

**EPA Superfund  
Explanation of Significant Differences:**

**CROSSLEY FARM  
EPA ID: PAD981740061  
OU 02  
HEREFORD TOWNSHIP, PA  
07/26/2004**

# EXPLANATION OF SIGNIFICANT DIFFERENCES CROSSLEY FARM SUPERFUND SITE

## I. INTRODUCTION

Site Name: Crossley Farm Superfund Site

Site Location: Hereford Township, Berks County, Pennsylvania

Lead Agency: U.S. Environmental Protection Agency,  
Region III ("EPA" or the "Agency")

Support Agency: Pennsylvania Department of Environmental Protection ("PADEP")

A Record of Decision ("ROD") which set out EPA's selected remedy ("Selected Remedy") for the Crossley Farm Superfund Site ("Site") Operable Unit Two ("OU-2 ROD") was signed on September 28, 2001.

This Explanation of Significant Differences ("ESD") has been prepared to provide the public with an explanation of the nature of a modification to the OU-2 ROD Remedy and to summarize the information that supports this modification.

This ESD complies with the statutory requirements of Section 121 of the Comprehensive Environmental Response, Compensation and Liability Act, as amended ("CERCLA"), 42 U.S.C. § 962, Section 117(c) of CERCLA, 42 U.S.C. § 9617(c), and 40 C.F.R. § 300.435.

This ESD is incorporated into the Administrative Record for the Site. Copies of the Administrative Record are available at the following location: U.S. EPA Region III [www.epa.gov/arveb](http://www.epa.gov/arveb).

The modification described below is "significant," as defined by 40 C.F.R. § 300.435(c)(2)(I) of the National Oil and Hazardous Substance Pollution Contingency Plan ("NCP"), and, therefore, requires preparation of this ESD. This modification to the OU-2 ROD Remedy does not fundamentally alter the basic features of the Selected Remedy with respect to scope, performance, or cost. Therefore, an ESD is appropriate.

Specifically, EPA has changed the technology utilized in the Selected Remedy for groundwater treatment from an on-site plant using an air stripping process (to transfer the volatile compounds from the groundwater to a vapor phase which can be captured in an off-gas treatment system) to an on-site plant which will use an advanced oxidation process ("AOP") that will destroy volatile, semi volatile and other organic compounds.

Also, EPA has added a component to the treatment system which will remove dense non-aqueous phase liquid ("DNAPL") from the water prior to treatment in the AOP unit. The DNAPL collected and contained in the treatment facility shall be disposed at an off-site facility in

accordance with 121(d)(3) of CERCLA and 40 CFR 300.440

Thirdly, in addition to reinjection of the treated water, EPA is adding an option to the remedy to discharge the treated water to already existing surface water ponds on the Site

Finally, long term access to the area where the treatment facility will be constructed, areas necessary for discharge of the treated water to reinjection wells or surface water bodies, and nondisturbance of these remedy components shall be required. The approximate area is shown on the attached Figure 1

## **II. SUMMARY OF THE SITE HISTORY, SITE CONDITIONS, AND SELECTED REMEDY**

The Crossley Farm Site ("Site") is located in a rural area approximately 7 miles southwest of Allentown in the Huffs Church community of Hereford Township, Berks County, Pennsylvania. The Site is located along the southern side of Huffs Church Road, approximately 3 miles west-northwest of State Route 100 and northwest of the borough of Bally. The Site location is shown on Figure 1.

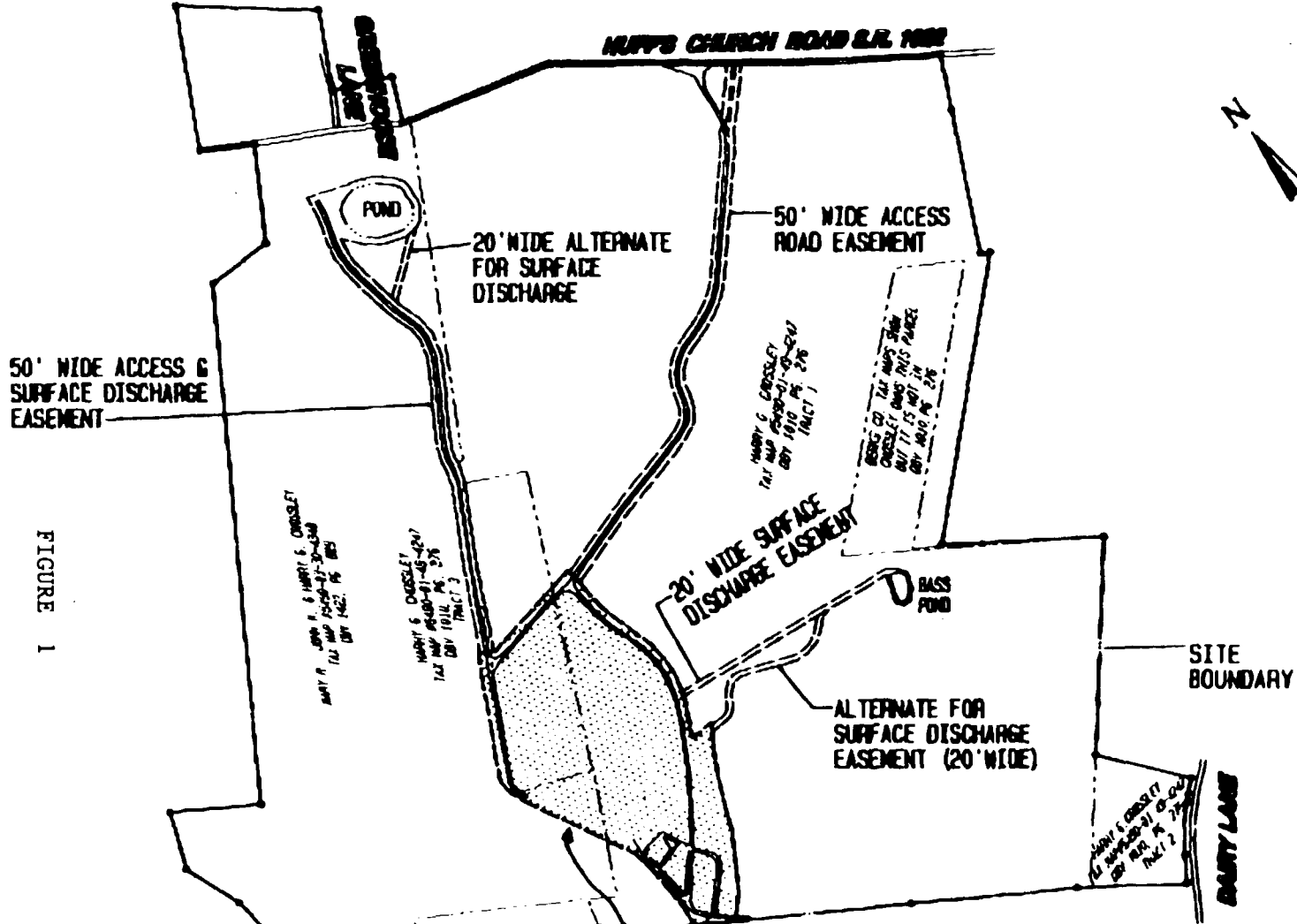
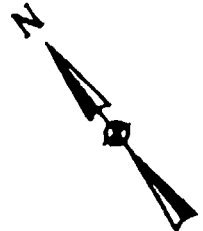
The Site consists of approximately 209 acres of land separated into several parcels owned by the Crossley Brothers Partnership, the Estate of Harry Crossley and Ruth Crossley. The Site has been operated as a dairy farm since 1927. Recently, the dairy operation has moved and now some local farmers rent the property. There has never been a permitted hazardous waste facility at the Site and no regulatory permits have ever been issued to owners of the Site.

From the mid-1960s to the mid-1970s, a local manufacturing plant reportedly sent numerous 55 gallon drums to the Crossley Farm for disposal. These drums contained mostly liquid waste and were described as having a distinctive "solvent" odor. The plant was believed to have used trichloroethylene ("TCE") as a degreaser from at least the mid-1960s until 1973 and tetrachloroethylene ("PCE") from at least the early 1960s until 1980.

Known and alleged waste disposal areas at the Site include a trash dump, the quarry, the borrow pit area, an alleged drum disposal area and the "EPIC pit area" identified by the Environmental Photographic Interpretation Center ("EPIC") file. All of these suspected source areas were investigated and are further described in the July 2001 Remedial Investigation Feasibility Study Report ("R/FS").

State involvement at this Site began in 1983, when local residents complained to the Pennsylvania Department of Environmental Resources ("PADER"), now known as PADEP, about odors in private water supply wells. A PADER sampling program of local wells conducted in September 1983 revealed concentrations of TCE as high as 8,500 micrograms/liter ("ug/l") and PCE as high as 110 ug/l. The Maximum Contaminant Levels ("MCLs") for both TCE and PCE established under the Safe Drinking Water Act are 5 ug/l. A subsequent sampling round conducted by PADER and EPA in November 1983 revealed that eight home wells contained detectable levels of TCE, and in six of these wells the

MAPP'S CHURCH ROAD & R.R. 1002



50' WIDE ACCESS & SURFACE DISCHARGE EASEMENT

20' WIDE ALTERNATE FOR SURFACE DISCHARGE

50' WIDE ACCESS ROAD EASEMENT

FIGURE 1

20' WIDE SURFACE DISCHARGE EASEMENT

ALTERNATE FOR SURFACE DISCHARGE EASEMENT (20' WIDE)

SITE BOUNDARY

MAIN PLANT EASEMENT

DRAINAGE LAKE

PROPOSED LONG TERM ACCESS AGREEMENTS  
FOR  
**CROSSLEY FARM**

SITUATE IN: HEREFORD TOWNSHIP, BERKS COUNTY, PENNSYLVANIA

**Ludgate Engineering Corporation**

LUDGATE CORPORATE CENTER  
10 VANLANDER DRIVE, SUITE 00  
READING, PA 19603  
PHONE 610/494-7700  
FAX 610/494-7771

SCALE: 1"=400' DATE: 7-10-04 PSR  
COMPUTER FILE: 2606187 0510 PFD

concentrations of TCE exceeded 200 ug/l.

As a result of the November 1983 sampling, PADER issued a health advisory on groundwater use in the area and recommended either boiling the water, installing carbon filtration systems, or using bottled water where TCE concentrations exceeded 45 ug/l. Shortly thereafter, a temporary water supply was provided by the Pennsylvania National Guard through the Pennsylvania Emergency Management Agency. This supply was terminated in mid-1985.

After the health advisory was issued, local residents began to voice concerns about Crossley Farm and alleged dumping of wastes there. In response to these concerns, EPA conducted a Preliminary Assessment ("PA") of the property. The PA, completed in June 1984, concluded that insufficient information existed to identify the source of the groundwater contamination and suggested that a regional groundwater study be conducted.

Further citizen complaints in August 1986 prompted additional sampling of residential wells by EPA in September 1986. TCE levels detected during these rounds ranged up to 19,000 ug/l. Additional well sampling in November 1986 detected TCE at a maximum level of 22,857 ug/l.

EPA initiated a removal action in December 1986. In January 1987 carbon filtration units were installed on the most severely impacted private wells. A contaminant concentration level of 180 ug/l of TCE or greater was used as the criterion for installing a filter for any particular well. This criterion was developed in consultation with the Agency for Toxic Substances and Disease Registry ("ATSDR") and was based on one-half of the Drinking Water Equivalent Level ("DWEL"). At that time, 15 carbon filter units were installed and maintained by EPA.

In the spring of 1987, EPA initiated a regional hydrogeological investigation to include the installation and sampling of on-site and off-site monitoring wells and the sampling of residential well supplies. This investigation, completed in August 1988, concluded that the source of the TCE in the groundwater was near the crest of Blackhead Hill. The abandoned quarry and the borrow pit area were cited as the presumed source areas. The investigation delineated a contaminated groundwater plume extending approximately 7,000 feet downgradient from Blackhead Hill and along Dale Road.

Concurrent with and independent of the EPA study, residential wells near Dale Road were sampled and analyzed for polychlorinated biphenyls ("PCBs") and other contaminants as part of a PADEP investigation of the Texas Eastern-Bechtelsville compressor station. One residential well located on Forgedale Road contained TCE at levels greater than 200 ug/l, suggesting that the TCE plume associated with the Crossley Farm Site extended even farther to the south than mapped, since TCE was determined not to be a common waste product from compressor station operations. This result prompted additional sampling by EPA along Forgedale Road, south to Old Route 100, as part of the Crossley Farm investigation. These analytical data indicated that the plume extended south of the compressor station and Forgedale Road and about 9,000 feet downgradient from Blackhead Hill.

In February 1991, EPA issued the final Hazard Ranking System ("HRS") package for the Crossley Farm Site in preparation for the Site's proposal for the National Priorities List ("NPL"). In July 1991, the Site was proposed for the NPL. The Site was formally listed on the NPL in October, 1992.

In September 1994, EPA initiated a RI/FS for the Site to evaluate existing data, collect additional data as necessary and consider appropriate actions. EPA decided to expedite the evaluation of alternatives to address the contaminated residential well supply problem by preparing a Focused Feasibility Study ("FFS") prior to completion of the remaining Site investigation activities.

In June 1997, EPA signed a ROD to provide point of entry carbon treatment units for all residential drinking water wells that showed contamination related to the Site. This was considered the first operable unit ("OU1") for the remedial action at the Site. EPA's subcontractor began the installations in September 1999. To date, EPA has installed a total of forty-seven carbon treatment systems in area homes impacted by the Site contamination.

The remedial action for OU1 is complete and PADEP assumed the responsibility for maintaining the carbon treatment systems beginning in February 2001. EPA will continue to sample drinking water wells in the area of the Site every six months to determine whether any new homes require a carbon treatment system.

In the summer of 1998, EPA's Removal Program excavated approximately 1200 drums and 15,000 tons of contaminated soil from the location at the Site identified as the EPIC pit area. All of these materials were disposed at approved and permitted hazardous waste disposal facilities.

The field activities at the Site continued through 1999 and the RI/FS reports were completed in July 2001. These activities resulted in the 2001 Record of Decision which required the following remedial actions:

1. The selected remedy is to implement a limited groundwater treatment remedial action for the highest concentration of contamination at the top of Blackhead Hill. By using a limited number of extraction wells in the "hot spot area", the Agency can evaluate the effectiveness of a few wells to decrease concentrations in the groundwater and in the springs down the hill and in the valley. This approach will allow for expansion of the extraction and treatment system as EPA considers which other remedial actions to select in future decision documents for the Site.

This remedial action will provide treatment of the highest concentration of TCE contamination located immediately downgradient of the borrow pit area using a limited number of extraction wells in the area represented by concentrations above 100,000 ug/l of TCE.

This remedy proposes installation of approximately ten wells in the highest concentration area at depths of approximately 125 and 400 feet to be pumped at a rate of 5 to 30 gallons per minute (gpm). **Current Status: Based on the Remedial Design, six extraction wells have been installed. Three are at 150 ft. depth two are at 338 ft. depth and one is at 418 ft. depth.**

2. This action will require additional groundwater sampling to better delineate the vertical and horizontal extent of contamination and to visually determine if a DNAPL exists. This will be further determined in a remedial design. **Current Status: The design investigation is complete and DNAPL was detected.**
3. Groundwater treatment will be at an on-site plant using an air stripping process to transfer the volatile compounds from the groundwater to a vapor phase which can be captured in an off-gas treatment system. The treated water will be run through an additional carbon polishing unit prior to discharge Current Status: This section is changed by this ESD to an Advanced Oxidation Process ("AOP") treatment technology.
4. Recharge of treated water on-site through trenches or reinjection wells. The recharge system for groundwater would be constructed to discharge the water into the shallow and intermediate aquifer by pumping the treated water to specifically constructed trenches in the wooded areas of the farm or into wells screened in the shallow and intermediate water bearing zones. **Current Status: Reinjection trenches were not able to percolate the water during the design evaluation and were eliminated. The current plan is to return the treated water to the groundwater aquifer by a system of reinjection wells. This ESD is adding an option to the remedy to discharge the treated water to already existing surface water ponds on the Site.**
5. The remedial action requires some property on the farm at the top of the hill for long term use to house the equipment for the extraction and treatment remedy as well as for the groundwater recharge system. **Current Status: This ESD adds the requirement of a long term access agreement, access order or easement for property shown on Figure 1.**
6. Institutional Controls from the OU-2 ROD requires that groundwater extraction wells shall not be installed and contaminated groundwater at the Crossley Farm Superfund Site, including but not limited to the areas of Huff s Church Road, Dale Road, Forgedale Road, Dairy Lane, Airport Road and Camp Mensch Mill Road shall not be used unless treatment units are installed and maintained to ensure that any water used has contaminant levels at or below Safe Water Drinking Act (SWDA) - Maximum Contaminant Levels (MCLs) (40 CFR-141) This could be achieved with local government restrictions on the use of groundwater Current Status: **This IC remains in effect.**
7. The June 1997 OU-2 ROD has been implemented and the PADEP has assumed responsibility for the operation and maintenance of the treatment units installed under that remedial action. Therefore, any new property construction over the contaminated groundwater plume after February 2001 would not receive carbon filtration units paid for by EPA **Current Status: This decision remains in effect.**
8. Groundwater monitoring under this remedy is a remedial action Sampling of residential wells and springs would be conducted every 6 months. **Current Status: As part of the interim remedy, this decision remains in effect indefinitely.**

9. This remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure Pursuant to Section 121(c) of CERCLA, 42 U.S.C 9621(c), a statutory review by EPA will be conducted no less often than every five years after initiation of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment. **Current Status: A Five Year Review is planned for September 2004 based on the initiation of the Remedial Action for OU1.**
  
10. Groundwater Remediation Standards for the Hot Spot Area, treated water from the Treatment Plant and treated water from new construction wells shall meet contaminant levels at or below these Maximum Contaminant Levels.
  1. cis-1,2-dichloroethylene 70 ug/1
  2. Tetrachloroethylene 5 ug/1
  3. Trichloroethylene 5 ug/1

**Current Status: Groundwater standards remain the same.**

### **III. DESCRIPTION OF SIGNIFICANT DIFFERENCES AND THE BASIS FOR THOSE DIFFERENCES**

The decision to change the ex-situ treatment technology was prompted by the findings of the design investigation at the Site. While constructing the monitoring wells and the extraction wells, analytical results indicted TCE concentrations were as high as 1,300,000 ug/1 in a monitoring well, which indicates the TCE DNAPL is at or near the solubility level in the groundwater In addition to the concentration, a field testing substance was used which indicated the presence of the TCE DNAPL. The design investigation also showed high concentration in the new extraction wells. (TCE concentration at 700,000 ug/1, PCE concentrations at 8,600 ug/1).

Based on these findings a treatment technology review was prepared and a pilot test was conducted at the Site using an Advanced Oxidation Process ("AOP") to treat the highly contaminated groundwater from the extraction wells. AOP destroys dissolved organic contaminants in groundwater using an oxidizing agent, which triggers a chemical reaction, which then converts the chlorinated organic contaminants into water, carbon dioxide and residual chlorine in solution.

Based on the results of this pilot test, this ESD changes the treatment technology for the extracted groundwater from an air stripping tower to an AOP system for treatment of the contaminated groundwater. The AOP system will be followed by an Granular Activated Carbon ("GAC") adsorption system to remove any remaining contaminants and to meet the discharge requirements This carbon polishing step was required in the original OU-2 ROD.

Since a TCE DNAPL was detected in the design investigation monitoring wells, the treatment system was modified to require a water/DNAPL separator as part of this ESD. When DNAPL



is observed in any of the incoming flow, the water will be diverted into the separator for phase separation and the DNAPL will be collected in a separate vessel for off site disposal.

The decision to allow for the possibility for surface water discharge is necessary to supplement the reinjection well system during routine maintenance of the injection wells. The option for surface water discharge may also be needed for additional capacity if the extraction rate increases to effectively capture the contaminated groundwater plume.

During the design investigation, PADEP provided EPA with maximum contaminant concentrations for discharge limits equivalent to the substantive requirements for an NPDES discharge permit. The substantive NPDES discharge requirements will be met before reinjection and before surface water discharge to the ponds.

The decision to implement an institutional control for long term access agreement, access order or easement is needed to assure that the expense and effort to construct the treatment facility will be available for the length of time necessary to achieve the goals for the remedial action. The area where the access is needed will be legally documented by property drawings based on a property survey conducted by EPA. This long term access agreement, access order or easement will be implemented by EPA and PADEP.

This modification to the 2001 OU-2 ROD does not fundamentally alter the cost of the ROD with respect to scope, or performance. The current estimate of the present worth costs are less than the 2001 ROD. The cost estimate of \$6,500,000 00 is approximately 20% less.

This ESD requires the following:

1. Changing the ex-situ treatment technology for extracted groundwater from an on-site plant using an air stripping process, to an on-site plant using an advanced oxidation process to remove volatile, semi volatile and other organic compounds, followed by a GAC adsorption treatment system. The effluent limitations and monitoring requirements are shown in the table contained within section I.A.2 of Attachment 1.

ATTACHMENT 1

I. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

A. Outfall 001, which receives wastewater from a groundwater remediation system.

1. Numbers in parentheses ( ) refer to Footnotes/Additional Requirements/Information.
2. Samples taken in compliance with the monitoring requirements shall be taken at the following location(s): at discharge from treatment system.

DISCHARGE LIMITATIONS						MONITORING REQUIREMENTS	
Discharge <sup>(1)</sup> Parameter	Mass Units (lbs/day)		Concentrations (mg/l)			<sup>(3)</sup>	
	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily	Inst. Maximum	Monitoring Frequency	Sample Type
Flow (mgd)	Monitor & Report	Monitor & Report	XXX	XXX	XXX		Pump Rate
Total Suspended Solids	XXX	XXX	Monitor & Report	Monitor & Report	XXX	2/month	24-hr comp
Carbon Tetrachloride	XXX	XXX	0.00025	0.0005	0.0006	2/month	24-hr comp
Chloroform	XXX	XXX	0.0057	0.0114	0.0143	2/month	24-hr comp
1,2-Dichloroethane	XXX	XXX	0.00038	0.00078	0.00095	2/month	24-hr comp
1,1-Dichloroethylene <sup>(2)</sup>	XXX	XXX	Non-Detect	Non-Detect	Non-Detect	2/month	24-hr comp
Methylene Chloride	XXX	XXX	0.0047	0.0094	0.01175	2/month	24-hr comp
Tetrachloroethylene	XXX	XXX	0.0008	0.0016	0.002	2/month	24-hr comp
1,1,2-Trichloroethane	XXX	XXX	0.0006	0.0012	0.0015	2/month	24-hr comp
Trichloroethylene	XXX	XXX	0.0027	0.0054	0.0068	2/month	24-hr comp
Vinyl Chloride	XXX	XXX	0.002	0.004	0.005	2/month	24-hr comp
1,1,1-Trichloroethane	XXX	XXX	0.005	0.010	0.0125	2/month	24-hr comp
Total Dissolved Solids	XXX	XXX	500	1,000	1,250	2/month	24-hr comp

B. Footnotes/Additional Requirements/Information

1. In addition to the listed parameters, the discharge of floating solids, visible foam, or other substances that produce color, tastes, odors, and turbidity, or settle to form deposits shall be controlled.
2. Water Quality Based Effluent Limit at or Below Detection Limits
  - a. The calculated limitation for 1,1-Dichloroethyene is the limitation necessary to comply with the State Water Quality Standards. This effluent limitation is lower than the method detection limit (MDL) of the most sensitive existing EPA approved (40 CFR 136) test method or other Department-approved method
  - b. For purposes of reporting, the Permittee shall use the reporting threshold equivalent to the Minimum Levels (ML). The ML is defined as the concentration in a sample equivalent to the concentration of the lowest calibration standard analyzed in a specific analytical procedure assuming that all the method-specified sample weights, volumes, and processing steps have been followed. As such, the permittee must conduct analyses in accordance with the method specified below and must utilize a standard equivalent to the concentration of the ML specified below:

<u>Analytical Method</u>	<u>ML and Lowest Calibration Concentration</u>
601	0.13 ug/l

3. This is the minimum number of sampling events required. Dischargers are encouraged, and it may be advantageous in demonstrating compliance, to perform more than the minimum number of sampling events.

II. DEFINITIONS

- A. "Average monthly" discharge limitation means the highest allowable average of "daily discharge" over a calendar month, calculated as the sum of all "daily discharge" measured during a calendar month divided by the number of "daily discharge" measured during that month.
- B. "Maximum daily discharge limitation means the highest allowable "daily discharge."
- C. "Instantaneous maximum" means the level not to be exceeded at any time in any grab sample.

- D. "Composite Sample" (for all except GC/MS volatile organic analysis) means a combination of individual samples (at least eight for a 24-hour period or four for an 8-hour period) of at least 100 milliliters each obtained at spaced time intervals during the compositing period. The composite must be "flow-proportional", which means either the volume of each individual sample is proportional to discharge flow rates, or the sampling interval is proportional to the flow rates over the time period used to produce the composite.
- E. The test procedures for the analysis of pollutants shall be those contained in 40 CFR Part 136, or alternate test procedures approved pursuant to those parts, unless other test procedures have been specified above.
- F. The discharger shall effectively monitor the operation and efficiency of all wastewater treatment and control facilities and the quantity and quality of the discharge(s) as specified above. Monitoring results must be submitted to the following address within 28 days after the end of each monthly report period:

Department of Environmental Protection  
Hazardous Sites Cleanup Program  
909 Elmerton Avenue  
Harrisburg, PA 17110-8200

- 2. Adding a DNAPL and water separator to remove the DNAPL prior to the Advanced Oxidation Process ("AOP") treatment. The DNAPL collected and contained in the treatment facility shall be disposed at an off-site facility in accordance with 121(d)(3) of CERCLA and 40 CFR 300 440.
- 3. With respect to treated water identified in Section II Items 3 and 4 above, EPA is adding an option to the remedy to discharge the treated water to already existing surface water ponds on the Site. The option for surface water discharge may be used as a full alternative or in combination with the primarily selected recharge system of reinjection wells for the shallow and intermediate aquifer.
- 4. Long term access to the area where the treatment facility will be constructed, roads leading to the treatment plant, areas necessary for discharge of the treated water to reinjection wells or surface water bodies, and non-disturbance of these remedy components shall be required. The approximate area is shown on the attached Figure 1. Tools for accomplishing this can be agreement, order or easement. The long term access agreement, access order or easement will be implemented by EPA and PADEP.

#### **IV. PUBLIC PARTICIPATION**

This ESD will become part of the Administrative Record File for the Site. The Administrative Record also includes the 1997 ROD for OLM and 2001 ROD for OU2 and all documents that formed the basis for EPA's selection of the remedial action at the Site. The Administrative Record is available for public review at the locations listed in Section I of this ESD.

Questions or comments on EPA's actions can be directed to

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1650 Arch Street (3HS22)  
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(215) 814-3210  
[schrock.roy@epa.gov](mailto:schrock.roy@epa.gov)

## **V. SUPPORT AGENCY REVIEW**

In accordance with 40 C.F.R. § 300.435(c)(2), EPA has notified PADEP of the modification to the cleanup and the institutional controls component of the Selected Remedy described in this ESD. PADEP concurs with the issuance of this ESD.

## **VI. AFFIRMATION OF STATUTORY DETERMINATION**

Considering the changes that have been made to the treatment technology, the option for surface water discharge of treated water and institutional control components of the Selected Remedy under this ESD, EPA and PADEP believe that the remedy remains protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to this remedial action, and is cost-effective. In addition, the Selected Remedy as revised through this ESD utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable at this Site.