Superfund Program
Proposed Plan

U.S. Environmental Protection Agency,
Region 2

SDMS Document
110449

Lightman Drum Superfund Site
May 2009

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan identifies the Preferred Alternative to address groundwater contamination at the Lightman Drum Superfund Site (Site) in Winslow Township, Camden County, New Jersey, and provides the rationale for this preference. Alternatives have been developed to address groundwater contaminated primarily with Volatile Organic Compounds (VOCs), including chlorinated hydrocarbons such as trichloroethene (TCE) and tetrachloroethene (PCE) as well as nonchlorinated hydrocarbons such as benzene and xylene.

The U.S. Environmental Protection Agency's (EPA) Preferred Alternative to address groundwater contamination is Alternative 4A, Air Sparging/Soil Vapor Extraction near the source areas with Pump and Treat for the downgradient portion of the groundwater contamination. This remedy will also include Institutional Controls and Monitored Natural Attenuation. Soil contamination will be addressed through a new Operable Unit (OU2).

This Proposed Plan includes summaries of all the cleanup alternatives evaluated for the Site groundwater. This document is issued by EPA, the lead agency for Site activities, and the New Jersey Department of Environmental Protection (NJDEP), the support agency. EPA, in consultation with NJDEP, will select the final remedy for the groundwater after reviewing and considering all information submitted during a 30-day public comment period. EPA, in consultation with NJDEP, may modify the preferred alternative or select another response action presented in this Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the alternatives presented in this document.

EPA is issuing this Proposed Plan as part of its community relations program under Section 117(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, commonly known as Superfund). This Proposed Plan summarizes information that can be found in greater detail in the Remedial Investigation and Feasibility Study (RI/FS) reports and other documents contained in the Administrative Record for the Site.

MARK YOUR CALENDAR

PUBLIC COMMENT PERIOD:
June 16, 2009 – July 16, 2009
EPA will accept written comments on the Proposed Plan during the public comment period.

PUBLIC MEETING: June 25, 2009
EPA will hold a public meeting to explain the Proposed Plan and all of the alternatives presented in the Feasibility Study. Oral and written comments will also be accepted at the meeting. The meeting will be held in the Municipal Building, 125 South Route 73, Braddock, NJ from 7 to 9 PM.

For more information, see the Administrative Record at the following locations:

U.S. EPA Records Center, Region 2
290 Broadway, 18th Floor.
New York, New York 10007-1866
(212) 637-4308
Hours: Monday-Friday - 9 am to 5 p.m., by appointment.

Camden County Library, South County Branch
35 Coopers Folly Road
Atco, NJ 08004
Hours M-F 10am – 9pm, Sat 10am – 6pm

SITE DESCRIPTION

The Site covers approximately 15 acres in Winslow Township, Camden County, New Jersey (Block 4404, Lot 6) and falls within the New Jersey Pinelands Protection Area. The Site is approximately 300 feet wide and is bordered by Route 73 to the east and the railroad formerly owned by Pennsylvania Railroad to the west (Figure 1). Currently, the portion of the Site nearest to Route 73 is operated by United Cooperage, a drum brokerage business, which stores drums and tractor trailers at the Site. There is a small septic system on the Site as well as a well for nonpotable uses.

SITE HISTORY

Prior to 1974, the Site was used for agriculture. Beginning in 1974, the Lightman Drum Company operated an industrial waste hauling and drum reclamation business there. In 1978, NJDEP issued a one-year Temporary Operating Authorization that allowed for the storage of various wastes including chemical powders, pesticides, waste oil, oil sludges, paints, pigment, thinner, ink residues, ketones, alcohols, and mixed solvents. The permit was not renewed.

In 1987, NJDEP collected soil samples which revealed the presence of various organic and inorganic compounds at the Site. A more extensive investigation of the soil and groundwater took place under an NJDEP Administrative Order from 1989 to 1990. During this investigation, about 80 soil samples were collected and 12 deep and shallow monitoring wells were installed. These samples were concentrated in known storage areas. These known areas are as follows.

Underground Diesel Fuel Tanks
Two fiberglass underground tanks (750 and 1,500 gallons) were installed in 1976 in the south-central portion of the Site. They were used for diesel fuels until the early 1980s and were removed in 1990. Soil samples collected by NJDEP in the vicinity of the tanks showed low levels of petroleum hydrocarbons and one detection of TCE.

Unlined Waste Disposal Pit
An Unlined Waste Disposal Pit was located in a small depression in a wooded area in the west-central portion of the Site. This pit was accessed by a dirt road leading from Lightman Drum Company's main operations area. As part of the NJDEP investigation of the Site, it was reported that the pit was used for the disposal of a single tank trailer of wastes including waste paint and possibly oil in 1976. The Lightman Drum Company reportedly removed the waste from this area shortly after it was deposited. There are no other records.

Former Waste Storage Tanks
Two 5,000-gallon underground storage tanks were formerly located in the north-central area of the Site. The tanks were reportedly used to store waste paint pigments, ink sludges, and thinners. The tanks operated under the NJDEP Temporary Operating Authorization. NJDEP observed the removal of the tanks in 1984.

Warehouse
Drums were stored in a warehouse located in the eastern part of the Site until a fire destroyed the warehouse in 1985. Only the concrete foundation slab remains.

Drum Storage Areas
There were various drum storage areas throughout the active portion of the Site. The investigated areas included the main storage areas along the southern property boundary, west of the former diesel tanks, and along the northern tree line east of the former waste storage tanks.

The NJDEP studies showed the presence of elevated levels of VOCs and Semi-Volatile Organic Compounds (SVOCs) in the groundwater and VOCs, SVOCs pesticides, and inorganic compounds in the soil.

In May 1999, NJDEP requested that EPA perform a Hazard Ranking System Evaluation. As a result of the evaluation, EPA placed the Site on the National Priorities List on October 22, 1999. At that time, EPA became the lead agency for Superfund remediation activities at the Site.

In November 2000, EPA issued an Administrative Order requiring a group of Potentially Responsible Parties (PRPs) to conduct a Remedial Investigation and Feasibility Study. The Remedial Investigation work plan was approved in 2002. Following review of the initial results, installation of additional wells and piezometers (groundwater sampling sites) was approved in September 2003. The work plan was updated and the investigations have been expanded as necessary from 2003 to the present. Additional soil samples were collected in May 200, and additional groundwater transect and monitoring well data were collected in 2007.

A second Administrative Order (Removal Order) was issued by EPA in 2007, under which the PRPs removed over 480 cubic yards of contaminated soil from the unsaturated and saturated zones in the vicinity of the former Underground Waste Storage Tanks. During the course of the soil removal, areas of unnaturally colored soils and an area of VOC-contaminated soils were identified. Removal of the unnaturally colored soils is ongoing and soil data have recently been collected.

A more complete explanation of these investigations and a summary of their results are discussed in the Site Characteristics section, below.

SITE CHARACTERISTICS

The entire Site is located within the New Jersey Pinelands area. In general, the topography of the area is flat. The majority of the Site is wooded with a 0.8-acre area of wetlands at the westernmost portion of the property. There is farm and woodlands to the north and a wooded area as well as commercial development to the south. There are a few residences and small businesses along Route 73.

The Site and adjacent properties are zoned for industrial use, though a portion of the corridor along Route 73 southeast of the Site is zoned as minor commercial. The Windsor Township administrative code requires that all properties within 200 feet of the municipal water main be connected to the public water supply system and use of private wells for drinking water is prohibited. Pre-existing wells may be used for nonpotable purposes if they do not contain contaminants. The nearest municipal well, well #8 is located about 7,500 feet southwest (downgradient) of the Site. The well draws water from about 140 feet below the ground surface and pumps at 1,000 gallons per minute. This well has been used sporadically since August 2007.

According to the Delaware Valley Regional Planning Commission, over 34,000 people live in Winslow Township as of 2007, and approximately 8,000 people live within a 3-mile radius of the Site.

The results of investigations conducted at the Site indicate that the area is underlain by well-drained sandy soils with poor filtering capacity. Active areas of the Site have a thin layer of relatively impermeable fill. Under the soil is the Cohansey-Kirkwood aquifer system which is used extensively as the water supply in the area of the Site.

The Cohansey-Kirkwood aquifer system, which dips eastward toward the Atlantic Ocean is a relatively uniform unconfined aquifer consisting of yellowish brown coarse to fine-grained sand. Groundwater within the aquifer flows primarily to the south in the vicinity of the Site. The base of the Cohansey-Kirkwood formation is defined as the top of a clay bed lying at the base of the Kirkwood at 100 feet below the ground surface.

Sediment and Surface Water Investigations

A total of eight sediment samples were taken from four sample locations. One location is from the wetlands at the western edge of the Site, one from a background sample upgradient of the Site, and two locations in Pump Branch Creek. Based on historical aerial photographs and the present Site configuration, the nearest Site operation activity to the sediments was the unlined Waste Disposal Pit which is about 750 feet away.

The sediment samples were screened against the NJDEP Sediment Screening Criteria (Lowest Effect Level) and the Site Background levels. The surface water samples were screened against the NJDEP Surface Water Quality Criteria and Site Background levels. Analyses of the sediment samples showed that no VOCs or semi-VOCs exceeded the NJ standards. Two pesticides and some metals were found at levels above the NJ standards. However, the area of and surrounding the Site has been historically used for farming and, therefore, it likely that the presence of pesticides do not stem from operations at Site. Lead, copper, arsenic, and mercury levels exceeded the NJ criteria. These concentration levels are unlikely to be Site related because the highest levels are found either upgradient or in the farthest downgradient areas.

Four surface water samples were taken, one from each of the sediment sampling locations. Analysis of the samples showed that VOCs, pesticides, and Polychlorinated Biphenyls (PCBs) were not detected in any of the samples. There was one detection of an SVOC in the background sample location. Some sample concentrations exceeded NJ Standards for lead and arsenic. It is likely that the metals in the surface water reflect the metal content in the sediments. Since the sediment metal levels are not likely to be from the Site, it is also unlikely that the metals in the surface water are from the Site.

Soil Investigations

Unsaturated Soils

During the Remedial Investigation, 40 subsurface unsaturated zone soil borings were installed throughout the operational areas of the Site to locate areas of contamination. An additional nine borings were installed in the wooded area of the Site to determine background levels of contaminants. The unsaturated zone soil borings were installed to the water table but in cases where field screening did not show contamination, the deepest sample was collected at five to six feet below the ground surface.

The soils were tested for VOCs, SVOCs, pesticides, metals, and PCBs. The soil sampling results were compared to the 1999 NJDEP Non-Residential Direct Contact Soil Cleanup Criteria and the NJDEP Impact to Groundwater Criteria for screening purposes, since those criteria were in effect when the samples were collected.

There were detections of all the classes of contaminants except for PCBs. Although other contaminants were detected, none of the levels exceed the NJDEP standards. The NJDEP standards used for screening were either the Non-residential Direct Contact Soil Cleanup Criteria or Impact to Groundwater Criteria, which ever was more stringent for that contaminant. Almost all contaminant levels were also below the NJDEP Residential Direct Contact standards. The exceptions are lead and hexavalent chromium which are found in the areas of unnaturally colored soils. These unnaturally colored soils are being removed under the 2007 Removal Order.

In May 2009, the PRPs submitted data collected in the unsaturated and saturated soils from an area of elevated VOC levels. This area of elevated VOCs was identified during the Removal Action (2008-2009) and is located just east of the soil excavation area and in the vicinity of the Former Waste Storage Tank Area. These data indicate that some unsaturated soil samples contained elevated levels of volatile contaminants, including PCE and TCE. Potential risks posed by this contamination have not yet been fully evaluated. EPA will establish a second Operable Unit (OU2) to evaluate soil contamination at the site further and, if necessary, develop a remedy for the soil contamination.

The details of the investigation and the analyses can be found in the Remedial Investigation Report which is part of the Administrative Record.

Saturated Soils

In April and May of 2006, 18 additional soil borings were installed to evaluate the presence of contaminants in the saturated zone. The saturated zone starts at about 12 to 14 feet below the ground surface and samples were taken starting at three feet above the water table (nine to 11 feet below the ground surface) and continuing as deep as 34 to 36 feet below the ground surface. Ten of these borings were installed in the area of the Former Waste Storage Tanks, three borings were installed in the area of the former Unlined Waste Disposal Pit, and two borings were installed in the area of the former Southwest Drum Storage Area.

Analyses of samples from borings showed that the only contaminants which exceeded the NJDEP Impact to Groundwater criteria were VOCs such as ethylbenzene, tetrachloroethene (PCE) and total xylenes. These elevated values: 150 mg/l (milligrams per liter) for ethylbenzene, 39 mg/l for PCE, and 1,700 mg/l for total xylenes were all found in the vicinity of the former Waste Tank Storage Area. Most of the contamination in this area was found in a localized zone close to the water table.

Since contamination of the saturated soils was confined to the relatively small area of the former Waste Tank Storage Area, in September 2007, EPA issued a Removal Order to address the removal of saturated soils in the area of the former Waste Storage Tank Area. The PRPs removed a volume of soils 33 feet by 16 feet by 25 feet deep (over 480 cubic yards). Removal of the soils was completed in 2008.

During the removal of the contaminated saturated soils in the former Waste Storage Tank Area, unnaturally colored soils were observed in the unsaturated soils at or a few inches below the surface throughout the Site. Analyses of these soils found that most colors contained heavy metals, especially lead, in excess of NJ Standards. All the un-naturally colored (i.e., red, green, yellow) soils are currently being removed under the 2007 Removal Order.

Also during removal of the soils, a new area of VOC contamination has been located in the unsaturated soils just east of the Former Waste Storage Tank Area. This area appears to be limited in size, but has been shown to contain elevated levels of VOCs. The data collected during the Removal Action will be further evaluated as part of a separate operable unit for soils. The results of the soil sampling conducted during the Remedial Investigation did not identify any "principal threat wastes" at the Site.

WHAT IS A "PRINCIPAL THREAT"?

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP Section 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 ground water, surface water or air, or acts as a source for direct exposure. Contaminated ground water generally is not considered to be a source material; however, Non-Aqueous Phase Liquids (NAPLs) in ground water may be viewed as source material. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. The decision to treat these wastes is made on a site-specific basis through a detailed analysis of the alternatives using the nine remedy selection criteria This analysis provides a basis for making a statutory finding that the remedy employs treatment as a principal element.

Groundwater Investigations

Overview

The Site in located within the New Jersey Pinelands area; and, therefore the groundwater underlying the Site is classified as Class I-PL. As such, the screening criteria for the groundwater is the higher of either background (contaminants levels found in the groundwater near and upgradient of the site but not affected by the site) or the NJDEP Practical Quantitation Limit (see glossary).

Based on the soil investigations, two sources of groundwater contamination were identified. One groundwater plume emanates from the former Waste Storage Tanks Area and is referred to as the eastern plume and another plume emanates from the Unlined Pit Area and is referred to as the western plume (Figure1).

Both plumes contain both chlorinated and non-chlorinated hydrocarbons and are relatively long and narrow. They also increase in depth with distance from the source where they are overlain by nonimpacted (clean) groundwater. The eastern plume is defined primarily by its elevated levels of TCE and PCE and extends about 4,500 feet downgradient of the Site property boundary, at which point it is about 85 feet below ground surface with about 65 feet of non-impacted water above it. The western plume is also defined by TCE and PCE and extends 1,500 feet downgradient of the Site property boundary, at which point it is about 55 feet below ground surface with about 45 feet of non-impacted water above it.

As described in the remedy alternatives section, the groundwater contamination at the Site can be further evaluated as two areas. One area is the groundwater contamination found immediately under the Site and under the first property to the south. This is referred to as the near-site groundwater contamination. The other area is farther to the south and is referred to as the downgradient groundwater contamination (Figure 1).

Results of the Groundwater Investigations

From August 2002 to December 2004, 243 groundwater samples were collected using a Geoprobe™ (temporary well point) system to characterize the groundwater at, and in the vicinity of, the Site. The results were used to determine where to place permanent groundwater monitoring wells and were compared to the I-PL screening levels (PQLs) to delineate areas of concern. There were detections of 22 different VOCs in the 243 transect samples taken. The PQLs for the most common contaminants are 1 ug/l (micrograms per liter) for TCE, 1 ug/l for PCE, 1 ug/l for benzene and 2 ug/l for total xylenes.

One set of VOCs in the groundwater at this Site are non-chlorinated hydrocarbons such as benzene and xylenes. These are components of fuels and are also used in industrial processes. They were found mostly closer to the Site than the PCE and TCE plumes and in both the eastern and western plumes. The highest level in the eastern plume was 63,600 ug/l for total BTEX (benzene, toluene, ethyl benzene, and xylene) found in a Geoprobe™ sample close to the Former Waste Tank Storage area and the plume still had over 100 ug/l under about 1500 feet to the south (eastern plume). The highest western plume was smaller with a high value of 32 ug/l. just to the south of the Site boundary.

Another set of VOCs are the chlorinated hydrocarbons, of which TCE and PCE are the ones most commonly found in the groundwater at the Site. These chemicals are chlorinated hydrocarbons commonly used to clean machinery, among other uses. They were both detected at elevated levels in the near-site and downgradient groundwater and define both the eastern and western plumes. During Geoprobe™ sampling from 2002 to 2004, the highest levels found was 470 ug/l for PCE which was found in the near-site groundwater and 310 ug/l for TCE in the downgradient groundwater. Both of these samples are in what is now the eastern plume. Degradation of chlorinated ethenes in groundwater may be occurring as evidenced by the presence of the daughter product cis-1,2-DCE. The presence of cis- 1,2-DCE may be the result of partial biodegradation of chlorinated ethenes, although the geochemical environment at the Site does not appear to be supportive of complete degradation.

Also seen in a downgradient area in the eastern plume were a few "hot spots" or specific, well defined areas of relatively high PCE and TCE concentration. These hot spots contained over 100 ug/l of each of these contaminants.

Based on the results of the Geoprobe™ investigation, 23 monitoring wells were installed from 2005 to 2007. These new wells, as well as the on-site office supply well, were sampled. The results from the wells helped to define the distribution of contaminants in and downgradient of the Site. High levels of nonchlorinated hydrocarbons were found near the former Waste Storage Tank Area and immediately downgradient.

The highest levels of on–site contamination were found in a monitoring well near the former Waste Storage Tank Area. Those values were 4,200 ug/l for PCE and 2,100 ug/l for TCE measured in March 2006. Downgradient, the highest value was 250 ug/l for TCE measured in February 2005 in the eastern plume. The maximum detected concentration of total xylenes on the Site was 90,000 ug/l in 2006 and the maximum detected concentration immediately downgradient from the Site was 370 ug/l measured in February 2005.

During sampling of the groundwater monitoring wells in 2006 and 2007, concentrations of TCE and PCE in the downgradient wells decreased compared to the earlier sampling events and the hot spots identified earlier appeared smaller. Based on this observation, additional Geoprobe groundwater samples were taken along two transects in July 2007 in order to determine if the hot spots had migrated or attenuated. Results from that sampling event indicated that the hot spots may have migrated to the west.

SCOPE AND ROLE OF THE ACTION

EPA is addressing the cleanup of this Site through immediate actions to address an imminent threat to human health, and two phases of long-term cleanup. Immediate actions, known as removal actions, are ongoing. In 2007, EPA issued a Removal Order to require excavation of source area soils in the saturated zone near the Former Waste Storage Tanks Area. The excavation was approximately 33 feet by 16 feet by 25 feet deep (over 480 cubic yards). During the removal action, unnaturally colored soils were observed, and after investigation, these soils are being removed. In early 2009, another nearby area of VOC-contaminated soils was also identified and characterized.

The first phase of long-term cleanup of the Site, which is the subject of this Proposed Plan, will provide for implementation of a remedy to address groundwater contaminants in both the eastern and western plumes near their on-site sources and in the downgradient areas. The second phase of long-term cleanup will address contaminated soil through a second Operable Unit (OU2) which will be used to evaluate and address contamination of these soils further.

SUMMARY OF SITE RISKS

RISK SUMMARY

The purpose of the risk assessment is to identify potential cancer risks and noncancer health hazards at the Site assuming that no further remedial action is taken. A baseline human health risk assessment was performed to evaluate current and future cancer risks and noncancer health hazards based on the results of the Remedial Investigation.

A screening-level ecological risk assessment was also conducted to assess the risk posed to ecological receptors due to site-related contamination.

As part of the RI/FS, EPA conducted a baseline risk assessment to estimate the current and future effects of contaminants on human health and the environment. A baseline risk assessment is an analysis of the potential adverse human health and ecological effects of releases of hazardous substances from a site in the absence of any actions or controls to mitigate such releases, under current and future land, groundwater and surface water/sediment uses. The baseline risk assessment includes a human health risk assessment (HHRA) and an ecological risk assessment.

The cancer risk and noncancer health hazard estimates in the HHRA are based on current reasonable maximum exposure scenarios and were developed by taking into account various health protective estimates about the frequency and duration of an individual's exposure to chemicals selected as chemicals of potential concern (COPCs), as well as the toxicity of these contaminants. Cancer risks and noncancer health hazard indexes (HIs) are summarized below.

Human Health Risk Assessment

The site and surrounding properties are currently zoned industrial. Future land use is expected to remain the same, though there may be residential development downgradient. The baseline risk assessment began by selecting COPCs in the various media that would be representative of site risks. The chemicals of concern (COCs) for the site are TCE and PCE.

The baseline risk assessment evaluated health effects that could result from exposure to surface soil, subsurface soil, groundwater, surface water and sediment. Based on the current zoning and anticipated future use, the risk assessment focused on a variety of possible receptors, including current and future commercial/industrial workers, current and future adolescent and pre-adolescent trespassers, future residents (child and adult) and future construction worker. Among all receptors evaluated at the site, future site workers and residents had potential adverse health impacts due to exposure to site contaminants released from the Lightman Drum site. Groundwater contamination contributed to the cumulative risk, but, based on soil data available at the time, soil contamination did not.

Since the risk assessment for the Remedial Investigation and Feasibility Study was performed, additional soil data were collected during the ongoing removal actions. These data indicate that there is some elevated VOC contamination in soils. It is not clear how these new data may affect risks calculated for the Site. Based on this information, EPA will create a separate Operable Unit (OU2) for soils to evaluate the nature and extent of soil contamination and risk posed by this soil contamination. The findings of the risk assessment for soils are presented below, but will be modified using new data, as appropriate, during the OU2 investigations. This Proposed Plan addresses only groundwater risks. Soils risks based on the new data will be addressed in a subsequent remedy.

Although residents and businesses downgradient are not currently impacted, groundwater is designated by the State as a potable water supply, meaning it could be used for drinking in the future. Therefore, potential exposure to groundwater was evaluated. A complete discussion of the exposure pathways and estimates of risk can be found in the *Human Health Risk Assessment* for the site in the information repository.

Summary of Risks to Future Site Workers: Cancer risks and noncancer health hazards were evaluated for exposure to soil and groundwater. Cancer and non-cancer risks for exposure to soil were within EPA's acceptable risk range. With respect to groundwater, the excess lifetime cancer risk estimate is 6.9×10^{-2}, which exceeds EPA's acceptable levels of risk. The calculated HI is 556, which exceeds EPA's threshold value of 1. The risks are primarily attributed to TCE and PCE in the groundwater.

Summary of Risks to Residents: Cancer risks and noncancer health hazards were evaluated for exposure to groundwater for the adult and child residents. The excess lifetime cancer risk estimate for the adult resident and child resident are 2.6×10^{-2} and 4.6×10^{-2}, respectively. These risks exceed EPA's acceptable levels of risk. The calculated HI for the adult resident and child resident are 1243 and 183, respectively. The Hazard Index values for these receptors exceed EPA's threshold value of 1. The risks are primarily attributed to TCE and PCE.

Summary of Risks to Future Construction Workers: Cancer risks and noncancer health hazards were evaluated for exposure to soil. The excess lifetime cancer risk estimate is 6.9×10^{-5}, which is within the acceptable risk range. The calculated HI is 50.1, which exceeds EPA's threshold value of 1. The elevated HI is primarily attributed to hexavalent chromium in the unnaturally colored soils. The risk was calculated under the assumption that the all measured chromium was present as hexavalent chromium. Upon further investigation, it was determined that the hexavalent chromium was found to range between nondetectable and a maximum of 11.1% of the total chromium in each sample. As stated previously, the area of unnaturally colored soils is limited in size and is currently being addressed under a removal action.

Summary of Risks to Future Trespassers: Cancer risks and noncancer health hazards were evaluated for exposure to soil, surface water and sediment for the adolescent and pre-adolescent trespasser. The excess lifetime cancer risk estimates for the adolescent and pre-adolescent trespasser are 3.3×10^{-6} and 3.2×10^{-6}, which is within EPA's acceptable risk range. The calculated HIs for the adolescent and pre-adolescent trespasser are 0.16 and 0.18, which do not exceed EPA's threshold value of 1. The risks are primarily attributed to arsenic. Upon review of the data, it has been determined that the concentrations of arsenic are representative of background.

EPA evaluated the potential for vapor intrusion into structures within the area that could be potentially affected by the groundwater contamination plume. The groundwater data collected during this investigation suggest that the groundwater plumes increases in depth as they migrate in a southerly direction. This resulted in a barrier of clean water above the plume which would prevent the generation of vapors that could impact any structures above the contaminated plume in downgradient areas. Currently, there are not any structures above the plume. This will be verified during the groundwater monitoring program following remedy selection.

The results of the human health risk assessment indicated that there is significant potential risk to potentially exposed populations from direct exposure to groundwater. For these receptors, exposure to groundwater results in an excess lifetime cancer risk that exceeds EPA's target risk range of 10^{-4} to 10^{-6}, as well as NJDEP's acceptable cancer risk level of 10^{-6}. The HI is above the acceptable level of 1. These risk estimates are based on the reasonable maximum exposure scenarios and were developed by taking into account various conservative assumptions about the frequency and duration of an individual's exposure to groundwater, as well as the toxicity of the chemicals of concern. The chemicals in groundwater that contribute most significantly to the cancer risk and noncancer hazard are TCE and PCE. In the risk assessment, risks posed by Site soils were not determined to pose an unacceptable risk to receptors. However, new data show that an area of the Site near the Former Waste Storage Tanks contains elevated levels of VOCs. To address this new area of soil contamination, EPA will create a second Operable Unit to evaluate risks posed by site Soils further. No soil remedy is proposed at this time.

Screening Level Ecological Risk Assessment

A Screening Level Ecological Risk Assessment was conducted to evaluate ecological receptors using the site. Potential risks were assessed by comparing contaminant concentrations with benchmark toxicity values. Hazard quotients were calculated for each individual contaminant of potential ecological concern for certain receptors included in the assessment endpoints. Additionally, food-chain modeling was conducted to determine exposure concentrations in upper-trophic level receptors.

Although potential risks were indicated for aquatic receptors, the hydrologic conditions do not support an aquatic community. Consequently, the sediment contaminant concentrations were incorporated into the terrestrial assessment. The most significant risk associated with amphibians was from aluminum. Potential risk to terrestrial invertebrates was found to be from chromium, copper, and mercury. Mammals and birds were found to be at risk to aluminum, chromium, lead, mercury, selenium, and pesticides. The contaminants which were found to have the greatest hazard quotient were aluminum and chromium. The sample with the maximum aluminum concentration was from an upgradient location and the areas of elevated chromium contamination were remediated. All of the other site- related contaminants, based on an average exposure basis, would not exceed a hazard quotient of 1. Therefore, the risks calculated are negligible and do not warrant additional evaluation.

Summary

It is EPA's current judgment that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan, is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

WHAT IS RISK AND HOW IS IT CALCULATED?

A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these under current- and future-land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

Hazard Identification: In this step, the contaminants of concern at the site in various media (i.e., soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, and fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

Exposure Assessment: In this step, the different exposure pathways through which people might be exposed to the contaminants identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil. Factors relating to the exposure assessment include, but are not limited to, the concentrations that people might be exposed to and the potential frequency and duration of exposure. Using these factors, a "reasonable maximum exposure" scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

Toxicity Assessment: In this step, the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response) are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other non-cancer health effects, such as changes in the normal functions of organs within the body (e.g., changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and non-cancer health effects.

Risk Characterization: This step summarizes and combines exposure information and toxicity assessments to provide a quantitative assessment of site risks. Exposures are evaluated based on the potential risk of developing cancer and the potential for noncancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a "one-in-ten-thousand excess cancer risk"; or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions explained in the Exposure Assessment. Current Superfund guidelines for acceptable exposures are an individual lifetime excess cancer risk in the range of 10^{-4} to 10^{-6} (corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk). For noncancer health effects, a "hazard index" (HI) is calculated. An HI represents the sum of the individual exposure levels compared to their corresponding reference doses. The key concept for a noncancer HI is that a "threshold level" (measured as an HI of less than 1) exists below which noncancer health effects are not expected to occur.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) were developed for groundwater to address the human health risks and environmental concerns posed by Site-related contamination.

Groundwater Remedial Action Objectives

- Prevent or minimize potential current and future human exposures including ingestion of and dermal contact with groundwater that presents a significant risk to public health and the environment;

- Minimize the potential for migration of the contaminants of concern in groundwater; and

- Restore the aquifer to Class I-PL standards within a reasonable time frame.

To achieve these RAOs, cleanup goals for groundwater at the Site were identified. The site lies within the New Jersey Pinelands Protection Area and the groundwater is classified as Class I-PL. The applicable groundwater quality standards correspond to background values or the practical quantification limit (limit of the accuracy of the testing method) whichever is higher for each contaminant. These standards are more stringent or equivalent to federal MCLs.

SUMMARY OF REMEDIAL ALTERNATIVES

Potential remedial technologies and process options were identified and screened using effectiveness, implementability and cost as the criteria, with the most emphasis on the effectiveness of the remedial technology. Those technologies that passed this initial screening were then assembled into five remedial alternatives for groundwater contamination. Two of the alternatives have two subalternatives each. The subalternatives reflect the differences in treating the groundwater contamination near the site boundary and the more diffuse contamination downgradient from the site.

All of the groundwater remedial alternatives, with the exception of the No Further Action Alternative (Alternative 1) would include institutional controls such as a Classification Exception Area (CEA) with well drilling restrictions, to minimize the public's potential exposure to contaminated groundwater until the groundwater meets the remediation goals. However, consistent with expectations set out in Superfund regulations, none of the alternatives rely exclusively on institutional controls to achieve protectiveness.

The time frames presented below for construction do not include the time for pre-design investigations, remedial design, or contract procurements. Each of the groundwater alternatives will take longer than five years to achieve remediation goals. Therefore, a review will be conducted every five years (Five-Year Review) after the initiation of the remedial action, until remediation goals are achieved.

More information on each of the technologies included in the remedial alternatives discussion can be found at the following EPA sponsored web sites.

For Air Sparging and Soil Vapor Extraction:
http://www.cluin.org/download/citizens/citsve.pdf

For Monitored Natural Attenuation:
http://www.cluin.org/download/citizens/mna.pdf

For In-Situ Chemical Oxidation:
http://www.clu-in.org/download/citizens/oxidation.pdf

For Pump and Treat Systems:
http://www.cluin.org/download/citizens/pump_and_treat.pdf

Institutional Controls are legal and administrative controls such as zoning decisions, deed notices, or the establishment of Classification Exception Areas. They protect the public by prohibiting certain actions in areas of contamination. More information about Institutional Controls can be found at:
http://www.epa.gov/fedfac/pdf/ic_ctzns_guide.pdf

Alternatives

Alternative 1 – No Further Action

The No Further Action Alternative was retained, as required by the National Contingency Plan (NCP), and provides a baseline for comparison with other alternatives. No remedial actions would be implemented as part of the No Further Action Alternative. Furthermore, this alternative would not involve any monitoring of groundwater or institutional controls. Groundwater would continue to migrate and the contamination would continue to attenuate through natural attenuation processes.

Total Capital Cost	$0
Operation and Maintenance	$0
Total Present Net Worth	$0
Time frame	0 years

Alternative 2 –Air Sparging/Soil Vapor Extraction + Institutional Controls + Monitored Natural Attenuation

This alternative addresses contaminated groundwater by constructing an Air Sparging/Soil Vapor Extraction system operating near the source areas for both the east and west plumes. The downgradient portions of the plumes would be monitored as the contaminants attenuate.

Air Sparging is an in-situ technology for the removal of volatile and some semi-volatile compounds from groundwater. Air is injected into the groundwater through wells which causes the contaminants to evaporate (become a gas). This gas moves upward through the groundwater and into the soils above the groundwater. These contaminated gases then will be removed by a Soil Vapor Extraction system.

In a Soil Vapor Extraction system, extraction wells are drilled into the soils above the groundwater. Then, a vacuum is applied to the wells which pulls the gases out. The gases are then passed through a material such as activated carbon which traps the contaminants. The activated carbon will be regenerated or disposed of properly.

Air Sparging and Soil Vapor Extraction are appropriate for this site because the contaminants in the groundwater will easily become vapors when air is added. In addition, the soils in and above the groundwater are sandy and vapors can move through the soils easily.

To be protective of human health, Institutional Controls which include a groundwater Classification Exception Area would be established in conjunction with well drilling restrictions to minimize exposure to contaminated groundwater until the groundwater in the aquifer meets the remediation goals. Concurrently, long-term groundwater monitoring would be implemented to provide an understanding of changes in contaminant concentrations and spatial distributions over time.

The implementation of Monitored Natural Attenuation requires long-term monitoring for VOCs, and BTEX and additional groundwater quality parameters to monitor the contaminants as they attenuate. Sentinel wells will be placed between the end of the contaminated groundwater plume and public water supply well #8. This would ensure EPA's ability to take any necessary action in the unlikely event that contaminated groundwater moves toward a water supply well.

Air Sparging /Soil Vapor Extraction	$5,450,000
Monitored Natural Attenuation	$1,880,000
Total Present Net Worth	$7,330,000

Time frame	
Air Sparging/Soil Vapor Extraction	5 years
Monitored Natural Attenuation	>30 years

Alternative 3 – In-Situ Chemical Oxidation + Institutional Controls + Monitored Natural Attenuation

In this alternative, contamination near the source areas will be treated through the injection of chemicals to help the contaminated materials decompose. The downgradient portions of the plumes will be monitored as the contaminants attenuate.

When In-Situ Chemical Oxidation is used, an oxidant or oxygen releasing compound is injected into wells placed in the contaminated groundwater. The oxidant mixes with the contaminants causing them to decompose. When the process is complete, only water and other harmless breakdown products are left.

For the eastern plume, near its source area, two different process options would be used: permanganate and hydrogen peroxide plus iron (Fenton's reagent). Fenton's Reagent would be used first due to the presence of benzene. After the benzene has been removed, permanganate would be injected. Since permanganate is less reactive, it would be effective for a longer time. Since there is no benzene in the western plume, only the permanganate will be used.

As described in Alternative 2, Institutional Controls which would include a groundwater CEA would be established and the groundwater would be sampled regularly as part of the Monitored Natural Attenuation portion of the remedy.

In-Situ Chemical Oxidation	$8,150,000
Monitored Natural Attenuation	$1,880,000
Total Present Net Worth	$10,030,000

Time frame	
In-Situ Chemical Oxidation	1 Year
Monitored Natural Attenuation	>30 Years

Alternative 4A – Air Sparging/Soil Vapor Extraction + Downgradient Pump and Treat + Institutional Controls + Monitored Natural Attenuation

In this variation of Alternative 4, Air Sparging and Soil Vapor extraction would take place near the source areas

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as in Alternative 2. In addition, any hot spots identified in the downgradient area in the plumes would be remediated by a Pump and Treat System.

In a Pump and Treat System, wells are placed in the contaminated groundwater. The contaminated groundwater is pumped out and placed in a treatment system where it is cleaned. The removed contaminants are either destroyed or disposed of properly. The clean water can be put back into the ground or discharged to a surface source.

For this site, the first step would be to delineate hot spots. Hot spots are areas within the larger groundwater plume which are significantly higher in contaminant concentration than the rest of the plume. The method to locate any hot spots will be defined during the Remedial Design portion of the remediation.

Once the hot spots are defined, an appropriate number (estimated to be one or two) of extraction wells would be installed into the contaminated groundwater and the contaminated groundwater would be extracted and treated. EPA is also considering the use of an ART (Advanced Remediation Technology) system in which the contaminated groundwater is extracted, treated and reinjected within specially designed wells. In this case, the water would not need to be treated and reinjected separately. If a traditional Pump and Treat System is used, the contaminated groundwater would be filtered through an activated carbon system. The clean water would be re-injected and the carbon would be regenerated or disposed of properly.

The rest of the plume will be monitored as it would be allowed to attenuate through natural processes.

As described in Alternative 2, Institutional Controls which would include a groundwater CEA would be established and the groundwater would be sampled regularly as part of the Monitored Natural Attenuation portion of the remedy.

Air Sparging/Soil Vapor Extraction	$5,540,000
Downgradient Pump & Treat	$2,810,000
Monitored Natural Attenuation	$1,880,000
Total Present Net Worth	$10,140,000

Time frame	
Air Sparging/Soil Vapor Extraction	5 Years
Downgradient Pump and Treat and Monitored Natural Attenuation	<30 Years

Alternative 4B – In-Situ Chemical Oxidation + Downgradient Pump and Treat + Institutional Controls + Monitored Natural Attenuation

In this alternative, In-Situ Chemical Oxidation would be used to treat contamination in the near source areas as in Alternative 3, and a Pump and Treat System would be used in the downgradient areas as in Alternative 4A.

As described in Alternative 2, Institutional Controls which would include a groundwater CEA would be established and the groundwater would be sampled regularly as part of the Monitored Natural Attenuation portion of the remedy.

In-Situ Chemical Oxidation	$8,150,000
Downgradient Pump & Treat	$2,180,000
Monitored Natural Attenuation	$1,880,000
Total Present Net Worth	$12,840,000

Time frame	
In-Situ Chemical Oxidation	1 Year
Downgradient Pump and Treat and Monitored Natural Attenuation	<30 Years

Alternative 5A – Air Sparging/Soil Vapor Extraction + Downgradient In-Situ Chemical Oxidation + Institutional Controls + Monitored Natural Attenuation

In this Alternative, Air Sparging and Soil Vapor Extraction would be used as in Alternative 2. In the downgradient area of the groundwater plume, In-Situ Chemical Oxidation would be used after hot spots have been defined and characterized. Potassium permanganate alone would be used in the downgradient area because benzene is not present.

As described in Alternative 2, Institutional Controls which would include a groundwater CEA would be established and the groundwater would be sampled regularly as part of the Monitored Natural Attenuation portion of the remedy.

Air Sparging/Soil Vapor Extraction	$5,450,000
Downgradient In-Situ Chemical Oxidation	$4,190,000
Monitored Natural Attenuation	$1,880,000
Total Present Net Worth	$11,520,000

Time frame	
Air Sparging/Soil Vapor Extraction	5 Years
Downgradient In-Situ Chemical Oxidation and Monitored Natural Attenuation	<30 Years

Alternative 5B – In-Situ Chemical Oxidation + Downgradient In-Situ Chemical Oxidation + Institutional Controls + Monitored Natural Attenuation

In this alternative, In-Situ Chemical Oxidation would be used near the source areas as in Alternative 3 and would also be used in the downgradient contaminated groundwater as in Alterative 5A.

As described in Alternative 2, Institutional Controls which would include a groundwater CEA would be established and the groundwater would be sampled periodically as part of the Monitored Natural Attenuation portion of the remedy.

Near Site In-Situ Chemical Oxidation	$8,150,000
Downgradient In-Situ Chemical Oxidation	$4,190,000
Monitored Natural Attenuation	$1,880,000
Total Present Net Worth	$14,220,000

Timeframe	
Near Site In-Situ Chemical Oxidation	1 Year
Downgradient In-Situ Chemical Oxidation and Monitored Natural Attenuation	<30 Years

EVALUATION OF REMEDIAL ALTERNATIVES

Nine criteria are used to evaluate the different remedial alternatives individually and against each other in order to select the best alternative. This section of the Proposed Plan profiles the relative performance of each alternative against the nine criteria, noting how it compares to the other options under consideration. The nine evaluation criteria are discussed below. A more detailed analysis of the presented alternatives can be found in the Feasibility Study report.

THE NINE SUPERFUND EVALUATION CRITERIA

1. **Overall Protectiveness of Human Health and the Environment** evaluates whether and how an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

2. **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.

3. **Long-term Effectiveness and Permanence** considers the ability of an alternative to maintain protection of human health and the environment over time.

4. **Reduction of Toxicity, Mobility, or Volume (TMV) of Contaminants through Treatment** evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

5. **Short-term Effectiveness** considers the length of time needed to implement an alternative and the risks the alternative poses to workers, the community, and the environment during implementation.

6. **Implementability** considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

7. **Cost** includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.

8. **State/Support Agency Acceptance** considers whether the State agrees with the EPA's analyses and recommendations, as described in the RI/FS and Proposed Plan.

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

Overall Protection of Human Health and the Environment

The No Action Alternative (Alternative 1) is not considered protective of human health and the environment, because it does not prevent the current and future use of contaminated groundwater which could present an unacceptable human health risk. Because the No Action Alternative is not protective of human health and the environment, it was eliminated from consideration under the remaining eight criteria.

The remaining alternatives are considered protective. They all provide for active treatment near the source areas and include institutional controls to minimize potential exposure to contaminated groundwater until remediation goals have been achieved.

Alternatives 2 and 3 do not provide for active treatment of hot spots in the downgradient portion of the groundwater plumes as they rely instead on unenhanced natural attenuation processes, which would require a long time
(> 30 years) to achieve the remediation goals. Alternatives 4A, 4B, 5A and 5B involve active treatment of downgradient hot spots which would reduce the time to achieve remediation goals at the Site.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

The alternatives that include active downgradient remediation; 4A, 4B, 5A, and 5B are expected to comply with chemical-specific ARARs by achieving remediation goals in less than 30 years. The other alternatives; 2 and 3 will also achieve the chemical-specific ARARs but it is expected to take more than 30 years because they do not include active downgradient remediation. All of the alternatives will comply with location- and action-specific ARARs.

Long-Term Effectiveness and Permanence

Alternatives 2 and 3 would be effective for removal of groundwater contamination near the source areas but will not actively remove hot spots in the downgradient portion of the plumes. Some of the downgradient contaminants will degrade over time and the rest will dissipate. Although detailed modeling was not performed to predict the estimated timeframe for downgradient portion of the plumes to be restored through monitored natural attenuation alone, it is estimated that remediation will take more than 30 years.

Alternatives 4A, 4B, 5A and 5B would all be effective and permanent in the long term. All of these alternatives would ultimately result in groundwater contaminant levels being reduced to meet the remediation goals though active remediation of both near the source areas and downgradient areas. Because there would be active remediation of any down gradient hot spots, it is estimated that the remediation goals will be met in less than 30 years.

Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternatives 2 and 3 are expected to reduce the toxicity and volume of contaminants in the groundwater near the source areas through active treatment. In the downgradient area, the alternatives could result in some reduction in toxicity or volume due to unenhanced natural processes. There would be no reduction in mobility in the downgradient area. Therefore, Alternatives 2 and 3 are the least effective in meeting this criteria.

Alternatives 4A, 4B, 5A, and 5B would be expected to reduce the toxicity and volume of contaminants both near the source areas and in the downgradient portions of the plume.

Alternatives 4A and 4B will also reduce the mobility of downgradient contaminants to a greater extent than Alternatives 2 and 3 through pumping of any hot spots. The In-Situ Chemical Oxidation technology included in Alternatives 5A and 5B would destroy contaminants, thereby reducing their toxicity and volume.

Short-Term Effectiveness

Each alternative has some short term impacts because it would be necessary to construct parts of the remedies on the property of nearby land owners and possibly near railroad tracks and wetlands. For the remedial options in the near source areas, the remedial options; air sparging and soil vapor extraction, or in-situ chemical oxidation; will likely only involve the landowner on the southern side of the site.

For the air sparging and soil vapor extraction options in Alternatives 2, 4A and 5A, the impact is expected to be minimal once the wells, pipes, and vacuum system are constructed because only air will be injected into the ground and any mobilized vapors will be extracted under nearby vacuum. This air sparging and soil vapor extraction option is estimated to operate for approximately 5 years.

The in-situ chemical oxidation system used in Alternatives 3, 4B, and 5B in the near source areas is expected to have more of a short-term impact compared to the air sparging and soil vapor extraction technologies used in Alternatives 2, 4A and 5A. This is because of the number of injection points and the injection of oxidants. Injection of oxidants may increase the mobility of some metals (e.g. chromium) and other compounds, and the oxidants themselves require special handling and storage. The oxidation of the organic compounds found in the groundwater is an exothermic (heat generating) reaction. Special precautions would be needed to protect workers on-site. It is estimated that a near-site In-Situ Chemical Oxidation system will run for one year.

The potential for impact for treating downgradient groundwater hot spots depends on the specific remediation technology. The potential impacts from In-Situ Chemical Oxidation are discussed above. The full extent of any impacts would depend on the number and location of the injection wells.

The impact of a groundwater pump and treat would also depend on the size and extent of hot spots. Mobile units may be used and may be effective and would have a minimal impact. Use of an ART system would also have a minimal impact. However, a larger system may involve installing pipes over many properties and may have a bigger impact.

Implementability

Alternatives 2 and 3 would be the second easiest to implement. Alternative 2 (Air Sparging/Soil Vapor Extraction) uses standard services and equipment. There are no special safety precautions necessary because only surface air is injected. Alternative 3 (In-Situ Chemical Oxidation) also uses standard services and equipment. However, chemical oxidants can be dangerous and would require special handing. In both cases, an access agreement would likely be necessary with only one property on the southern boundary.

The other alternatives 4A, 4B, 5A, and 5B would be more difficult to implement. Further defining hot spots will entail access agreements with multiple nearby property owners and may also require access near railroad tracks and in wetlands. Alternatives 4A and 4B (downgradient pump and treat) may include the construction of pipelines, wells, and a treatment system on one or more properties. This may be minimized if an ART or mobile system is used. In the downgradient area, In-Situ Chemical Oxidation in Alternatives 5A and 5B may be difficult to implement depending on the areal extent of the hot spots, the number of injection wells necessary, and the volume of oxidant needed.

Cost

The present worth cost for Alternatives 2 and 3 are the next lowest but those alternatives do not actively remediate downgradient hot spots. Alternative 4A is the alternative with the lowest cost that will meet the remediation goals and remediate downgradient hot spots.

State/Support Agency Acceptance

The State of New Jersey agrees with the preferred alternative in this Proposed Plan.

Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the Responsiveness Summary of the Record of Decision for this Site. The Record of Decision is the document that formalizes the selection of the remedy for a site.

SUMMARY OF THE PREFERRED ALTERNATIVE

Alternative 4A, Air Sparging and Soil Vapor Extraction near the source areas; Pump and Treat for downgradient groundwater hot spots with Institutional Controls and Monitored Natural Attenuation for the downgradient portions of the plume, is the preferred remedial alternative for groundwater contamination at this Site.

This alternative consists of the installation of injection wells for the air sparging system and removal wells for the Soil Vapor Extraction system near the Former Waste Storage Tank Areas (east plume), the Former Unlined Pit Areas (west plume), and the immediate downgradient areas. Air will be pumped into the groundwater which will promote the transition of contaminants into vapors. It is estimated that the system would consist of over 60 air injection wells located on the Lightman property and the adjacent property to the south.

The vapors will migrate out of the groundwater and into the overlying soils. Then, the vapors will be removed by the soil vapor extraction system and captured on activated carbon. It is estimated that the soil vapor extraction system would consist of about 40 wells located on the Lightman property and the adjacent property to the south.

In the areas of contaminated groundwater further downgradient from the site, remediation will occur in phases. In the first phase, the plume will be examined to fully characterize hot spots. Then, a pump and treat system will be constructed to collect the contaminated

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groundwater, remove the contaminants, and return the clean water to the groundwater. Any residual contamination would be monitored as it attenuates through natural processes.

Institutional Controls such as a groundwater CEA would be established in conjunction with well drilling restriction to minimize exposure to contaminated groundwater until the groundwater meets the remediation goals. Concurrently, long-term groundwater monitoring would be implemented to provide an understanding of changes in contaminant concentrations and spatial distributions over time. Sentinel wells will be placed between the end of the contaminated groundwater plume and public water supply well #8. This would ensure EPA's ability to take any necessary action in the unlikely event that contaminated groundwater moves toward a water supply well.

Consistent with EPA Region 2's Clean and Green policy, EPA will evaluate the use of sustainable technologies and practices with respect to any remedial alternative selected for the Site.

As is EPA's policy, Five-Year Reviews will be conducted until remediation goals are achieved.

COMMUNITY PARTICIPATION

EPA provided information regarding the cleanup of the Lightman Drum Superfund Site to the public through public meetings, the Administrative Record file for the Site and announcements published in the Courier-Post newspaper. EPA encourages the public to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted there.

For further information on EPA's preferred alternative for the Lightman Drum Superfund Site:

Renee Gelblat
Remedial Project Manager
(212) 637-4414

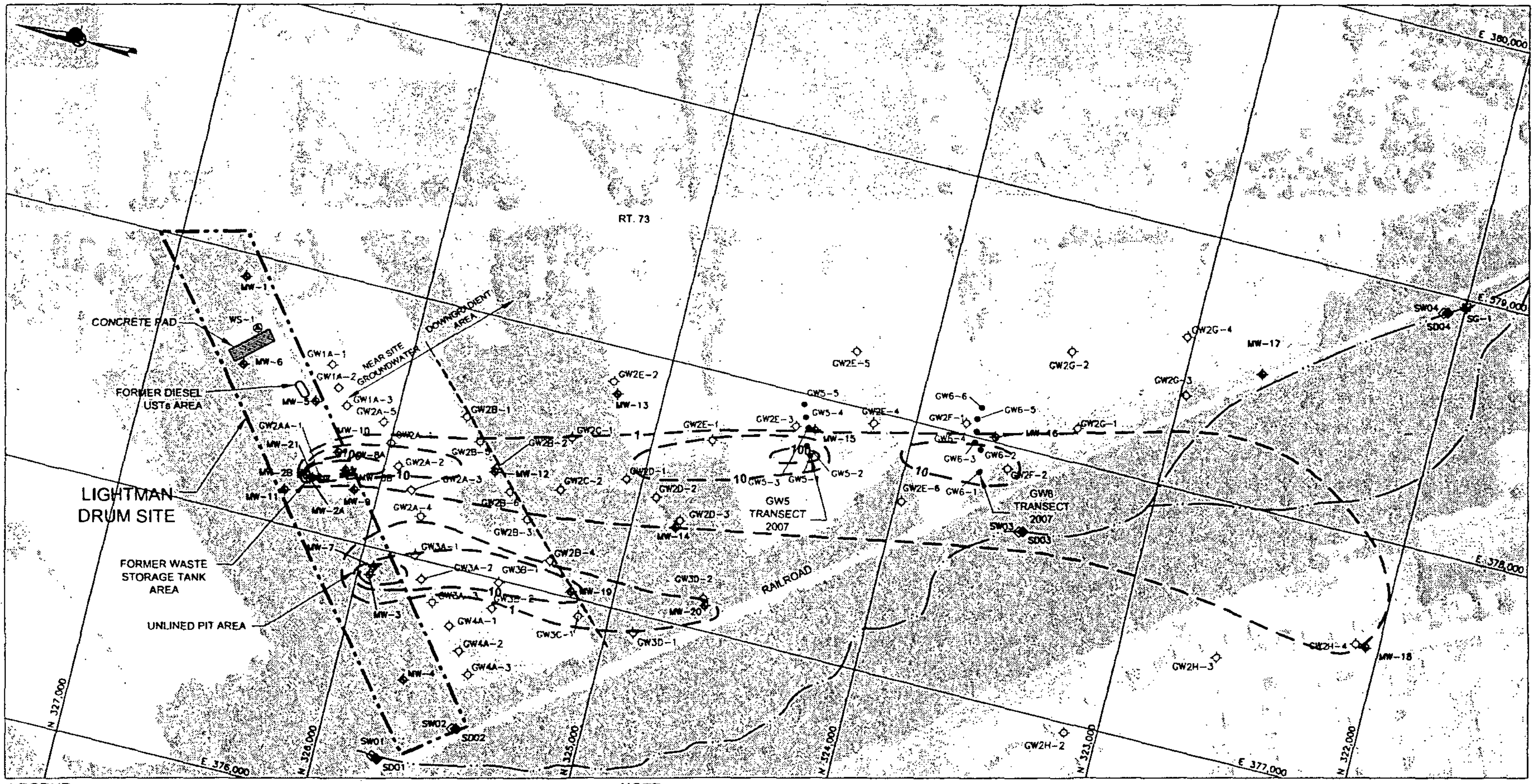
Natalie Loney
Community Relations
(212) 637-3639

U.S. EPA
290 Broadway, 19th Floor
New York, New York 10007-1866

The dates for the public comment period; the date, the location and time of the public meeting; and the locations of the Administrative Record files are provided on the front page of this Proposed Plan.

GLOSSARY

ARARs: Applicable or Relevant and Appropriate Requirements. These are Federal or State environmental rules and regulations that may pertain to the Site or a particular alternative.
Carcinogenic Risk: Cancer risks are expressed as a number reflecting the increased chance that a person will develop cancer if exposed to chemicals or substances. For example, EPA's acceptable risk range for Superfund hazardous waste sites is 1×10^{-4} to 1×10^{-6}, meaning there is 1 additional chance in 10,000 (1×10^{-4}) to 1 additional chance in 1 million (1×10^{-6}) that a person will develop cancer if exposed to a Site contaminant that is not remediated.
CERCLA: Comprehensive Environmental Response, Compensation and Liability Act. A Federal law, commonly referred to as the "Superfund" Program, passed in 1980 that provides for response actions at sites found to be contaminated with hazardous substances, pollutants or contaminants that endanger public health and safety or the environment.
COPC: Chemicals of Potential Concern.
SLERA: Screening Level Ecological Risk Assessment. An evaluation of the potential risk posed to the environment if remedial activities are not performed at the Site.
FS: Feasibility Study. Analysis of the practicability of multiple remedial action options for the Site.
Groundwater: Subsurface water that occurs in soils and geologic formations that are fully saturated.
HHRA: Human Health Risk Assessment. An evaluation of the risk posed to human health should remedial activities not be implemented.
HI: Hazard Index. A number indicative of noncarcinogenic health effects that is the ratio of the existing level of exposure to an acceptable level of exposure. A value equal to or less than one indicates that the human population is not likely to experience adverse effects.
HQ: Hazard Quotient. HQs are used to evaluate noncarcinogenic health effects and ecological risks. A value equal to or less than one indicates that the human or ecological population are not likely to experience adverse effects.
ICs: Institutional Controls. Administrative methods to prevent human exposure to contaminants, such as by restricting the use of groundwater for drinking water purposes.
Nine Evaluation Criteria: See text box on Page 7.
Noncarcinogenic Risk: Noncancer Hazards (or risk) are expressed as a quotient that compares the existing level of exposure to the acceptable level of exposure. There is a level of exposure (the reference dose) below which it is unlikely for even a sensitive population to experience adverse health effects. USEPA's threshold level for noncarcinogenic risk at Superfund sites is 1, meaning that if the exposure exceeds the threshold; there may be a concern for potential noncancer effects.
NPL: National Priorities List. A list developed by USEPA of uncontrolled hazardous substance release sites in the United States that are considered priorities for long-term remedial evaluation and response.
Operable Unit (OU): a discrete action that comprises an incremental step toward comprehensively addressing site problems. This discrete portion of a remedial response manages migration, or eliminates or mitigates a release, threat of a release, or pathway of exposure. The cleanup of a site can be divided into a number of operable units, depending on the complexity of the problems associated with the site.
Practical Quantitation Level (PQL): means the lowest concentration of a constituent that can be reliably achieved among laboratories within specified limits of precision and accuracy during routine laboratory operating conditions.
Present-Worth Cost: Total cost, in current dollars, of the remedial action. The present-worth cost includes capital costs required to implement the remedial action, as well as the cost of long-term operations, maintenance, and monitoring.
Proposed Plan: A document that presents the preferred remedial alternative and requests public input regarding the proposed cleanup alternative.
Public Comment Period: The time allowed for the members of a potentially affected community to express views and concerns regarding USEPA's preferred remedial alternative.
RAOs: Remedial Action Objectives. Objectives of remedial actions that are developed based on contaminated media, contaminants of concern, potential receptors and exposure scenarios, human health and ecological risk assessment, and attainment of regulatory cleanup levels.
Record of Decision (ROD): A legal document that describes the cleanup action or remedy selected for a site, the basis for choosing that remedy, and public comments on the selected remedy.
Remedial Action: A cleanup to address hazardous substances at a site.
RI: Remedial Investigation. A study of a facility that supports the selection of a remedy where hazardous substances have been disposed or released. The RI identifies the nature and extent of contamination at the facility and analyzes risk associated with COPCs.
Saturated Soils: Soils that are found below the Water Table. These soils stay wet.
TBCs: "To-be-considereds," consists of non-promulgated advisories and/or guidance that were developed by EPA, other federal agencies, or states that may be useful in developing CERCLA remedies.
Unsaturated Soils: Soils that are found above the Water Table. Rain or surface water passes through these soils. These soils remain dry:
USEPA: United States Environmental Protection Agency. The Federal agency responsible for administration and enforcement of CERCLA (and other environmental statutes and regulations), and final approval authority for the selected ROD.
VOC: Volatile Organic Compound. Type of chemical that readily vaporizes, often producing a distinguishable odor.
Water Table: The water table is an imaginary line marking the top of the water-saturated area within a rock column.



LEGEND

- APPROXIMATE PROPERTY LINE ~ LIGHTMAN DRUM SITE
- GENERAL OUTLINE OF GROUNDWATER PLUME (SEE NOTE 2)
- WS-1 ONSITE WATER SUPPLY WELL (LOCATION APPROXIMATE)
- MW-11 MONITORING WELL
- GW3B-1 GEOPROBE AQUIFER PROFILE BORINGS (LOCATION APPROXIMATE)
- SG-1 STAFF GAUGE
- SW01 SURFACE WATER SAMPLE (LOCATION APPROXIMATE)
- SD01 SEDIMENT SAMPLE (LOCATION APPROXIMATE)
- PUMP BRANCH CREEK (SEE NOTE 3)

NOTE

1.) ND = NOT DETECTED

2.) ISOCONCENTRATION CONTOURS BASED ON GEOPROBE AND MONITORING WELL PCE DATA COLLECTED 2006-2007. DATA FROM MW-2B AND MW-8B WERE NOT CONTOURED AS THEY ARE SCREENED BELOW THE PLUME. WHERE MONITORING WELL DATA FROM 2006 AND 2007 WERE AVAILABLE, 2007 DATA WAS USED.

3.) APPROXIMATE CREEK LOCATION ESTIMATED FROM 1995 AERIAL PHOTO, EPHEMERAL IN VICINITY OF LIGHTMAN PROPERTY.

REFERENCES

1.) AERIAL PHOTOGRAPH TAKEN FROM USDA GEOSPATIAL DATA GATEWAY, DATED 2006.

2.) MONITORING WELLS, STAFF GAUGE AND PIEZOMETERS SHOWN WERE BASED ON SURVEY INFORMATION SUPPLIED BY JAMES M. STEWART, INC.

3.) GEOPROBE PROFILE BORINGS AND SURFACE WATER/SEDIMENT SAMPLING LOCATIONS WERE LOCATED IN THE FIELD BY GOLDER ASSOCIATES, INC. PERSONNEL USING A HANDHELD GPS UNIT AND ARE APPROXIMATE ONLY.

4.) PARCEL BOUNDARIES FROM GIS DATABASE OF NEW JERSEY.

300 0 300
SCALE FEET

LIGHTMAN DRUM SITE
WINSLOW TOWNSHIP, NEW JERSEY

SITE CONDITIONS

Golder Associates

FIGURE 1

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