Pennsylvania Department of Environmental Protection

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December 23, 2005

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Southcentral Regional Office

Mr. Abraham Ferdas, Director (3HS00)
Hazardous Sites Cleanup Division
US EPA, Region III
841 Chestnut Building
Philadelphia, PA 19107

Re: Record of Decision (ROD)
Ryeland Road Arsenic Superfund Site
Heidelberg Township
Berks County, Pennsylvania

Dear Mr. Ferdas.

The Record of Decision (ROD) for the Ryeland Road Arsenic Superfund Site, Heidelberg Township, Berks County was received by the Department on December 19, 2005, and was subsequently reviewed.

The proposed remedy for this site consists of the following major components:

Excavation and off-site disposal of arsenic and lead contaminated soils, brick and sediments. Sampling results indicate that extensive soil contamination exists beneath three residential properties in the Northern Source Area. The families residing in the three homes would be permanently relocated and all structures would be demolished prior to the soil cleanup. Two additional families would require temporary relocation during part of the cleanup. EPA would purchase the three residential properties in the Northern Source Area as well as the property in the Southern Source Area. All excavation areas would be restored with clean fill, topsoil, wild flowers and/or grasses.

The Department hereby concurs with EPA's proposed remedy with the following conditions:

- The Department will be given the opportunity to review and comment on documents and concur with decisions related to the design and implementation of the remedial action, to assure compliance with Pennsylvania ARARs.

- Public comment and the issuance of an Explanation of Significant Differences (ESD) must occur before any modification of the ROD.
- This concurrence with the selected remedial action is not intended to provide any assurances pursuant to CERCLA § 9604(c)(3).

Thank you for the opportunity to comment on this EPA Record of Decision. If you have any questions regarding this matter, please do not hesitate to contact me.

Sincerely,

Rachel S. Diamond
Director
Southcentral Region

RECORD OF DECISION
RYELAND ROAD ARSENIC SUPERFUND SITE
OPERABLE UNIT ONE

DECLARATION

Site Name and Location

Ryeland Road Arsenic Superfund Site
Womelsdorf, Berks County, Pennsylvania
CERCLIS ID number PAD981033459

Statement of Basis and Purpose

The attached Record of Decision ("ROD") presents the selected remedial action for Operable Unit One ("OU1") at the Ryeland Road Arsenic Site ("Site") located in Womelsdorf, Berks County, Pennsylvania. The remedial action was selected in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. § § 9601 - 9675, as amended ("CERCLA"), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), 40 C.F.R. Part 300. The ROD explains the factual and legal basis for selecting the remedial action for OU1 at this Site. The information supporting the ROD is contained in the Administrative Record for this Site.

The Pennsylvania Department of Environmental Protection ("PADEP") concurs with the selected remedy.

Assessment of the Site

Pursuant to duly delegated authority, I hereby determine, pursuant to Section 106 of CERCLA, 42 U.S.C. § 9606, that actual or threatened releases of hazardous substances from OU1 of this Site, if not addressed by implementing the response action selected in the ROD, may present an imminent and substantial endangerment to public health or welfare or the environment.

Description of the Remedy

The selected remedial action for OU1 will be the first remedial action at the Site. The Site is located in a residential area which includes private residences and a commercial nursery. Removal actions conducted in 1985 and 2001 addressed waste piles and contamination in the upper two feet of soil throughout most of the Site. The selected remedy addresses the threat from the remaining contaminated soil and from contaminated sediments by permanently relocating three households and excavating the contaminated soils and sediments prior to disposing of them in off site landfills. Approximately sixty percent of the contaminated soils will be treated via stabilization at an off site treatment facility prior to disposal. Ferns will be planted in a restored wetland area on the nursery property to reduce residual arsenic and poplars will be planted for

hydraulic control. Institutional controls will be used to limit access and future use along a railroad embankment where contaminated soil will remain in place.

The selected remedial action includes the following major components:

- Permanent relocation of three households and the temporary relocation of two or three additional families;
- Excavation and off site disposal of approximately 94,000 tons of contaminated soil;
- Off site stabilization of soils that exhibit the characteristic of toxicity using the Toxicity Characteristic Leaching Procedure;
- Excavation and off site disposal of contaminated brick piles;
- Restoration of excavated areas with clean fill, topsoil, wild flowers and/or grasses;
- Institutional controls such as enforceable orders, deed notices, easements and/or restrictive covenants to prevent disturbing any contaminated soils beneath the railroad embankment;
- Excavation of approximately 4200 tons of contaminated sediments;
- Restoration of a wetland area to filter out sediments and metals before they flow into a spring-fed creek;
- Phytoremediation using ferns to reduce arsenic in sediments bordering the spring-fed creek and residual arsenic in shallow soils and groundwater near seeps and springs; and
- Hydraulic control using hybrid poplars to reduce the lateral migration of shallow groundwater.

The selected remedy will provide protection of human health and the environment by eliminating the sources of contamination that leach elevated arsenic into a spring-fed creek. Soils will be remediated to residential cleanup standards in the residential area along Ryeland Road and to non-residential standards at a commercial nursery which contains the wetland area. Future use will be consistent with the current use of each area.

Statutory Determinations

The selected remedial action is protective of human health and the environment; complies with all Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action; is cost-effective, and utilizes permanent solutions and alternative treatment (or

toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment).

The remedial action will result in hazardous substances, pollutants, or contaminants remaining on-Site above levels that allow unlimited use and unrestricted access. Therefore, an assessment of the Site will be conducted no less often than every five years after initiation of remedial action in accordance with Section 121(c) of CERCLA, 42 U.S.C. § 9621(c), to ensure that the remedy is, and will be, protective of human health and the environment.

ROD Data Certification Checklist

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

- Contaminants of concern and the concentration of the most prevalent metals (pages 5-9);
- Current and future land use assumptions (page 10);
- Baseline risk represented by the chemicals of concern (pages 10-13);
- Cleanup levels to be established and the basis for these levels (page 14);
- How source materials constituting principal threats are addressed (page 32);
- Potential land use that will be available at the Site as a result of the Selected Remedy (pages 33-34);
- Key factors that lead to selecting the remedy (pages 33-35); and
- Estimated capital, annual operation and maintenance and total present worth cost of the Selected Remedy (page 34).

Abraham Ferdas, Director
Hazardous Site Cleanup Division
Region III

1/11/06
Date

RYELAND ROAD ARSENIC SUPERFUND SITE

OPERABLE UNIT #1

WOMELSDORF, PENNSYLVANIA

RECORD OF DECISION

RYELAND ROAD ARSENIC SUPERFUND SITE
OPERABLE UNIT #1
WOMELSDORF, PENNSYLVANIA

RECORD of DECISION

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RECORD OF DECISION
RYELAND ROAD ARSENIC SUPERFUND SITE
OPERABLE UNIT #1

DECISION SUMMARY

I. SITE NAME, LOCATION, AND DESCRIPTION

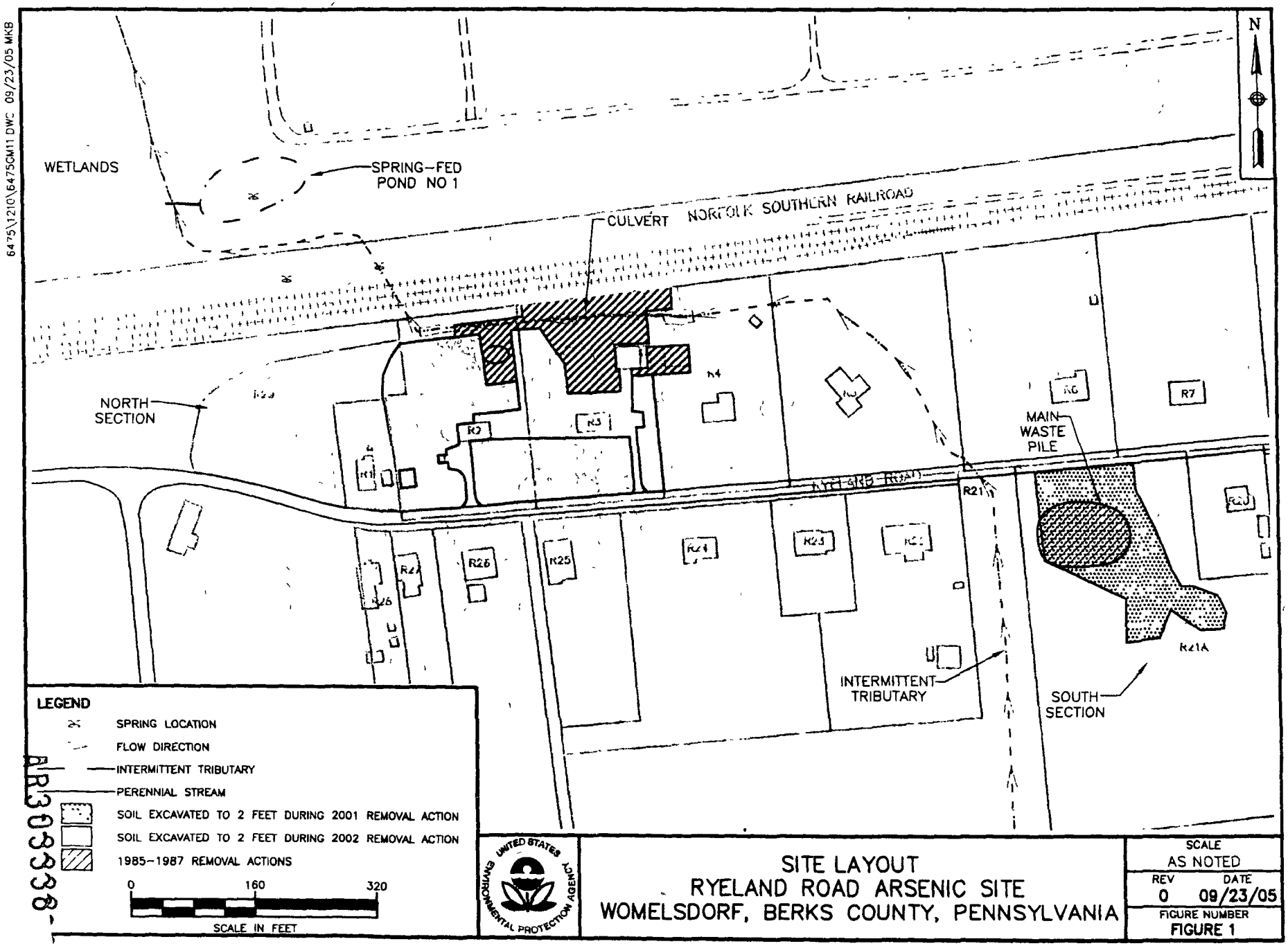
The Ryeland Road Arsenic Superfund Site ("Site") is located approximately 0.75 miles southeast of the Town of Womelsdorf, in Heidelberg Township, Berks County, Pennsylvania. The United States Environmental Protection Agency ("EPA") is the lead agency and has identified the Site as PAD981033459. The Pennsylvania Department of Environmental Protection ("PADEP") is the support agency. No potentially responsible parties have been identified for this Site and all investigations and removal activities have been conducted by either EPA or PADEP.

The Site consists of the Northern and Southern Source Areas located on the north and south side of Ryeland Road, respectively (Figure 1). The Northern Source Area includes approximately 5 acres and is located on a former chemical manufacturing plant which operated from 1927 until destroyed by fire in 1940. Three residences are currently located directly on top of this source area. The Southern Source Area includes approximately 2.7 acres and is located to the south of Ryeland Road. The Southern Source Area was used by the former plant as a disposal area for waste materials. Other areas which have lower concentrations of contamination include several nearby brick piles which appear to be debris from the former plant; surface soil in a commercial nursery; a spring-fed pond at the commercial nursery; and a thin band of contaminated soil located adjacent to the southern edge of Ryeland Road. Contaminated sediments in an unnamed tributary extend 3/4 of a mile downgradient into the Veterans of Foreign Wars ("VFW") Park in Womelsdorf.

II. SITE HISTORY

Beginning in 1927, the former plant manufactured pesticides, fungicides, insecticides, paint, and varnishes. By-products such as lead arsenate, calcium arsenate and copper acetoarsenate were disposed of in on-Site trenches, pits and mounds. A fire destroyed the plant in 1940 and, sometime after the fire, a tobacco crushing operation briefly used the former plant property until 1942. The former plant property remained vacant from 1942 until the late 1970s when individual lots began to be sold for residential development. Residences were constructed on the former plant property which is now referred to as the Northern Source Area.

PADEP conducted a Preliminary Assessment of the Site in 1984 and a more detailed Site Investigation in March 1985. Heidelberg Township requested EPA's assistance in the spring of 1985 after uncovering a grayish-white waste material while excavating an intermittent tributary adjacent to the source areas. EPA conducted a removal assessment which revealed elevated concentrations of arsenic and lead on the north side of Ryeland Road behind the three residences



SITE LAYOUT
RYELAND ROAD ARSENIC SITE
WOMELSDORF, BERKS COUNTY, PENNSYLVANIA

SCALE	
AS NOTED	
REV	DATE
0	09/23/05
FIGURE NUMBER	
FIGURE 1	

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and initiated a removal action in August 1985. EPA conducted a removal action in two phases between 1985 and 1989 during which approximately 2400 cubic yards of waste material were excavated and disposed from the Southern Source Area and about 3000 cubic yards of soil were removed from behind the residences.

EPA was notified in July 2001 that the owner of a vacant parcel on the south side of Ryeland Road was excavating a foundation for a new home. EPA noted grayish-white waste material in the soil and sampling revealed that the soil contained arsenic in concentrations of up to 26,000 milligrams per kilogram ("mg/kg") of arsenic and lead exceeding 35,000 mg/kg at depths up to 9 feet. Arsenic was also detected at 44,000 mg/kg in soil from the residences located in the Northern Source Area.

EPA implemented several removal actions between 2001 and 2002 to address contaminated soils and waste materials. EPA excavated waste material and two feet of contaminated surface soil from the Southern Source Area and from two residential yards located within the Northern Source Area. Over 8300 tons of contaminated wastes were transported off site for disposal and the excavation areas were backfilled with clean soil. EPA also detected elevated levels of lead and copper in several off-Site residential drinking water wells and installed filtration systems to reduce metals in three homes.

EPA conducted an Expanded Site Investigation in 2002 during which it detected arsenic in soil at concentrations as high as 66,200 mg/kg and lead exceeding 150,000 mg/kg. Sediment samples revealed elevated arsenic, copper and lead and surface water samples contained arsenic concentrations up to 500 micrograms per liter ("ug/L") EPA proposed the Site to be listed on the National Priorities List ("NPL") on March 8, 2004. The Site was listed on the NPL on July 22, 2004. EPA initiated field activities for the remedial investigation in May 2004 and completed field work in May 2005.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

On November 8, 2005, pursuant to section 113(k)(2)(B) of CERCLA, 42 U.S.C. § 113(k)(2)(B), EPA released for public comment the Proposed Remedial Action Plan ("Proposed Plan") setting forth EPA's preferred remedial alternatives for the Site. The Proposed Plan was based on documents contained in the Administrative Record File. EPA made these documents available to the public in the EPA Administrative Record Room in EPA Region III's office located at 1650 Arch Street in Philadelphia, Pennsylvania, and at the local information repository at the Womelsdorf Library located at 203 West High Street in Womelsdorf, Pennsylvania. A notice of availability of these documents was published in the Reading Eagle on November 7, 2005. EPA opened a 30-day public comment period on November 8, 2005 to receive comments on EPA's preferred alternatives and the other alternatives identified in the Proposed Plan. Comments received during this public comment period, as well as EPA's response to such comments, are summarized in the Responsiveness Summary section of this Record of Decision ("ROD"). EPA and PADEP also held a public meeting on November 14, 2005 at the Bethany Children's Home

located at 1863 Bethany Road in Womelsdorf. A detailed discussion of the recent community activities is presented in Section X under the subheading "Community Acceptance."

More detailed documentation on the information contained in this ROD may be found in the Administrative Record which contains the Remedial Investigation, Feasibility Study, and other information used by EPA in the decision making process. EPA encourages the public to review the Administrative Record in order to gain a more comprehensive understanding of the Site and the activities that have been and will be conducted there. The Administrative Record can be viewed at the Womelsdorf Library located at 203 West High Street in Womelsdorf, Pennsylvania and is also available at the EPA Region III Office located at 1650 Arch Street in Philadelphia, Pennsylvania. To review the Administrative Record at EPA's Philadelphia office, contact Ms. Anna Butch, Administrative Record Coordinator, at (215) 814-3157. The Administrative Record can also be accessed on the web at www.epa.gov/arweb. Copies of this ROD are available for public review in these information repositories.

IV. SCOPE AND ROLE OF OPERABLE UNIT

This ROD addresses sediments, surface water and all sources of Site-related contamination including surface soil, subsurface soil, and brick piles. This ROD does not address Site-related contaminated groundwater which appears to be limited to the shallow aquifer. However, because implementation of the Selected Remedy will reduce and potentially eliminate future releases to the environment, EPA anticipates that the implementation of the Selected Remedy will have a significant and immediate, positive impact on the quality of groundwater potentially eliminating the need for any groundwater remediation. To determine if any additional cleanup activities will be necessary to protect groundwater, EPA will collect and evaluate groundwater data throughout the cleanup and post-construction monitoring of the remedial action.

V. SITE CHARACTERISTICS

A. Geographical, Topographical, and Hydrogeological Features

The Site is located in a quiet residential area. Three houses are currently located directly upon the Northern Source Area. Adjacent homes on both sides of the Northern Source Area reveal limited contamination in the soil. The Southern Source Area is located on a partially developed lot with homes on both sides. Limited contamination extends onto the properties adjacent to the Southern Source Area. Railroad tracks form the northern boundary of the Site, separating the Site from a commercial nursery to the north. An orphanage, the Bethany Children's Home, is located immediately west of the Site. The town of Womelsdorf is located approximately one mile to the northwest.

The Site is located at the base of South Mountain, which rises steeply to the south. Surface drainage from south of the Site flows towards the north-northwest along an unnamed intermittent tributary. The unnamed intermittent tributary passes underneath Ryeland Road and behind the

residences located on the Northern Source Area before it flows through a culvert underneath the railroad line and onto the nursery property.

Fracture traces, surface features, and groundwater and spring data indicate that groundwater follows the same general path as the surface water. Groundwater migrates from South Mountain, flowing beneath the Southern and Northern Source Areas and discharges as springs on the nursery property. Arsenic leaches out of contaminated soil from the two Source Areas and into the shallow groundwater. The impacted groundwater migrates to the northwest and surfaces at numerous springs and seeps in the wetland area. A significant spring with elevated arsenic feeds directly into a pond located on the nursery property. Additional smaller springs feed into the creek and wetland area on the nursery property, immediately downgradient of the railroad tracks. The seeps and springs and the intermittent tributary which flows beneath the railroad form the headwaters of an unnamed tributary of the Tulpehocken Creek. The unnamed tributary is also fed by the overflow from the spring-fed pond, also located on the nursery property.

These waters flow for about a third of a mile before combining in the wetland with a perennial stream whose headwaters include a clean, non-contaminated spring originating at the nearby Bethany Children's Home. The combined surface waters flow approximately ½ mile prior to entering the VFW Park. After leaving the VFW Park, the unnamed tributary continues flowing north until it joins the Tulpehocken Creek in approximately one mile. Arsenic contamination can be traced via surface water and sediments from the Site, through the wetland area and VFW Park and into the Tulpehocken Creek, where it mixes with low levels of arsenic from other sources.

The residents on Ryeland Road west of the Southern Source Area, which includes those residences on the Northern Source Area, are supplied with drinking water from a pristine, upgradient spring located on the Bethany Children's Home. Residents east of the Southern Source Area rely upon private groundwater wells to supply their drinking water. EPA has detected elevated levels of lead in some of these homes. It is not currently known if the elevated lead levels are from household plumbing, sediment build-up in storage tanks, and/or Site-related soils. EPA will continue to evaluate the quality of water in residential wells throughout the implementation of this remedial action.

B. Sampling Activities and Extent of Contamination

1. Soil Investigation

In May 2004, as part of the remedial investigation, EPA took soil borings, dug test pits and took surface and subsurface soil samples. Samples from both the Northern and Southern Source Areas revealed elevated arsenic, lead and copper, with the most contaminated area located in the subsurface behind the residences located on the Northern Source Area. Over 1200 soil samples from 282 locations at the Site were analyzed using a field portable X-Ray Fluorescence ("XRF") instrument, with approximately 25% of the samples verified at a fixed-base laboratory.

Additional soil samples were collected from the other impacted areas, such as the brick piles and nursery soils.

Sample locations were selected based on a grid pattern and samples were collected at regular intervals to a depth of 15 feet to determine the extent of soil contamination. Soil sample results revealed that concentrations of arsenic exceeded 100,000 mg/kg, concentrations of lead reached 83,000 mg/kg, and copper was detected just under 13,000 mg/kg. The volume of contaminated soil from the two source areas is estimated to be 59,000 cubic yards, ranging in depth from two to fifteen feet. Approximately 60% of the contaminated soils are expected to fail the toxicity characteristics leaching procedure ("TCLP") and require treatment upon excavation prior to disposal. No significant volatile or semivolatile organic compounds, pesticides or polychlorinated biphenyls ("PCBs") were discovered that could be attributed to the Site.

Elevated arsenic was detected in subsurface soils throughout the vacant lot on the Southern Source Area, with concentrations reaching 14,000 mg/kg below the location of the former disposal area waste pile. Surface contamination was found primarily in wooded areas adjacent to the vacant lot and in the front and back yard of the residence located east of the vacant lot. Elevated arsenic levels were also found in a thin band of soil adjacent to Ryeland Road in front of four residences located west of the vacant lot.

Site contaminants were detected in the surface soil from five residences located in the Northern Source Area, though the extent of contamination at the residences located on the eastern and western edge was significantly less than those in the middle of the Northern Source Area. Soil contamination also extends onto undeveloped property owned by the Bethany Children's Orphanage along the western boundary of the Northern Source Area. Contamination reached depths of 12 to 15 feet in the backyards of the three most severely impacted residences located in the middle of the Northern Source Area. Subsurface soils in this area represent the most highly contaminated Site soils, with contamination routinely exceeding the TCLP regulatory level. The shallow water table was present at an average depth of 10 feet throughout the Northern Source Area, overlapping some of the deeper contaminated soils.

Dust wipe samples were collected from residences located on or near the Site to evaluate the presence or absence of lead and arsenic in residential indoor dust. The highest level of arsenic was 106 micrograms per wipe and was collected from the track of a basement sliding glass door in a residence located within the Northern Source Area. Arsenic was not detected above trace levels in the other samples. Lead was detected in all wipe samples, but the residence with the maximum concentration is known to have lead-based paint coatings which is the likely primary source of the contamination.

EPA investigated several brick piles after a resident informed EPA of the bricks which appear to have come from the former manufacturing facility after the fire. The largest pile is 8 feet high and 40 feet in diameter. XRF analysis detected elevated arsenic and lead on the surface of the

bricks and up to 435 mg/kg of arsenic in the upper 6 inches of the soil beneath the bricks. EPA discovered three smaller piles of bricks during the investigation and residents indicated that additional piles may be scattered in the nearby wooded area.

Soil sampling on the nursery property focused on two areas where water from the spring-fed pond was sprayed to irrigate potted plants. Sample results detected arsenic in only one of the areas, the area closest to the rail line and the spring-fed creek In that area, arsenic levels reached a concentration of 225 mg/kg. The impacted area appears to be a relatively thin band of soil on the downgradient edge of a spray area which may be impacted by the spray activities and/or the nearby contaminated springs. The total volume of contaminated soil from this area is estimated to be 275 cubic yards. Arsenic and other Site-related metals were only slightly elevated in the other areas where plants were sprayed.

2. Surface Water Sampling

Surface water samples were collected from the upper intermittent tributary, the spring-fed pond and spring-fed creek on the nursery property, and the VFW Park in Womelsdorf. Surface water in the immediate vicinity of the Site contained elevated levels of arsenic in unfiltered samples. Field-filtered samples, which provide a better representation of surface water contamination, were highest on the nursery property, immediately downgradient of the Northern Source Area, on the opposite side of the railroad tracks. The primary spring feeding the pond at the nursery contained 539 ug/L of arsenic in the filtered sample. Elevated arsenic in filtered samples were also collected throughout the headwaters of the spring-fed creek and the adjacent wetland area. Filtered surface water samples from the pond exceeded 320 ug/L. These results indicate that the headwaters of the spring-fed creek and the adjacent wetland area are being impacted by elevated arsenic from shallow groundwater discharging as springs and seeps.

Surface water samples downgradient of the headwaters of the spring-fed creek and the spring-fed pond showed a general decrease in arsenic concentrations as distance from the Site increased. The filtered surface water samples from the VFW Park contain arsenic at levels less than an order of magnitude of the samples collected at the origin of the spring-fed creek.

3. Sediment Sampling

Sediments in the immediate vicinity of the Site contained elevated levels of arsenic, lead, and zinc. The maximum concentration of arsenic in sediments was 818 mg/kg and was found approximately 1200 feet downgradient of the headwaters of the unnamed tributary. Arsenic in sediments was elevated at the headwaters and the spring-fed pond, though the concentration of arsenic generally increased downstream for a short distance through an area with numerous seeps. The concentration of arsenic in sediments located farther than 1200 feet downstream from the Site begins to decrease as distance from the Site increases, especially after the perennial stream enters the spring-fed creek. The primary mechanisms influencing the extent of sediment

contamination are groundwater discharges to surface water via seeps and springs, sediment transport followed by deposition, and adsorption of arsenic, lead, and zinc from the water column to the sediments.

Sediments from the unnamed tributary flowing through the VFW Park were collected at depths of up to 6 feet to evaluate the historical build-up of sediment contamination. The concentration of arsenic was relatively consistent throughout the depth of the deposits, suggesting a relatively consistent source of arsenic for an extended period of time. Arsenic concentrations in VFW Park sediments were generally in the 50 to 60 mg/kg range, though some samples were slightly lower. Additionally, the VFW Park is designed to attract visitors and it was reported that watercress growing in the waterway was being harvested for human consumption. A literature search indicated that certain species of watercress will absorb arsenic into their leaves and stem. Watercress samples collected from the VFW Park showed elevated levels of arsenic was consistently present as compared to a background sample.

Samples collected downgradient of the VFW Park revealed that the level of arsenic in sediments decreases as distance from the Site increases. Sediment samples prior to the confluence of the unnamed tributary and the Tulpehocken Creek continued to show elevated arsenic as did floodplain soil samples which were consistent with sediment results from the same area. It is difficult to interpret sediment results below the confluence because additional potential sources of arsenic contamination are located upstream along the Tulpehocken Creek, i.e., the Whitmoyer Laboratories Superfund Site, and downstream of the confluence, i.e., Womelsdorf Sewer Authority.

4. Groundwater Sampling

Arsenic has migrated into the shallow groundwater as demonstrated by MW-3S1 located near the downgradient northern edge of the Southern Source Area. Significant total and dissolved arsenic, at concentrations of 387 ug/L and 382 ug/L, respectively, were collected from this new monitoring well. Elevated levels of arsenic were also detected in the spring flowing into the spring-fed pond and in seeps bordering or within the wetland area. Contaminated shallow groundwater is migrating downgradient from the Site and is discharging to the surface in the vicinity of the headwaters of the spring-fed creek and pond. Groundwater samples collected downgradient of the spring-fed pond did not contain elevated arsenic, nor did the samples from the deeper bedrock wells.

Lead was detected in several private wells in samples collected near the water storage tanks, typically located in the basement. Samples collected from the kitchen faucet in each residence were all within acceptable limits. The presence of lead in residential well water may be attributable, in whole or in part, to household plumbing systems. Previous inspections and sample results reveled the presence of lead solder. The elevated lead levels may also be related to the build-up of sediments in the water storage tanks. Additional information is needed to determine if the presence of lead in residential well water is related to the Site.

Samples were also collected to prepare a baseline ecological risk assessment to predict risks to ecological receptors impacted by the Site. Toxicity testing was performed on soils, sediments, and water from the spring-fed pond and related water bodies. Surface soils from the southern edge of the Site were analyzed to characterize the habitat which includes vernal pools in this area and soil samples from additional areas were collected to determine any bioaccumulation of contaminants in soil. Aquatic receptors are not at risk from contaminants in surface water, though several groups of ecological receptors were determined to be at risk from site-related contaminants. Sample results revealed that the greatest risks are to sediment invertebrates from arsenic and zinc and to insectivorous mammals and birds from arsenic, lead, and zinc.

C. Conceptual Site Models

A Conceptual Site Model was developed to identify which human exposure pathways were complete or could be potentially complete in the future. The following discussion identifies complete pathways for potential on-site and off-site receptors as identified in the Conceptual Site Model.

The primary source of Site-related contamination are the soils from the Northern and Southern Source Areas which were impacted during the operation and fire of the former plant. Site-related contaminants are released by leaching from soil to groundwater and erosion combined with overland runoff. Groundwater contamination impacts drinking water, and as a secondary source, impacts surface water and sediments, which in turn affect bio-uptake in certain plants, such as watercress. Erosion and overland runoff also contribute contamination to surface water and sediments and wind erosion will release contamination into the air.

Residents, trespassers, recreational users, and construction workers may be potentially exposed to contamination in Site soils, surface water, sediments, and air. Residents may also be exposed to contamination in drinking water. Commercial workers may be exposed to contaminated surface water from the pond at the nursery in addition to contamination in soils. Contamination in shallow groundwater may impact construction workers during excavation activities.

The ecological Conceptual Site Model predicts relationships between stressors and ecological entities, and evaluates contaminants, potential ecological receptors and exposure pathways. The immediate exposure medium to ecological receptors is surface soil where plants, vertebrates and invertebrates in terrestrial habitats and forested wetlands have been exposed by direct contact, ingestion of soil, and ingestion of other food items. Contaminants have also migrated via groundwater or overland transport to surface water and sediments, exposing aquatic receptors to contaminants transported to aquatic environments.

VI. CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

The Northern and Southern Source Areas and the brick piles are located within a quiet, rural residential setting. There are 16 residential dwellings and an orphanage, Bethany Children's Home, within 200 feet of contamination sources. Bethany Children's Home has a staff of about 100 along with approximately 100 children who live there. The Bethany campus also includes a daycare center with a part-time population of an additional 90 children.

Three residences were constructed directly within the area of the former manufacturing plant and a fourth residence is on the eastern edge. A fifth residence, which predates the former plant, is also located on the Northern Source Area. The vacant lot on the Southern Source Area has been cleared and a foundation for a home is partially completed. The foundation was buried beneath 2 feet of clean soil during the 2001 Removal Action.

During the Site Investigation, EPA mailed a questionnaire to nearby residents of the Site soliciting their preference for future use of the Site. EPA also contacted citizens and met individually with families to discuss future use of the Site. The vast majority of citizens requested that their neighborhood remain a quiet, residential area and strongly support that Site use be limited to residential use or open space. Citizens opposed future recreational use of the Site, i.e., ballfields, and the potential construction of a municipal building. A significant number of local residents attended several meetings with Heidelberg Township officials to voice their concerns regarding future uses other than the current residential use of the properties.

The portion of the nursery property in the vicinity of the spring-fed pond, including the spray-irrigation areas, and along the spring-fed creek, has been designated as an agricultural conservation easement under the Pennsylvania Agricultural Conservation Easement Purchase Program. The easement prevents development or improvement of the land for any purpose other than agricultural development. The easement has been recorded by the Berks County recorder of deeds and the future use of this property is considered non-residential. Current and future land use of the VFW Park in Womelsdorf are considered to be recreational. The park serves as open space for the Town of Womelsdorf and its citizens and will likely continue.

VII. SUMMARY OF SITE RISKS

A. Human Health Risk Assessment Summary

A Human Health Risk Assessment ("HHRA") was conducted to estimate the risks to human health resulting from the presence of contaminants from the Site. Both carcinogenic and noncarcinogenic risks were assessed. A cumulative incremental cancer risk ("ICR") of 1×10^{-6} or 1E-6 indicates that the exposed receptor has a 1 in 1,000,000 chance of developing cancer as a result of the defined exposure scenario. Noncarcinogenic risk was assessed using the concept of Hazard Quotients ("HQs") and Hazard Indices ("HIs"). An HI exceeding unity (1) indicates

there may be potential noncarcinogenic health risks associated with exposure. HIs are generated by adding individual HQs for contaminants of concern.

The results of the HHRA indicate that there are unacceptable risks resulting from exposure to soils, shallow groundwater, and selected sediments from the Site. Contamination from arsenic, lead and zinc pose risks that require the evaluation of remedial alternatives. The HHRA identified dermal contact and incidental ingestion as the primary routes of exposure. The evaluation of remedial alternatives focused on a set of contaminants of concern ("COCs") that were the primary risk drivers for each medium. COCs contribute significantly towards a cumulative cancer risk of 1E-4 or having an HQ exceeding 1.

Arsenic was the primary COC for all surface and subsurface soils. Lead was also a COC in the Northern Source Area. The Northern Source Area posed the most significant human health risk at the Site from exposure to arsenic and lead. The ICR for a lifetime resident was 2.5E-2 and the HI for a child resident was 460. The estimated HI for a child trespasser was 103 and the ICRs for the lifetime, child and adult trespasser or recreational person ranged from 1.7E-3 to 5.6E-3. In addition, adverse blood-lead effects could not be ruled out for a residential child exposed to lead in the Northern Source Area soils. Medical monitoring of blood-lead for three of the children residing within the Northern Source Area indicated blood lead levels below the threshold of concern which is 10 micrograms per deciliter.

The HI was 29 for the child resident exposed to surface soil at the Southern Source Area. ICRs for the lifetime, child and adult residents for the Southern Source surface soil were 1.4E-3, 9.9E-4 and 4.2E-4, respectively. Cancer risks for the lifetime and child trespassers also exceed 1E-4. These risks were driven by exposure to arsenic through ingestion and dermal contact.

The ICR for the lifetime resident exposed to surface soil at a brick pile was 1.2E-3 from arsenic via ingestion and dermal contact, and to a lessor extent, inhalation. The ICRs for the child and adult residents were 8.1E-4 and 3.5E-4. Arsenic was also the primary risk driver for the non-cancer risk contributing to HQs of 21 and 2.2 for the child resident and the adult resident, respectively.

The estimated HI for a child trespasser exposed to surface soil at the nursery property was 2.8. Arsenic was the primary risk driver, contributing an HQ of 1.5. The incremental cancer risks for workers exposed to surface soils in the spray irrigation area was 8.5E-5. Exposure to future residents is not considered an appropriate scenario for this portion of the nursery property because of the agricultural conservation easement. Similarly, risks to residents is also not appropriate for floodplain soils due to the inability to build a home in this area. ICRs for other receptors to floodplain soils were in the range of 1.2E-6 to 3.9E-5.

Sediment risks were estimated for the intermittent tributary draining the Site, the spring-fed pond, the spring-fed creek, the unnamed tributary flowing through the VFW Park, the unnamed tributary downstream of the Park prior to the confluence with Tulpehocken Creek and the

Tupehocken Creek. Among the various sediment risk assessments, only the intermittent tributary adjacent to the Source Areas and the spring-fed creek on the nursery property had HIs that were greater than 1 when risks were grouped by target organ. For the intermittent tributary, the HI for the child resident was 6.9, with arsenic contributing an HQ of 3.7. The HIs for the spring-fed creek for the adult construction worker and the child trespasser were 1.5 and 4.0, respectively. The ICRs for the spring-fed creek were 1.9E-4 for the lifetime trespasser/recreational person and 1.3E-4 for the child trespasser via ingestion and dermal exposure to arsenic.

Surface water risks were calculated for the intermittent tributary, spring-fed pond, and the spring-fed creek, including a portion of the unnamed tributary. Surface water risks were also calculated for the unnamed tributary flowing through the VFW Park. No unacceptable non-cancer or cancer risks were identified for receptors exposed to any of these surface waters.

Blood-lead levels in residential children were calculated using the EPA Integrated Exposure and Uptake Biokinetic Model. Adverse health effects could not be ruled out for a residential child exposed to lead from three private wells located to the east of the Site. At these three homes, samples collected from the raw water nearest the point where the plumbing enters the home contained elevated lead levels, while samples collected from the kitchen faucet did not reveal significant lead levels.

The COCs selected for the shallow groundwater plume include arsenic, iron, lead, manganese and thallium. For contamination in the shallow groundwater, the non-cancer HIs for the child and adult resident were 156 and 50, respectively. The primary contributor to these risks were arsenic. The ICR for the lifetime resident exposed to the shallow plume was 7.3E-3. The ICR for the child resident was 3.2E-3 and the ICR for the adult resident was 7.3E-3.

There were no unacceptable non-cancer or cancer risks associated with the deeper groundwater plume nor were unsafe cancer risks determined for private wells. It was not clear based on the information gathered to date if the lead in private wells is Site-related or from household plumbing or from the build-up of sediments in storage tanks. Thallium detected in one private well caused an HI of 12 and 3.7 for a resident child and resident adult, respectively. Thallium was not determined to be a COC in Site soils.

B. Summary of Ecological Risk Assessment

A Baseline Ecological Risk Assessment ("BERA") was prepared to evaluate risks to ecological receptors. The BERA included soil sampling to characterize habitat, toxicity testing of soils, sediments and surface waters, and bioaccumulation testing of soils. The ecological receptors determined to be at the greatest risk from contaminants in the surface soil or sediment were soil invertebrates, insectivorous birds and mammals and sediment invertebrates. Potential risks to earthworms were limited to a few samples across the Site. Significant impacts to the earthworm population are not expected.

Small mammals and birds may be impacted by arsenic, lead, zinc, and mercury. The highest mercury levels were detected in the same samples where arsenic concentrations exceeded 63,000 mg/kg. The very high arsenic level may have impacted the accuracy of the analysis for mercury. Given the correlation between the elevated results, the lack of information attributing mercury to manufacturing operations at the Site and the fact that mercury levels were statistically within background, mercury was not considered to be a Site-related contaminant of concern. The risk to small mammals and birds was based on average metal concentrations in soil, therefore specific areas responsible for these risks have not been identified.

The risk to sediment invertebrates were evaluated for three separate areas: the intermittent tributary/wetland area; the VFW Park, and the tributary below the Park including Tulpehocken Creek. Based on Site-specific toxicity testing, sediment invertebrates are not likely to be impacted by metals in the VFW Park or by sediments in the Tulpehocken Creek. However, sediment invertebrates may be impacted by elevated arsenic and zinc in the intermittent tributary/wetland area, particularly along a 600-foot segment of the spring-fed creek. The volume of sediment is relatively limited given the shallow depth and narrow width of the creek. Aquatic receptors were not at risk from chemicals in the surface water.

VIII. REMEDIAL ACTION OBJECTIVES

Remedial action objectives are medium specific goals developed to protect human health and the environment. The remedial action objectives specify Site-related COCs, exposure routes, and acceptable contaminant levels for each exposure route. Protectiveness may be achieved by reducing exposure as well as by reducing actual contaminant levels.

The following remedial action objectives address soil contamination:

- Prevent current and future direct contact to exposed soils and bricks posing unacceptable human health risks,
- Prevent future releases to groundwater to minimize the migration of contaminants into surface water and sediment;
- Minimize further degradation of groundwater quality by reducing sources of contaminants and prevent migration of contaminants via leaching that results in groundwater contamination in excess of respective Maximum Contaminant Levels ("MCLs") established pursuant to the Safe Drinking Water Act, 42 U.S.C. Sections 300f et seq.; and
- Comply with Site-specific Applicable or Relevant and Appropriate Requirements ("ARARs") including, but not limited to the Resource Conservation and Recovery Act ("RCRA") Land Disposal Restrictions ("LDRs").

The following remedial action objectives address contaminated sediments and the spring-fed pond:

- Remove sediments that may pose a direct contact threat to human health;

- Protect sensitive environments (wetlands and streams) from adverse ecological risks that result from exposure to contaminated sediments; and
- Remove sediments that contribute to contaminant loading of nearby streams and surface water bodies.

IX. SUMMARY OF REMEDIAL ACTION ALTERNATIVES

The Superfund law (CERCLA) requires that any remedy selected to address contamination at a hazardous waste site must be protective of public health and welfare and the environment, cost-effective, in compliance with regulatory and statutory provisions that are ARARs, and consistent with the NCP to the extent practicable. During the development of the Feasibility Study, EPA developed the following three remedial action alternatives for the soil cleanup and three separate alternatives for the sediment cleanup.

Description of Soil Alternatives

Soil Alternative 1: No Action

This alternative was developed and retained as a baseline scenario to which the other alternatives could be compared, as required by CERCLA. The only activity that would occur under the no-action alternative is a review of Site conditions and risks every 5 years.. Under this alternative, exposure to contaminated soils would still remain and arsenic and lead constituents present in soils would continue to migrate and leach downward resulting in contaminated groundwater. No capital costs are associated with Soil Alternative 1. The present net worth cost of this alternative was estimated as $49,600.

Soil Alternative 2: Excavation with Off-Site Treatment and Off-Site Disposal

Under this alternative, soils with contamination exceeding Performance Standards would be excavated and disposed of at appropriate off-site landfills. The Performance Standard for arsenic in all soils from the Northern and Southern Source Area and brick piles is the PADEP Act 2 medium-specific concentrations ("MSCs"), because EPA does not have a promulgated standard. PADEP's residential cleanup standard of 12 mg/kg for arsenic extends to a depth of 15 feet, though it could decrease if conditions become saturated by the water table. The PADEP Act 2 non-residential arsenic cleanup standard which would apply to the nursery property soils is 53 mg/kg for the upper two feet of contaminated soil. The PADEP non-residential standard for arsenic-contaminated soils below two feet is 190,000 ppm. The levels of arsenic-contamination detected in nursery soils are well below that standard.

The cleanup standard for lead in residential soil is 400 ppm and is based on EPA Guidance described further in OSWER Directive 9355.4-12, Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. Though developed to protect human health, the soil cleanup standards also provide ecological protection.

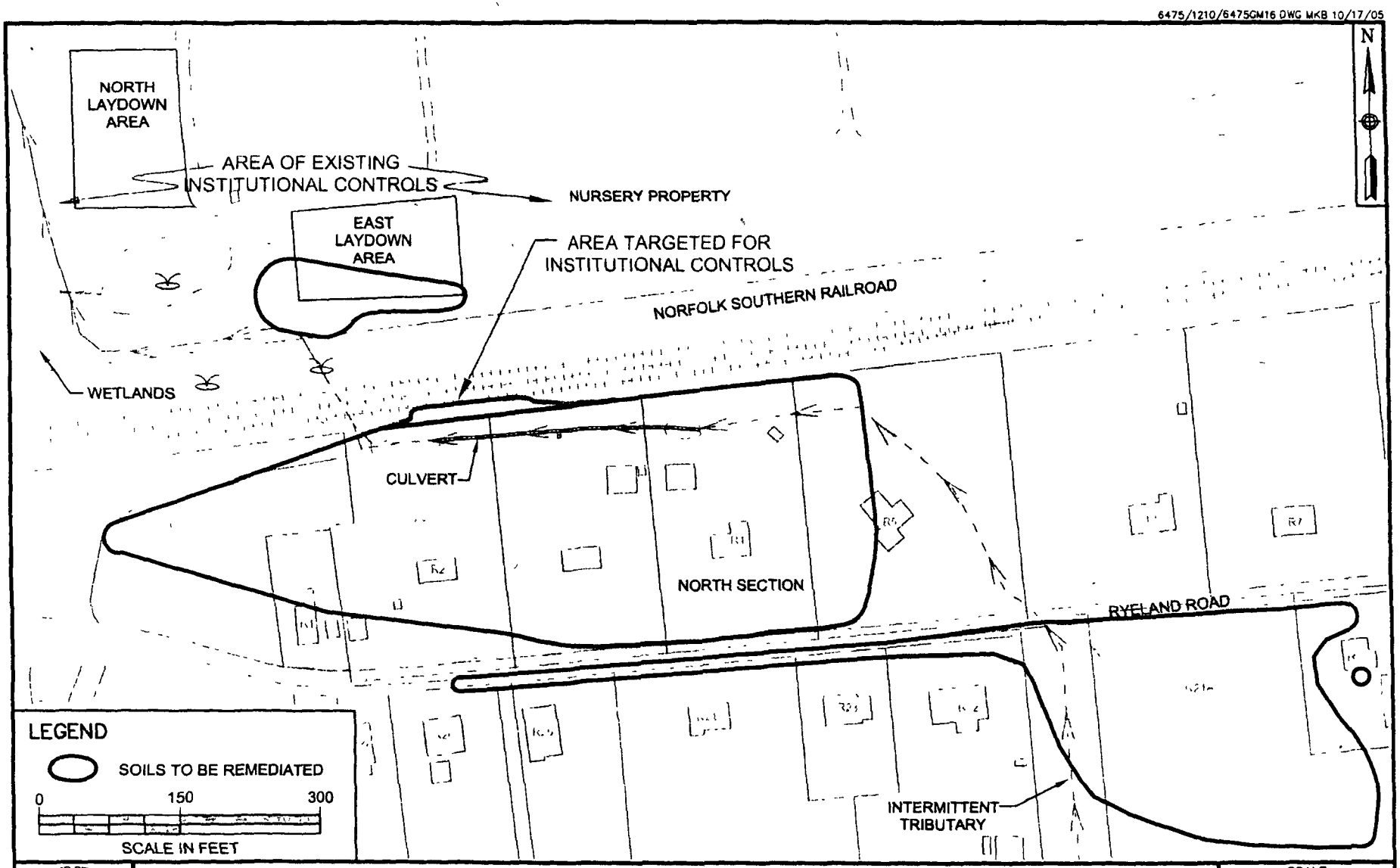
Sampling results indicate that extensive soil contamination exists beneath the homes and other structures (i.e., garages, pools) on three residential properties in the Northern Source Area. Three families residing on the Northern Source Area would be permanently relocated and all structures would be demolished prior to the soil cleanup. Salvageable material may be recycled prior to the demolition and the debris would be disposed off-site. The demolished materials would be sent via trucks to a municipal or construction debris landfill. If necessary, air monitoring and noise reduction programs would be implemented during the demolition and salvage work. Erosion and sediment control measures would be implemented to mitigate the migration of soil contaminants to the environment. EPA would also purchase the Southern Source Area to facilitate the cleanup. Two or three additional families may require temporary relocation during part of the cleanup. All temporary and permanent relocations will be performed in accordance with the Uniform Relocation Act.

Under this Alternative, approximately 94,000 tons of soil would be excavated from the Northern and Southern Source Areas, the nursery property, the thin band of soil adjacent to the south side of Ryeland Road (Figure 2) and the various brick piles. The transportation and disposal of contaminated soils would be in compliance with applicable RCRA requirements at 25 Pa. Code Sections 263a and 264a, and the applicable portions of the Hazardous Materials Transportation requirements at 49 C.F.R. Parts 107, 171 - 179. All appropriate measures will be taken to safely remove and transport the soils to off-site disposal facilities. Soil Alternative 2 will also comply with location and action-specific ARARs as all substantive requirements including erosion control measures and water discharge criteria would be met during the implementation of the remedial action.

Contaminated bricks would be excavated and disposed at an off-site construction debris landfill. An inspection of the surrounding area would be performed to identify any remaining charred brick piles in the vicinity of the Site. Any newly-identified piles of brick debris found near the Site that are similar in appearance would also be removed. Soils beneath the brick piles will be remediated to the PADEP Act 2 residential cleanup standard for arsenic of 12 mg/kg. Roadways and drainage areas impacted by the excavation of the bricks would be restored accordingly.

The Feasibility Study evaluated using both rail and truck to transport soils for off-Site disposal. Based on the findings presented in the Feasibility Study, the most cost-effective approach is transporting untreated soils by truck to an appropriate landfill for treatment and/or disposal. EPA will continue to explore using the railroad to transport soils and will select the safest, cost-effective mode of transportation. One disadvantage of using the rail spur adjacent to the Site is limited access. Current use of the rail line prevents complete access to the Site several days each week.

It is estimated that approximately 60% of the excavated soils have the potential to exhibit the characteristic of toxicity using the Toxicity Characteristic Leaching Procedure ("TCLP") because they would contain arsenic in leachate concentrations equal to or greater than 5,000 ug/L. As a result, RCRA requires these soils to be treated and rendered non-hazardous prior to their disposal



SOIL REMEDIATION AREAS
RYELAND ROAD ARSENIC SITE
WOMELSDORF, BERKS COUNTY, PENNSYLVANIA

SCALE	
AS NOTED	
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FIGURE 2	

in a RCRA Subtitle D Landfill. Soils with less than 5,000 ug/L of arsenic in leachate may be disposed in an off-site, non-hazardous landfill without treatment. The Feasibility Study also evaluated the cost to dispose untreated soils that contain more than 5,000 ug/L in a RCRA Subtitle C hazardous waste landfill. That option is not cost-effective.

Samples would be collected from the floor and sidewalls of the excavated areas to ensure that the soils left in place at the excavation limits do not exceed soil Performance Standards. Shallow monitoring wells would be installed and spring samples would be collected to determine the effectiveness of the soil cleanup by monitoring shallow groundwater. Clean fill would be used to re-grade the Site. A minimum of 2 feet of soil (including 6 inches of topsoil) would be placed on the surface and vegetated with wild flowers and/or grasses to control erosion prior to the land being re-used. Title to all property purchased for the cleanup will be transferred to the Commonwealth of Pennsylvania following the completion of the cleanup. It is anticipated that the Commonwealth will transfer the property to Heidelberg Township, the local municipal authority.

Depending on the depth to the water-table and the ability to excavate into the saturated zone, limited contamination may remain below the watertable after the completion of the soil excavation. Areas excavated below the water table may be immediately backfilled to reduce the need to manage water. Both rainwater and groundwater that accumulate in excavated areas will require management. Water not reabsorbed into the ground would be directed to a temporary, on-Site treatment system prior to discharge in accordance with applicable PADEP requirements at 25 Pa. Code Chapters 91 and 92 . Alternately, this water could be containerized and sent to a publicly owned treatment work or similar facility for disposal.

Only low levels of residual arsenic are expected to be present following the soil cleanup. The goal of the soil excavation is to remove all contaminated soil prior to excavating downgradient sediments, though a small amount of contaminated soil may have to remain beneath the railroad embankment to prevent any instability. Contaminated soils associated with the railroad right-of-way would not be excavated since this work could affect the integrity of the rail lines. Institutional controls, such as enforceable orders, deed notices, easements and/or restrictive covenants, would be required to prevent disturbing any remaining contaminated soils under the railroad right-of-way in a manner which may release contamination. Existing restrictions required by the agricultural conservation easement under the Pennsylvania Agricultural Conservation Easement Purchase Program will preclude future residential use of the nursery property. The easement prevents development or improvement of the land for any purpose other than agricultural development.

Upon implementation, Soil Alternative 2 would meet all of the soil remedial action objectives described above. Implementation of this alternative would take approximately two years and the estimated capital costs associated with Soil Alternative 2 is $16,900,000. Following the completion of this remedial action, use of all of the properties, with the exception of the railroad embankment, impacted by Site-related contamination will be unrestricted and consistent with

their current use. It is anticipated that shallow groundwater and spring data will demonstrate significant improvements in water quality following the completion of the soil cleanup. Annual costs for Years 1 through 30 would be $5,000, with an additional $23,000 every 5 years. The present worth cost for this alternative is $17,000,000.

Soil Alternative 3: Excavation and On-Site Treatment with Off-Site Disposal Alternative

This Alternative is similar to Soil Alternative 2 with one significant difference - soils exceeding the TCLP leachate regulatory level of 5,000 ug/L for arsenic would be treated on-Site and then disposed of in an off-site non-hazardous waste landfill. Under this scenario, about 60% of the total volume of contaminated soils would be treated on Site. As in Soil Alternative 2, soils with less than 5,000 ug/L of arsenic in leachate may be disposed in an off-site, non-hazardous landfill without treatment.

Contaminated soils exceeding 5000 ug/L for arsenic would most likely be treated through stabilization using cement and iron compounds as binders. Effectiveness would be measured by leach testing the stabilized mass to ensure the material has been rendered non-hazardous. The goal would be to produce a leachate concentration of arsenic in the treated soils equal to or below the regulatory threshold as measured by the TCLP.

The treated material and non-hazardous soils/debris would be loaded onto trucks and properly disposed of in an off-site non-hazardous waste landfill. Similarly, contaminated bricks and associated soil would be excavated and disposed at an off-site construction debris landfill. Roadways and drainage areas impacted by the excavation of the bricks would be restored accordingly. Clean fill, topsoil, wild flowers and/or grasses would then be used to re-grade and restore all of the excavation areas. Appropriate measures would be taken to control dust and noise during the excavation work. Verification sampling and monitoring would include the measures described above for Soil Alternative 2.

Prior to excavating the Northern Source Area, three residences and associated structures at affected properties would be removed and the materials disposed in a municipal or construction debris landfill. The construction area would be fenced and utilities would be removed and terminated along Ryeland Road. EPA would also purchase the Southern Source Area to facilitate the cleanup. Two or three additional families may require temporary relocation during part of the cleanup when EPA excavates soil on or in close proximity to their property. All temporary and permanent relocations will be performed in accordance with the Uniform Relocation Act.

The work would be performed in accordance with the same ARARs as in Soil Alternative 2, though additional RCRA requirements would be met during the staging and treatment of the hazardous soils. It is assumed that a small amount of contaminated soil would remain within the railroad right-of-way. Deed notices would be implemented to prevent construction or excavation activities that might disturb any contaminated soils that remain after the excavation of soil is completed.

Upon implementation, Soil Alternative 3 would meet all of the soil remedial action objectives described above. The estimated capital cost to implement this soil remedy is $24,765,000. Annual monitoring costs plus Five-Year Reviews are $5000 and $23,000 (every 5 years), respectively. The present worth cost for this alternative is estimated at $24,821,000.

DESCRIPTION OF SEDIMENT ALTERNATIVES

It is anticipated that contaminated sediments would be remediated after contaminated soils have been remediated. This sequence of activities would prevent cross-contaminating sediments during the soil cleanup. Groundwater monitoring, including spring sampling, would be performed after completing the soil excavation to evaluate the potential for the re-contamination of sediments prior to initiating the downgradient sediment cleanup.

Sediment Alternative 1: No Action

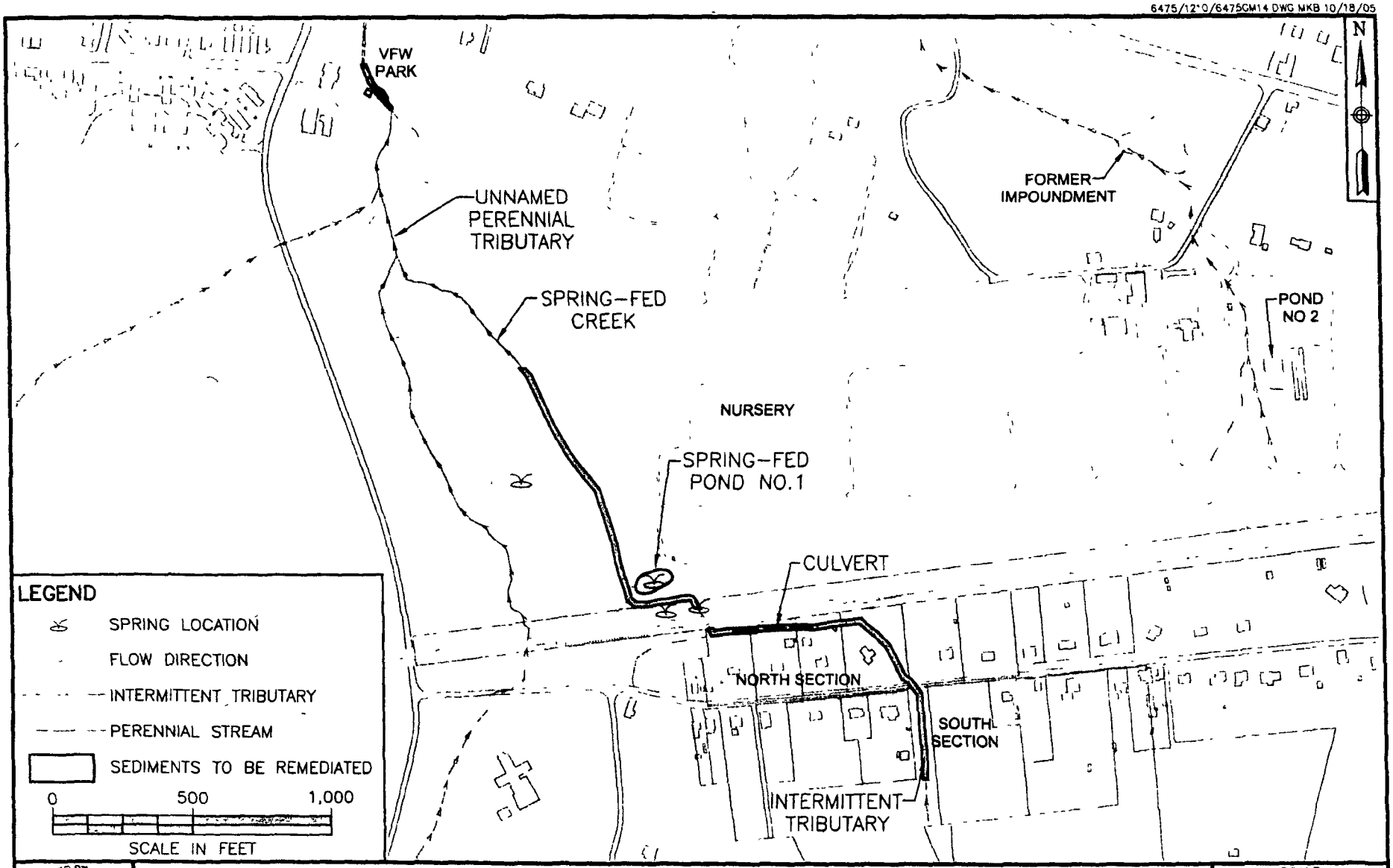
As required by CERCLA, this Alternative was developed and retained as a baseline scenario to which the other alternatives may be compared. The only activity that would occur under the no-action alternative is long-term monitoring and a review of Site conditions and risks every 5 years. No risk reduction from contaminated sediments would be accomplished. No capital costs would be associated with Sediment Alternative 1. The present worth cost of this alternative is approximately $50,000 over a 30-year period.

Sediment Alternative 2: Excavation with Off-site Disposal and Natural Filtration

For Sediment Alternative 2, sediments with contaminant concentrations greater than the Performance Standards (Figure 3) would be excavated or dredged, dewatered as necessary, and loaded onto trucks for transport to an off-site landfill. The PADEP residential soil cleanup standard for arsenic of 12 mg/kg was selected for sediments in the intermittent tributary. The Performance Standard for arsenic in the spring-fed creek sediments is 140 mg/kg and is based on protecting a trespasser/recreational child from noncarcinogenic risks. The less stringent cleanup standard of 140 mg/kg is appropriate in this non-residential area. The cleanup standard for zinc in these sediments is set at 200 mg/kg to reduce ecological risk to an acceptable level.

EPA selected PADEP's non-residential arsenic soil standard of 53 mg/kg for pond sediments, consistent with the adjacent surface soil cleanup on the nursery property. Following the excavation of contaminated sediments on the nursery property, the spring-fed pond would be filled and re-graded and the area would be restored as natural wetlands. The objective of the restoration would be to create a wetland filtration area to help purify shallow groundwater discharges to the surface by filtering out sediments and metals before they flow into the spring-fed creek.

EPA developed a Site-specific standard of 46 mg/kg of arsenic for the VFW Park sediments to ensure that ingesting watercress would not pose any unacceptable risks. Sediments exceeding this



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

SEDIMENT REMEDIATION AREAS
RYELAND ROAD ARSENIC SITE
WOMELSDORF, BERKS COUNTY, PENNSYLVANIA

SCALE	
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FIGURE 3	

standard within the walled area of the VFW tributary would be de-watered and then either excavated or dredged. Sediments in the immediate vicinity of the spillway will not be removed due to the age and deteriorating condition of the structure. The excavated sediments will be transported by truck to a residual waste or non-hazardous, off-site landfill. The total volume of sediments requiring excavation from the four areas is approximately 4200 tons.

Dredging may include mechanical means (e.g., clam shell or backhoe) or hydrovacuuming to remove wet and dry materials that cannot be removed by mechanical means. The area in the vicinity of the spring-fed pond, which receives shallow groundwater discharges from the surface via seeps and springs, would be restored to natural conditions. The objective of the restoration area would be to create a natural filtration system to help purify groundwater discharges to the surface by filtering out sediments and heavy metals and reducing nutrient loading prior to water flowing into the down gradient streams and eventually the Tulpehocken Creek.

The upper 6 inches of the surface soil throughout the restored area would be treated as necessary to establish topsoil suitable for planting vegetation. The area would be planted with perennial, regionally indigenous wetland vegetation capable of slowing overland runoff and reducing down gradient sedimentation. The significant spring that forms the source of water for the existing spring-fed pond and the spring-fed creek would be rerouted through the restoration area. The pond would subsequently be drained, excavated or dredged, filled, and re-graded, and incorporated into the restoration area.

Clean fill would be used to replace the volume of excavated materials (as needed) and to restore the affected areas. The existing culvert draining the intermittent tributary within the Northern Source Area need to be removed and replaced, or restored as a natural channel. After excavation work is completed, sediments associated with the intermittent tributary, a segment of the spring-fed creek, significant seeps within the wetland area bordering the spring-fed creek, and sediments from the VFW Park would be sampled to verify that the Performance Standards have been met. Based on the results of sediment sampling during the RI, the sediments of concern did not contain elevated metal concentrations that would classify these materials as hazardous. If needed, waters associated with the sediments would be directed to a treatment system prior to discharge to meet water quality requirements.

Sediments within the VFW Park tributary would be drained by transferring the water upstream of the spillway to a point downstream along the unnamed tributary to Tulpehocken Creek. If this approach is not feasible, portions of the tributary within the walled enclosure would be dewatered using engineering controls. Once the sediments are allowed to dry, the deposits would be excavated or dredged, loaded onto trucks, and transported off-site to a residual waste or municipal waste landfill.

Upon implementation, Sediment Alternative 2 would meet all of the sediment remedial action objectives described above. The estimated capital costs associated with Sediment Alternative 2

are $1,300,000. Annual costs for Years 1 through 30 would be $5,000. The 30-year net present worth is $1,400,000.

Sediment Alternative 3: Natural Filtration/Phytoremediation/Excavation/Off-site Disposal

Sediment Alternative 3 is identical to Sediment Alternative 2, except that phytoremediation would be used to provide long-term treatment near the spring-fed pond to stabilize any sediments contaminated with arsenic in the future, and to address any contaminated sediments (generally within 2 feet of the ground surface) that would not be excavated and disposed off-site. The area near the spring-fed pond would be addressed by planting and growing specially selected trees and plants (e.g., poplars and ferns) to help accumulate any remaining or future arsenic contamination present in soils, sediments, or shallow groundwater discharges to the ground surface. Only the significant differences between Sediment Alternatives 2 and 3 are discussed below.

The area near the spring-fed pond would be restored to natural conditions in a manner similar to Sediment Alternative 2. However, along with wetland species, plants capable of performing phytoremediation processes would be planted for long-term treatment and control of any remaining or residual contamination near the pond and at locations where contaminated seeps are present in the wetlands adjacent to the spring-fed creek. The spring-fed pond would be drained, excavated or dredged, backfilled, and re-graded into the restoration area as required. Contaminated sediments with concentrations greater than the Performance Standard would be removed, dewatered as necessary, and transported to an off-site landfill.

Sediment Alternative 3 would provide the wetland filtration functions as described for Sediment Alternative 2. Whereas natural wetland vegetation would provide the filtration under Alternative 2, Alternative 3 includes the planting of the brake fern and hybrid poplar vegetation (or similar species). As a result, two phytoremediation technologies would contribute to Sediment Alternative 3. The first technology would be phytoextraction, whereby plant roots uptake contaminants for translocation to above-ground tissues such as leaves and stems. Phytoextraction plants are known as hyperaccumulators. The Chinese brake fern and other brake fern species are effective hyperaccumulators for arsenic. The planted ferns would remove residual arsenic concentrations from shallow soils and groundwater near seeps and springs. Ferns may also be used to reduce arsenic in sediments bordering the spring-fed creek, especially in lightly contaminated areas and sensitive habitats which may be damaged by excavation activities. The brake fern (or similar species) top growth would be harvested at the end of each growing season and the clippings would be analyzed prior to disposal. EPA will determine the duration of harvesting and disposal of the ferns during the Remedial Action. This decision will be based upon several factors including the level of residual arsenic emanating from the springs, the level of residual arsenic in shallow soils, and the amount of arsenic present in the clippings. EPA anticipates that harvesting and disposal of the ferns will last for approximately three to five years and that approximately 20 percent of the ferns would require replacement after each harvesting.

The second technology would be hydraulic control, whereby rapid uptake of shallow groundwater for transpiration would reduce the lateral migration of shallow groundwater. The most commonly used plants for hydraulic control are hybrid poplars or similar species. Hydraulic control would be accomplished by planting 3- to 5-foot tall hybrid poplar tree saplings (or similar species) in the restored wetland. Since the poplars are not arsenic hyperaccumulators, they would not be harvested for disposal. Instead, they would be left to continue growing even after the arsenic hyperaccumulation function provided by the ferns was complete. The poplars would continue to suppress the lateral migration of shallow groundwater providing some long-term protection against residual arsenic concentrations once the phytoextraction and other remedial processes were completed. The vegetation used in phytoremediation would be periodically inspected to assist with evaluating the remedy's performance.

Upon implementation, Sediment Alternative 3 would meet all of the sediment remedial action objectives described above. The estimated costs of Sediment Alternative 3 include capital costs of $1,500,000. Annual costs for Years 1 through 5 would be approximately $15,300 and then $5,000 per year beginning with Year 6. The 30-year net present worth is $1,650,000.

X. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

Criteria Used To Compare Cleanup Alternatives

The remedial alternatives summarized in this Record of Decision have been evaluated against the nine decision criteria set forth in the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP") (see 40 C.F.R. § 300.430(e)(9)). These nine criteria are organized into three categories-threshold criteria, primary balancing criteria, and modifying criteria. Threshold criteria must be satisfied in order for an alternative to be eligible for selection. Primary balancing criteria are used to weight major trade-offs between alternatives. Modifying criteria are formally taken into account after public comment has been received. The criteria are set forth below:

Threshold Criteria

1. ***Overall Protectiveness of Human Health and the Environment*** addresses whether a remedy provides adequate protection of human health and the environment from unacceptable risks posed by hazardous substances or pollutants or contaminants and describes how risks are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. ***Compliance with Applicable or Relevant and Appropriate Requirements*** ("ARARs") addresses whether a remedy will meet all of the applicable, or relevant and appropriate requirements of Federal and State environmental statutes and regulations and/or whether there are grounds for invoking a waiver.

Primary Balancing Criteria:

3. ***Long-Term Effectiveness*** refers to the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals are achieved.

4. ***Reduction of Toxicity, Mobility, or Volume Through Treatment*** addresses the degree to which treatment will be used to reduce the toxicity, mobility, or volume of the contaminants causing site risks.

5. ***Short-Term Effectiveness*** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

6. ***Implementability*** addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

7. ***Cost*** includes estimated capital and operation and maintenance costs. Costs are evaluated on a present worth basis.

Modifying Criteria:

8. ***State Acceptance*** indicates whether the State concurs with, opposes, or has no comment on the remedy.

9. ***Community Acceptance*** considers whether the community agrees with the remedy.

The above criteria are used to evaluate the advantages and disadvantages of each alternative in order to select an appropriate remedy. The following is a brief summary evaluating and comparing each alternative against the nine criteria.

1. Overall Protection of Human Health and the Environment

Soil Alternatives:

The No Action Alternative would not provide adequate protection of human health and the environment. The No Action Alternative was developed as a baseline for comparison against the other alternatives. The No Action Alternative does not eliminate or control the current and future risks to residents and trespassers from exposure to contaminated soils. The only activity that would occur is long-term monitoring and a review of the Site conditions and risks every five years. No capital costs are associated with the No Action Alternative and the present-worth cost over a 30 year period is approximately $50,000.

Soil Alternatives 2 and 3 offer outstanding overall protection of human health and the environment by eliminating potential exposures to soil contamination. They also eliminate the sources of contamination that historically have impacted shallow groundwater which transported contamination to surface water and sediments via springs discharging on the nursery property, flowing into the pond and spring-fed creek. Risks would be reduced by removing arsenic-contaminated soils from various source areas and by removing lead-contaminated soils from the Northern Source Area. Contaminated bricks would also be removed under both Alternatives. Institutional controls would prevent exposure to contaminants within the railroad right-of-way and land use restrictions under an agricultural conservation easement would prevent residential development of the nursery property near the spring-fed pond.

The most significant difference between the two remedies is the inclusion in Soil Alternative 3 of an on-site pugmill to stabilize soils before they are transported to an off-site landfill. Though treatment could be safely accomplished on Site, residential areas are typically not considered to be suitable locations to treat hazardous wastes. The on-site stabilization system would require dust suppression and increase the level of noise during the cleanup. On-site treatment does provide the advantage of transporting wastes that have been rendered non-hazardous, however treatment will increase the volume of waste transported by approximately 15%, increasing the percentage of truck traffic accordingly.

Sediment Alternatives:

The No Action Alternative would not provide adequate protection of human health and the environment. The No Action Alternative was developed as a baseline for comparison against the other alternatives and does not eliminate or control the current and future risks to trespassers and recreational users from contaminated sediments.

Sediment Alternatives 2 and 3 provide overall protection to human health and the environment because they include excavating contaminated sediments, thereby eliminating all future exposures to these deposits. Sediments with contaminant concentrations in excess of Performance Standards would be excavated, providing a permanent solution and eliminating the current risks. Proper engineering controls would be required during the excavation activities to minimize releases and prevent further contamination of down gradient sediment depositional areas. Both alternatives also include the excavation of contaminated sediments from the VFW Park that support the growth of watercress that may pose risks to human health.

The inclusion of phytoremediation in Sediment Alternative 3 offers an additional level of overall protection when compared to Sediment Alternative 2. Phytoremediation would treat residual arsenic contamination in soil and shallow groundwater near seeps and springs via root uptake into the hyperaccumulating ferns. The ferns would be harvested annually for approximately three years and disposed of at an appropriate off-site landfill. Alternative 3 also provides the added protection of poplar trees that provide hydraulic control to prevent the lateral migration of shallow groundwater. The combination of ferns reducing residual arsenic levels, hydraulic

control from the poplars, and natural filtration from volunteer species would minimize any future impacts to nearby wetlands and downstream areas. All exposures to contaminated sediments in excess of the Performance Standards would be eliminated.

2. Compliance with ARARs

Soil Alternatives:

Any cleanup alternative selected by EPA must comply with all applicable or relevant and appropriate federal and state environmental requirements ("ARARs") or provide the basis upon which such requirement(s) can be waived. *Applicable* requirements are those substantive environmental standards, requirements, criteria, or limitations promulgated under federal or state law that are legally applicable to the Remedial Action to be implemented at the Site. *Relevant and appropriate* requirements, while not being directly applicable, address problems or situations sufficiently similar to those encountered at the Site that their use is well-suited to the particular circumstance.

EPA will also consult to-be-considered material ("TBCs"). TBCs are are non-promulgated advisories or guidance issued by Federal or State governments that are not legally binding and do not have the status of potential ARARs. However, EPA will consider TBCs along with ARARs and EPA may use the TBCs in determining the necessary level of cleanup for protection of health and the environment.

Soil Alternative 1, the No Action Alternative, would not comply with chemical-specific ARARs because all contaminants would be left in place. No action-specific or location-specific ARARs apply to this alternative.

Soil Alternatives 2 and 3 would comply with the medium-specific concentrations ("MSCs") for arsenic in soils as established by the Statewide Health Standards in Act 2, because the MSCs for arsenic in soil are more stringent than the federal standards. The MSC for arsenic in residential areas is 12 mg/kg and the MSC for arsenic in non-residential areas is 53 mg/kg. As a result of consulting EPA's OSWER Directive 9355.4-12, Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, EPA will use the Performance Standard of 400 mg/kg for lead in residential areas.

Soil Alternatives 2 and 3 would also comply with location- and action-specific ARARs because all substantive permit requirements such as erosion control measures and water discharge criteria would be met during implementation of the remedial action. The on-site management of hazardous soils would also comply with the relevant RCRA regulations. Liquids, such as rainwater or groundwater that accumulate in the excavation area would be treated, as necessary, prior to being discharged to the environment in accordance with PADEP water quality criteria or transported to a publicly owned treatment works ("POTW") or privately owned treatment facility. Both soil alternatives will also require the permanent and temporary relocation of

several households. All relocation activities will be conducted in accordance with the Department of Transportation Uniform Relocation Act.

Soil Alternative 3, which includes on-site stabilization, would also comply with additional RCRA requirements regulating the storage and treatment of hazardous wastes. RCRA hazardous soils would be treated on-site to comply with the leachable limit for arsenic and lead which are both 5.0 mg/l based on TCLP testing. A detailed list of all ARARs for the remedial alternatives is included as Tables 1 - 3.

Sediment Alternatives:

Under Sediment Alternatives 2 and 3, the residential MSC for arsenic would apply to the sediments within the intermittent tributary that flows through the residential area south of the railroad. The non-residential arsenic MSC for soil applies to the spring-fed pond sediments which is consistent with the adjacent surface soil cleanup on the nursery property. For spring-fed creek sediments, the Performance Standard for arsenic is 140 mg/kg to protect human health and 200 mg/kg for zinc to protect ecological receptors. EPA developed an advisory level of 46 mg/kg of arsenic for VFW Park sediments to prevent unacceptable risks from consuming watercress.

All excavation, dredging and related activities would be performed in such a manner to minimize impacts to wetland areas in accordance Executive Order 11990, Protection of Wetlands. Hyperaccumulating ferns may be used in environmentally sensitive areas with relatively low levels of contamination in lieu of excavating sediments. Dewatered liquids from excavated sediments would be treated, as necessary, prior to being discharged to the environment in accordance with PADEP water quality criteria or discharged to a local POTW or a privately owned treatment facility.

3. Long-Term Effectiveness and Permanence

Soil Alternatives:

The No Action Alternative would not provide any long-term protection of human health or the environment since no actions would be taken to prevent exposure to contaminated soils and bricks. Soil Alternatives 2 and 3 would both provide an effective long-term and permanent solution by eliminating the various sources of contamination at the Site through excavation. Contaminants present in any remaining soils (i.e., beneath the railroad embankment) and contamination in the saturated zone and shallow groundwater could continue to migrate, though levels are expected to quickly decrease once the source is excavated. Long-term monitoring of groundwater and spring data would be required to determine the effectiveness of the remedy and to assess whether additional response actions are necessary. Institutional controls regarding access and land use limitations would be included for Soil Alternatives 2 and 3 to prevent the disturbance of contaminated soils not excavated. Five-Year Reviews would be required for all

Soil Alternatives since it is expected that some contamination will remain following the completion of the remedial action.

Sediment Alternatives:

The No Action Alternative would not provide any long-term protection of human health or the environment since no actions would be taken to prevent exposure to contaminated sediments. Sediment Alternatives 2 and 3 would provide an effective long-term and permanent solution by eliminating the various sources of contamination at the Site through excavation. Natural filtration would reduce any residual contamination in shallow groundwater that discharges as springs in the wetland area on the nursery property. Sediments may continue to accumulate in depositional areas such as the VFW Park; however, the presence of site-related arsenic in future sediments is expected to be significantly reduced or eliminated based on the remediation of upstream sediments coupled with the remedy for addressing contaminated soils.

The inclusion of phytoremediation in Sediment Alternative 3 provides an additional measure to control and decrease any residual contamination, providing even greater long-term effectiveness and permanence when compared to the Sediment Alternative 2. The hyperaccumulating ferns would reduce arsenic that might otherwise migrate into the headwater of the spring-fed creek and re-contaminate downstream sediments. Long-term operation and maintenance ("O&M") would include harvesting the ferns for several years and replanting vegetation, as required. O&M for both Soil Alternatives 2 and 3 would include inspections and monitoring.

4. Reduction of Toxicity, Mobility, or Volume Through Treatment

Soil Alternatives:

Soil Alternative 1 would not satisfy the statutory preference for treatment since no remedial activities would be performed. Soil Alternatives 2 and 3 would satisfy the statutory preference for reducing toxicity, mobility and volume through treatment by including the stabilization of contaminated soils prior to disposal in an off-site landfill. Treatment would reduce the hazard potential of soil constituents into less soluble, mobile, and toxic forms. However, the stabilization process would also increase the volume of the treated material by 15% thereby increasing the volume of material transported off-site for disposal under Alternative 3. The volume of material transported off-site under Alternative 2 would not increase because treatment would be performed at an off-site RCRA Subtitle C treatment facility prior to disposal.

Treatment of the hazardous soils under Alternatives 2 and 3 would reduce the toxicity and mobility of the contaminated soil rendering them non-hazardous. Excavating contaminated soils and brick piles would also eliminate future leaching of arsenic into the shallow groundwater thereby reducing the mobility of arsenic in the environment.

Sediment Alternatives:

Sediment Alternative 1 would not satisfy the statutory preference for treatment since no remedial activities would be performed. Sediment Alternative 3 satisfies the statutory requirement to reduce toxicity, mobility, or volume through treatment by treating the residual contamination in shallow groundwater, soil and springs through the root uptake of arsenic into ferns planted on the nursery property. Ferns may also be used to reduce arsenic in sediments bordering the spring-fed creek, especially in areas with relatively limited contamination and sensitive habitats which may be damaged by excavation activities. A treatability study would be conducted during the remedial design to evaluate the effectiveness of various fern species. The ferns' top growth would be mowed at the end of each growing season for approximately three years. The clippings would be tested prior to disposal in an off-site landfill.

5. Short-Term Effectiveness

Soil Alternatives:

No additional short-term impacts are anticipated for the No Action Alternative. Short-term impacts to the community for Soil Alternatives 2 and 3 are limited to the duration of the construction activities. Disruptions may be the result of noise, vehicle traffic, and excavation activities. Cleanup actions and restoration in the more heavily populated area of Ryeland Road and Vince-Julia Lane could last for approximately three years, though the majority of the construction should be performed within two years. Engineering controls and other precautionary measures would be taken to protect the safety and well being of residents and to protect the environment.

Proper dust suppression techniques and air monitoring would limit releases and document air quality to ensure the protection of nearby residents. The implementation of a site-specific health and safety plan will protect workers, residents and the environment. A contingency plan would be prepared prior to the start of construction to anticipate disruptions and plan response measures in the event of an emergency. The most significant short-term impact for both alternatives would result from vehicle traffic to transport excavated soils off-site for disposal and to bring clean fill onto the Site to backfill and re-grade excavation areas. Proper scheduling and traffic control would reduce concerns and minimize problems and disturbances to the local community.

On-site treatment of soils in a residential area, as included in Soil Alternative 3, would create additional short-term concerns, such as additional noise and dust from the pugmill, storage of treatment materials, additional handing of contaminated materials, storage of soils waiting for treatment and/or disposal, and additional time to treat the soil prior to disposal. Excavated soils awaiting treatment and/or disposal would be staged in containment areas and appropriate measures would be taken to prevent the release of contamination. Residential areas are typically not preferred locations for treating hazardous wastes.

Sediment Alternatives:

No additional short-term impacts are anticipated for the No Action Alternative. Short-term impacts from sediment excavation activities performed under Alternative 2 and 3 are not anticipated due to the relatively low concentration of constituents in the sediments. The implementation of engineering controls during excavation and/or dredging will minimize releases to the environment during the remedial action. It is recognized that draining water bodies, excavating sediments, and constructing wetland areas may release sediments and/or contaminants into a sensitive environment. To minimize any such releases, these activities would be planned and coordinated with specialists from EPA and/or the U.S. Fish and Wildlife Service to reduce impacts to sensitive areas.

Visual observation and air monitoring during excavation activities would determine the need for any dust control measures to eliminate or minimize impacts to workers, residents and the environment. Impacts to the community from an increase in vehicle traffic for a short period would be minimized by establishing proper traffic controls. Proper health and safety procedures would protect workers and precautions such as limiting access and controlling erosion would protect the safety of residents and the environment.

Sediment Alternative 2 would achieve the remedial action objectives in approximately 18 months. The implementation of Sediment Alternative 3 would take about two years and O&M activities would last for approximately 3 years after planting the initial phytoremediation vegetation.

6. Implementability

Soil Alternatives:

Since no active remediation would occur, the No Action Alternative would be readily implementable. Soil Alternatives 2 and 3 could be readily implemented using standard construction practices and experienced labor. All areas are readily accessible with the exception of contamination below the railroad embankment. There are several non-hazardous and construction debris landfills nearby that could accept the Site wastes. Some landfills, however, may have a limited capacity to accept large volumes of non-hazardous soil to be used as daily cover. Under Soil Alternative 2, hazardous soils will require off-site treatment prior to disposal in an off-site landfill. Treatment facilities located in close proximity to disposal facilities are available in western Pennsylvania.

Both soil remedies require excavation to depths of up to 15 feet, extending beneath homes and related structures currently located on the Northern Source Area. As a result, three families will have to be permanently relocated and two families may be temporarily relocated. An additional residence on the south side of Ryeland Road may also require temporary relocation during the

excavation activities. All relocation activities will be conducted in accordance with the Department of Transportation Uniform Relocation Act.

Excavations are likely to encounter saturated soil conditions and may proceed or be terminated depending on conditions within the excavation area. Rainwater will also enter the excavation area. Potentially contaminated water from the excavation area will have to be properly managed and disposed. Options include the construction of a temporary wastewater treatment plant or off-site disposal at a commercial wastewater treatment facility.

Sediment Alternatives:

Since no active remediation would occur, the No Action Alternative for sediments is readily implementable. Alternatives 2 and 3 can be readily implemented as well using standard construction practices and experienced labor. Contaminated sediments are readily accessible except some of the sediments associated with the spring-fed creek may not be easy to reach. Some of the excavation work in this area could be readily implemented by using hand-tools to minimize impacts to the environment. Some excavation could ultimately be avoided by an expanded use of ferns which would minimize impacts to the environment that could be caused by excavating in environmentally sensitive areas.

Sediment Alternative 3 would be slightly more difficult to implement when compared to Alternative 2 because of the phytoremediation component. Phytoremediation is a new technology and appears to be readily implementable based on EPA's experience at a limited number of sites. Though available, only a few vendors have experience with hyperaccumulating ferns. Potential implementation problems could be identified and resolved during a treatability study conducted during the remedial design.

7. Cost

Soil Alternatives:

The estimated present worth cost to implement Soil Alternative 2 is $17,000,000 and to implement Soil Alternative 3 is $24,821,000. Thus, treating wastes on-Site prior to disposal, as described in Soil Alternative 3, will increase the remedy by approximately $7,821,000.

Sediment Alternatives:

The estimated present worth of the cost to implement Sediment Alternative 2 is $1,400,000 and to implement Sediment Alternative 3 is $1,650,000.

8. State/Support Agency Acceptance

The Commonwealth of Pennsylvania supports the selection of Soil Alternative 2, Excavation with Off-Site Treatment and Off-Site Disposal, and Sediment Alternative 3, Natural Filtration/Phytoremediation/Excavation/Off-site Disposal.

9. Community Acceptance

A thirty-day public comment period on EPA's Proposed Plan for the Ryeland Road Arsenic Site began on November 8, 2005. An advertisement announcing the issuance of the Proposed Plan and a public meeting to discuss the Plan was placed in the Reading Eagle. The public meeting was held on November 14, 2003 at the Bethany Children's Home located at 1863 Bethany Road in Womelsdorf. The meeting was attended by approximately 25 members of the community, as well as a representative from Pennsylvania State Senator Sheila Miller's office and a representative from U.S. Congressman Tim Holden's office.

The community appears to fully support EPA's findings and preferred alternative. All attendees at the public meeting appeared to agree with EPA's preferred alternative. No one objected to EPA's preferred alternative, nor did anyone recommend an alternative approach. One letter was received which supported EPA's preferred alternative and provided comments regarding transportation issues and future land use. The comments and EPA's responses are provided in the Responsiveness Summary.

The residents are aware of the availability of a Technical Assistance Grant and may pursue this option. A copy of the transcript of the public meeting is included in the Administrative Record.

XI. PRINCIPAL THREAT WASTES

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP § 300.430 (a)(1)(iii)(A)). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to groundwater, surface water or air, or acts as a source for direct exposure. EPA considers the hazardous soils that fail the TCLP leachability test to be "principal threat" wastes since they are the soils most likely to leach arsenic into the shallow groundwater which then transports contamination to the nursery property, impacting the wetland area and down gradient sediments. These soils would be treated prior to disposal during the implementation of Soil Alternative 2 (off-site treatment) or Soil Alternative 3 (on-site treatment).

XII. SELECTED REMEDY

Following consideration of the requirements of CERCLA, a detailed analysis of the alternatives using the nine criteria set forth in the NCP, and careful review of public comments, EPA has selected ***Soil Alternative 2: Excavation with Off-Site Treatment and Off-Site Disposal***, and ***Sediment Alternative 3, Natural Filtration/Phytoremediation/Excavation/Off-site Disposal*** for implementation at the Ryeland Road Arsenic Site.

Summary of the Rationale for the Selected Remedy

Soils:

EPA's selected alternative for soils is Soil Alternative 2: Excavation with Off-Site Treatment and Off-Site Disposal. EPA recommends this Alternative for soil because it will eliminate all sources of contamination, with the exception of a relatively minor amount located below the railroad embankment. While Soil Alternative 3 would achieve the same results, the addition of on-site treatment would increase the cost of the cleanup by approximately $7,821,000 and would also increase the volume of material removed from the Site. Soil Alternative 3 would also require treating wastes in a residential neighborhood which is typically not a preferred location to perform the treatment of hazardous wastes. When compared to the Selected Alternative, the limited benefit of on-Site treatment does not outweigh the noted concerns and significant additional cost.

The Selected Alternative is consistent with the current residential use of the Site on Ryeland Road and Vince-Julia Lane and the commercial use of the nursery property. Following implementation of the cleanup, it is likely that Heidelberg Township will receive ownership of the three properties located within the Northern Source Area and the one property which comprises the majority of the Southern Source Area. All four properties would be ready for unrestricted residential development following the completion of the remedial action. Cleanup of the nursery will be consistent with the current commercial use of that property.

EPA solicited comments from the current citizens residing on Ryeland Road regarding the future use of the Site. All of the citizens that provided their opinion regarding future use requested that the Site be prepared for future residential use or a similar use that is consistent with the current quiet, residential setting of the Site. The vast majority of citizens opposed the future use of the Site as a recreational facility or for municipal purposes and attested so publicly at two separate meetings with officials from Heidelberg Township.

It is anticipated that the implementation of the Selected Alternative will have a significant and immediate positive impact on the quality of groundwater. Additional groundwater data will be collected during and after the cleanup, allowing EPA to determine if any additional cleanup activities are necessary to protect groundwater.

Under EPA's Selected Alternative, exposure to any residual contamination will be prevented by institutional controls such as enforceable orders, deed notices, easements and/or restrictive covenants. In addition, the Selected Alternative will meet all ARARs and provide a long-term and permanent solution. The Selected Alternative offers short-term effectiveness, provided appropriate controls and plans are in-place.

Sediments:

EPA's Selected Alternative for sediments is Sediment Alternative 3: Natural Filtration/ Phytoremediation/Excavation/Off-Site Disposal. EPA has chosen this alternative for sediments because it will eliminate all sediments with elevated levels of contamination. In addition, a significant advantage of the selected alternative is the added protection of treatment of residual contamination through phytoremediation. The combination of natural filtration, hydraulic control from poplars, and reduction of arsenic through root uptake from the hyperaccumulating ferns will provide the necessary treatment and controls to ensure residual contamination does not impact down gradient areas following the completion of the remedial action.

The selected alternative will meet all ARARs and provide a long-term and permanent solution. The selected alternative also offers short-term effectiveness, provided appropriate controls and plans are in-place.

Summary of the Estimated Remedy Costs

The estimated combined cost of implementing Soil Alternative 2 and Sediment Alternative 3 is $18,400,000 in capital cost and approximately $20,000 per year for operation and maintenance for years 1 - 5 and $10,000 per year for years 6 - 30. An additional $23,000 is required every 5 years to prepare a Five Year Review. The total present worth cost is $18,650,000.

Performance Standards

Performance Standards were developed to address unacceptable risks posed by the Site and to comply with ARARs. For residential land use settings, the soil Performance Standard for arsenic is 12 mg/kg to a depth of 15 feet. The Performance Standard for lead is 400 mg/kg. Contaminated bricks located in the residential area will be remediated to the same standards as the residential soils. For non-residential land use scenarios, i.e., the nursery property, the arsenic Performance Standard for soil is 53 mg/kg to a depth of two feet from the surface. The selected alternative will achieve these performance standards. In addition, under the selected alternative, three families residing on the Northern Source Area will be permanently relocated and all structures will be demolished prior to the soil cleanup. Two or three additional families may also require temporary relocation during part of the cleanup.

Performance Standards for sediments were developed based on the land use setting. The Performance Standard for arsenic in sediments in the intermittent tributary was 12 mg/kg,

consistent with the soil Performance Standard for a residential setting. The Performance Standard for arsenic in spring-fed pond sediments was 53 mg/kg, consistent with the soil Performance Standard for non-residential areas. The Performance Standard for arsenic in sediments in the VFW Park is 46 mg/kg to prevent risks related to the consumption of watercress. A Site-specific Performance Standard for arsenic was calculated at 140 mg/kg for the spring-fed creek sediments for the protection of human health. The Performance Standard to protect ecological receptors was established as 200 mg/kg for zinc in all sediments. The selected alternative will achieve these performance standards for sediments.

Expected Outcome of the Selected Remedy

The selected remedy will reduce, to acceptable levels, risks to human health and the environment from the Ryeland Road Arsenic Site by excavating and removing all soils and sediments that exceed the Performance Standards described above, though a very limited amount of contaminated soil may have to remain under the railroad right-of-way. Implementation of the selected remedy will achieve all of the remedial action objectives. It is anticipated that contamination in the shallow groundwater will decrease quickly following the completion of the soil cleanup. Implementation of the soil remedy will occur prior to excavating the down gradient sediments to avoid re-contaminating the sediments. Monitoring shallow groundwater and springs will provide the necessary data to determine the effectiveness of the soil remediation. The combination of natural filtration, hydraulic control from the poplars, and reduction of arsenic through root uptake from the hyperaccumulating ferns will provide the necessary treatment and controls to ensure that residual contamination does not impact downgradient areas.

XIII. STATUTORY DETERMINATIONS

Section 121 of CERCLA requires that the selected remedy be protective of human health and the environment, comply with ARARs, be cost effective, and use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Additionally, CERCLA includes a preference for remedies that use treatment to significantly and permanently reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy for the Site meets these statutory requirements.

Protection of Human Health and the Environment

The selected remedy will provide protection of human health and the environment by excavating and disposing all soils and sediments that exceed the Performance Standards with the exception of a small area within the railroad right-of-way.

Compliance with Applicable or Relevant and Appropriate Requirements

The selected remedy will comply with all Federal and State requirements, standards, criteria, and limitations that are applicable or relevant and appropriate, as required by section 121(c) of CERCLA, 42 U.S.C. § 9621(c). Such requirements, standards, criteria and limitations are identified in Tables 1 - 3 of this ROD.

Cost Effectiveness

The NCP at 40 C.F.R. § 300.430(f)(1)(ii)(D), requires EPA to evaluate cost-effectiveness by comparing all the alternatives meeting the threshold criteria--protection of human health and the environment and compliance with ARARs--against long-term effectiveness and permanence; reduction of toxicity, mobility or volume through treatment; and short-term effectiveness (collectively referred to as "overall effectiveness"). The NCP further states that overall effectiveness is then compared to cost to insure that the remedy is cost effective.

EPA concludes, following an evaluation of these criteria, that the selected remedy is cost-effective in providing overall protection in proportion to costs and meets all other requirements of CERCLA. The estimated present value of the selected remedial action is $18,650,000.

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

The selected remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable through the off-site stabilization of all soils that fail the TCLP leachability test. Treatment of residual arsenic contamination shall be provided via the reduction of arsenic through the root uptake from hyperaccumulating ferns. Portions of the ferns will be harvested and disposed at an off-site landfill for approximately three years.

Preference for Treatment as a Principal Element

The selected remedy satisfies the statutory preference for treatment as a principal element in that the remedy requires the treatment of all soils that fail the TCLP leachability test.

Five Year Review Requirements

Section 121(c) of CERCLA and section 300.430(f)(4)(ii) of the NCP require review of the remedy if the remedy results in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure. Any such review must be conducted no less often than every five years after initiation of the remedial action.

Because hazardous substances will remain at the Ryeland Road Arsenic Site, the review described by section 121(c) of CERCLA and section 300.430(f)(4)(ii) of the NCP will be conducted no less often than every five years after initiation of the remedial action.

Documentation of Significant Changes

The Proposed Plan for the Ryeland Road Arsenic Site was released for public comment on November 8, 2005. The Proposed Plan identified as EPA's preferred alternatives for soil and sediments the alternatives selected in this ROD. The remedy selected in this ROD involves no changes to the preferred alternative identified in the Proposed Plan.

Table 1

Ryeland Road Arsenic Superfund Site
Action Specific
Applicable or Relevant and Appropriate Requirements (ARARs)
and To Be Considered Material

ARAR or TBC	Citation	Classification	Summary of Requirement	Applicability to Selected Remedy
I Soil				
A Federal				
1 Resource Conservation and Recovery Act of 1976, Hazardous and Solid Waste Amendments of 1984, 42 U S C §§ 5901 - 6992k				
a Land Disposal Restrictions	40 C F R. Part 268	Applicable	Restrictions on land disposal of hazardous waste.	If the remedy involves placement of hazardous waste on land, except within an area of containment ("AOC") on-site, these requirements will apply prior to disposal
• Management of Remediation Waste	EPA530-F-98-026 (October 14, 1998)	To Be Considered	Guidance addressing Areas of Contamination in which contaminated soils are to be consolidated	This guidance will be considered in addressing AOCs in which contaminated soils are to be consolidated
2 DOT Hazardous Waste Transportation Requirements				
a Standards for Transportation of Hazardous Waste	49 C.F R. § 171 3, 49 C.F.R. § 173 5	Applicable	Provides standards for the off-site disposal of hazardous wastes	If Site Remediation results in the transportation of hazardous waste off-site, such transportation shall be done in accordance with the substantive requirements.
B State				
1 Pennsylvania Solid Waste Management Act, 35 P S. §§				

a	Institutional Controls	35 P S § 6018 405	Applicable	Requirements for conveyance of property on which hazardous wastes are being or have ever been disposed	If EPA conveys the property, as grantor of property on which hazardous waste has been disposed, EPA must include in property description in deed an acknowledgment of such disposal
b	Hazardous Waste Management System - General Definition	25 Pa Code § 260a.10 (Subpart B)	Applicable	Provides definitions for when hazardous waste management requirements are triggered.	Hazardous wastes shall be managed while on-Site in accordance with the substantive requirements.
c	Empty Containers	25 Pa Code § 261a.7	Applicable	Provides that empty containers or inner liners removed from empty containers are regulated under 25 Pa. Code 262a-255a, 268a and 270a.	During Site remediation, containers may be used to store hazardous waste Therefore, this regulation may be applicable.
d.	Hazardous Waste Identification	25 Pa Code Chapter 261a, Subpart A	Applicable	Contains criteria and lists for determining if a waste is classified as hazardous.	Site remediation may require the excavation of soils If such soils exhibit the characteristic of a hazardous waste, they shall be managed as such in accordance with the substantive requirements.
e	Generator Requirements	25 Pa. Code §§ 262a 20 -23	Applicable	Requires that a generator who transports hazardous waste for off-site treatment, storage or disposal must prepare a manifest	During Site remediation, if any waste is characterized as hazardous, such waste shall be transported off-site with manifests completed in accordance with the substantive requirements
f.	Transporter Requirements	25 Pa. Code § 263a	Applicable	Establishes standards for transporters of hazardous waste.	If any waste is characterized as hazardous, such waste shall be transported off-site in accordance with the substantive requirements.
g	Standards for Management of Containers	25 Pa Code § 264a 173	Applicable	Regulates management of hazardous waste stored in containers	During Site remediation, containers may be used to store hazardous waste and shall be managed while on-site in accordance with the substantive requirements
h	Standards for Land Treatment	25 Pa. Code § 264a 273	Applicable	Regulates management of hazardous waste in land treatment units	During Site remediation, hazardous waste may be treated in land treatment units and shall be managed in accordance with the substantive requirements.
i	Management of Waste Piles	25 Pa Code § 264a 251	Applicable	Regulated design and operation of waste pile	Hazardous waste may be placed in an on-Site waste pile and shall be managed in accordance with the substantive requirements.

j Residual Waste Management	25 Pa Code § 287 2	Applicable	Provides definitions for when residual waste management requirements are triggered.	Site remediation activities may generate non-hazardous contaminated soil and/or, dredged material and such wastes shall be managed while on-site in accordance with the substantive requirements.
k. Chemical analyses of waste	25 Pa. Code § 287.54	Applicable	Provides requirements for characterizing residual waste.	If Site remediation activities generate residual waste, such waste shall be managed in accordance with the substantive requirements.
II. WATER				
A. Federal				
1 Clean Water Act, 33 U.S C Sections 1251-1387				
a Federal Ambient Water Quality Criteria for the Protection of Aquatic Life	33 U.S C § 1314	Relevant and Appropriate	Non-enforceable guidelines established pursuant to Section 304 of the Clean Water Act that set the concentrations of pollutants which are considered adequate to protect human health based on water and fish ingestion and to protect aquatic life. Federal ambient water quality criteria may be relevant and appropriate to CERCLA cleanups based on the uses of a water body	The designated uses for the Tulpehocken Creek at the Site include fishing and protection of aquatic life. These ambient water quality criteria which deal with fish ingestion and protection of aquatic life are relevant and appropriate to the Creek unless a State water quality standard exists for that particular pollutant.
b Discharge of Storm Water Runoff	40 C F R § 122 26	Applicable	Storm water runoff must be monitored and controlled.	Storm water runoff from Site remediation may result in runoff to the Tulpehocken Creek and its tributaries Any such runoff must comply with the substantive requirements
B. State				
1 PA Clean Streams Law, 35 P.S. §§ 691.1 - 691.1001				
a General Provisions	25 Pa Code § 91 33	Applicable	Requirements to notify PADEP if substance would result in pollution or create danger is discharged or placed in waters of Commonwealth	Substantive requirements will apply if remedy results in discharge of pollutant into water of Commonwealth.
b Wastewater Impoundments	25 Pa Code § 91 35	Applicable	Requirements for persons intending to construct wastewater impoundments	Substantive requirements will apply if remedy requires construction of wastewater impoundment

c.	National Pollution Discharge Elimination System	25 Pa Code Chapter 92	Applicable	Regulates the discharge of water into public surface waters.	Substantive requirements will apply if remediation results in the discharge of treated water to surface water
d	Water Quality Standards	25 Pa Code § 93.3	Applicable	Identifies protected water uses.	Applicable to remedial actions which will impact those portions of the Tulpehocken Creek which have been classified as a "trout water fishery" and those portions of an unnamed tributary to the Tulpehocken Creek which have been classified as a "Class A wild trout stream"
e	Water Quality Standards	25 Pa Code § 93.4	Applicable	Identifies statewide water uses which are to be protected.	Applicable to remedial actions which will impact statewide water uses for the Tulpehocken Creek and the unnamed tributary to the Tulpehocken Creek.
f	Water Quality Standards	25 Pa. Code § 93 4a	Applicable	Provides that levels of water quality that must be protected	Applicable to remedial actions which will impact existing uses of surface waters, High Quality Waters and Exceptional Value Waters
g	Water Quality Standards	25 Pa Code § 93.4b	Applicable	Defines High Quality or Exceptional Value Waters.	Applicable to remedial actions which will impact existing uses of surface waters, High Quality Waters and Exceptional Value Waters.
h	Water Quality Standards	25 Pa Code § 93 4c	Applicable	Sets forth requirements to persons proposing to discharge to High Quality or Exceptional Value Waters.	Substantive requirements will apply if remedy results in discharges to High Quality or Exceptional Value Waters
i	Water Quality Standards	25 Pa Code § 93 6	Applicable	Provides general water quality standards	Applicable to remedial actions which will result in discharges sufficient to be harmful to protected water uses or to human, animal, plant or aquatic life and to discharges that produce turbidity.
l	Water Quality Standards	25 Pa. Code § 93 8a	Applicable	Provides definitions for when water quality criteria are triggered.	Applicable to remedial actions which will discharge to surface water.
j	Water Quality Standards	25 Pa. Code §§ 93.9, 93 9a-93 9z	Applicable	Provides that designated water uses, as listed in 25 Pa. Code §§ 93 9a-93 9z, shall be protected.	Substantive requirements will apply if remedy results in discharges to surface waters with designated uses
k	Erosion and Sediment Control Requirements	25 Pa Code § 102 4(b)(1)	Relevant and Appropriate	Requirements to minimize erosion and sedimentation for all earth disturbance activities.	Any earth disturbance activities at the Site shall meet the substantive requirements of this regulation

l	Erosion and Sediment Control Requirements	25 Pa Code § 102 11	Relevant and Appropriate	Requirements to design, implement and maintain BMPs for all earth disturbance activities at the Site	Any earth disturbance activities at the Site shall meet the substantive requirements of this regulation.
m	Erosion and Sediment Control Requirements	25 Pa. Code § 102.22	Relevant and Appropriate	Requirements for permanent stabilization	Permanent stabilization shall be implemented and maintained in accordance with the substantive requirements
2 Storm Water Management Act, 32 P.S §§ 680 1-680.17					
a	Dam Construction	25 Pa. Code § 105 15	Applicable	Requires approval of environmental assessment prior to dam construction.	Substantive requirements will apply if remedy requires dam construction
b	Dam Construction	25 Pa Code § 105 17	Applicable	Provides definitions for when wetland protection requirements are triggered.	Applicable if Site remediation involves wetlands.
c	Dam Construction	25 Pa. Code § 105 18a	Applicable	Provides limits on Commonwealth's ability to grant a permit for construction of dam, water obstruction or encroachment in a wetland.	Substantive requirements will apply if Site remediation requires construction of dam, water obstruction or encroachment in a wetland
d	Wetland Replacement Criteria	25 Pa. Code § 105.20a	Applicable	Provides criteria for replacing wetlands.	Substantive requirements will apply if Site remediation requires construction of dam, water obstruction or encroachment in a wetland
III. AIR					
A Federal					
1 Clean Air Act, 42 U S C §§ 7401 to 7671q					
a	National Ambient Air Quality Standards (NAAQS) for Total Suspended Particulates	40 C F R Part 50	Applicable	Specifies maximum primary and secondary 24-hour concentrations for fugitive dust	Substantive requirements will be applicable if remediation of soil generates fugitive dust emissions
b	National Primary and Secondary Ambient Air Quality Standards	40 C F R Part 50	Applicable	Sets forth emission standards for lead.	Substantive requirements will be applicable if remediation and excavation of soil result in emission of contaminants into the air.
2 Other					

(a) Threshold Limit Values (TLVs)	Established by American Conference of Governmental Industrial Hygienists	Relevant and Appropriate	Identifies levels of airborne contaminants with which health risks may be associated	TLVs are based on the time-weighted average exposure to an airborne contaminant over an 8-hour work day or a 40- hour work week. Since there are no ARARs for arsenic, the TLV for arsenic should be considered ARARs for airborne emissions
B. State				
1 Air Pollution Control Act, 35 P S §§ 4001 - 4015				
a Fugitive Emissions	25 Pa Code § 123 1	Applicable	Prohibition of certain fugitive emissions.	Substantive requirements will be applicable if remediation results in fugitive emissions from demolition of buildings, clearing of land, and stockpiling of materials
• Fugitive Particulate Matter	25 Pa. Code § 123 2	Applicable	Prohibition on fugitive particulate matter	Substantive requirements will be applicable if remediation results in emission of fugitive particulate matter from demolition of buildings, clearing of land, and stockpiling of materials
c. Visible Air Contaminants	25 Pa. Code § 123 41	Applicable	Prohibition on visible air contaminants.	Substantive requirements will be applicable if remediation results in emission of visible air contaminants
d Ambient Air Quality	25 Pa Code § 127.1	Applicable	Use of best available technology for control of new sources through construction	Substantive requirements will be applicable if remediation results in emission of contaminants into the air.
(e) Ambient Air Quality	25 Pa Code § 131 1; 40 C F R Part 50	Applicable	Establishes maximum concentration of air contaminants necessary to protect public health	Substantive requirements will be applicable if remedy results in emission of any listed pollutants, including lead.
f Ambient Air Quality	25 Pa Code § 131 3	Applicable	Provides maximum emission standards for settled particulates	Substantive requirements will be applicable if remedy affects ambient air quality for particulate matter

Table 2

Ryeland Road Arsenic Superfund Site
Location Specific
Applicable or Relevant and Appropriate Requirements (ARARs)
and To Be Considered Material

ARAR or TBC	Citation	Classification	Summary of Requirement	Applicability to Selected Remedy
I Water				
A. Federal				
1 Wild Scenic Rivers Act	16 U S C. §§ 1271-1287	Applicable	Provides for protection of scenic rivers designated by State.	The Commonwealth has designated the Tulpehocken Creek asa scenic river so substantive requirements will apply
2 National Environmental Policy Act	42 U.S.C. §§ 4321- 4370e, 40 CFR § 6.302(b)	To Be Considered	Executive Order which requires EPA to evaluate activities' effects on flood plain.	Substantive requirements will apply if remedial action impacts flood plain
B State				
1 Pennsylvania Scenic Rivers	32 P.S. §§ 820 21-820 2, 820 151 - 820 161	To Be Considered	Requires State agencies to be guided by Management Guidelines outlined in "Tulpehocken Creek Study."	The guidelines may be applicable to activities associated with Tulpehocken Creek.
• PA Fish and Boat Code	30 Pa. C S §§ 101 - 328	To Be Considered	Implements regulations pertaining to fish consumption advisories	The substantive standards of this regulation will be considered with respect to any discharges to the Tulpehocken Creek.
• Pennsylvania Flood Plain Management Act	32 P S §§ 679 101-60, 25 Pa Code §§ 106.31- 33	Relevant and Appropriate	Standards relating to construction, earthmoving, filling and excavation within 100-year flood plain, wetlands and regulated water	The substantive standards of this regulation are relevant and appropriate to earthmoving activities in the Tulpehocken Creek's 100-year flood plain and associated wetlands

II Fish and Wildlife				
A Federal				
1 Endangered Species Act	16 U.S C §§ 1531-1534	To Be Considered	Imposes limits on agency action that may jeopardize endangered or threatened species or adversely modifies their habitat.	Substantive requirements will apply if, during remedial work, endangered or threatened species or their habitat are found to be present at the Site. At this time, it appears that no endangered or threatened species or their habitat are present

Table 3

Ryeland Road Arsenic Superfund Site
Chemical Specific
Applicable or Relevant and Appropriate Requirements (ARARs)
and To Be Considered Material for Soils

ARAR or TBC	Citation	Classification	Summary of Requirement	Applicability to Selected Remedy
I. Water				
A. Federal				
1. Clean Water Act, 33 U.S.C. Sections 1251-1387				
a. Federal Ambient Water Quality Criteria for the Protection of Aquatic Life	40 C.F.R. § 131.36	Relevant and Appropriate	These are non-enforceable guidelines established pursuant to Section 304 of the Clean Water Act that set the concentrations of pollutants which are considered adequate to protect human health based on water and fish ingestion and to protect aquatic life. Federal ambient water quality criteria may be relevant and appropriate to CERCLA cleanups based on the uses of a water body.	Tulpehocken Creek is an approved trout water fishery beginning 0.5 miles below former Charming Forge Dam upstream to Berks County Line. The unnamed tributary to the Tulpehocken Creek is a Class A wild trout stream. Those federal ambient water quality criteria which deal with water and fish ingestion are relevant and appropriate to the Tulpehocken Creek.

II. Soil				
A. State				
• Land Recycling and Environmental Remediation Standards Act	35 P.S. § 6026.101, et seq.; 25 Pa. Code §250.305	Applicable	Medium-specific concentrations (MSCs) for substances found in soil.	These standards apply to arsenic, lead, copper, thallium, aluminum, manganese and total chromium found in on-Site soil.

RESPONSIVENESS SUMMARY

RYELAND ROAD ARSENIC SITE

WOMELSDORF, PENNSYLVANIA

A thirty-day public comment period on EPA's Proposed Remedial Action Plan (Proposed Plan) for the Ryeland Road Arsenic Superfund Site began on November 8, 2005. A public meeting was held on November 14, 2005 at the Bethany Children's Home located at 1863 Bethany Road in Womelsdorf. The meeting was attended by approximately 25 members of the community and a representative from U.S. Congressman Tim Holden's office and a representative from Pennsylvania Senator Sheila Miller's office.

Based on the public response to the Proposed Plan, it appears that the community fully supports EPA's findings and preferred alternative. All attendees at the public meeting appeared to agree with EPA's preferred alternative. No one objected to EPA's preferred alternative, nor did anyone recommend an alternative approach. The residents are aware of the availability of a Technical Assistance Grant and may pursue this option. A copy of the transcript of the public meeting is included in the Administrative Record.

The purpose of this document is to organize the written comments submitted during the comment period and provide EPA's response to each concern. Written comments were submitted by one member of the community. The following is a summary of the comments submitted and EPA's response to each comment.

SUMMARY OF COMMENTS AND EPA RESPONSES

Extent of Contamination/Funding the Cleanup

Question/Comment: The level of contamination is alarming and warrants immediate funding of the cleanup.

Response: EPA agrees and will pursue immediate funding of the cleanup. The cleanup will be separated into two phases to expedite the permanent relocation of the three families that reside within the central portion of Northern Source Area. Funding for the design is planned and preparations for starting the design are underway. The goal is to conduct the permanent relocation of residents in the summer of 2006. The design of the soil cleanup is also planned to begin in early 2006 and will last approximately one year. Assuming funding is provided, the soil cleanup should begin in the spring of 2007.

Utilizing the Rail Line for Transportation

Question/Comment: The rail transport option should be pursued to decrease vehicle traffic and avoid inadvertent contamination of the roadways through tire transfer, dust, and over spillage.

Response: EPA has evaluated the option of rail transportation and will continue to coordinate with Norfolk Southern Railroad to determine the effectiveness of using the railroad to transport wastes. One disadvantage noted in the Proposed Plan is that access to the rail spur adjacent to the Site is limited several days per week because the railroad temporarily stores railcars loaded with coal on the spur. This activity would block access to the main rail line for up to four days. It is likely that the cleanup construction crew would not be able to excavate soils for several days each week because filled railcars on the Site could not be removed until the coal cars are delivered to the nearby energy plant. Delaying the excavation several days each week would increase the cost of the cleanup significantly.

Preparation and implementation of the Health and Safety Plan and Transportation Plan will ensure vehicles are properly filled prior to leaving the Site. Wheel washes or similar activities will be used to remove contaminants from vehicle tires and if any soils migrate onto Ryeland Road, the road will be swept. Wastes in trucks will be properly covered and vehicles will be inspected prior to leaving the Site. These measures and additional measures will be developed during the Remedial Design to minimize the release of contaminants during the transport of wastes from the Site.

Future Land Use - Wildlife Habitat

Question/Comment: The Site should be restored to maximize the natural resource benefits of the vernal pools, springs and seeps located on and near the Site.

Response: EPA fully supports the conservation of sensitive habitats and has included a provision in the Record of Decision to avoid excavation in environmentally sensitive areas (i.e., springs and seeps on the nursery property) by planting additional ferns to minimize impacts to the environment. The nursery property containing the springs and seeps affected by the Site shall be restored with ferns, poplars, and indigenous wetland species to preserve and enhance the current habitat. This area shall remain undisturbed following the cleanup because it has been designated as an agricultural conservation easement under the Pennsylvania Agricultural Conservation Easement Purchase Program. The vernal pool area on the boundary of the Southern Source Area, though only several hundred feet in diameter, was recognized as an environmentally sensitive area during the Remedial Investigation. EPA will work closely with PADEP and Heidelberg Township to ensure that this area is properly managed following the completion of the remedial action.