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Nease Chemical Site
Operable Unit Two

Columbiana County, Ohio

Record of Decision

United States
Environmental Protection Agency

Region 5

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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

Judy L Carney for

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

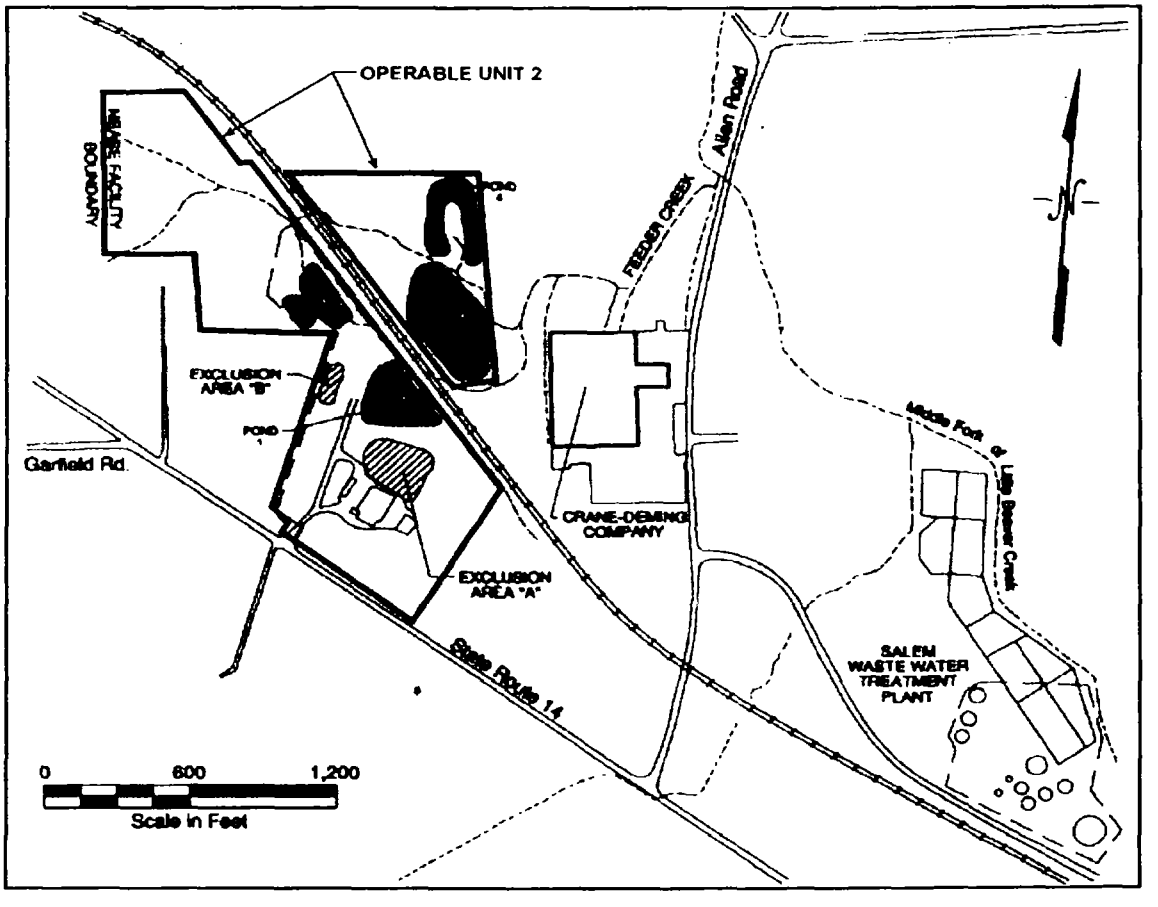
9/29/05
Date

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 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."

2.2.3 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

<u>Current Use Scenario – On-Facility Locations</u>

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.

<u>Current Use Scenario – Off-Facility Locations</u>

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.

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[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).

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[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

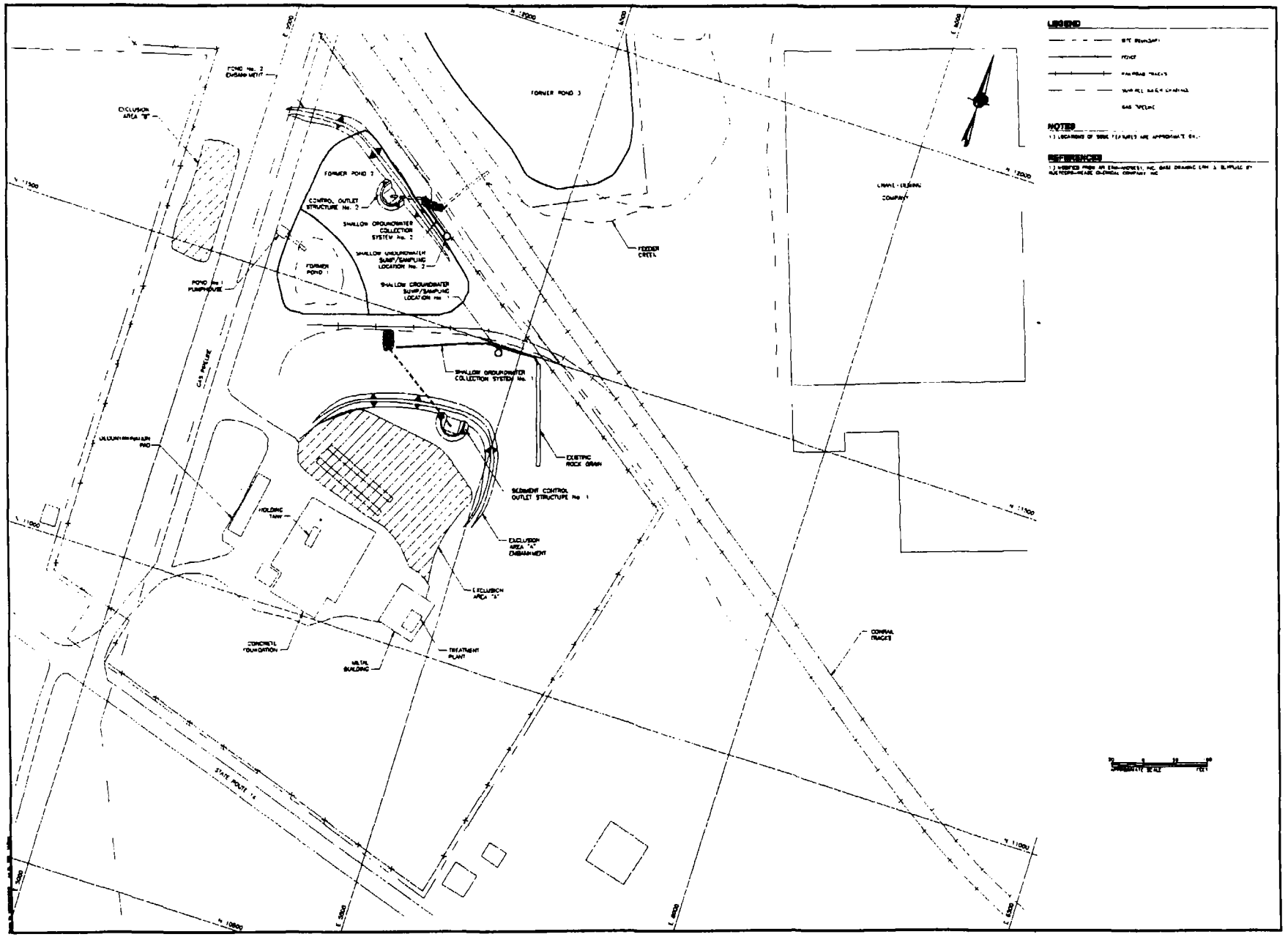
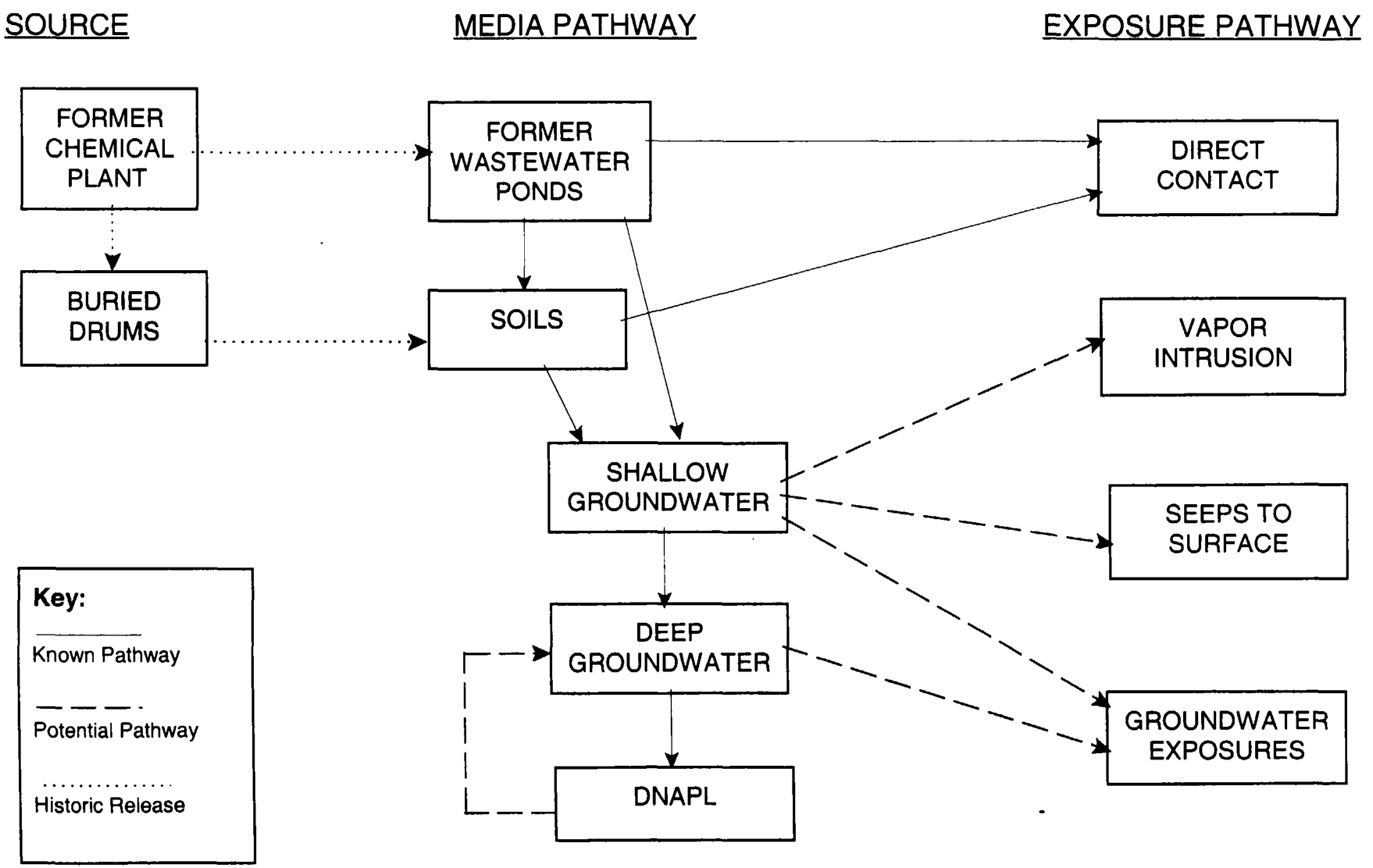
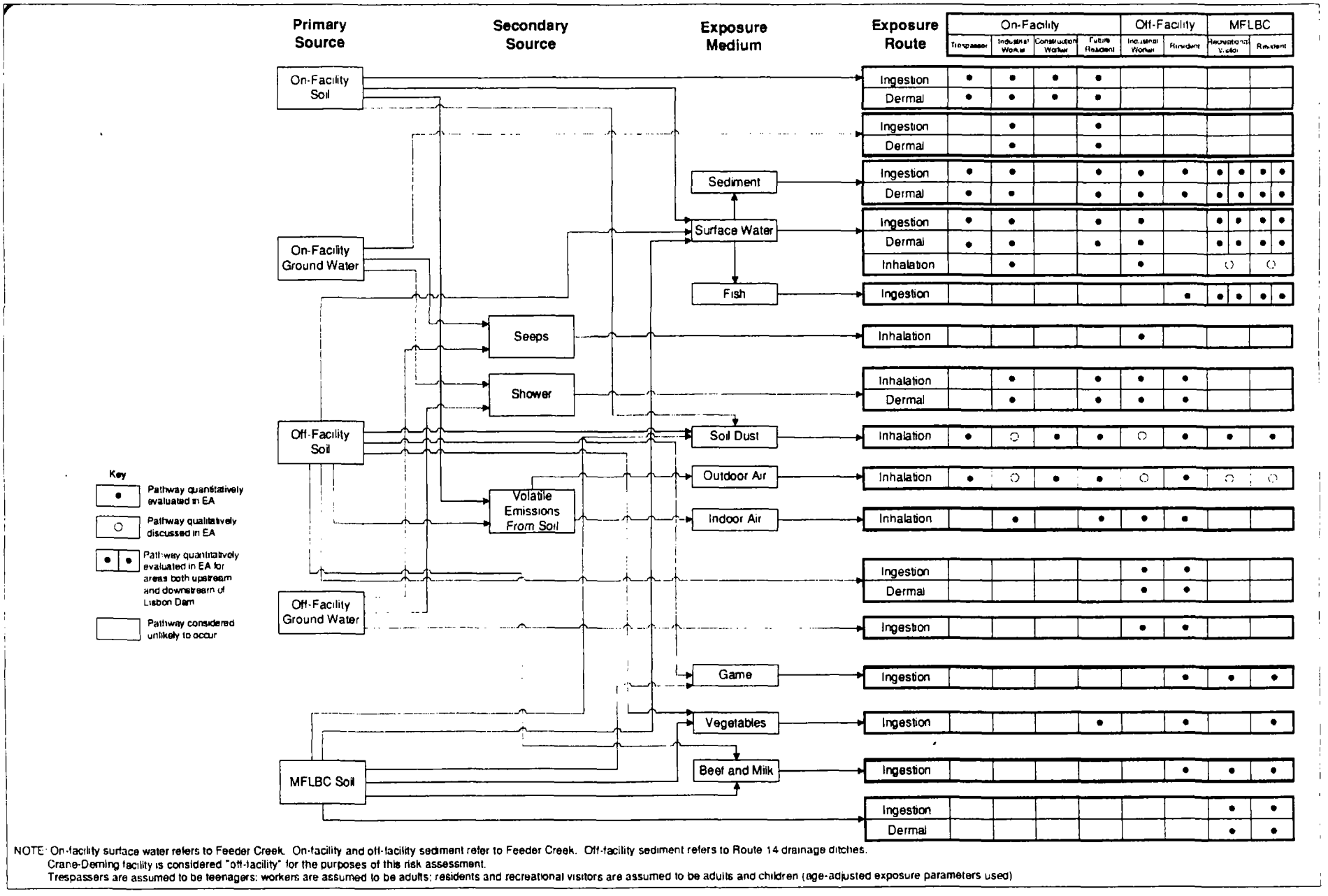


Figure 2 **Interim Remedial Measures**

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

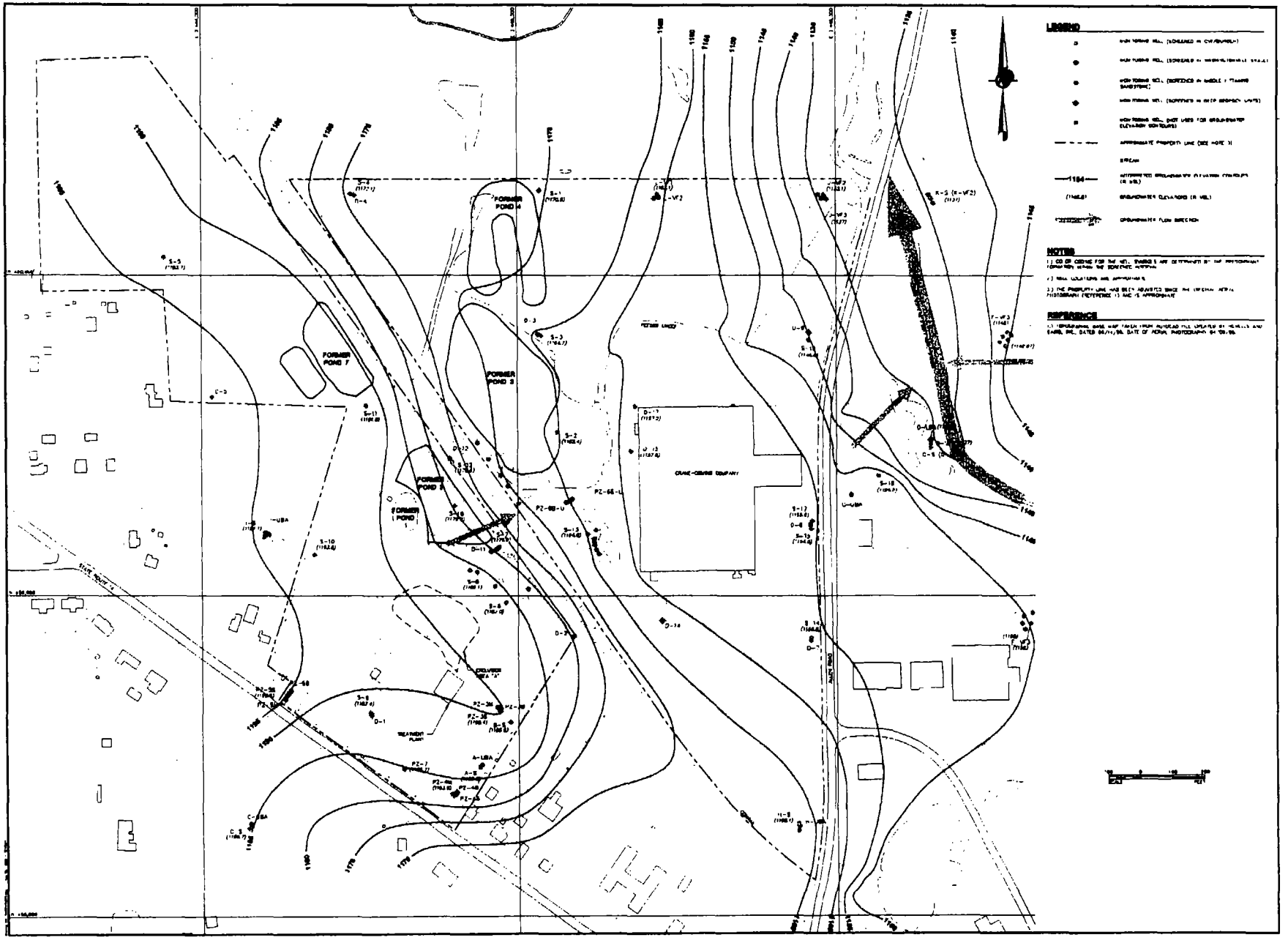


Figure 5 Overburden Groundwater Flow

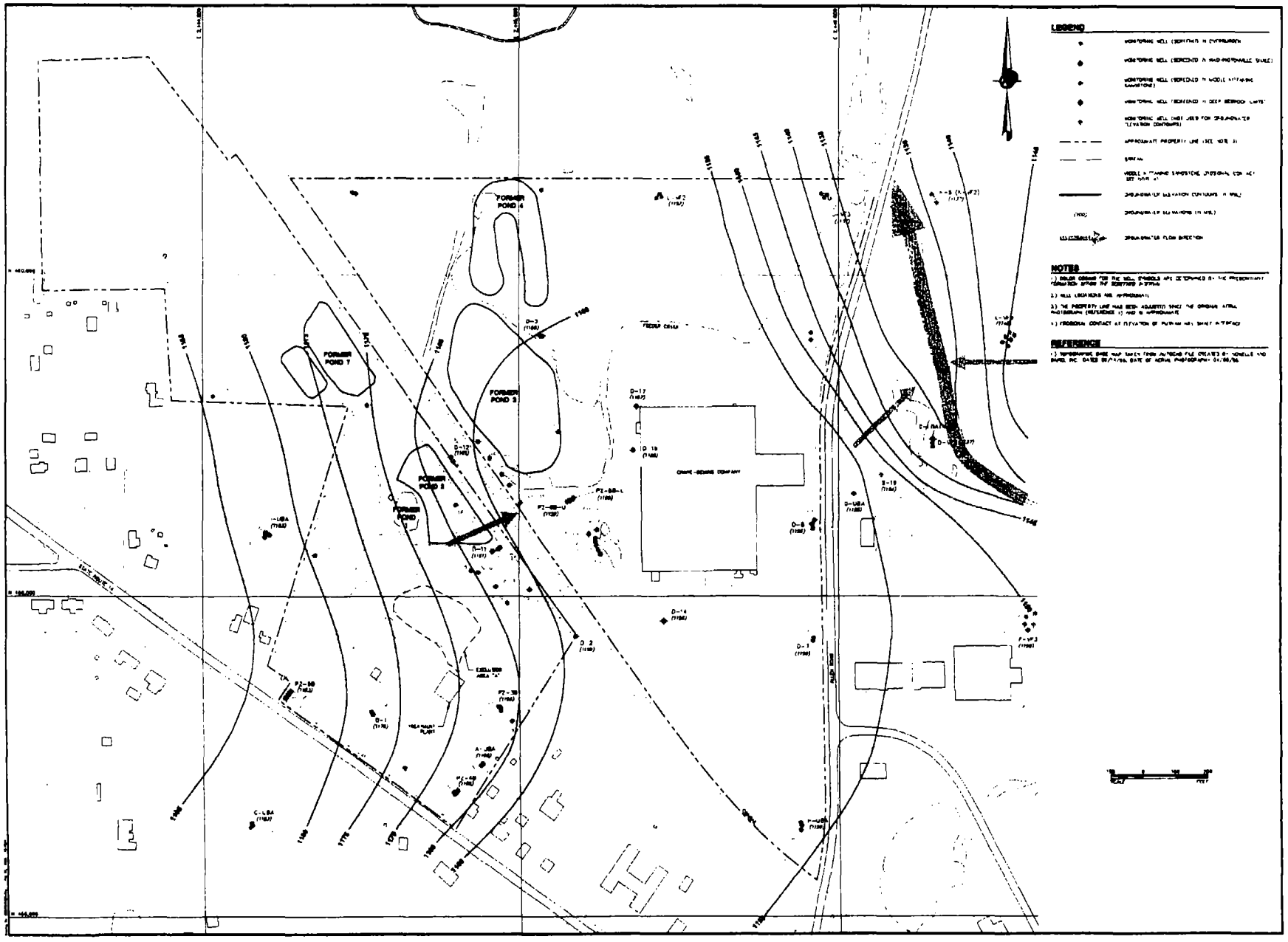


Figure 6 Bedrock Groundwater Flow

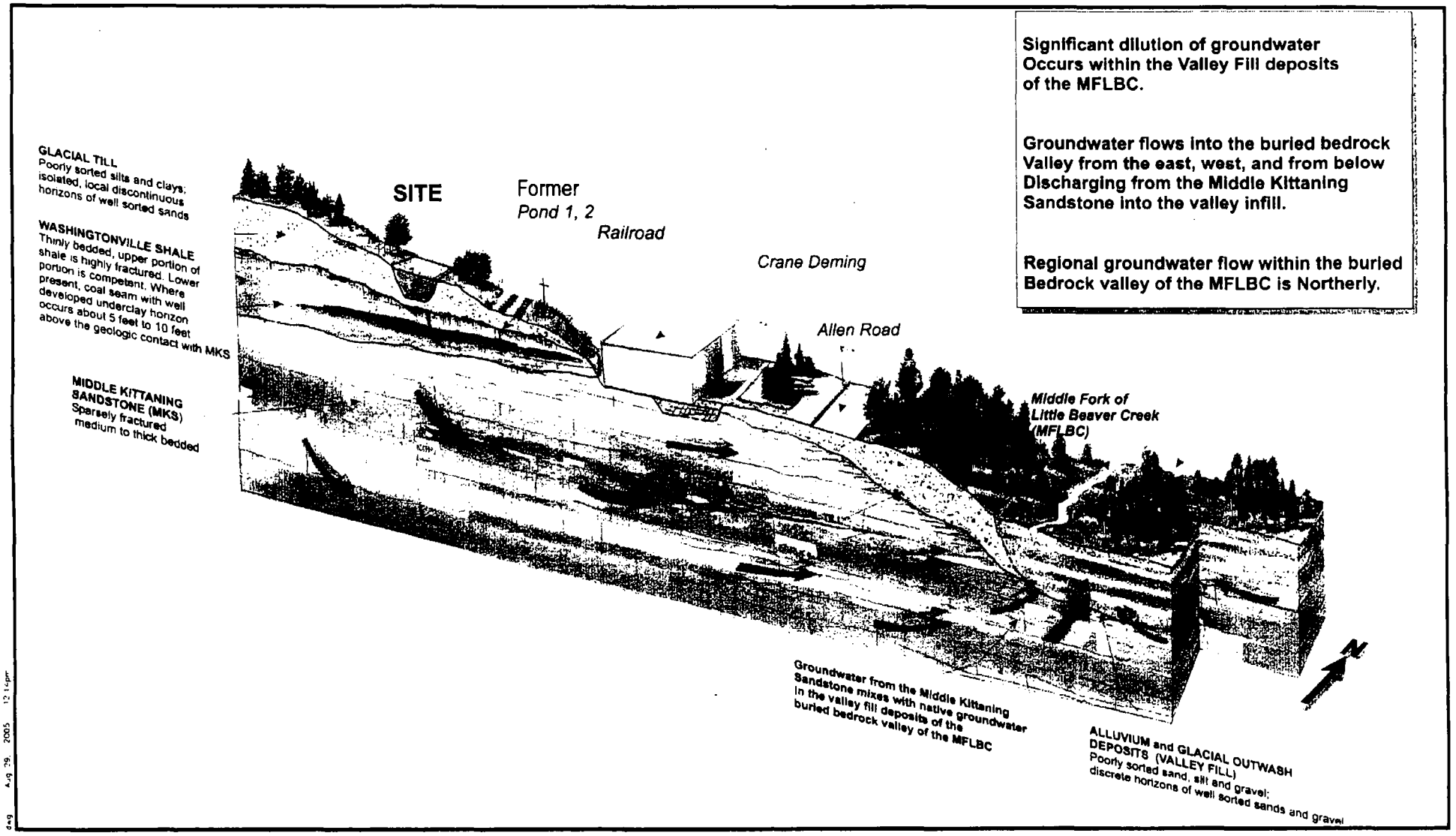


Figure 7 Conceptual Hydrologic Setting and Transport Pathways

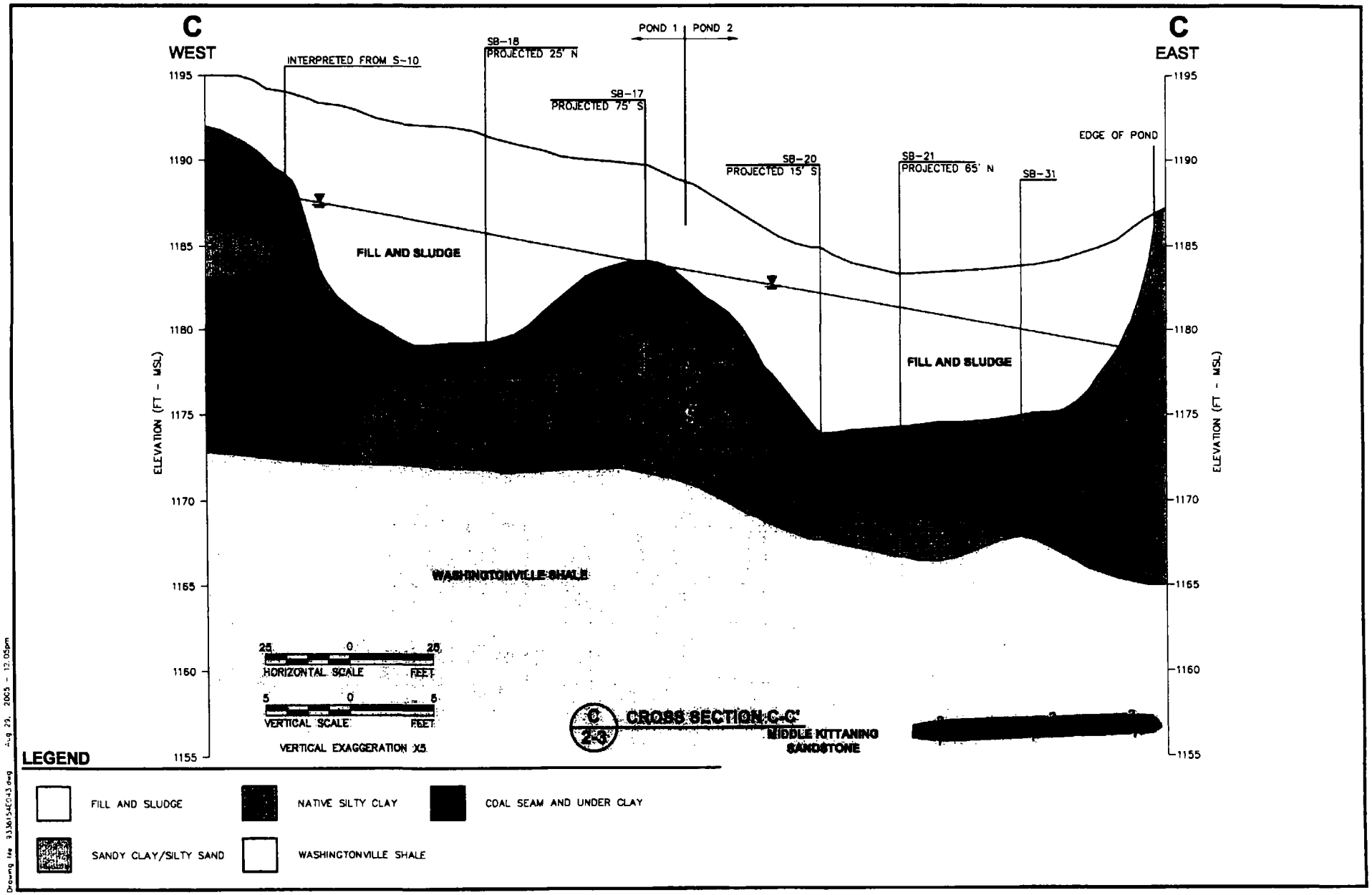


Figure 8 Cross Section of Ponds 1 and 2

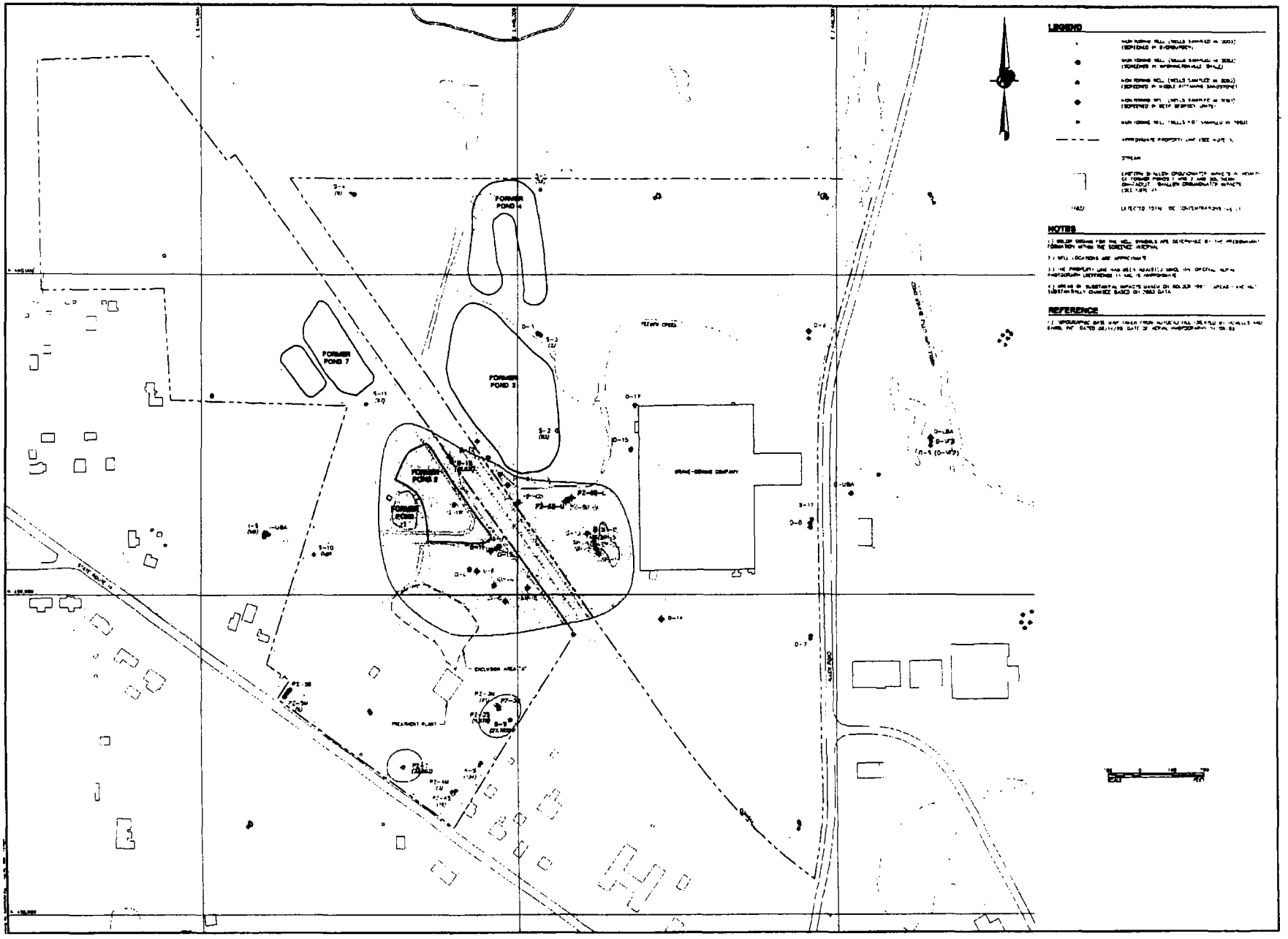


Figure 9 Overburden Groundwater Contamination

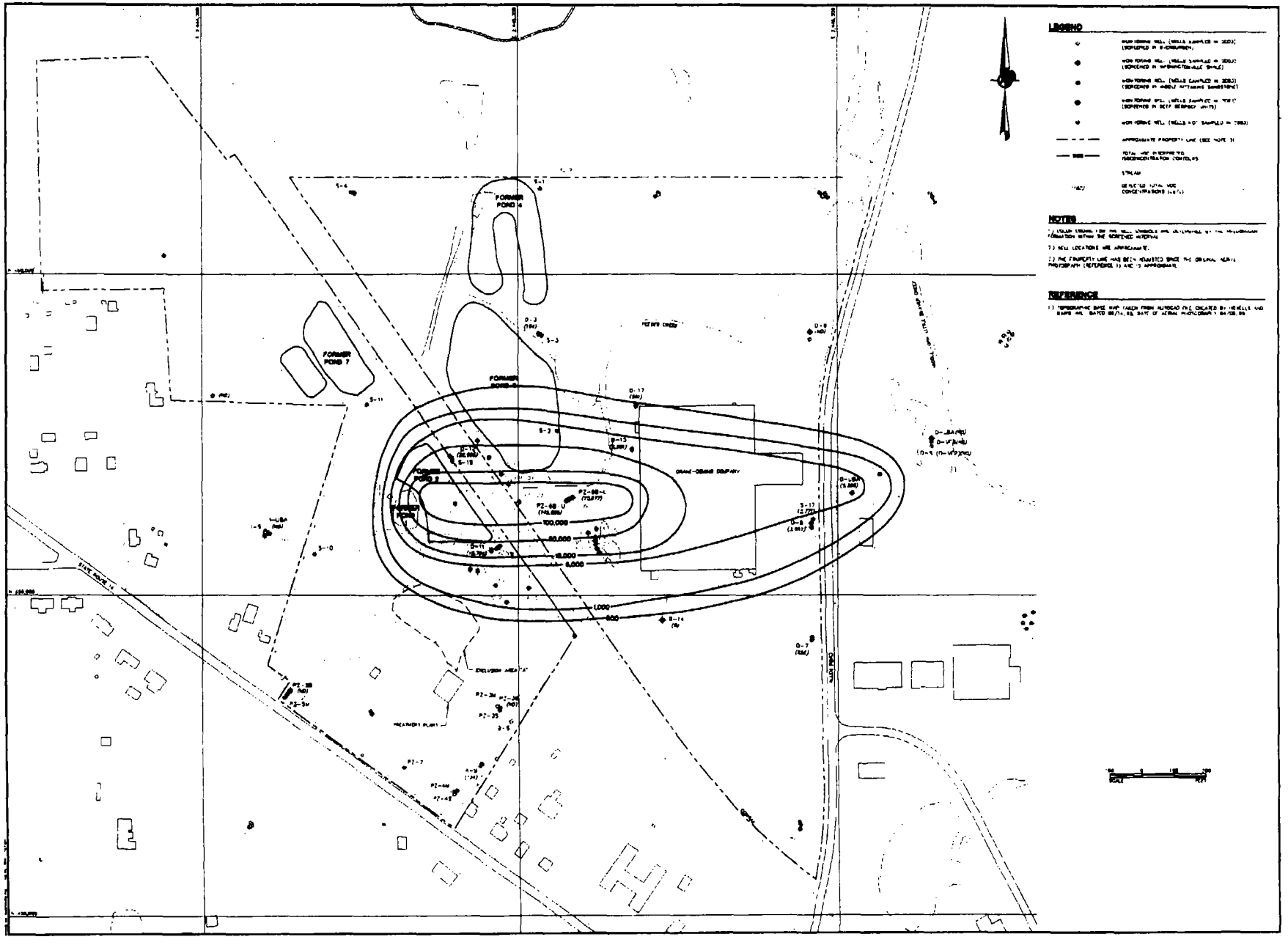


Figure 10 Bedrock Groundwater Contamination

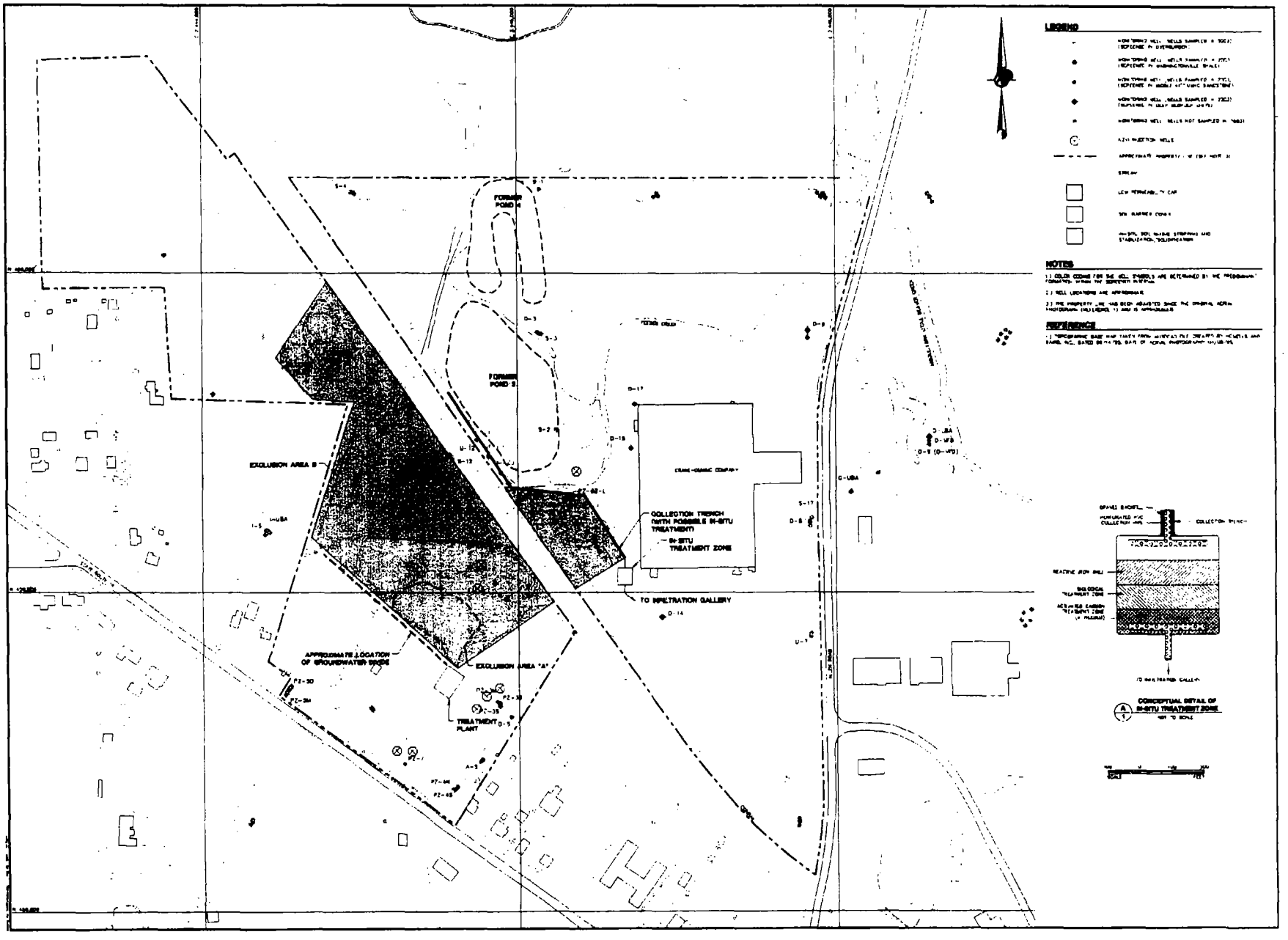


Figure 11 Conceptual Model of Alternative B

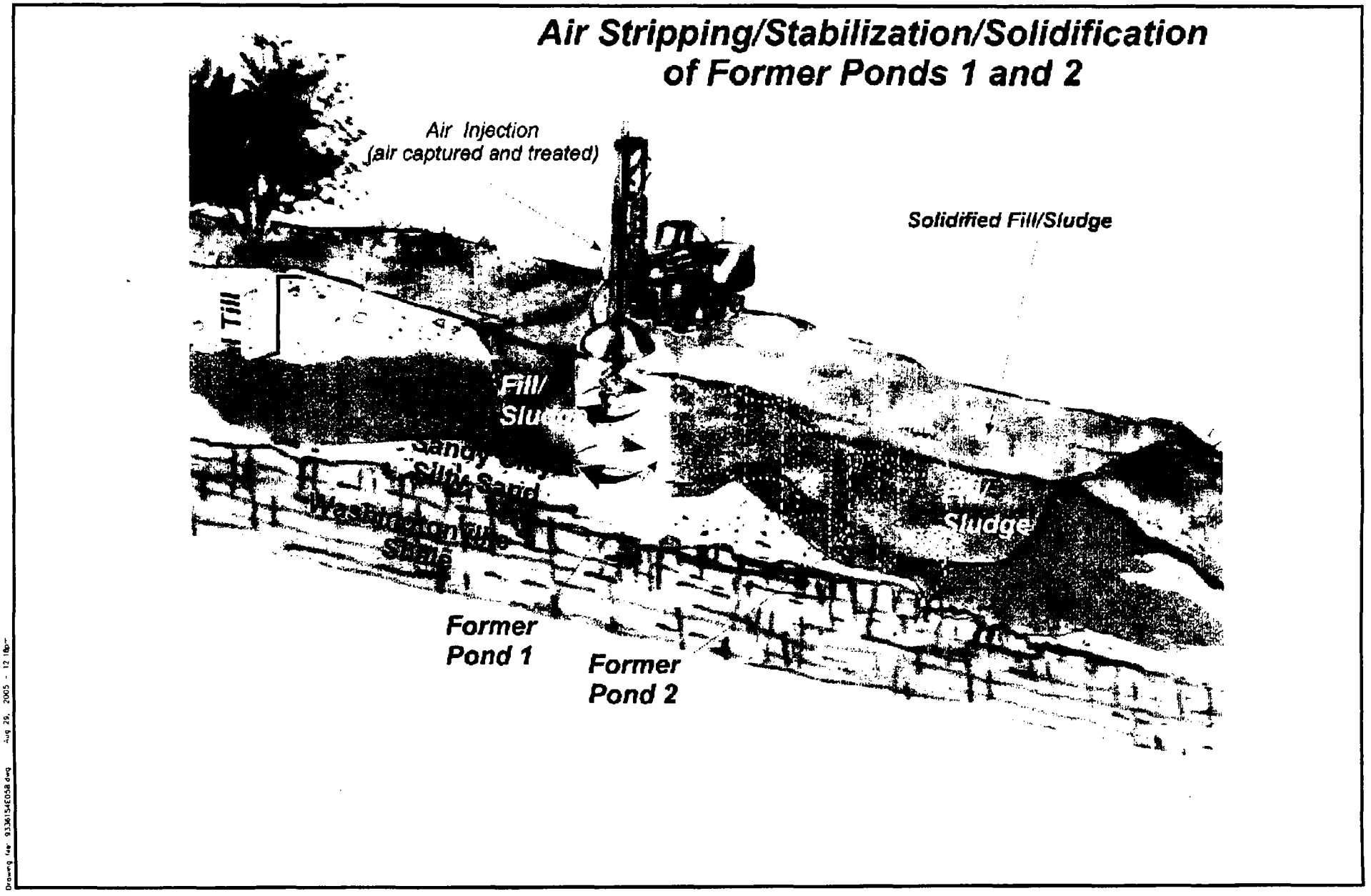


Figure 12 Conceptual Diagram of S/S/S

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	Construction 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	08/08/84	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

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231096

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	- OMPE - 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 #9345.1-01
0002	1	PRELIMINARY ASSESSMENT GUIDANCE FISCAL YEAR 1988	01/01/88	- OERR/ECO	Final	83	2		OSWER #9345.0-01
**		Removal Action							
1000	1	CERCLA REMOVAL ACTIONS AT METHANE RELEASE SITES	01/23/86	- LONGEST, 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	- RISHEL, 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	- MELVOLD, R.W./ROCKWELL INTERNATIONAL - MCCARTHY, L.T./HERL	Final	23	1		EPA 600/8-84-021
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	- LONGEST, 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: 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 EXPEDITED RESPONSE ACTIONS UNDER SARA	04/21/87	- LONGEST, 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 #9360.1-01
4003	32	REMOVAL COST MANAGEMENT MANUAL (Secondary Reference)	04/01/88	- OSWER/OERR	Final	170	1		OSWER #9360.0-02B

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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	- ORD/OEET/HERL - OSWER/OERR	Final	830	1		EPA 540/2-84/0038
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	- BOURWELL, S.H., ET AL./ANDERSON-NICOLS AND CO - OSWER/OERR - AMMEN, 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	- HEDEMAN, JR., W N /OERR - LUCERO, G /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/OWPE	Final	120	1		OSWER #9355.0-7B
2103	6	DESIGN AND DEVELOPMENT OF HAZARDOUS WASTE REACTIVITY TESTING METHODOLOGY	02/01/84	· KOLBACH, C.D., ET AL /ACUREX CORP · BARKLEY, W /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 /ALIS 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	· OERR/ASBD	Final	90	1		EPA/540/2-88/005
2106	6	FIELD STANDARD OPERATING PROCEDURES MANUAL #4-SITE ENTRY	01/01/85	· OERR/RSD	Final	29	2		OSWER #9285.2-01
2107	7	FIELD STANDARD OPERATING PROCEDURES MANUAL #6-WORK ZONES	04/01/85	· OERR/RSD	Final	19	2		OSWER #9285.2-04
2108	7	FIELD STANDARD OPERATING PROCEDURES MANUAL #8 AIR SURVEILLANCE	01/01/85	· OERR/RSD	Final	24	2		OSWER #9285.2-03
2109	7	FIELD STANDARD OPERATING PROCEDURES MANUAL #9-SITE SAFETY PLAN	04/01/85	· OERR/RSD	Final	26	2	1) SAMPLE SITE SAFETY PLAN AND OSHA SAFETY PLAN 2) EMERGENCY OPERATION GEIGER REAL TIME MONITOR 3) RESPONSE SAFETY CHECK-OFF SHEET	OSWER #9285.2-05
2110	7	GEOPHYSICAL METHODS FOR LOCATING ABANDONED WELLS	07/01/84	· FRISOPNECT, 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
2112	8	GUIDELINES AND SPECIFICATIONS FOR PREPARING QUALITY ASSURANCE PROGRAM DOCUMENTATION	06/01/87	· ORD/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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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 /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 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/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/WES - YOUNG-COFD, 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	- GOLDMAN, J L , ET AL /HLS - 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	- LONGEST, H.L./OSWR - LUGBRO, 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	· MATRECON, INC · LANDRETH, R /ORD/RISK REDUCTION ENGINEERING LAB	Final	950	2		
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 10
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 ENGINEERING OF UNEXPOSED & EXPOSED POLYMERIC MEMBRANE LINERS MATRECON INC 2) SEC 3019 EXPOSURE INFO AND HEALTH ASSESSMENTS	OSWER 9480 00 13
2211	15	TECHNICAL GUIDANCE DOCUMENT CONSTRUCTION QUALITY ASSURANCE FOR HAZARDOUS WASTE LAND DISPOSAL FACILITIES	10/01/86	· FERRMANN J G /MERL/LAND POLLUTION CONTROL DIV · OSWER	Final	88	2		OSWER 9472 003
2212	15	TREATMENT OF REACTIVE WASTES AT HAZARDOUS WASTE LANDFILLS PROJECT SUMMARY	01/01/84	· SHEDDITER 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	- GUIBS, 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./OEET	Final	445	2		OSWER #9480 00 5
2303	17	EPA GUIDE FOR IDENTIFYING CLEANUP ALTERNATIVES AT HAZARDOUS WASTE SITES AND SPILLS: BIOLOGICAL TREATMENT	—	- PACIFIC NORTHWEST LABORATORY - RAMIERE, 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 3
2305	17	GUIDANCE DOCUMENT FOR CLEANUP OF SURFACE IMPOUNDMENT SITES	06/01/86	- COMMODDARD-CLYDE/ROY F WESTON - BARTH, E./OERR	Final	39	1		OSWER #9380 0 06
2306	17	GUIDANCE DOCUMENT FOR CLEANUP OF SURFACE TANK AND DRUM SITES	05/20/85	- COMMODDARD-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	- SHRINEELD, J AND BASS, J /ARTHUR D LITTLE INC - PARRIN 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 - HOUWKOOPD, J M /ORD/MERL	Final	125	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 RUES, C /JRB ASSOCIATES - BARKLEY, N /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 00 M
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/S2 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./JRB 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 TRENCH CONSTRUCTION FOR POLLUTION MIGRATION CONTROL	02/01/84	- OERR - ORD/MERL	Final	270	1		EPA/540/2-84-001
2318	22	SYSTEMS TO ACCELERATE IN SITU STABILIZATION OF WASTE DEPOSITS	09/01/86	- ANDERSON, 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 (GME) 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/440/6-84-003
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	METHODS 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 /OWPE	Final	8	1		OSWER #9950 1-a
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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	· OERR	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 (GME) GUIDANCE DOCUMENT [Secondary Reference]	12/19/86	· LUCERO, G A /OWPE	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/OWPE/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, G A /OWPE	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, OWM	Final	3	2		
**		Water Quality							
4000	26	ALTERNATE CONCENTRATION LIMIT GUIDANCE PART 1, ACL POLICY AND INFORMATION REQUIREMENTS	07/01/87	· OSW/WQO	Final	124	2		OSWER #9481.00-6
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	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	06/16/86	· 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/CHEA/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--BROCHURE ON ACCESS IS INCLUDED]	-	- CHEA	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 "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	- ATHEY, 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	- OERR	Final	160	1		OSWER #9285.5-1
5014	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 /OHPE	Draft	126	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'BRIEN & GERE - OHD/HERL - OSWER/OERR	Final	56	1		
6001	32	REMOVAL COST MANAGEMENT MANUAL	04/01/88	- OSWER/OERR	Final	170	1		OSWER #9360.0-02B
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 COMM REL HANDBOOK 11/03/88	OSWER #9230.0-03B

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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	06/24/85	· KILPATRICK, M /COMPLIANCE BRANCH, OWPE	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

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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]	

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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	