Superfund Program
Proposed Plan

U.S. Environmental Protection Agency, Region 2

Emmell's Septic Landfill Superfund Site
July 2008

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan identifies the Preferred Alternatives to address groundwater and soil contamination at the Emmell's Septic Landfill Superfund Site (Site) in Galloway Township, Atlantic County, New Jersey, and provides the rationale for these preferences. These alternatives have been developed to address groundwater contaminated with volatile organic compounds (VOCs), including trichloroethene, cis-1,2-dichloroethene and vinyl chloride, and soil contaminated with polychlorinated biphenyl (PCB) compounds.

The U.S. Environmental Protection Agency's (EPA's) Preferred Alternative to address soil contamination is Alternative S2, excavation and off-site disposal of PCB-contaminated soil. EPA's Preferred Alternative for addressing groundwater contamination is Alternative GW3, pumping and treatment with biosparging and monitored natural attenuation. The groundwater remedy would also include institutional controls and long-term groundwater monitoring.

EPA is addressing the cleanup of the Site in two phases, called Operable Units. This Proposed Plan addresses Operable Unit 2 (OU2), which includes the final cleanup of contaminated groundwater and surface soil contamination related to the Site. The Operable Unit One (OU1) remedy, which is currently in the construction phase, will serve to control further off-site migration of groundwater contaminants near the disposal area of the Site, until the OU2 alternative is implemented.

This Proposed Plan includes summaries of all cleanup alternatives evaluated for use at the Site. 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 OU2 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, or 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.

SITE DESCRIPTION

The Site is located in a predominantly rural area of Galloway Township, Atlantic County, New Jersey. The Site consists of a 38-acre former septic waste and sludge disposal facility, and the VOC-contaminated groundwater which has emanated from the disposal area.

MARK YOUR CALENDAR

PUBLIC COMMENT PERIOD:
July 25, 2008 – August 25, 2008
EPA will accept written comments on the Proposed Plan during the public comment period.

PUBLIC MEETING: August 18, 2008
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 Atlantic County Library, Galloway Township Branch, 306 E. Jimmie Leeds Road, Galloway Township, New Jersey.

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.

Atlantic County Library
Galloway Township Branch
306 East Jimmie Leeds Road
Galloway Township, NJ 08205
(609) 652-2352
Hours M-Th 9am – 8pm, Fri & Sat 9am – 5pm

Residential properties are located to the east/northeast and west/northwest of the disposal area, along Liebig Street and Zurich Avenue. The area immediately south of the disposal area is undeveloped and heavily wooded. Further

to the south and southeast of the disposal area is the Morses Mill Stream and its associated wetlands and surface impoundments, and the campus of Stockton State College (Figure 1).

Groundwater in the vicinity of the Site is utilized as a potable water source. However, residents located on Lisa Drive, Liebig Street and Zurich Avenue who previously used private wells for drinking water have been connected to the public water supply.

SITE HISTORY

From 1967 to 1979, the Site was used for disposal of septic wastes and sewage sludge which were reportedly disposed of in trenches and lagoons. Other wastes, including chemical wastes, drums of paint sludge, gas cylinders, household garbage, and construction debris, were also disposed of at the Site.

An April 1975 solid waste facility permit issued by NJDEP indicated that the Site was to be used for land application of septic wastes and sewerage sludge. From 1976 to 1980, a number of enforcement actions were taken by NJDEP concerning disposal activities at the Site. Violations were noted for improper disposal of septic wastes, surface pooling of septic waste, and improper registration for disposal of chemical waste. Operations at the Site ceased in August 1979.

Sampling conducted at the Site in 1984 by NJDEP indicated the presence of soil and groundwater contamination. Also in 1984, the Atlantic County Health Department (ACHD) sampled residential wells in the vicinity of the Site. Results of this sampling indicated the presence of elevated concentrations of volatile organic compounds (VOCs) in five residential wells. Based on the results of the residential well sampling, the ACHD recommended that the affected wells not be used for cooking or drinking purposes. The contaminated wells were subsequently closed and replaced with deeper wells.

In 1996, NJDEP and consultants for Galloway Township conducted additional investigations at the Site. Results for groundwater samples collected from monitoring wells installed by Galloway Township's consultant indicated the presence of VOCs at levels exceeding New Jersey Groundwater Quality Standards (NJGQSs). VOCs were also detected in samples from temporary well points and monitoring wells installed at the Site by NJDEP. An Expanded Site Inspection Report prepared for NJDEP in 1997 confirmed the presence of Site-related groundwater contamination.

In 1997 and 1998, EPA's Removal Action Branch (RAB) and Environmental Response Team conducted soil and groundwater investigations at the Site to evaluate potential sources of VOC contamination found in former residential wells and to determine whether a removal action was warranted. A number of VOCs were detected in soil, soil gas, and groundwater samples, including trichloroethene (TCE) and its associated degradation products, and various chlorinated benzene compounds. Waste materials, including paint-like substances, sludge, and drums, were observed in test pit excavations. The results of this investigation indicated that waste materials at the Site were a continuing source of groundwater contamination.

In May 1999, EPA's RAB collected groundwater samples from 26 residential wells in the vicinity of the Site. Sample results indicated the presence of lead in two residential wells at levels exceeding EPA's Action Level. In addition, the methylene chloride concentration in one residential well sample exceeded NJGQSs, but was less than EPA's Maximum Contaminant Level (MCL). Subsequently, EPA conducted a lead isotope study which concluded that the lead detected in these wells was attributable to household plumbing rather than the Site.

The Site was proposed for inclusion on the National Priority List (NPL) in April 1999, and was placed on the NPL on July 22, 1999, making it eligible for Superfund cleanup.

In July 1999, EPA's RAB initiated a removal action at the Site to address buried drums and waste material which were continuing to serve as a source of groundwater contamination. This removal action, which was completed in February 2000, resulted in the excavation and off-site disposal of 435 drums, eleven compressed gas cylinders, and approximately 28,000 cubic yards of contaminated soil.

On February 16, 2000, EPA initiated a Focused Feasibility Study (FFS) for groundwater contamination at the Site. The FFS was intended to evaluate whether it was appropriate to implement an interim remedy for groundwater contamination while the Site-wide RI/FS was being conducted. On September 30, 2003, EPA issued a Record of Decision (ROD) which selected an interim remedy to control the migration of groundwater contamination near the disposal area until a Site-wide remedy could be implemented.

Groundwater investigations conducted during the FFS indicated that residential wells in the vicinity of the Site were in danger of being impacted by Site-related groundwater contamination. Therefore, during the Summer of 2003, EPA's RAB connected 36 residences to the municipal water supply.

As part of the Site-wide RI, from August through September 2002, four monitoring wells were installed into the deep zone of the aquifer to further define the extent of Site-related groundwater contamination.

Additional groundwater investigations were conducted from October 2005 through February 2006. During this period, EPA conducted groundwater quality screening in the deep zone of the aquifer downgradient of the existing monitoring well network. Fourteen screening points were installed to determine the placement of wells that would be needed to completely define the extent of Site-related groundwater contamination in the deep zone of the aquifer.

In January, February and April 2006, EPA installed seven additional monitoring wells to delineate the vertical and horizontal extent of deep aquifer groundwater contamination. Groundwater samples were subsequently collected from all Site monitoring wells.

In July and August 2002, surface and subsurface soil samples were collected at the Site to define the extent of soil contamination and to investigate other potential sources of groundwater contamination at the Site.

In January 2005, EPA initiated an investigation to determine whether non-aqueous phase liquid (NAPL) may be present beneath the Site. A membrane interface probe (MIP) investigation was conducted in January, March and April 2005 to delineate the possible extent of NAPL beneath the Site. NAPL soil borings were completed during November 2005 to verify the presence or absence of NAPL beneath the Site. NAPL was not detected during this investigation.

SITE CHARACTERISTICS

In general, the topography in the area of the Site is flat and slopes toward the southeast. Surface water infiltrates into the ground very rapidly due to the well-sorted sandy soil on the Site. Consequently, there is little runoff from the Site and there are no well-defined overland drainage pathways from the Site to nearby surface waters.

The Site is generally rural and is surrounded by heavily wooded areas and residential properties. The Site property is located within the New Jersey Pinelands. Water in the vicinity of the Site is supplied by private water wells. The Richard Stockton College of New Jersey (College) is located to the southeast within a mile of the Site; dormitories are located within 0.5 mile of the Site. The College has two supply wells located approximately one mile southeast of the Site which supply water to the College.

Galloway Township, which encompasses 297 square kilometers, has a population of approximately 31,209 people. Approximately 100 people live within one-half mile of the Site.

The results of investigations conducted at the Site indicate that the lithology in the vicinity of the Site is dominated by yellow to brownish gray to gray fine to medium sand. Beneath the sand-rich shallow unit is a clay-rich, discontinuous, low permeability layer which appears to be localized to an area downgradient of the former disposal area. This unit may be comprised of a number of clay lenses of discontinuous lateral extent and an interfingering nature rather than one continuous layer. Consequently, this low permeability layer likely allows some vertical movement of groundwater between the overlying sand-rich unit and the underlying sand-dominated unit. Therefore, three hydrostratigraphic units have been identified at the Site based upon Site geology; the shallow zone, the low permeability layer, and the deep zone.

Soil Contamination

During the RI field investigation, 22 subsurface soil samples were collected from 16 soil borings installed in and around the former disposal area of the Site in order to identify and delineate the potential presence of NAPL. In addition, surface soil samples were collected from 19 locations at the Site.

The surface soil sample results indicate that PCBs were detected at concentrations above both the EPA residential cleanup goal of 1 part per million (ppm) and the New Jersey criterion of 0.2 ppm in nine of the 19 surface soil samples. Specifically, PCBs were detected in surface soil samples at concentrations up to 100 ppm. In addition, barium was detected above its delineation criterion of 700 ppm in one surface soil sample. None of the 22 subsurface soil samples exceeded delineation criteria.

A membrane interface probe (MIP) screening investigation was conducted to attempt to identify potential NAPL source areas at the Site. Based upon the results of the MIP investigation, 27 soil boring samples were collected to analyze for the presence of NAPL. NAPL was not detected in any of the soil samples using the Oil-In-Soil Sudan IV test kits. Furthermore, contaminants were not detected above the applicable soil delineation criteria in any of the subsurface soil samples.

Shallow Zone Groundwater Contamination

Groundwater screening in the shallow aquifer zone indicates the presence of a number of VOCs including

trichloroethene, and its degradation products cis-1,2-dichloroethene and vinyl chloride; petroleum-related compounds such as benzene, toluene, ethylbenzene and xylene; chlorinated benzene compounds; and chlorinated ethane (Table 1). The shallow groundwater screening data show that as Site-related groundwater contamination moves eastward, it moves downward, toward the top of the low permeability layer. The most significant VOC contamination in the shallow aquifer zone occurs at about 70 to 80 feet below ground surface (bgs), directly above the low permeability layer. The eastern extent of the shallow plume is approximately 0.5 mile east of the former disposal area (Figure 2). However, monitoring wells close to the former disposal area exhibit the widest variety and highest concentrations of contaminants.

Deep Zone Groundwater Contamination

Groundwater contaminants detected in the deep zone of the aquifer were similar to those detected in the shallow aquifer zone and included vinyl chloride, cis-1,2-dichloroethene, trichloroethene, chlorinated benzene compounds, benzene, toluene, ethylbenzene and xylene (Table 1). The results of groundwater sampling indicate that the groundwater contaminant plume in the deep zone of the aquifer extends eastward beyond the Garden State Parkway, approximately 1.26 miles east of the former disposal area (Figure 2). In general, the maximum concentrations of contaminants in the deep zone occur at approximately 130 to 140 feet bgs. Overall, contaminant levels are higher in the shallow zone of the aquifer than the deep zone.

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.

The buried drums and waste material which were removed from the Site as part of a removal action conducted from July 1999 through February 2000 were considered "Principal Threat" wastes. The waste material addressed during this removal action contained elevated levels of VOCs which, if not remediated, would have continued to serve as a source of groundwater contamination. As part of the Site-wide RI, EPA conducted additional investigations in an attempt to identify any remaining source areas which may present a principal threat. Investigations conducted to determine whether NAPL may be present beneath the Site did not identify the existence of NAPL.

SCOPE AND ROLE OF THE ACTION

EPA has addressed the cleanup of this Site by implementing immediate actions to address situations which present an imminent threat to human health, and a long-term cleanup. Immediate actions, known as removal actions, which have been implemented to date include: the removal of 435 drums, eleven compressed gas cylinders and approximately 28,000 cubic yards of contaminated soil from the disposal area of the Site; the installation of a water treatment system for a residence which was impacted by Site-related groundwater contaminants above health-based levels; and the connection of 36 residences threatened by Site-related groundwater contamination to the municipal water supply.

The long-term cleanup will be conducted in two discrete phases, or Operable Units. Operable Unit One (OU1), which was the subject of a 2003 Record of Decision, will provide for implementation of an interim groundwater remedy to control further off-site migration of groundwater contaminants near the disposal area of the Site while the Site-wide remedy is being designed and constructed. Operable Unit Two (OU2), which is the subject of this Proposed Plan, will provide for implementation of a remedy to address PCB-contaminated surface soils located near the disposal area of the Site, as well as a final remedy for the VOC-contaminated groundwater in the OU2 study area.

SUMMARY OF OPERABLE UNIT 2 RISKS

RISK SUMMARY

The purpose of the risk assessment is to identify potential cancer risks and non-cancer 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.

Human Health Risk Assessment

As part of the RI/FS, a baseline human health risk assessment was conducted to estimate the risks and

hazards associated with the current and future effects of contaminants on human health and the environment. A baseline human health risk assessment is an analysis of the potential adverse human health effects caused by hazardous-substance exposure in the absence of any actions to control or mitigate these under current and future land uses.

A four-step human health risk assessment process was used for assessing site-related cancer risks and noncancer health hazards. The four-step process is comprised of: Hazard Identification of Chemicals of Potential Concern (COPCs), Exposure Assessment, Toxicity Assessment, and Risk Characterization (see adjoining box "What is Risk and How is it Calculated").

The baseline human health risk assessment began with selecting COPCs in the various media (i.e., on-site soil and off-site groundwater) that could potentially cause adverse health effects in exposed populations. These populations included on-site visitors, recreational visitors (dirt bike riding and horseback riding), and construction workers who may be exposed to contaminants in the soils by ingestion, inhalation, and dermal contact, and also off-site adult and child residents who may be exposed through ingestion and inhalation of groundwater used as a potable water supply or by inhalation through vapor intrusion. In this assessment, exposure point concentrations were estimated using either the maximum detected concentration of a contaminant or the 95th-percent upper-confidence limit (UCL) of the average concentration. Chronic daily intakes were calculated based on the reasonable maximum exposure (RME), which is the highest exposure reasonably anticipated to occur at the site. The RME is intended to estimate a conservative exposure scenario that is still within the range of possible exposures. Central tendency exposure (CTE) assumptions, which represent typical average exposures, were also developed. A complete summary of all exposure scenarios can be found in the baseline human health risk assessment.

Soil

Exposure to surface soil was evaluated for adolescent site visitors, dirt bike riders, and horseback riders and subsurface soil was evaluated for on-site construction workers based on a potential for future development at the Site. The cancer risk for all of the on-site populations that may have current or future exposure to the surface or subsurface soil was within the acceptable EPA risk range of 10^{-6} to 10^{-4}. Non-cancer hazards for all of the populations that were evaluated were at or above EPA's acceptable hazard index (HI) of 1 for on-site exposure to surface and subsurface soil due to exposure to Aroclor-1254, which is a PCB. HIs calculated for exposure to surface soil and subsurface soil ranged from 1 to 3. Contaminated soil related to the Site was not detected outside of the property boundaries. Therefore, risks and hazards were only evaluated for on-site soil.

Groundwater

The contaminated groundwater that is associated with the Site is designated as a drinking water source by the State of New Jersey. Current exposure to the contaminated groundwater was eliminated through the use of point-of-entry treatment (POET) systems and installation of a municipal water supply. However, residents and businesses in this area may install private wells in the future to serve as their source of potable (drinking) water or the POET systems could be removed by the owners. Therefore, future exposure to groundwater through ingestion, dermal contact and inhalation of contaminated groundwater was evaluated for both future off-site adult and child residents. The estimated cancer risks for off-site adult residents (5×10^{-3}) and off-site child residents (4×10^{-2}) were above the EPA acceptable cancer risk range from exposure to VOCs in the groundwater, primarily trichloroethene, vinyl chloride, 1,1,2-trichloroethane, and 1,2-dichloroethane. In addition, the non-cancer hazard for the adult resident (12) and child resident (101) exceeded EPA's acceptable hazard index of 1 due to concentrations of VOCs (1,1,2-trichloroethane, 1,2-dichloroethane, 1,4-dichlorobenzene, chloroform, tetrachloroethene, trichloroethene, and vinyl chloride) and mercury.

Indoor Air

The contamination of groundwater by volatile organic compounds has the potential to impact indoor air in buildings which may be constructed on the Site property in the future. The potential exposure to contaminated indoor air from vapor intrusion to a future on-site adult and child resident were evaluated. The cancer risk for an adult resident was estimated to be 4 x 10-4 and the cancer risk for a child resident was estimated to be 2.8 x 10-4, which are above the acceptable EPA acceptable risk range. In addition, the non-cancer hazard for adult residents (3) and child residents (7) were above EPA's acceptable hazard index of 1. The cancer risk and non-cancer hazards were due to exposure to vinyl chloride. The potential for off-site exposure through vapor intrusion was also evaluated qualitatively in the risk assessment. Based on the characteristics of the groundwater plume, it was determined that off-property impacts from vapor intrusion are unlikely to occur. This is due to the immediate vertical migration of the groundwater plume as it leaves the Site property. The contamination migrates to the deeper zone of the aquifer and as the plume moves away from the Site, there is a clean layer of groundwater that acts as a barrier to limit migration of volatile organic vapors into the soil. Additional investigations will be

conducted to verify that off-site impacts from vapor intrusion remain unlikely.

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.

Screening Level Ecological Risk Assessment

As part of the RI/FS, a Screening Level Ecological Risk Assessment (SLERA) was conducted to identify potential environmental risks associated with the Site. Information regarding the environmental setting and chemical contamination at the Site was compiled. Since there are no completed pathways for ecological receptors to be exposed to groundwater, surface soil was the only media of concern evaluated in the SLERA. The maximum concentrations of contaminants detected in surface soil were compared with conservative ecological screening levels. Based upon assumptions used in the SLERA, it was determined that a PCB, Arochlor 1254, may be a chemical of concern for ecological receptors.

REMEDIAL ACTION OBJECTIVES

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

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 non-cancer 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 non-cancer 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 non-cancer HI is that a "threshold level" (measured as an HI of less than 1) exists below which non-cancer health effects are not expected to occur.

Soil Remedial Action Objective

- Prevent or minimize potential human and ecological receptor exposure to contaminated surface soil that presents an unacceptable risk to human health and the environment.

Groundwater Remedial Action Objectives

- Prevent ingestion and dermal contact with contaminated groundwater which may present an unacceptable risk to current and potential users of groundwater in the vicinity of the Site.

- Restore the aquifer, within a reasonable time frame, to Class I-PL Ground Water Quality Standards (GWQSs) for groundwater west of the Garden State Parkway (GSP), and to Class II GWQSs for groundwater east of the GSP.

To achieve these RAOs, cleanup goals for both surface soil and groundwater at the Site were identified. The remediation goal for soil is EPA's residential direct contact standard of 1 ppm. Based on the distribution of PCBs in the soils indicated by the sampling events, it is believed that remediating soils to meet the 1 ppm goal for PCBs will also meet New Jersey's Residential Direct Contact Soil Remediation Standard of 0.2 ppm for PCBs in soil. The remediation goals for groundwater were derived from the more stringent of drinking water standards and appropriate New Jersey's Groundwater Quality Standards.

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 two remedial alternatives for soil contamination and five remedial alternatives for groundwater contamination.

All of the groundwater remedial alternatives, with the exception of the No Action Alternative (Alternative GW-1) would include institutional controls (Classification Exception Area (CEA) and 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.

Soil Alternatives

Alternative S1 - No Action

The No Action alternative was retained, as required by the National Oil and Hazardous Substance Pollution Contingency Plan (NCP), and provides a baseline for comparison with other alternatives. No remedial actions would be implemented as part of the No Action Alternative. Furthermore, institutional and engineering controls would not be implemented.

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

Alternative S2 – Excavation and Off-site Disposal

Soil Alternative S2 involves the excavation and off-site disposal of surface soils contaminated with PCBs. It is currently estimated that 7,532 tons of soil will need to be excavated to part of this alternative. However, a pre-design investigation would need to be conducted to further delineate the areal extent of contamination and the volume of contaminated soil to be removed. Soil with PCB concentrations below 50 ppm would be disposed of in an industrial waste landfill, while soil with PCB concentrations above 50 ppm would require disposal in a landfill regulated under the Toxic Substances Control Act (TSCA). It is currently estimated that 400 tons of the excavated soil would need to be disposed of in a TSCA landfill. Excavations would be backfilled with clean soil and revegetated to stabilize the soil. This alternative would allow for unrestricted residential use. Therefore, a Five-Year Review of this action is not required.

Total Capital Cost	$3,200,000
Operation and Maintenance	$0
Total Present Net Worth	$3,200,000
Timeframe	6 Months

Groundwater Alternatives

Alternative GW1 – No Action

The No Action Alternative was retained, as required by the NCP, and provides a baseline for comparison with other alternatives. No remedial actions would be implemented as part of the No 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
Timeframe	0 years

Alternative GW2 – Monitored Natural Attenuation (MNA)

This alternative addresses contaminated groundwater in both the shallow and deep zones of the aquifer through natural attenuation. For the shallow zone, data collected during the RI indicates that reductive dechlorination of chlorinated VOCs is occurring near the former disposal area. Further downgradient of the disposal area, subsurface conditions become aerobic which is conducive to co-metabolic biodegradation of cis-1,2-dichloroethene and vinyl chloride. In the deep zone of the aquifer, RI results indicate that natural attenuation of chlorinated VOCs is occurring. Aerobic conditions in the deep zone in areas that exhibit the highest levels of VOCs are conducive to co-metabolic biodegradation of cis-1,2-dichloroethene and vinyl chloride.

To be protective of human health, a groundwater Classification Exception Area would be established in conjunction with well drilling restriction to minimize exposure to contaminated groundwater until the groundwater in the shallow and the deep zones 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 MNA would require long-term monitoring of VOCs, and additional groundwater quality parameters which consist of a variety of electron acceptors commonly encountered in subsurface (nitrate/nitrite, iron, sulfate, etc.), dissolved total organic carbon, alkalinity, chloride, and methane, ethane, and ethene.

Total Capital Cost	$138,000
Operation and Maintenance	$2,316,000
Total Present Net Worth	$2,454,000
Timeframe	>70 years

Alternative GW3 – Pumping and Treatment, Biosparging and Monitored Natural Attenuation

This alternative consists of pumping groundwater via two additional extraction wells to the groundwater treatment system, with subsequent recharge of treated water through a surface recharge basin. The two extraction wells will be utilized to address the shallow and deep contaminant plumes. The new extraction wells would be connected to the OU1 groundwater treatment facility. Modifications to the OU1 groundwater treatment facility may be required to handle the additional groundwater flow. Pumping at the extraction wells may be continuous or pulsed to allow equilibration of contaminants within the groundwater. For areas outside the capture zone, contaminants would be allowed to attenuate through natural processes.

Since some part of the vinyl chloride plume downgradient of the new deep extraction well would not be captured by the groundwater extraction, a series of biosparging wells would be installed along West Moss Mill Road. Air would be injected into the deep zone via a row of injection wells to oxygenate the groundwater. Biosparging would promote aerobic degradation of vinyl chloride to innocuous compounds such as ethene. Care would be taken not to inject too much air to strip the vinyl chloride from the groundwater.

As with Alternative GW2, a groundwater CEA would be established in conjunction with well drilling restriction to minimize exposure to contaminated groundwater until the groundwater in the shallow and the deep zones 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.

Total Capital Cost	$5,215,000
Operation and Maintenance	$15,630,000
Total Present Net Worth	$20,845,000
Timeframe	<25 years

Alternative GW4 – Enhanced Anaerobic Biodegradation with Monitored Natural Attenuation

Similar to Alternative GW2, enhanced anaerobic biodegradation (EAB) also takes advantage of the in-situ attenuation of VOCs via biodegradation. In this alternative, EAB would be implemented via injection of appropriate amendments such as electron donors and nutrients into the subsurface where contamination is present in groundwater to alter the subsurface conditions such that reductive dechlorination of chlorinated VOCs is promoted.

To be protective of human health, a groundwater CEA would be established in conjunction with well drilling restrictions to minimize exposure to contaminated groundwater until the groundwater in the shallow and the deep zones meets the remediation goals. Long-term groundwater monitoring would also be implemented to provide an understanding of changes in contaminant concentrations and spatial distributions over time. The implementation of this alternative would require monitoring of groundwater quality parameters as described in Alternative GW2.

Total Capital Cost $10,459,000
Operation and Maintenance $13,223,000
Total Present Net Worth$23,682,000

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.

Timeframe <25 years

Alternative GW5 – In-Situ Chemical Oxidation, Pumping and Treatment with Monitored Natural Attenuation

With this alternative, in-situ chemical oxidation (ISCO) technology would be utilized for the highest contamination area within the shallow zone chlorinated VOC plume. In-situ chemical oxidation would not be cost effective in treating a large plume area with low VOC concentrations because most of the oxidant would be consumed by the soil. Several oxidants could be considered for this site. For this alternative, permanganate was chosen as the representative oxidant to treat the chlorinated VOCs at the Site because of its reliability and effectiveness in treating chlorinated solvents. Other oxidants would also be evaluated during the remedial design stage. A treatability study would be required prior to design of the remedy to select an oxidant and determine the natural oxidant demand of Site soils.

This alternative is identical to Alternative GW3, with the exception that ISCO technology would be applied to the area with the highest groundwater contamination in the shallow zone of the aquifer (i.e., area with greater than 1000 parts per billion of vinyl chloride). Similar to Alternative GW3, a groundwater CEA would be established in conjunction with well drilling restrictions to minimize exposure to contaminated groundwater until the groundwater in the shallow and the deep zones meets the remediation goals. Long-term groundwater monitoring would also be implemented to provide an understanding of changes in contaminant concentrations and spatial distributions over time.

Total Capital Cost $8,139,700
Operation and Maintenance $15,711,400
Total Present Net Worth$23,851,100
Timeframe <25 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 FS report.

Overall Protection of Human Health and the Environment

Soil

The No Action Alternative S1 is not protective of human health and the environment because it would continue to allow potential exposure to PCB-contaminated surface soil at the Site. Alternative S2 provides for the excavation and off-site disposal of PCB-contaminated surface soil. Therefore, Alternative S2 is considered protective of human health and the environment, because the potential for exposure to these contaminated soils would be eliminated.

Groundwater

The No Action Alternative GW1 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.

The remaining alternatives are considered protective. However, Alternative GW2, which relies on unenhanced natural attenuation processes, would require a long time (over 70 years) to achieve the remediation goals. Alternatives GW3, GW4 and GW5 involve active treatment which would significantly reduce the time to achieve remediation goals. Alternatives GW2, GW3, GW4 and GW5 include institutional controls to minimize potential exposure to contaminated ground-water until remediation goals have been achieved.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Soil

Alternative S1 would not meet the risk-based remediation goal for PCBs. Alternative S2 would clean up surface soil to meet the remediation goal for PCBs.

Groundwater

Alternative GW1 would not involve any action to remediate VOC-contaminated groundwater, and would not comply with chemical-specific ARARs for groundwater. Alternatives GW3, GW4 and GW5 are all expected to comply with chemical-specific ARARs by achieving the remediation goals within 25 years. However, alternative GW2 would be expected to take a significant longer period (70 years) to achieve the groundwater remediation goals. All alternatives would comply with location- and action-specific ARARs.

Long-Term Effectiveness and Permanence

Soil

Soil Alternative S1 would not be effective or permanent, as contaminated soil would not be remediated and there would be no controls put in place to prevent exposure to the contaminated soil. Alternative S2 would provide long-term effectiveness and permanence through the removal and off-site disposal of PCB-contaminated soil.

Groundwater

Alternative GW1, the No Action Groundwater Alternative, is not considered to be effective in the long term. Under this alternative, groundwater contaminants could remain at the Site for a very long time, and there would be no provisions to monitor the fate and transport of the contaminants.

Alternatives GW2, GW3, GW4 and GW5 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. However, Alternative GW2 would require a longer timeframe to achieve the remediation goals compared to Alternatives GW3, GW4 and GW5, as it would rely on unenhanced natural attenuation processes to address the groundwater contamination.

Reduction of Toxicity, Mobility, or Volume Through Treatment

Soil

Alternative S1 would not result in a reduction in toxicity, mobility or volume since no treatment of soil contamination would be conducted. Similarly, Alternative S2 would provide no reduction of toxicity, mobility or volume through treatment. However, Alternative S2 would achieve a reduction of mobility for contaminated soil that is excavated and disposed of off site.

Groundwater

Alternatives GW1 and GW2 would reduce groundwater contaminant concentrations over time through natural attenuation processes. However, the intermediate product, vinyl chloride, is more toxic than trichloroethene. Further, the biodegradation of vinyl chloride may be limited due to the relatively low dissolved oxygen concentrations observed at the downgradient side of the groundwater contaminant plume. Alternatives GW3, GW4 and GW5 are all expected to reduce the toxicity and volume of groundwater contaminants over time through treatment, which is preferred under CERCLA.

Short-Term Effectiveness

Soil

Alternative S1 would not include a remedial action. Therefore, there would be no short-term impacts to workers or the community. Furthermore, there would be no environmental impacts to habitats or vegetation which may be associated with implementation of a remedial action. Alternative S2 would include construction work and would be expected to have moderate short-term impacts on the community and workers. During earthwork activities, dust suppression efforts would need to be utilized to minimize potential worker and community exposure to PCB-laden dust. Furthermore, efforts would need to be taken to protect residents from noise related to construction activities. Potential risks posed to the environment due to stormwater runoff would be controlled through the use of conventional, temporary stormwater/erosion control features, such as berms, ditches, or silt fences. Construction for Alternative S2 can be completed within six months of mobilization.

Groundwater

Alternative GW1, the No Action Groundwater Alternative, would have no short-term impacts because it involves no remedial action. Alternative GW2 is expected to have minimal short-term impacts, which would be associated with groundwater sampling.

Alternative GW4 is expected to have significant short-term impacts on the community. A large number of injection wells would need to be installed, many in close proximity to residences. Access to private properties would be required for well drilling and amendment injections. In addition, tree clearing activities would need to be conducted to allow for access to the proposed drilling locations.

Of the three active remedial alternatives, Alternative GW3 is expected to have the least short-term impacts. Alternative GW3 would involve the installation of extraction wells, associate piping, and approximately 16 biosparging wells, which would have short-term impacts on the community. EPA anticipates that the biosparging wells would be installed along West Moss Mill Road, which should help mitigate impacts on private property owners.

Alternative GW5 would have greater short-term impacts than Alternative GW3 but less short-term impacts than GW4, because it would include short-term intensive drilling and injection activities to provide for in-situ chemical oxidation of VOCs in the area of the greatest groundwater contamination. Furthermore, additional tree clearing activities would need to be conducted to access the injection points.

Of the active remedial alternatives, it is estimated that Alternative GW3 could be constructed more quickly (18 months) than Alternatives GW4 (24 months) and GW5 (36 months). Alternative GW2 could be implemented more quickly than Alternatives GW3, GW4 and GW5, as no active construction is required.

Implementability

Soils

Alternative S1 would be the easiest both technically and administratively to implement, since no additional work would be performed at the Site to address soil contamination. Alternative S2 would involve a greater degree of difficulty to implement, since there would be excavation, restoration and disposal facility issues to resolve.

Groundwater

Alternative GW1 would be the easiest both technically and administratively to implement, as no additional work would be performed at the Site to address groundwater contamination. Alternative GW2 would be the second easiest to implement. Establishment of the groundwater classification exception area, including well drilling restrictions, could be easily implemented through the current NJDEP certification and permitting process. Alternative GW3 would be easy to implement technically, given that groundwater extraction and treatment is a proven technology, but could be administratively difficult to implement, due to the need to obtain access agreements for construction of new wells and piping. Alternatives GW4 and GW5 would be more difficult to implement than Alternative GW3. These alternatives would also involve the need to obtain access agreements to implement. In addition, bioremediation and in-situ chemical oxidation are considered innovative technologies and dictate the need to conduct pilot-scale testing prior to full-scale implementation. Furthermore, NJDEP permitting requirements would need to be addressed to inject bioremediation amendments and chemical oxidants into the subsurface.

Cost

Soil

Alternative S1 has no cost, but provides no protection of human health and the environment. The present worth cost associated with Alternative S2 is $3,200,000.

Groundwater

Alternative GW1 has no associated cost, but is not considered protective of human health and the environment. The present worth cost for Alternative GW2 is much lower than for Alternatives GW3, GW4 and GW5. However, Alternatives GW3, GW4 and GW5 are expected to achieve remediation goals in a considerably shorter timeframe. The present worth cost for Alternative GW3 is lower than the present worth cost for Alternatives GW4 and GW5.

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 OU2 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

Soil

The Preferred Alternative for cleanup of PCB-contaminated surface soil at the Site is Alternative S2, Excavation and Off-Site Disposal.

Prior to implementation of this remedy, a pre-design investigation would be conducted to further delineate the areal extent of PCB-contaminated soil. Furthermore, waste characterization sampling would be performed to determine the disposal destination of the PCB-contaminated soil.

Contaminated soil would be excavated using standard construction equipment. It is estimated that surface soil would need to be excavated to a maximum depth of 1 foot to achieve the remediation goal, resulting in the excavation of approximately 7,500 tons of soil. Based upon existing sampling results, approximately 7,100 tons of the excavated soil would be disposed of in an industrial waste landfill, and 400 tons would be disposed of in a TSCA landfill. Stormwater runoff would be controlled during remedial construction by installing temporary storm water/erosion control features, such as berms, ditches, erosion control blankets and silt fencing. Dust would be controlled through the use of water or commercial dust suppressants.

Post-excavation soil samples would be collected from the excavation areas to verify that remediation goals have been achieved. Subsequently, the excavations will be backfilled with clean fill and seeded with grass to stabilize the soil. No post-remediation monitoring would be required.

Groundwater

Groundwater Alternative GW3, Pumping and Treatment, Biosparging and Monitored Natural Attenuation, is the preferred remedial alternative for groundwater. This alternative consists of pumping groundwater via two extraction wells, one in the shallow zone of the aquifer and one in the deep zone, to a groundwater treatment system. The treated groundwater would subsequently be discharged to an on-site recharge basin. Since a groundwater extraction and treatment system will be installed as part of the preferred OU1 remedy, the OU2 groundwater remedy would utilize this groundwater treatment facility by connecting the two new extraction wells to the facility. Modifications may need to be made to the planned OU1 facility in order to handle the increased groundwater flow. Current groundwater modeling indicates that the shallow zone and deep zone extraction wells would have to be pumped at rates of 100 gallons per minute (gpm) and 150 gpm, respectively, in order to capture groundwater within the most highly contaminated portions of the groundwater plume. However, the number of extraction wells, extraction well locations and pumping rates would be refined based upon the results of a pre-design investigation and subsequent groundwater modeling effort. For areas outside of the groundwater capture zones, contaminants would be allowed to attenuate through natural processes.

Since some part of the contaminant plume downgradient of the new deep extraction well would not be captured by the groundwater extraction, a series of biosparging wells would be installed along West Moss Mill Road to enhance aerobic degradation of vinyl chloride. Air would be injected into the deep zone via a row of injection wells at a slow rate which is just enough to increase oxygen levels in groundwater without stripping VOCs from the groundwater. Prior to design of the groundwater remedy, a pilot study would be conducted to determine the aerial influence of the biosparging system and the appropriate placement of the biosparging wells.

A groundwater CEA would be established in conjunction with well drilling restriction to minimize exposure to contaminated groundwater until the groundwater in the shallow and the deep zones 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.

Geochemical modeling conducted during the RI/FS indicates that it will take approximately 25 years to achieve the remediation goals throughout the groundwater contaminant plume. Therefore, as per EPA policy, Five-Year Reviews will be performed until remediation goals are achieved.

COMMUNITY PARTICIPATION

EPA provided information regarding the cleanup of the Emmell's Septic Landfill Site to the public through public meetings, the Administrative Record file for the Site and announcements published in the Press of Atlantic City New Jersey 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 Emmell's Septic Landfill Superfund Site:

Joe Gowers Remedial Project Manager (212) 637-4413	Cecilia Echols Community Relations (212) 637-3678

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.

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.

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.

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.

TABLE 1 - VOC CONCENTRATIONS IN GROUNDWATER (2006)

VOLATILE ORGANIC COMPOUND	MAXIMUM DETECTED CONCENTRATION SHALLOW ZONE MONITORING WELLS (ug/L)	MAXIMUM DETECTED CONCENTRATION DEEP ZONE MONITORING WELLS (ug/L)
1,1,1-Trichloroethane	210	13
1,1,2-Trichloroethane	3.5	33
1,1-Dichloroethane	52	44.5
1,1-Dichloroethene	36	3.5
1,2,3-Trichlorobenzene	4.05	7.5
1,2,4-Trichlorobenzene	14	3.95
1,2-Dichlorobenzene	14	6.75
1,2-Dichloroethane	18	13
1,3-Dichlorobenzene	15.5	5.9
1,4-Dichlorobenzene	20.5	12.5
Benzene	11	15
Carbon Disulfide	3.25	0.33
Chlorobenzene	200	73
Chloroethane	5.9	0.37
Chloroform	5.1	2.4
cis-1,2-Dichloroethene	1350	200
Cyclohexane	130	12.5
Ethylbenzene	66.5	ND
Isopropylbenzene	7.75	2.05
Methyl Tert-Butyl Ether	4.5	4.1
Methylcyclohexane	0.63	0.17
Methylene Chloride	4.1	1.9
Tetrachloroethene	ND	0.51
Toluene	4850	13
trans-1,2-Dichloroethene	32.5	5.35
Trichloroethene	2.6	7
Vinyl Chloride	2600	380
Xylene (m,p)	150	0.11
Xylene (o)	66.5	19.5