301.67-.70 of the Ohio Revised Code. Grantor intends to preserve the Conserved Land for conservation of natural resources. Specifically, the Conserved Land conserves: (*include, for example, and as applicable to the Conserved Land in issue, riparian and woodland features necessary for contiguous habitat corridors for waterfowl, migratory birds and pollution-intolerant fish or amphibian*

species), together hereinafter referred to as "natural resource values" of the Conserved Land.

The natural characteristics, the physical conditions, any existing physical structures, and the conservation uses/natural resource values of the Conserved Land as of the date of this Easement, including a map that accurately identifies the ecological habitat(s) of the Conserved Land ("Current Conditions"), are documented in the attached Current Conditions Report (hereinafter referred to as the "Report") and signed and acknowledged by Grantor and representatives of Grantee, establishing the condition of the Conserved Land as of the date of this Easement, including photographs, maps and other documents, as set forth in Exhibit B and incorporated by reference herein.

C. Qualified Organization

Grantee is a qualified organization under Section 170 of the U.S. Internal Revenue Code, as amended from time to time, and under the regulations promulgated thereunder, to receive conservation easements, and is also qualified under Section 5301.69 of the Ohio Revised Code to hold conservation easements.

Terms and Conditions of the Conservation Easement

Now therefore, in consideration of the mutual promises, conditions, restrictions and obligations contained herein pursuant to the laws of the State of Ohio and the United States, Grantor hereby voluntarily grants and conveys with general warranty covenants to Grantee a perpetual conservation easement, as defined in Sections 5301.67 through 5301.70 of the Ohio Revised Code, and which is intended to meet the terms and conditions of a Qualifying Conservation Contribution under U.S. Internal Revenue Code Section 170(h), with respect to the Conserved Land. The Easement is subject to the following terms and conditions:

1. **Statement of Purpose.** It is the purpose of this Easement to assure that the natural resource values of the Conserved Land, as identified by the Report in Exhibit B, will be preserved and that the entire Conserved Land will be retained forever in its natural condition, and to prevent any use of the Conserved Land that will significantly impair or interfere with the natural resource values of the Conserved Land or that is inconsistent with the purpose of this Easement, all through a perpetual restriction on the use of the Conserved Land (hereinafter referred to as the "Purpose of this Easement").

2. **General Authority provided to the Grantee by this Easement.** By granting this Easement, Grantor hereby grants to Grantee the following rights:

2.1. To preserve and protect the natural resource values of the Conserved Land.

2.2. To post or clearly mark the boundaries of the Conserved Land, including any conserved natural resources, at reasonable boundary intervals.

2.3. To enter upon the Conserved Land at reasonable times in order to monitor Grantor's compliance with and otherwise enforce the terms of this Easement; provided that such entry shall be upon prior reasonable notice to Grantor, and Grantee shall not unreasonably interfere with Grantor's use and quiet enjoyment of the Conserved Land except in cases in which immediate action is necessary to protect the natural resource values.

2.4. To prevent any activity on or use of the Conserved Land that is inconsistent with the natural resource values of the Conserved Land as described in the Current Conditions Report and the Purpose of this Easement and to require the restoration of such areas or features of the Conserved Land that may be damaged by any inconsistent activity or use.

3. **Current Conditions Report and Conserved Lands Management Plan.** Grantor intends to preserve Conserved Land in manner consistent with the Current Conditions as described in the Report, Exhibit B. In addition, Grantor or the Grantee may develop and implement a Conserved Lands Management Plan that is tailored to the unique needs of the Conserved Land in issue that proposes how that Conserved Land is to be managed. Examples of items that may be included in a Conserved Lands Management Plan are fences, utility services management, water rights, hunting rights, and vehicle use restrictions.

The Conserved Lands Management Plan may also propose a higher level of conservation than contained in the Report provided that it is consistent with the Purpose of this Easement and approved by Grantor. Grantee shall have the same rights under this Easement with respect to monitoring and enforcing compliance with the Conserved Lands Management Plan. Any Conserved Lands Management Plan shall be signed and acknowledged by all parties and incorporated by reference herein.

4. **Prohibited Uses/Restrictions.** Except to the extent that activities and uses are authorized in this Easement, any activity on or use of the Conserved Land inconsistent with the natural resource values of the Conserved Land, or with the Purpose of this Easement, is prohibited. Without limiting the generality of the foregoing, the following activities and uses are expressly prohibited throughout the Conserved Land:

4.1. The Conserved Land shall be kept in its natural state, *i.e.*, no new buildings, billboards, signs or other structures of any kind, either temporary or permanent, shall be placed or erected on the Conserved Land, unless otherwise expressly provided hereunder. Signs which are consistent with the Purpose of this Easement and whose placement and number do not diminish the natural resource values of the Conserved Land are permitted, including (1) educational signage; (2) signs stating the name and address of the Conserved Land; (3) signs facilitating directions; and (4) signs identifying the natural resource value of the Conserved Land and restricting access to the same.

4.2. Subject to the Grantor's reservation of rights in Paragraph 5 of this Easement, there shall be no filling, excavating, or removal of top soil, sand, gravel, or rock, minerals or other materials on or at the Conserved Land, nor any building of roads or change in topography of the land in any manner, other than that caused by the forces of nature, except as approved by the Grantee and the Nease Trustees and/or as specified in the Conserved Lands Management Plan. Any existing roads or trails constructed as of the date of this Easement may continue to be maintained but any new trails or road constructed on the Conserved Land after the date of this Easement must be constructed of pervious material.

4.3. Subject to Grantor's reservation of rights in Paragraph 5 of this Easement, there shall be no construction or placement on the Conserved Land of new commercial, industrial, or municipal antennas, poles, towers, pipes, conduit lines, or other infrastructure intended for electric power, natural gas, petroleum products, sewage, drainage, telecommunications, or any other utilities; and no sale, transfer, or granting of any interest in the Conserved Land for such purposes. The area affected by any repair work for existing infrastructure shall be the minimum necessary to accomplish the task. Upon completion of all construction for such utilities, the area shall be restored to its previous state.

4.4. The mining or extraction of any mineral, including oil or gas, by any method that disturbs the surface of the Conserved Land is prohibited. Methods of mineral extraction that are managed so as to have a limited and localized impact on the Conserved Land and that do not have a materially adverse

effect on the natural resource values of the Conserved Land may be permitted upon notice to and approval by the Grantee and the Nease Trustees. Grantor shall not transfer, encumber, lease, sell, or otherwise separate mineral rights from the Conserved Land, except upon notice to and approval by the Grantee and the Nease Trustees.

4.5. The control, management and eradication of animal or plant species on the Conserved Land must comply with the State and Federal requirements including the federal Endangered Species Act, 16 U.S.C. §§1531 to 1599, and manufacturer guidelines. Unless allowed by the Conserved Lands Management Plan, notice must be given to the Nease Trustees prior to implementing any control, management and eradication of any animal or plant species.

4.6. No native trees, ground cover or other vegetation shall be removed from the Conserved Land, except that which is necessary to: perform activities permitted on the Conserved Land under this Easement; maintain the foot paths and trails; restore natural habitat areas; promote native vegetation; and protect life and property and/or as allowed by the Conserved Lands Management Plan.

4.7. The Conserved Land shall at all times be kept free of garbage, trash, and machinery; and no other unsightly material shall be allowed to accumulate or be stored thereon.

4.8. Use of motorized vehicles for recreation, including snow mobiles, all-terrain vehicles or other motorized vehicles, shall not be permitted on the Conserved Land. However, non-recreational motorized vehicles (e.g., road vehicles, tractors and other non-recreational all terrain vehicles) are permitted on the Conserved Land for maintenance, monitoring and management of the Conserved Land (including permitted trails and roads) and improvements thereon provided such vehicles are used as specified in the Conserved Lands Management Plan.

4.9. Each and every other activity or construction that is inconsistent with the purpose of this Easement or which may endanger, affect or impair the natural resource values of the Conserved Land is prohibited.

4.10 The legal subdivision of the Conserved Land, including the recording of a subdivision plan, partition, or any other division of the Conserved Land into two or more parcels, is prohibited. The Grantor, its successors or assigns shall notify the Grantee and the Nease Trustees of any proposed transfer of the Conserved Land, or any portion thereof, at least sixty (60) days prior to any such proposed transfer.

5. **Retained and Reserved Rights.** Grantor retains for itself, and for its beneficiaries, successors, and assigns, all rights accruing from Grantor's ownership of the Conserved Land that are not prohibited in this Easement or inconsistent with the maintenance of the natural resource values of the Conserved Land, including: the right of access to, and quiet enjoyment of, all portions of the Conserved Land; the right to exclude any member of the public from trespassing on the Conserved Land; the right to sell or otherwise transfer the Conserved Land subject to the terms hereof; and the right to engage in recreational activity that is conducted so as not to compromise the natural resource values of the Conserved Land. This Easement shall not be construed as a dedication of the Conserved Land for public use, nor is the Grantee authorized by this Easement to make any use of the Conserved Land other than as provided herein.

6. **Ongoing Responsibilities of Grantor.** Other than as specified herein, this Easement is not intended to impose any legal or other responsibility on the Grantee or the Nease Trustees, or in any way to affect any existing obligation of Grantor as owner of the Conserved Land. In particular, but without limitation:

6.1 **Taxes.** Grantor shall continue to be solely responsible for payment of all taxes and assessments levied against the Conserved Land, and is required to do so by the scheduled due date. If the Grantee is ever required to pay any taxes or assessments on its interest in the Conserved Land, or if Grantee determines that it should pay taxes or assessments in order to protect its interests, Grantor shall within ten (10) days of written demand reimburse Grantee for the amount of such taxes.

6.2 **Upkeep and Maintenance.** Grantor shall continue to be solely responsible for the upkeep and maintenance of the Conserved Land, to the extent it may be required by local, state and federal laws and regulations. The Grantee and the Nease Trustees shall have no obligation for the upkeep and maintenance of the Conserved Land.

6.3 **Liability and Indemnification.** Grantor shall indemnify and hold harmless Grantee and the Nease Trustees, their employees, agents and assigns for any and all liabilities, claims, demands, losses, expenses, damages, fines, fees, penalties, suits, proceedings, actions, and costs of actions, sanctions asserted by or on behalf of any person or governmental authority, and other liabilities, whether legal or equitable in nature and including, without limitation, court costs, and reasonable attorneys' fees and attorneys' fees on appeal, to which the Grantee or the Nease Trustees may be subject or incur relating to the Conserved Land, including, but not limited to, Grantor's negligent acts or omissions or Grantor's breach of any representation,

warranty, covenant, or agreement contained in this Easement, or violations of any Federal, State, or local laws, including all Environmental Laws.

7. **Enforcement Rights and Remedies of the Grantee and the Nease Trustees.** In order to enforce the terms of this Easement, the Grantee and the Nease Trustees shall have the following rights and remedies:

7.1 To file any legal action Grantee and/ or the Nease Trustees determine is appropriate to enforce this Easement, and to obtain evidence during any visit to the Conserved Land for the purpose of seeking judicial enforcement of this Easement. Grantee and/or the Nease Trustees may seek money damages, injunctive relief, restoration of the Conserved Land to its condition at the time of the conveyance of this Easement and any other remedy available under applicable law. Grantor acknowledges that money damages are not a sufficient remedy for Easement violations.

In addition to the general right of entry specified in Paragraph 2.3 of this Easement, Grantee and/ or the Nease Trustees and successors or assigns, shall have a right to access to the Conserved Land to ensure implementation and compliance.

7.2 Grantee and others holding an interest in the Easement may also enter the Conserved Land without notice to Grantor if, in the reasonable judgment of either party, it is necessary to protect the natural resource values of the Conserved Land.

7.3 The Attorney General of Ohio, on behalf of the Ohio EPA, and the Department of Justice, on behalf of U.S. FWS (the Nease Trustees), may seek to enforce the terms of this Easement as permitted under any and all authorities available under Federal or State law.

8. **Enforcement Costs.** All reasonable costs incurred by Grantee or the Nease Trustees in enforcing the terms of this Easement against Grantor, including, without limitation, costs and expenses of suit and reasonable professional services fees, and any costs of restoration necessitated by Grantor's violation of the terms of this Easement, shall be borne by Grantor.

9. **Extinguishment.** This Easement may be extinguished, in whole or in part, only with the approval of Grantee and the Nease Trustees, or by a judicial ruling by a court of competent jurisdiction that, *inter alia*, an unexpected change in condition has occurred that renders impossible the protection of all of the natural resource values of the Conserved Land and fulfillment of the Purpose of this Easement. If this Easement is extinguished, in whole or in part, Grantor shall reimburse Grantee and the Nease Trustees. In such a case, Grantee and the Nease Trustees, no

later than the time of subsequent sale of the formerly restricted land, shall be entitled to compensation for the rights thereby extinguished. The Grantee and the Nease Trustees shall be entitled to the value of the Easement as compensation for their share of the loss in a condemnation proceeding, or in the event of an extinguishment and the generation of proceeds from the formerly restricted land through subsequent sale or other means.

The Grantee and the Nease Trustees shall receive, at the time the Easement is extinguished or terminated, their share of the Easement based on the appraised fair market value of the Easement at the time the Easement is extinguished or terminated.

Grantor, upon receipt of notification of any pending condemnation action brought by any governmental entity affecting and/or relating to the Conserved Land, shall notify the Grantee and the Nease Trustees, in writing, within fifteen (15) days of receipt of said notification.

10. **Appropriation.** Notwithstanding any other provision of this Easement, public roads which are open to the public may be constructed, repaired, relocated, maintained, etc. by the authorized governmental entity, subject to applicable state and federal law, within the existing right of way. In such a circumstance of a governmental appropriation of any portion of the Conserved Land, applicable state and federal law shall be supplemented as between the Parties to this Easement by the terms of this Easement.

11. **Notices to Grantee.** In the event Grantor is notified by a government agency of any proposed design/improvement to an existing public road adjoining/affecting the Conserved Land, Grantor shall immediately notify Grantee, in writing, of such proposal to allow Grantee to exercise its obligations and protect its rights hereunder. Upon receipt of such notice, the Grantee shall notify the Nease Trustees, in writing, of such proposal.

12. **Promotion.** With the permission of Grantor, which shall not be unreasonably withheld, Grantee may post a sign(s) which state(s) that the Conserved Land is preserved by a conservation easement.

13. **Perpetual Burden.** This Easement shall run with and burden the Conserved Land in perpetuity and shall bind Grantor and Grantee, their heirs, successors and assigns.

14. **Assignment.** Subject to the restrictions set forth herein, this Easement is in gross and may be assigned or transferred by Grantee, in whole or in part, with a minimum of sixty (60) day written notice given to the Nease Trustees. The transferee or

assignee will be required to carry out in perpetuity the Purpose of this Easement. In addition, the Grantee agrees to the following:

14.1 The organization or entity receiving this interest must be (a) a qualified organization as that term is defined in Section 170(h)(3) of the U.S. Internal Revenue Code, as that section may be amended from time to time, and in the regulations promulgated thereunder; and (b) an entity which is organized and operated primarily for one of the conservation purposes specified in Section 170(h)(4)(A) of the U.S. Internal Revenue Code, as that section may be amended from time to time, and in the regulations promulgated thereunder.

14.2 If either Grantee, or its assignee, ever ceases to exist or no longer qualifies under Section 170(h) of the U.S. Internal Revenue Code, and the Nease Trustees decline to take or accept such party's rights and obligations under this Easement, a court of competent jurisdiction shall order the transfer of this Easement to another qualified organization that agrees to assume the responsibility imposed by this Easement on such party.

15. **Immediate Property Right.** This perpetual Easement gives rise to a property right, immediately vested in the Grantee, which is equal to the proportionate value that the restrictions of this Easement bear to the value of the Conserved Land absent the restrictions at the time of this conveyance of the Conserved Land, as required by Treasury Reg. 1.170A-14(g)(6)(ii).

16. **Transfer of Conserved Land.** Unless this Easement is extinguished pursuant to Paragraph 9.1, the terms, conditions, restrictions and purposes of this Easement will either be referenced or inserted by Grantor in any subsequent deed or other legal instrument by which Grantor divests itself of any interest in all or part of the Conserved Land. In addition to the pre-transfer notice requirements in Paragraph 4.10, Grantor agrees to notify the Grantee and the Nease Trustees, their successors and assigns, of any such conveyance in writing by certified mail within fifteen (15) days after closing.

17. **Compliance with Environmental Laws.** "Environmental Law" or "Environmental Laws" means any and all Federal, state, local or municipal laws, rules, orders, regulations, statutes, ordinances, codes, guidelines, policies or requirements of any governmental authority regulating or imposing standards of liability or standards of conduct (including common law) concerning air, water, solid waste, hazardous materials, worker and community right-to-know, hazard communication, noise, radioactive material, resource protection, inland wetlands and watercourses, health protection and similar environmental health, safety, building and land use as may now or at any time hereafter be in effect.

"Hazardous Materials" means any petroleum, petroleum products, fuel oil, waste oils, explosives, reactive materials, ignitable materials, corrosive materials, hazardous chemicals, hazardous wastes, hazardous substances, toxic substances, toxic chemicals, radioactive materials, infectious materials and any other element, compound, mixture, solution or substance which may pose a present or potential hazard to human health or the environment.

Grantor warrants that the Conserved Land is in compliance with, and shall remain in compliance with, all applicable Environmental Laws. Grantor warrants that there are no notices by any governmental authority of any violation or alleged violation of, non-compliance or alleged non-compliance with, or any liability under any Environmental Law relating to the operations or conditions of the Conserved Land.

Grantor warrants that they have no actual knowledge of a release or threatened release of any Hazardous Materials on, at, beneath or from the Conserved Land exceeding regulatory limits.

18. **Amendment of Easement.** Subject to the restrictions set forth herein, this Easement may be amended only with the written consent of Grantor, Grantee, and the Nease Trustees. Any such amendment shall not confer financial benefit upon Grantor and shall be consistent with the Purpose of this Easement and shall comply with Section 170(h) of the U.S. Internal Revenue Code or any regulations promulgated in accordance with that Section. Any such amendment shall also be consistent with Section 5301.67 *et seq*., of the Ohio Revised Code or any regulations promulgated pursuant to those laws. Any such amendment shall be duly recorded, with costs borne by the Grantor.

Boundary line adjustments are permitted in the case of technical errors made in the survey or legal description. Any adjustments shall be duly recorded as well, with costs borne by Grantor.

19. **Subordination of Subsequent Liens.** Any mortgage or lien arising after the date of this Easement must be subject to the terms of this Easement. Any liens, mortgages, easements, or other clouds on the title of the Conserved Land existing prior to the date of the Easement must be subordinated to this Easement or eliminated prior to recording this Easement.

20. **Recording.** The Grantee is authorized to record or file this Easement and any subsequent amendments to this Easement, as well as any notices or instruments appropriate to assure the perpetual enforceability of this Easement; for such purpose, Grantor appoints Grantee as its attorney-in-fact to execute, acknowledge and deliver any necessary instrument on its behalf. Without limiting the foregoing, Grantor agrees to execute any such instruments upon request.

21. **Notices.** Any notices required by this Easement shall be sent by registered or certified mail, return receipt requested, to Grantor, Grantee and the Nease Trustees at the following addresses or such addresses as may be hereafter specified in writing:

Grantor: INSERT NAME(S)

Grantee: INSERT NAME(S)

Trustees:

Ohio EPA:
Nease NRD Project Coordinator
Ohio EPA
2110 East Aurora Road, Twinsburg, Ohio 44087

U.S. FWS:
Regional Director
U.S. Fish and Wildlife Service, Region 3
1 Federal Drive, Fort Snelling, Minnesota 55111

22. **Severability.** If any provision of this Easement or the application thereof to any person or circumstance is found to be invalid, the remainder of the provisions of this Easement and the application of such provisions to persons or circumstances other than those as to which it is found to be invalid shall not be affected thereby.

23. **Entire Agreement.** This instrument sets forth the entire agreement of the Parties with respect to the Easement and supersedes all prior discussion, negotiations, understandings, or agreements relating to the Easement, all of which are merged herein.

24. **Termination of Rights and Obligations.** A Party's rights and obligations under this Easement terminate upon transfer of the Party's interest in the Easement or the Conserved Land, except that the Party's liability for acts or omissions prior to transfer shall survive transfer.

25. **Counterparts**. This Easement may be executed in multiple counterparts by Grantor, Grantee and Nease Trustees, each acting at different times and at separate locations, whether or not in the presence of each other, and any copy of this Easement to which signatures of Grantor, Grantee and Nease Trustees have been appended shall constitute one and the same original, and one of which

shall constitute proof of the terms of this Easement without the necessity of producing any other original copy.

26. **Governing Law.** This Easement shall be governed by and interpreted under the laws of the State of Ohio and applicable federal law. Except as otherwise specifically provided, all references to statutes and regulations that are contained in this Easement shall be construed to mean the version of that statute or regulation in effect as of the date on which this Easement is recorded. Any action or proceeding arising out of the terms of this Easement shall be brought in the applicable court of competent jurisdiction.

27. **No Merger.** Should Grantee obtain fee title to the Conserved Land, either the purposes, terms, obligations and restrictions of this Easement shall continue to bind and govern Grantee with respect to its rights and obligations regarding the Conserved Land, or Grantee shall, with notice given to the Nease Trustees a minimum sixty (60) days in advance, transfer this Easement to a State or local government agency or non-profit organization which, at the time of transfer, is a qualified organization under Ohio law and Section 170(h) or successor provision of the U.S. Internal Revenue Code, which has among its purposes the conservation and preservation of land and water areas.

28. **Recitals.** The recitals shall be considered substantive terms of this Easement.

TO HAVE AND TO HOLD the above-described Conservation Easement to the use, benefit, and behalf of the Grantee, and its successors and assigns forever.

The Grantor(s)

(ADD NAME)
Signature: _____

(ADD NAME)
Signature: _____

Acknowledgement

State of Ohio)
) ss:
County of _____)

On this ___ day of _____, 20XX, before me, a Notary Public in and for said County and State, personally appeared (ADD NAME OF GRANTOR(S), Grantor(s) in the foregoing Conservation Easement, who acknowledged before me to be said persons and who signed the foregoing instrument and acknowledged the same as their voluntary act and deed.

Witness my official signature and seal on the day last above mentioned.

_____
Notary Public, State of Ohio

Acceptance by (INSERT GRANTEE NAME)

Grantee: (INSERT NAME)

Signature: _____

Print Name: _____

Acknowledgement

State of Ohio)
) ss:
County of _____)

The foregoing instrument was acknowledged before me this ____ day of _____, 20XX, by _____, acting for and on behalf of the (insert Grantee name) who acknowledged that (s)he executed the same for and on behalf of that organization and did so on her/his and as the (insert Grantee's name) own free act and deed.

_____
Notary Public
My Commission Expires:

Acceptance by Ohio EPA on behalf of the Nease Trustees

The Ohio Environmental Protection Agency, an agency of the State of Ohio, on behalf of the Nease Trustees, which consist of authorized representatives the United States Department of the Interior (Fish & Wildlife Service), and the Ohio Environmental Protection Agency, hereby accepts and approves the foregoing Conservation Easement, and the rights conveyed therein, on behalf of the Nease Trustees.

Signature: _____

Craig W. Butler, Director

Acknowledgement

State of Ohio)
) ss:
County of Franklin)

The foregoing instrument was acknowledged before me this _____ day of _____, 20XX, by Craig W. Butler, Director of the Ohio Environmental Protection Agency, acting for and on behalf of the Nease Trustees, who acknowledged that he executed the same for and on behalf of the Agency and the Trustees and that he did so as the Agency's and the Nease Trustees' voluntary act and deed.

_____
Notary Public, State of Ohio

Acceptance by US Fish & Wildlife Service on behalf of the Nease Trustees

The United States Fish & Wildlife Service, a bureau of the United States Department of the Interior, on behalf of the Nease Trustees, which consist of authorized representatives of the Ohio Environmental Protection Agency and the United States Department of the Interior (U.S. Fish & Wildlife Service), hereby accepts and approves the foregoing Conservation Easement, and the rights conveyed therein, on behalf of the Nease Trustees.

Signature: _____

[Thomas Melius,
Regional Director,
Region 3, US Fish and Wildlife Service]

Acknowledgement

State of [insert state])
) ss:
County of [insert county])

The foregoing instrument was acknowledged before me this _____ day of _____, 20XX, by [Insert name and title}, of the United States Fish & Wildlife Service, acting for and on behalf of the Nease Trustees, who acknowledged that he executed the same for and on behalf of the U.S. Fish & Wildlife Service and the Nease Trustees and that he did so as the U.S. Fish & Wildlife Service's and the Nease Trustees' voluntary act and deed.

_____
Notary Public, State of [insert name of state]

This Instrument Prepared By:

(Insert name(s))

ENVIRONMENTAL COVENANT TEMPLATE

To be used when there are two parties: (i) the Owner or Holder of the Environmental Covenant and (ii) the Natural Resource Trustees

To be recorded with Deed Records - ORC 317.08

ENVIRONMENTAL COVENANT

This Environmental Covenant is entered into by (Owner), the United States acting through the United States Department of the Interior, the United States Fish and Wildlife Service (U.S. FWS), 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 (hereafter referred to and defined as "Conserved Land") to the activity and use limitations set forth herein.

Background

Negotiations between the responsible party for the former Nease Chemical Site, Rutgers Organics Corporation (ROC), and the natural resource trustees (*i.e*., the U.S. FWS, and Ohio EPA (Nease Trustees)), in conjunction with the U.S. Department of Justice and the Ohio Attorney General, resulted in a consent decree filed in the United States District Court, Northern District of Ohio, Eastern Division, captioned (INSERT), dated (INSERT), 2016. As required by the consent decree, ROC has funded the "ROC Conservation Trust" ("Trust"). Trust assets are utilized by a land conservation organization ("Trust Grantee") to conserve properties ("Conserved Lands") in the Little Beaver Creek watershed and the City of Salem drinking water source area ("Assessment Area") to restore, replace, rehabilitate or acquire the equivalent of natural resources that the Trustees allege were injured as a result of releases of hazardous substances in the Assessment Area. The Administrative Record for this Site, including the Natural Resource Restoration Plan & Environmental Assessment for the Nease Assessment Area (Restoration Plan), is maintained at Ohio EPA's Northeast District Office, 2110 East Aurora Road, Twinsburg, Ohio.

Now therefore, Owner, the U.S. FWS, and Ohio EPA agree to the following:

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

2. Conserved Land. This Environmental Covenant concerns an approximately (Insert # acres) acre tract of real property, located in__, (ADD) County, Ohio, identified as permanent parcel number -__- -_____- , and more particularly described in Exhibit A attached hereto and hereby incorporated by reference herein (Conserved Land). The Environmental Covenant conserves: (*include, for example, and as applicable to the Conserved Land in issue, riparian and woodland features necessary for contiguous habitat*

corridors for waterfowl, migratory birds and pollution-intolerant fish or amphibian species), together hereinafter referred to as "natural resource values" of the Conserved Land.

3. Owner. Owner, [located at]_____, currently owns the Conserved Land.

4. Current Conditions. The natural characteristics, the physical conditions, any existing physical structures, and the conservation uses/natural resource values of the Conserved Land as of the date of this Environmental Covenant, including a map that accurately identifies the ecological habitat(s) of the Conserved Land (Current Conditions), are documented in the attached Current Conditions Report and signed and acknowledged by the Owner, establishing the condition of the Conserved Land as of the date of the Environmental Covenant, including photographs, maps and other documents, as set forth in Exhibit B and incorporated by reference herein.

5. Conserved Lands Management Plan. The Owner may develop and implement a Conserved Lands Management Plan that proposes a higher level of conservation that is consistent with the conservation of natural resources. A copy of any Conserved Lands Management Plan, or any revisions or updates to the Current Conditions Report in Exhibit B, shall be approved by the Nease Trustees at the time the Conserved Lands Management Plan is completed. The Nease Trustees shall have the right to enter upon the Conserved Land, at reasonable times, in order to monitor compliance with the Conserved Lands Management Plan.

6. Activity and Use Limitations. Pursuant to the Restoration Work Plan(s) approved by the Nease Trustees pursuant to the consent decree filed in the United States District Court, Northern District of Ohio, Eastern Division, captioned (INSERT) _____, dated (INSERT), Owner hereby imposes the following activity and use limitations on the Conserved Land and agrees to comply with such limitations, unless otherwise agreed to in writing by the Nease Trustees:

   A. The Conserved Land shall be kept in its natural state, *i.e.*, no new buildings, billboards or other structures of any kind, either temporary or permanent, shall be placed or erected on the Conserved Land, unless otherwise expressly provided hereunder. Signage that is consistent with the purpose of this Environmental Covenant and whose placement and number do not diminish the natural resource values of the Conserved Land are permitted, including (1) educational signage; (2) signs stating the name and address of the Conserved Land; (3) signs facilitating directions; and (4) signs identifying the natural resource value of the Conserved Land and restricting access to the same.

B. There shall be no filling, excavating, or removal of top soil, sand, gravel, or rock, minerals or other materials on or at the Conserved Land, nor any building of roads or change in topography of the land in any manner, other than that caused by the forces of nature, except in accordance with the Restoration Work Plan(s) and/or Work Plan Supplements approved by the Nease Trustees pursuant to the consent decree filed in the United States District Court, Northern District of Ohio, Eastern Division, captioned (INSERT), dated (INSERT)_____, 2015, or as specified in the Conserved Lands Management Plan . Any new roads or trails constructed on the Conserved Land must be of pervious material.

C. There shall be no construction or placement on the Conserved Land of new commercial, industrial, or municipal antennas, poles, towers, pipes, conduit lines, or other infrastructure intended for electric power, natural gas, petroleum products, sewage, drainage, telecommunications, or any other utilities; and no sale, transfer, or granting of any interest in the Conserved Land for such purposes. However, the Owner reserves the right to maintain and repair telephone, electric, water, wells, or other utility lines or mains on existing easements needed to provide for the needs of the Owner, successors or assigns. The area affected by any repair work for existing infrastructure shall be the minimum necessary to accomplish the task. Upon completion of all construction for such utilities, the area shall be restored to its previous state.

D. The mining or extraction of any mineral, including oil or gas, by any method that disturbs the surface of the land is prohibited. Methods of mineral extraction that are managed so as to have a limited and localized impact on the Conserved Land and that do not have a materially adverse effect on the natural resource values of the Conserved Land may be permitted upon notice to and approval by the Nease Trustees. Owner shall not transfer, encumber, lease, sell, or otherwise separate mineral rights from the Conserved Land, except upon notice to and approval by the Nease Trustees.

E. The control, management and eradication of animal or plant species on the Conserved Land must comply with the State and Federal requirements including the federal Endangered Species Act, 16 U.S.C. §§1531 to 1599, and manufacturer guidelines. Unless allowed by the Conserved Lands Management Plan, notice must be given to the Nease Trustees prior to implementing any control, management and eradication of any animal or

plant species.

F. No trees, ground cover or other vegetation shall be removed from the Conserved Land, except that which is necessary to: maintain foot paths and trails; restore natural habitat areas; promote native vegetation; protect life and property; or comply with the Restoration Work Plan and/ or Work Plan Supplements or modifications to the Restoration Work Plan and/ or Work Plan Supplements approved by the Nease Trustees pursuant to the consent decree filed in the United States District Court, Northern District of Ohio, Eastern Division, captioned (INSERT), dated (INSERT), 2016, or as allowed by the Conserved Lands Management Plan.

G. The Conserved Land shall at all times be kept free of garbage, trash, and machinery; and no other unsightly material shall be allowed to accumulate or be stored thereon.

H. Use of motorized vehicles for recreation, including snow mobiles, all-terrain vehicles or other motorized vehicles, shall not be permitted on the Conserved Land. However, motorized vehicles are permitted on the Conserved Land to maintain trails on the Conserved Land or to comply with the Restoration Work Plan(s) approved by the Nease Trustees pursuant to the consent decree filed in the United States District Court, Northern District of Ohio, Eastern Division, captioned (INSERT), dated (INSERT), 2016 and the Conserved Lands Management Plan.

I. Each and every other activity or construction that is inconsistent with the conservation of natural resources or which may endanger, adversely affect, or impair the natural or scenic state of the Conserved Land is prohibited.

J. The legal subdivision of the Conserved Land, including the recording of a subdivision plan, partition, or any other division of the Conserved Land into two or more parcels, is prohibited. The Owner, its successors or assigns shall notify the Nease Trustees of any proposed transfer of the Conserved Land, or any portion thereof, at least sixty (60) days prior to any such proposed transfer.

7. Breach. If any event or action by or on behalf of a person who owns an interest in or holds an encumbrance on the Conserved Land, or any other person, constitutes a breach of the activity and use limitations, Owner, including Transferee, shall notify the U.S. FWS and Ohio EPA within thirty (30) days of becoming aware of the event or action, and shall remedy the breach of the

activity and use limitations within sixty (60) days of becoming aware of the event or action.

8. Running with the Land. This Environmental Covenant, including the activity and use limitations set forth in paragraph 7 herein, shall be binding upon the Owner and 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 Conserved Land including, but not limited to, owners of an interest in fee simple, mortgagees, easement holders, and/or lessees.

9. Compliance Enforcement. In the event of a violation of this Environmental Covenant, a civil action for injunctive and/or other equitable relief may be maintained by the United States on behalf of the U.S. FWS or the Ohio Attorney General on behalf of Ohio EPA, or other parties authorized by law pursuant to ORC § 5301.91. 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 enforce this Environmental Covenant. Nothing in this Environmental Covenant shall restrict the Nease Trustees from exercising their authority under applicable law.

10. Rights of Access. Owner hereby grants to the U.S. FWS, Ohio EPA, the Ohio Department of Natural Resources, their agents, contractors, and employees, and the County(ies) of _ _ _ _ _ _ [, and *the City of (INSERT) – if the Conserved Land is located in the City*], at all reasonable times and upon reasonable notice, the right of access to the Conserved Land for enforcement of this Environmental Covenant.

11. Compliance Reporting. Owner or any Transferee shall submit to the U.S. FWS, Ohio EPA, and the County(ies) of (_____) and the City of (_____), on an annual basis, written documentation verifying compliance with this Environmental Covenant.

12. Notice upon Conveyance. Each instrument hereafter conveying any interest in the Conserved Land, 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:

A. THE INTEREST CONVEYED HEREBY IS SUBJECT TO AN ENVIRONMENTAL COVENANT, DATED_____, RECORDED IN THE DEED OR OFFICIAL RECORDS OF THE (INSERT) COUNTY RECORDER ON_____, 20 , IN [DOCUMENT , *or* BOOK , PAGE ,].

B. Owner shall notify the U.S. FWS and Ohio EPA within ten (10) days after each conveyance of an interest in the Conserved Land. Owner's 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 Conserved Land being transferred.

13. Representations and Warranties. Owner hereby represents and warrants to the other signatories hereto that:

A. the Owner is the sole owner of the Conserved Land;

B. the Owner holds fee simple title to the Conserved Land which Owner hereby warrants is free and clear of all liens and encumbrances not beneficial to the conservation of natural resources, and is acceptable to the Nease Trustees. The Conserved Land is subject to the following existing interests or encumbrances: [Insert any]_____;

C. 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. the Owner has identified all other persons that own an interest in or hold an encumbrance on the Conserved Land and notified such persons of the Owner's intention to enter into this Environmental Covenant; and,

E. 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.

14. Amendment. This Environmental Covenant may be amended by consent of all of

the following: the Owner or a Transferee; the U.S. FWS; and the Ohio EPA, pursuant to ORC § 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 when there is at least one activity and use limitation remaining.

This Environmental Covenant may be amended only by a written instrument duly executed by the Regional Director of the U.S. FWS, the Director of Ohio EPA and the Owner or Transferee of the Conserved Land, as applicable. Within thirty (30) days of signature by all requisite parties on any amendment of this Environmental Covenant, the Owner or Transferee shall file such instrument for recording with the (INSERT) County Recorder's Office, and shall provide a file and date-stamped copy of the recorded instrument to the U.S. FWS and Ohio EPA.

15. Severability. 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.

16. Governing Law. This Environmental Covenant shall be governed by and interpreted in accordance with the laws of the State of Ohio.

17. Recordation. Within thirty (30) days after the date of the final required signature upon this Environmental Covenant, Owner shall file this Environmental Covenant for recording, in the same manner as a deed to the Conserved Land, with the (INSERT) County Recorder's Office.

18. Effective Date. 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 Conserved Land with the (INSERT) County Recorder.

19. Distribution of Environmental Covenant. The Owner shall distribute a file- and date-stamped copy of the recorded Environmental Covenant to: the U.S. FWS; Ohio EPA; [*and*] the County of (INSERT) [*; and the City of (*INSERT*) – if the Conserved Land is located in the City*].

20. Notice. Unless otherwise notified in writing by or on behalf of the current owner, the U . S . FWS or Ohio EPA, any document or communication required by this Environmental Covenant shall be submitted to:

Regional Director
U.S. Fish and Wildlife Service
Region 3
1 Federal Drive
Fort Snelling, Minnesota 55111

Nease NRD Project Coordinator
DERR
Ohio EPA
2110 East Aurora Road
Twinsburg, Ohio 44087

ADD County/ City contacts as necessary based on Conserved Land location.

The undersigned representative of Owner represents and certifies that he/she is authorized to execute this Environmental Covenant.

IT IS SO AGREED:

Owner

_____

Signature

_____

Printed Name and Title Date

State of_____)
) ss:
County of_____)

Before me, a notary public, in and for said county and state, personally appeared_____
_____, a duly authorized representative of OWNER,

who acknowledged to me that he/she did execute the foregoing instrument on behalf of OWNER.

IN TESTIMONY WHEREOF, I have subscribed my name and affixed my official seal this _____ day of_____, 20 .

_____

Notary Public

_____

Date of My Commission Expiration

OHIO ENVIRONMENTAL PROTECTION AGENCY

_____ _____

Craig W. Butler, Director Date

State of Ohio)
)
County of Franklin) ss:

Before me, a notary public, in and for said county and state, 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_____, 20 .

_____

Notary Public

_____

Date of My Commission Expiration

The United States acting through the U.S. Department of the Interior, the U.S. Fish & Wildlife Service

_____ _____

(Thomas Melius), Regional Director, Region 3 Date

State of _____)
) ss
County of_____)

Before me, a notary public, in and for said county and state, personally appeared (ADD NAME), a duly authorized representative of the U.S. FWS, who acknowledged to me that he did execute the foregoing instrument on behalf of the US FWS.

IN TESTIMONY WHEREOF, I have subscribed my name and affixed my official seal this ____day of_____, 20 .

_____

Notary Public

_____

Date of My Commission Expiration

United States v. Rutgers Organics Corporation (N.D. Ohio)

Consent Decree
Appendix J

Draft Form of Remedial Performance Guarantee

[Letterhead of Issuing Institution]

IRREVOCABLE STANDBY LETTER OF CREDIT

IRREVOCABLE STANDBY LETTER OF CREDIT NUMBER: [**insert number**]

ISSUANCE DATE: [**insert date**]

MAXIMUM AMOUNT: $[**insert dollar amount**]

APPLICANT:
Rutgers Organics Corporation
[**Insert contact person(s), title(s), and contact information (address, phone, email, etc.)**]

BENEFICIARY:
U.S. Environmental Protection Agency Region 5
c/o Douglas Ballotti
Acting Director, Superfund Division
EPA Region 5 (S-6J)
77 West Jackson Boulevard
Chicago, Illinois 60604-3590
ballotti.douglas@epa.gov

Dear Sir or Madam:

We hereby establish our Irrevocable Standby Letter of Credit No. [**insert number**] in your favor, at the request and for the account of Rutgers Organics Corporation (the "Applicant"), in the amount of $[**insert amoun**t] (the "Maximum Amount"). We hereby authorize you, the United States Environmental Protection Agency (the "Beneficiary"), to draw at sight on us, [**insert name of issuing institution**], an aggregate amount equal to the Maximum Amount upon presentation of:

(1) Your sight draft, bearing reference to this Letter of Credit No. [**insert number**] (which may, without limitation, be presented in the form attached hereto as Exhibit A); and

(2) Your signed statement reading as follows: "I certify that the amount of the draft is payable pursuant to that certain Consent Decree, dated [**insert date**], [**insert civil action number**], between the United States and Rutgers Organics Corporation, entered into by the parties thereto in accordance with the authority of the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601-9675, relating to the Nease Chemical Superfund Site."

This letter of credit is effective as of [**insert issuance date**] and shall expire on [**insert date that is at least 1 year later**], but such expiration date shall be automatically extended for a period of [**insert period of at least 1 year**] on [**insert date that is at least 1 year later**] and on each successive expiration date, unless, at least 120 days before the current expiration date, we notify both you and the Applicant by certified mail that we have decided not to extend this letter of credit beyond the current expiration date. In the event you are so notified, any unused portion of the letter of credit shall immediately thereupon be available to you upon presentation of your sight draft for a period of at least 120 days after the date of receipt by both you and the Applicant of such notification, as shown on signed return receipts.

All notifications, requests, and demands required or permitted hereunder shall be given in writing, identify the site, and provide a contact person (and contact information).

Multiple and partial draws on this letter of credit are expressly permitted, up to an aggregate amount not to exceed the Maximum Amount. Whenever this letter of credit is drawn on, under, and in compliance with the terms hereof, we shall duly honor such draft upon presentation to us, and we shall deposit the amount of the draft in immediately available funds directly into such account or accounts as may be specified in accordance with your instructions.

All banking and other charges under this letter of credit are for the account of the Applicant.

This Letter of Credit is subject to the Uniform Customs and Practice for Documentary Credits (2007 Revision) Publication No. 600, published by the International Chamber of Commerce.

Very Truly Yours,

Date: _____

By [signature]: _____
Printed name: _____
Title: _____
Address: _____
Contact information: _____

Exhibit A - Form of Sight Draft
[EPA LETTERHEAD]

SIGHT DRAFT

TO: [**Insert name of issuing institution**]
[**Insert name and title of contact person(s)**]
[**Insert address**]

RE: Letter of Credit No. [**insert number**]

DATE: [**Insert date on which draw is made**]

TIME: [**Insert time of day at which draw is made**]

This draft is drawn under your Irrevocable Standby Letter of Credit No. [**insert number**]. I certify that the amount of the draft is payable pursuant to that certain "Consent Decree," dated [**insert date**], [**insert civil action number**], between the United States and Rutgers Organics Corporation, entered into by the parties thereto in accordance with the authority of the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601-9675, relating to the Nease Chemical Superfund Site. Pay to the order of the United States Environmental Protection Agency, in immediately available funds, the amount of $[**insert dollar amount of draw**] or, if no amount certain is specified, the total balance remaining available under such Irrevocable Standby Letter of Credit.

Pay such amount as is specified in the immediately preceding paragraph by [**insert payment instructions as appropriate, such as:** "Fedwire EFT, referencing Site/Spill ID Number [**insert number**] [and DJ Number [**insert number**]]. The Fedwire EFT payment must be sent as follows:

Federal Reserve Bank of New York
ABA = 021030004
Account = 68010727
SWIFT address = FRNYUS33
33 Liberty Street
New York NY 10045
Field Tag 4200 of the Fedwire message should read [D 68010727 Environmental Protection Agency]"]

The total amount paid shall be deposited by EPA in the Nease Chemical Superfund Site Special Account to be retained and used to conduct or finance response actions at or in connection with the site, or to be transferred by EPA to the EPA Hazardous Substance Superfund.

This Sight Draft has been duly executed by the undersigned, an authorized representative or agent of the United States Environmental Protection Agency, whose signature hereupon constitutes an endorsement.

By [signature]: _____
Printed name: _____
Title: _____
Address: _____
Contact information: _____

United States v. Rutgers Organics Corporation (N.D. Ohio)

Consent Decree
Appendix K

Alternate Properties Screening Criteria

APPENDIX K: ALTERNATE PROPERTIES SCREENING CRITERIA

In accordance with Section X of the Consent Decree, "Performance of Restoration Projects by Settling Defendant," ROC shall establish and fund the ROC Conservation Trust for the acquisition of the Conserved Lands (*i.e*., Priority Properties and Alternate Properties).

Alternate Properties should be considered on their individual merits and prioritized according to relationship to injuries such as proximity to the Assessment Area (i.e., properties closer to the injuries preferred over those further away), habitat types, ecological function and hydraulic connectivity. Prioritization shall also consider the overall high quality of the conservation opportunities, size (larger/contiguous areas preferred over isolated ones) and cost-effectiveness. These screening criteria will be used by ROC and the Grantee of the ROC Conservation Trust when considering potential acquisitions of the Alternate Properties. Alternate Properties may be considered as and when they become available for acquisition, within the 5 year period specified in the Consent Decree.

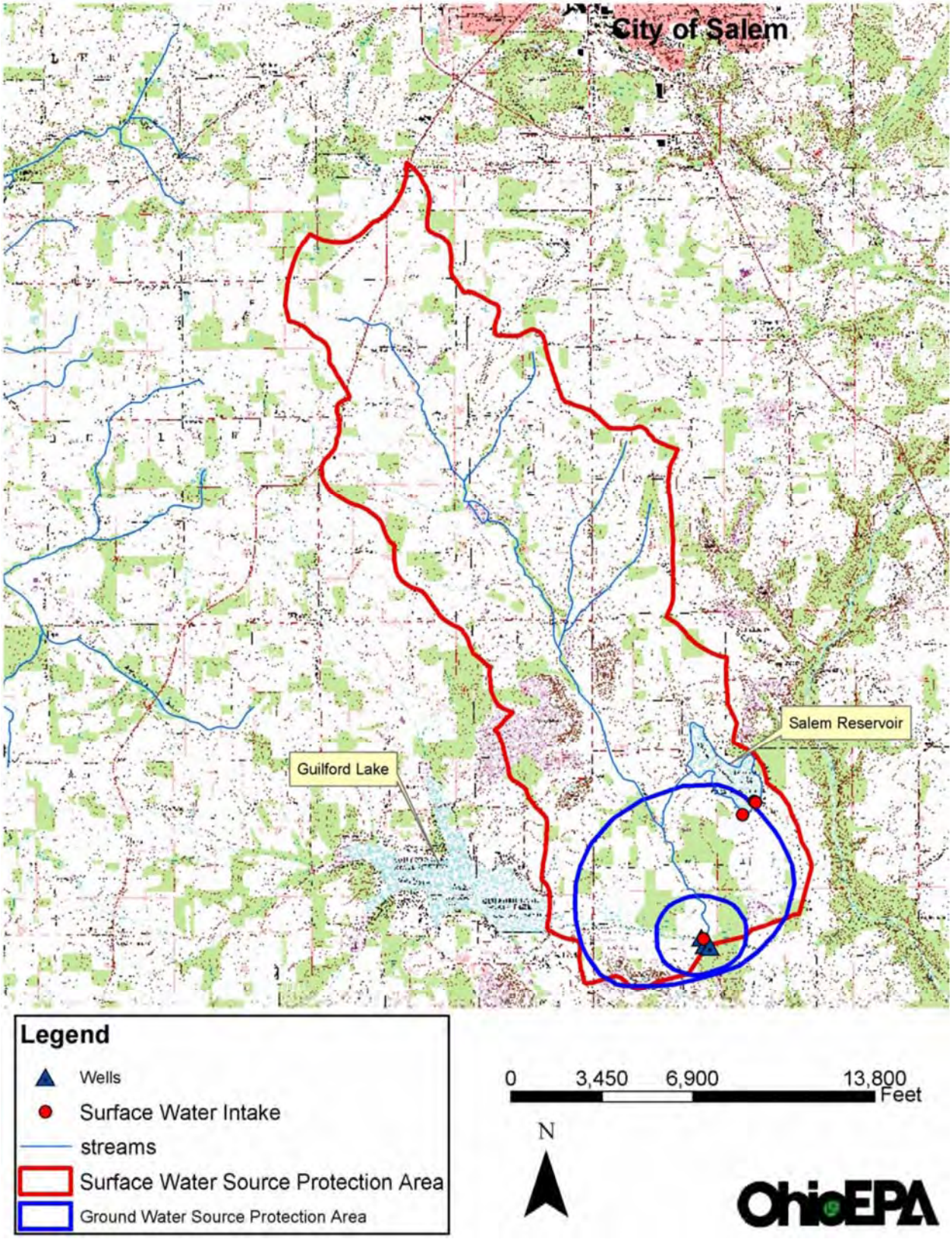
- The following Alternate Properties are *not* eligible for consideration:
    - Properties[1] with known or suspected releases of hazardous substances or hazardous wastes.
    - Properties[1] with easements, rights of entry, interests, or other encumbrances (e.g., rights to remove topsoil, sand and gravel or other materials), that may be reasonably expected to result in harm to or reduced habitat quality or ecological services provided by those habitats, unless such rights, interests, or encumbrances are subordinated and/or the Trustees agree in writing that the property can be considered.
    - Properties consisting primarily of Category 1 wetlands, unless agreed to on a project-specific basis by the Trustees in writing.
- The following Alternate Properties in Ohio are eligible for consideration:
    - Properties that support improved water quality in the Little Beaver Creek (LBC) and/or Middle Fork of the Little Beaver Creek (MFLBC) watershed(s) (*e.g*., connected wetlands, wetlands near LBC/MFLBC, riparian habitat and buffers to areas that may adversely affect water quality such as cattle farms, agriculture and urban runoff). See attached map of the Little Beaver Creek watershed.
    - Even if water quality is not likely to be improved, riparian habitat along LBC/MFLBC where ecological habitat quality would improve with the additional protection afforded from the land use restrictions (*e.g.,* dairy/cattle farms, old farm fields) may be considered.
    - Areas of exceptional stream, riparian and floodplain habitat quality, such as portions of Egypt Swamp that are not already included in the Priority Properties, where land use restrictions would ensure long-term protection of valuable natural resources, may be considered.
    - Total amount of such LBC/MFLBC properties, combined with similar Priority Properties identified in Section X of the Consent Decree, must equal at least

[1] These criteria also apply to the Priority Properties.

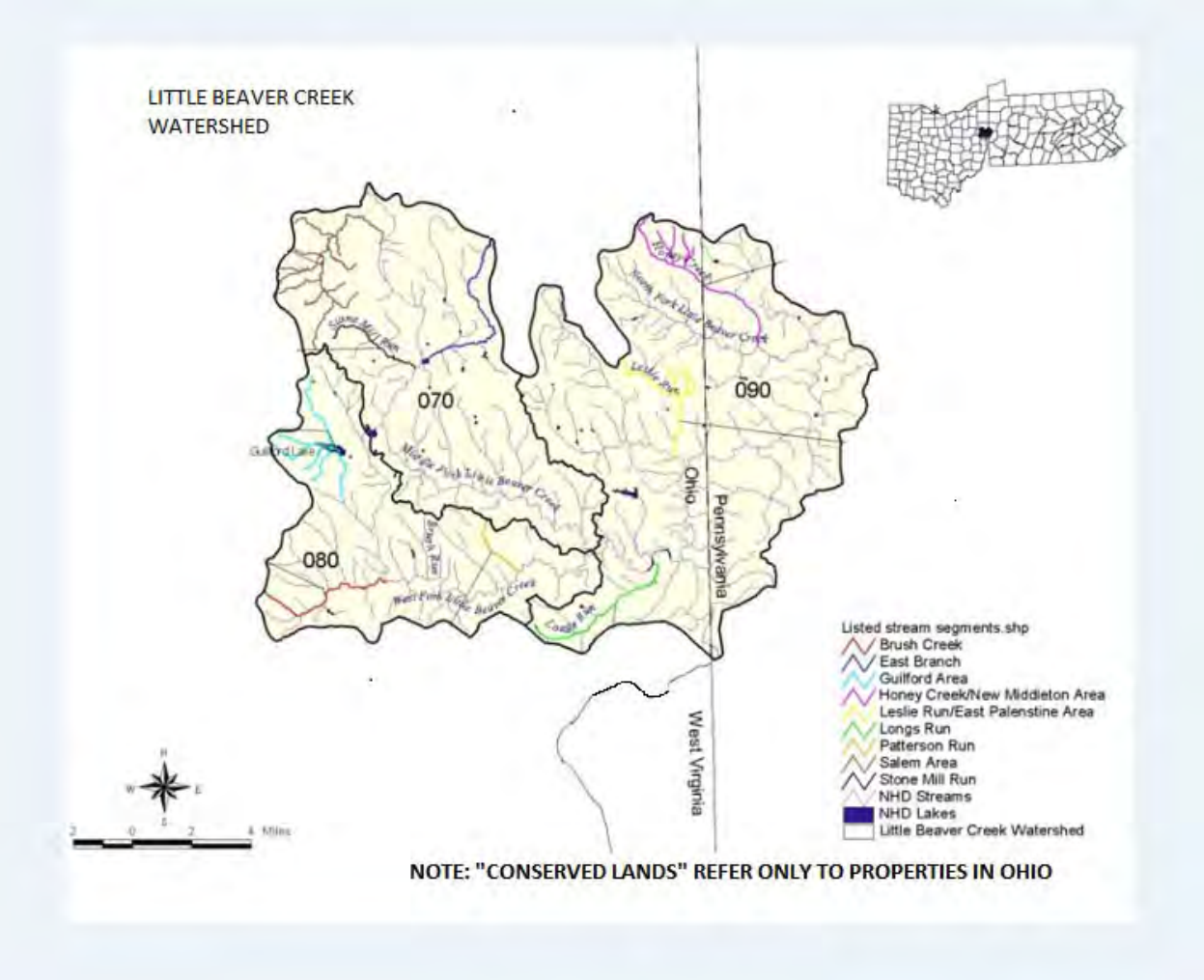
110 acres.

- Properties that may protect the City of Salem's water resources but falling outside of the City of Salem's Source Water Protection Areas for ground water and surface water as depicted on the attached map, which are approved by the Trustees in writing prior to selection. Total amount of such property, combined with similar Priority Properties that fall within the City of Salem's Source Water Protection Areas, must equal at least 40 acres.

- Additional properties qualifying as Alternate Properties under these screening criteria totaling at least 3 acres, in the event of ROC's failure to acquire three acres of adjacent riparian habitat at the Lisbon Dam location as prescribed in Section X of the Consent Decree, so that the total amount of Conserved Lands equals at least 153 acres.



Summary Figure - City of Salem Combined Drinking Water Source Protection Areas (Surface and Ground Water Sources)


LITTLE BEAVER CREEK
WATERSHED
070
080
090
Ohio
Pennsylvania
West Virginia
Listed stream segments.shp
Brush Creek
East Branch
Guilford Area
Honey Creek/New Middleton Area
Leslie Run/East Palenstine Area
Longs Run
Patterson Run
Salem Area
Stone Mill Run
NHD Streams
NHD Lakes
Little Beaver Creek Watershed
NOTE: "CONSERVED LANDS" REFER ONLY TO PROPERTIES IN OHIO