



**White Swan Cleaners/Sun Cleaners Area Groundwater
Contamination Superfund Site
August 2013**

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan identifies the Preferred Alternative to address soil and groundwater contamination at the White Swan/Sun Cleaners Area Groundwater Superfund Site (Site) located in Wall Township, Sea Girt and Manasquan, Monmouth County, New Jersey, and provides the rationale for this preference. Alternatives have been developed to address soil and groundwater contaminated primarily with the dry cleaning chemicals perchloroethylene (PCE), and its breakdown products trichloroethene (TCE) and cis-1, 2 dichloroethene (cis-1,2 DCE).

The U.S. Environmental Protection Agency's (EPA's) preferred alternative to address soil and groundwater contamination is Alternative 4 for soils and Alternative 4 for groundwater. The major elements of the preferred alternative include:

- excavation and off-Site disposal of soils at the White Swan Cleaners property source area;
- in-situ soil vapor extraction/air sparging of soils and shallow groundwater at the Sun Cleaners property source area;
- construction of a groundwater extraction and treatment system to capture and treat the most highly contaminated groundwater at the Site;
- monitored natural attenuation for lesser contaminated groundwater;
- establishment of a Classification Exemption Area to prevent exposure to groundwater during the remediation; and
- indoor air monitoring of buildings in close proximity to the groundwater contamination plume, and installation of vapor mitigation systems, as necessary.

This Proposed Plan includes summaries of the cleanup alternatives evaluated for Site soils and 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 soils and 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) and Sections 300.430(f) and 300.435(c) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This Proposed Plan summarizes information that can be found in greater detail in the Remedial Investigation (RI), Baseline Human Health Risk Assessment, Feasibility Study (FS) Reports and other documents contained in the Administrative Record for the Site.

MARK YOUR CALENDAR

PUBLIC COMMENT PERIOD:

August 20, 2013 – September 19, 2013

EPA will accept written comments on the Proposed Plan during the public comment period.

PUBLIC MEETING: August 27, 2013

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 Wall Township Municipal Center, Main Meeting room, 2700 Allaire Road, Wall, NJ at 7:00 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.

Wall Township Public Library,
Reference Section
2700 Allaire Road
Wall, NJ 07719

Hours: Mon - 10am-9pm, Tues-Thurs - 9 am – 9 pm,
Fri - 1pm-5pm, Sat - 9am – 5 pm



SITE DESCRIPTION

The White Swan Cleaners/Sun Cleaners Area Groundwater Contamination Site is an area of soil and groundwater contaminated with dry cleaning chemicals and/or their breakdown products in portions of three municipalities: Wall Township, Manasquan Borough and Sea Girt Borough, New Jersey. The shallow, unconfined Cohansey and Kirkwood aquifer was contaminated by chemicals released at two former dry cleaning facilities located approximately 0.2 miles apart along Route 35. The two dry cleaners released the same volatile organic contaminant, PCE, onto the soil and in to the shallow permeable sandy aquifer. The White Swan source area is located at 1322 Sea Girt Avenue and the Sun Cleaners source area is located at 2213 Route 35, (aka 201 Manasquan Circle) in Wall Township. The groundwater contaminant plume extends from these two source areas to the east and is approximately one mile wide and two miles long. That plume is bordered by Route 35 on the west; Hannabrand Brook and Wreck Pond on the north, Judas Creek and Stockton Lake on the south and the Atlantic Ocean on the east (see Figure 1). The former Sun Cleaners building on the west side of Manasquan Circle was demolished. The property is currently a vacant lot. The former White Swan building was used as a branch office for a local bank and is currently vacant. After the White Swan cleaning operation ceased, the White Swan property was used as a branch office by a national bank, but the property is now vacant.

SITE HISTORY

The two dry cleaners operated from approximately 1960 through 1991. In the early 1990s, a resident of Magnolia Avenue notified the Monmouth County Health Department (MCHD) that their private irrigation well contained PCE. Subsequent sampling identified three irrigation wells containing PCE at levels up to 1,500 parts per billion (ppb). From 1997 to 1998, MCHD sampled an additional 29 irrigation wells located east of Route 35, and found extensive PCE contamination up to 1,100 ppb. Subsequently, approximately 100 irrigation wells were sampled by MCHD and the NJDEP and showed up to 1,648 ppb of PCE.

In 1999, MCHD sampled Hannabrand Brook and Wreck Pond and found PCE levels ranging from 0.8 ppb to 16 ppb, in excess of the NJDEP Surface Water Quality Standard of 0.34 ppb for PCE in fresh water. PCE was not detected in surface water to the south in Mac Pond and Stockton Lake. In 2002, PCE was detected at 5 ppb in the surface water of Judas Creek near Route 71. Subsequent surface water sampling in 2003 showed PCE at levels up to 996 ppb in Judas Creek east of Sea Girt Mall.

PCE was not detected in the Sea Girt Municipal Wells initially. However, in late 1999, PCE was detected below the NJ groundwater quality criteria of 1 ppb at 0.63 ppb in one of the municipal wells. Sea Girt installed an air stripper treatment system to remove Volatile Organic Compounds (VOCs) from the water prior to distribution.

In January 2000, soil samples were collected by NJDEP at the White Swan property at depths ranging from 3.5 to 6.5 feet below ground surface (bgs). PCE was detected in samples up to 0.340 parts per million (ppm). Groundwater samples collected at the time indicated PCE at levels up to 670 ppb, TCE at levels up to 97 ppb and DCE at levels up to 25 ppb. NJDEP concluded the White Swan property was a source of groundwater contamination.

In 2001, NJDEP collected soil samples from the Sun Cleaners property which revealed the presence of PCE at levels up to 1,900 ppm. Groundwater sampling on the property showed PCE at levels up to 15,500 ppb. These data confirmed the Sun Cleaners property as a source of groundwater contamination.

NJDEP determined that VOCs in the shallow groundwater might be volatilizing and entering the unsaturated zone soils. These vapors could also be impacting the indoor air quality of buildings in the vicinity of soil and groundwater contamination. NJDEP collected indoor air samples from approximately 30 locations and found PCE present in some of samples. As a result, NJDEP requested EPA's assistance to evaluate the regional PCE contamination in December 2001.

EPA began an investigation of indoor air in late 2001 which included approximately 300 samples from 220 locations. The sampling included homes, schools and businesses. As a result, indoor air ventilations systems, similar to radon type systems, were installed in 6 residences and 2 commercial properties. Additionally, NJDEP continued to sample and install ventilation systems in structures with PCE above health based levels in indoor air. Eventually, a total of 29 buildings received systems during this phase. Indoor air sampling continued while the remedial investigation was being conducted and is ongoing.

EPA conducted soil sampling at the White Swan and Sun Cleaners properties in early 2003. At the White Swan property, the highest PCE soil concentration detected was 57 ppm located 20 feet bgs. At the Sun Cleaners property the highest PCE concentration detected was 1,200 ppm, located 14 feet bgs.

The site was included on the National Priorities List (NPL) on September 23, 2004.

Remedial Investigation

On September 21, 2006, EPA issued Bank of America (BOA), a potentially responsible party (PRP) for the Site, an administrative order on consent which required BOA to conduct a remedial investigation and feasibility study. Following review and approval of the planning documents, the remedial investigation field activities began in August 2007. The purpose of the investigation was to determine the nature and extent of contamination at the Site. After extensive preliminary field screening investigations, BOA installed over 60 monitoring wells and piezometers (groundwater sampling sites). They collected over 500 groundwater samples using temporary borings. Soil and groundwater samples were collected and analyzed through 2008, 2009 and 2010. Most of the RI field work was completed in 2010. Subsequent to the field operations, the remedial investigation report, risk assessment, and feasibility study were drafted. Concurrent with this work, EPA performed extensive vapor investigations in and under structures in proximity to the groundwater contaminant plume.

SITE CHARACTERISTICS

The Site is located within the New Jersey Coastal Plain. In general, the topography of the area is flat. The majority of the Site contains mixed residential housing and small commercial buildings. There are farms and woodlands to the west and the Atlantic Ocean coast on the east.

The Site area is underlain by the Cohansey and Kirkwood Formations which consist of unconsolidated, interbedded sand, silt and clay layers gently dipping towards the east. The ground surface is mostly medium grained sand which allows surface water to percolate down and flow to the east. Approximately 75 feet bgs is a low permeability layer which keeps the groundwater contamination from going deeper. The top of the water table, or saturated zone, is about 12 to 15 feet bgs. The regional groundwater flow across the Site is generally east towards the ocean, but some of the shallow contaminated groundwater flows northeast into Hannabrand Brook and Wreck Pond. To the south, some shallow contaminated groundwater flows southeast into Judas Creek and Stockton Lake.

The White Swan facility is located 44 to 47 feet above mean sea level (msl) and the ground surface slopes to the east. Hannabrand Brook is located approximately 1,500 feet northeast of the White Swan source area and flows eastward into Wreck Pond and the Atlantic Ocean. The Sun Cleaners property is located approximately 1,200 feet to the southwest of the White Swan property at an elevation of 46 to 51 feet above msl. Surface water

from the west of the Sun Cleaners property flows east into an intermittent stream called Judas Creek, then into Mac Pond and eventually to Stockton Lake and finally, the ocean.

The contaminants of concern (CoCs) at the Site include PCE and its associated breakdown products, TCE and cis-1, 2-DCE. PCE, TCE and DCE contamination from both source areas is dissolved in groundwater. The contaminated groundwater from the separate sources flows east and meets near Old Mill Road between Magnolia Ave and Sea Girt Ave. The combined groundwater contamination continues to migrate east, northeast and southeast towards the Atlantic Ocean. The northern boundary of the contaminant plume is Hannabrand Brook and Wreck Pond. The southern boundary is Judas Creek, Mac Pond and Stockton Lake. The extent of the contaminant plume is approximately one mile wide (north to south) and two miles long (west to east) (see Figure 1).

The groundwater contaminant plume is underlying an area of dense residential and commercial development. The towns impacted by the Site's groundwater plume provide residents with a public water supply system. Pre-existing wells within the area of the Site's groundwater contaminant plume are used for non-potable purposes, mainly irrigation.

The nearest municipal wells to the source areas are operated by Sea Girt, and are located about 6,000 feet east (downgradient) of the Site's source areas. The wells draw water from depths of 123 feet, 129 feet and 715 feet below the ground surface. The Borough of Sea Girt installed an air stripper after detecting PCE at 0.63 ppb (below the NJ Groundwater Quality Standard) in 1999. Frequent sampling is performed to assure that all drinking water standards are met.

White Swan Soils

In 2001, the PRP excavated the septic tank, associated piping and associated contaminated soil from the White Swan property parking lot. Approximately 20 tons of soil were excavated and transported off-Site to a licensed facility for disposal. However, significant soil contamination remains at the property, to a depth of 25 feet bgs, which is 10 feet below the water table. During the RI, in 2008, a total of 52 samples were collected from 13 borings. In 2009, 16 additional subsurface soil samples were collected from 10 additional borings. Soil samples from the unsaturated zone below the asphalt pavement at the White Swan property showed PCE contamination at levels ranging from 1 ppm to a maximum of 160 ppm at a depth of 0-7 feet bgs, and up to a maximum of 28,000 ppm at 17 -25 feet bgs (below the water table). PCE mass in the soil at the White Swan property is estimated to be approximately 4,360 pounds. Maximum TCE and cis-1,

2, DCE levels on the property are 32 ppm and 37 ppm respectively.

Sun Cleaners Soils

At the Sun Cleaners property, a total of 48 subsurface soil samples from 13 soil borings were collected in 2008. PCE contamination in the unsaturated zone soils at the Sun Cleaners property was found to be as high as 51 ppm (at a depth of 6 to 13 feet bgs) with a total PCE soil mass of approximately 140 pounds. The maximum TCE level was 3.8 ppm and the maximum cis-1, 2, DCE level was 31 ppm.

Surface Water and Sediments

NJDEP surface water samples from 2003 showed levels of PCE at 996 ppb in Judas Creek east of the Foodtown Mall near Sea Girt Ave. These levels were above the NJ surface water quality standard of 0.34 ppb in fresh water. In 2008, RI surface water samples collected 500 feet downgradient showed significantly lower levels of PCE at 31 ppb, 13 ppb, 6.3 ppb, 4.1 ppb, 12 ppb and 13 ppb between Mac Pond and Stockton Lake.

Judas Creek sediment samples showed PCE at 4.4 ppm near Manasquan High School and 0.79 ppm and 0.81 ppm near Route 71. These are above the site specific NJDEP ecological screening criteria of .45 ppm for sediments.

In 2000, in Hannabrand Brook, NJDEP found PCE at 1 ppb in surface water near St. Catharine's Cemetery and 2 ppb in Wreck Pond. During the RI, PCE was found at 1.1 ppb in the unnamed tributary surface water that feeds into Hannabrand Brook and up to 5.9 ppb in the surface water of Hannabrand Brook itself. Wreck Pond surface water showed PCE levels up to 0.25 ppb (estimated) at the Route 71 Bridge.

PCE was found at 0.21 ppm in the Hannabrand Brook sediments near St. Catharine's Cemetery. Sediments in the unnamed tributary had PCE levels as high as 1.8 ppm and 4.1 ppm (estimated) in Hannabrand Brook.

Groundwater

The Site's groundwater plume is contaminated with PCE at levels ranging from 1 ppb to 75,000 ppb, and continues to migrate from the two source areas located near Route 35 eastward to the Atlantic Ocean, approximately 2 miles away. The plume extends from the water table at the source areas to a depth of approximately 70 feet bgs, where a low permeability layer extends across much of the site. The contamination does not extend to the north of Hannabrand Brook or Wreck Pond, and generally not south of Judas Creek and Stockton Lake.

During the RI, PCE was found as high as 75,000 ppb

at the White Swan property and 61,000 ppb at the Sun Cleaners property.

There are two areas of the plume, in close proximity and downgradient of the two source areas which generally contain the highest levels of groundwater contamination. These two areas are referred to as the Near Field areas and generally contain concentrations of PCE over 1,000 ppb. The Near Field areas include groundwater underlying the Sun Cleaners property and extending over 1,000 feet downgradient, and groundwater underlying the White Swan property and extending approximately 700 feet downgradient. The remainder of the groundwater plume is referred to as the Far Field. The Far Field area of groundwater contamination generally includes areas where PCE has been detected between the levels of 1 ppb and 1,000 ppb. However, within the large Far Field area, there are a number of "hot spots," which are smaller localized areas of PCE contamination that range from 500 ppb up to 3,100 ppb. The PCE contamination within the groundwater generally sinks deeper as it proceeds to the east, but was not found below the low permeability zone around 75 feet bgs.

Indoor Air

In the vicinity of the shallow groundwater contamination, VOCs may escape or volatilize from the groundwater and permeate the unsaturated zone soils. This vapor can penetrate basement walls and floors in occupied dwellings. EPA has sampled the sub-slab air and/or indoor air of over 400 residences and commercial buildings in order to evaluate this exposure pathway and will continue to sample buildings in the vicinity of the contamination to assess the potential risk to occupants. The highest level of PCE vapor in sub-slab air was found to be 9,500 $\mu\text{g}/\text{m}^3$ below a residence near Christie Lane and Sea Girt Ave. To date, thirty-four indoor air ventilation systems have been installed by EPA in buildings where indoor air PCE levels exceeded health based levels. The systems are designed to vent vapors from beneath the foundation, thereby preventing vapors from entering the building. These systems are monitored to ensure they are performing properly. Sampling of residences and buildings overlying the groundwater plume will continue. Additional indoor air ventilation systems will be installed, as needed, to prevent unacceptable risks to occupants of buildings.

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.

PRINCIPAL THREATS

This Proposed Plan addresses soil contamination at both PCE source areas identified at the Site. These soils are considered principal threat wastes. Addressing these contaminated soils will have a positive impact on the planned groundwater remediation, as they are an ongoing source of groundwater contamination at the Site.

SCOPE AND ROLE OF THE ACTION

EPA is addressing the cleanup of this Site through one phase, or operable unit of long-term cleanup, addressing the source area soils, sediment, groundwater contamination, and indoor air contamination.

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.

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., soil, groundwater, surface water, and sediment) that could potentially cause adverse health effects in exposed populations. The current and future land use scenarios included the following exposure pathways and populations:

- Construction Worker: current/future ingestion, dermal contact and inhalation of surface and subsurface soil and future inhalation of outdoor and indoor vapors for adults
- Utility Workers: current/future ingestion, dermal contact and inhalation of surface and subsurface soil for adults
- Residents: current/future ingestion and dermal contact of surface soil, current ingestion, dermal contact and inhalation of groundwater from lawn watering and swimming pools, current inhalation of air from outdoor and indoor vapors, and future ingestion, dermal contact and inhalation of groundwater for adults and children
- Transient Visitors: current/future ingestion and dermal contact of surface soil, current/future ingestion, dermal contact and inhalation of surface water and sediment from Wreck Pond, Hannabrand Brook and Judas Creek, which includes Mac Pond and Stockton Lake, and current future consumption of fish and crabs from Wreck Pond for adults, teens (age 12-17), older children (age 7-11) and children (age 0-6)
- Commercial Customers: current inhalation of air from outdoor and indoor vapors for adults, adolescents and children

- Commercial Workers: current inhalation of air from outdoor and indoor vapors for adults

In this assessment, exposure point concentrations were estimated using either the maximum detected concentration of a contaminant or the 95% 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.

Surface Soil

Risks and hazards were evaluated for current and future exposure to surface soil at both source areas. The populations of interest included adult construction and utility workers. The cancer risks for both receptor populations evaluated were within or below the acceptable EPA risk range of 1.0E-06 to 1.0E-04. The hazard index for construction workers and utility workers were below the EPA acceptable value of 1. There were no contaminants of concern (COCs) identified for soil (Table 1).

Table 1. Summary of hazards and risks associated with surface soil.

Receptor	Hazard Index	Cancer Risk
Construction Worker – Adult	0.17	1E-06
Utility Worker – Adult	0.17	2E-05
There were no COCs identified in the surface soil.		

Subsurface Soil

Risks and hazards were evaluated for the potential current and future exposure to subsurface soil. The population of interest included adult construction and utility workers. The subsurface soil, identified as 2-10 feet below ground surface, was evaluated for construction workers and the cancer risk and non-cancer hazards were within or below EPA criteria.

Both the cancer risk and hazard indices were below or within the EPA acceptable values and ranges. There were no COCs identified in the subsurface soil (Table 2).

Table 2. Summary of hazards and risks associated with subsurface soil.

Receptor	Hazard Index	Cancer Risk
Construction Worker – Adult	0.16	3E-05

Receptor	Hazard Index	Cancer Risk
Utility Worker – Adult	0.16	2E-06
There were no COCs identified in the subsurface soil.		

Groundwater

Risks and hazards were evaluated for current and future exposure to groundwater from irrigation wells and private wells. The populations of interest included adult and child residents. The cancer risk for the use of the irrigation wells for both the adult and child residents were within the acceptable EPA risk range of 1.0E-06 to 1.0E-04. The hazard indexes for use of the irrigation wells for both adult and child resident were below the EPA acceptable value of 1. The cancer risks and hazard indices for future use of the groundwater for drinking exceed the acceptable EPA risk ranges and hazard value for both the adult and the child. The COCs that were identified for groundwater include four VOCs (Table 3).

Table 3. Summary of hazards and risks associated with groundwater.

Receptor	Hazard Index	Cancer Risk
Irrigation Wells – Adult	0.13	1E-04
Irrigation Wells – Child	0.51	1E-04
Swimming Pools – Adult	0.14	1E-04
Swimming Pools – Child	0.17	3E-05
Tap Water (Shallow) – Adult	30	4E-02
Tap Water (Shallow) – Child	87	7E-02
Tap Water (Deep) – Adult	7.5	1E-04
Tap Water (Deep) – Child	18	7E-05
COCs include: tetrachlorethylene (PCE), trichloroethylene (TCE), cis-1,2-dichloroethylene, and vinyl chloride		

Surface Water and Sediment

Risks and hazards were evaluated for current and future exposure to surface water and sediment from Wreck Pond, Hannabrand Brook, and Judas Creek, which includes Mac Pond and Stockton Lake. The populations of interest included adult, teen, older child, and child transient visitors for Wreck Pond and teen and older child transient visitors for Hannabrand Brook and Judas Creek. The cancer risks and hazard indices for all of the populations evaluated were below or within the EPA acceptable values. There were no COCs identified for surface water or sediment (Table 4). Since there were no COCs identified for surface water or sediment, the ingestion of biota from Wreck Pond was considered to be an incomplete pathway.

Table 4. Summary of hazards and risks associated with surface water and sediment.

Receptor	Hazard Index	Cancer Risk
<i>Surface Water – Wreck Pond</i>		
Transient Visitor – Adult	0.0024	5E-08
Transient Visitor – Teen	0.01	5E-08
Transient Visitor – Older Child	0.022	1E-07
Transient Visitor – Child	0.0059	3E-08
<i>Surface Water – Hannabrand Brook</i>		
Transient Visitor – Teen	0.022	2E-07
Transient Visitor – Older Child	0.040	2E-07
<i>Surface Water – Judas Creek</i>		
Transient Visitor – Teen	0.018	3E-05
Transient Visitor – Older Child	0.035	4E-05
<i>Sediment – Wreck Pond</i>		
Transient Visitor – Adult	0.00031	5E-08
Transient Visitor – Teen	0.0016	6E-08
Transient Visitor – Older Child	0.0017	5E-08
Transient Visitor – Child	0.00072	3E-08
<i>Sediment – Hannabrand Brook</i>		
Transient Visitor – Teen	0.0056	2E-06
Transient Visitor – Older Child	0.012	2E-06
<i>Sediment – Hannabrand Brook</i>		
Transient Visitor – Teen	0.0078	2E-06
Transient Visitor – Older Child	0.0082	2E-06
There were no COCs identified in the surface water or sediment.		

Vapors

The potential for vapor intrusion into a building's indoor air is being addressed through an ongoing EPA sampling program. The investigation includes collection and analysis of sub-slab soil gas samples, and indoor air samples in structures overlying the groundwater contaminant plume. Levels of contaminants are compared to health-based standards for each structure. Where health-based standards are exceeded, vapor mitigation systems have been installed. Sampling is ongoing throughout the area overlying the plume, and additional indoor air ventilation systems will be installed, as needed, to prevent unacceptable risk to occupants of buildings. Therefore, a quantitative risk analysis was not needed.

The evaluation of potential outdoor vapor exposure to residents, commercial customers, commercial workers and construction workers indicated that the pathway was incomplete. Therefore, a quantitative analysis was not needed.

It is EPA's current judgment that although the risks

associated with soil exposure are within or below EPA's acceptable values, the soil concentrations of PCE and TCE are above concentrations that are associated with an adverse impact to groundwater, thus there is a need to address the soil through a remedial action.

Based on the results of the human health risk assessment, a remedial action is necessary to protect human health from actual or threatened releases of hazardous substances in groundwater.

Ecological Risk Assessment

A screening-level ecological risk assessment was conducted to evaluate the potential for ecological risks from the presence of elevated VOCs in ground water that discharges to surface water and sediments associated with the Judas Creek and Hannabrand Brook stream systems. The SLERA focused on evaluating the potential for impacts to sensitive ecological receptors to site-related constituents of concern through exposure to surface water and sediment from Wreck Pond, Hannabrand Brook, and Judas Creek, which includes Mac Pond and Stockton Lake. Surface water and sediment concentrations were compared to ecological screening values as an indicator of the potential for adverse effects to ecological receptors for each water body system. A complete summary of all exposure scenarios can be found in the screening level ecological risk assessment (SLERA).

Hannabrand Brook System: There is a potential for adverse effects to fish and aquatic invertebrates from exposure to contaminated groundwater that is discharging to Hannabrand Brook. The sediment screening criteria were exceeded for PCE in three locations, resulting in hazard indices (HIs) of 4.1, 1.8 and 0.7, two of which are above the acceptable value of 1. The PCE detections in the sediment are considered to be site-related. The surface water screening criteria was not exceeded for Hannabrand Brook.

Judas Creek System: There is a potential for adverse effects to aquatic fish and invertebrates from exposure to contaminated groundwater that may be discharging to Judas Creek. The sediment screening criteria were exceeded for PCE in two locations, resulting in HIs of 4.4 and 1.8, which are above the acceptable value of 1. The PCE detections in the sediment may be associated with runoff from an industrial area instead of groundwater discharge. The surface water screening criteria was not exceeded for Judas Creek.

Based on the results of the ecological risk assessment, a remedial action is necessary to protect the environment from actual or threatened releases of hazardous substances, which includes the discharge of contaminated groundwater into surface water bodies at the Site.

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 soils and groundwater to address the human health risks and environmental concerns posed by Site-related contamination.

RAOs:

- Prevent or minimize current and future human exposures, including ingestion of groundwater and/or inhalation of vapors, from Site-related VOCs in groundwater that present a risk to public health and the environment;
- Prevent or minimize migration of Site-related soil contamination to groundwater;
- Restoration of the Site groundwater to meet drinking water standards within a reasonable time frame; and
- Prevent or minimize the migration of Site-related contaminated groundwater to surface water and sediment that presents a risk to the environment.

To achieve RAOs, cleanup goals for soils at the Site were developed. Soil cleanup standards that will be protective of groundwater were developed by using the SESOIL model. The cleanup goal calculated through the model is 1 ppm for PCE in soils. It is believed that remediation of Site soils to this standard will address all Site-related contaminants.

The remediation goals selected for the groundwater are based on groundwater applicable or relevant and appropriate requirements (ARARs) for this Site, which include the federal and state MCLs, and NJDEP Groundwater Quality Criteria (GWQC). The Site groundwater remediation goals are the most conservative of the above criteria. The remediation goals selected for the primary contaminants of concerns at this Site are 1 ppb for PCE and 1 ppb for TCE, which are the state GWQC.

SUMMARY OF REMEDIAL ALTERNATIVES

Potential applicable technologies were identified in the FS prepared for this Site. These technologies were initially screened based on effectiveness, implementability and cost as criteria. Those technologies that passed initial screening were then assembled into four remedial alternatives for soil and four remedial alternatives for groundwater.

All of the alternatives, with the exception of the No Action alternative, would include the ongoing

investigation and remediation, as appropriate, of indoor air containing elevated levels of VOCs in structures overlying the groundwater contaminant plume.

Sampling of indoor and sub-slab air would continue. Individual vapor mitigation systems would be installed at each structure determined to have elevated levels of VOCs in indoor air, and systems installed previous to the remedy selection would be maintained.

In the process of developing groundwater remedial alternatives for the Site, a number of groundwater extraction and treatment scenarios that would address varying portions of groundwater contamination in the Far Field area were evaluated, but screened out. Extensive extraction and treatment of groundwater throughout the Far Field area, was shown through modeling as not likely to be highly effective. Extraction of groundwater throughout the Far Field area would be highly disruptive to the community, expensive and would not significantly decrease the overall cleanup time frame compared to the alternatives that were developed which rely on active treatment in the Near Field areas and allow Far Field contamination to attenuate.

All of the groundwater remedial alternatives, with the exception of the No Action Alternative, would include the establishment of a Classification Exception Area (CEA) in accordance with state regulations to minimize the 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.

All of the groundwater remedial alternatives, with the exception of the No Action Alternative, would rely in part on monitored natural attenuation (MNA) to restore the lesser contaminated portions of the groundwater contaminant plume to drinking water standards. With the performance of an active remediation of the most contaminated groundwater in the Near Field, modeling has shown that Far Field groundwater would be restored to drinking water standards in a much shorter time frame than without remediation (roughly 70 years vs. 400 years). The implementation of MNA requires long-term monitoring of contaminants as they naturally attenuate through dilution, dispersion, adsorption, volatilization and/or biodegradation, until groundwater returns naturally to concentrations below the remediation goals. These processes are expected to be effective at this Site in areas of lesser groundwater contamination in conjunction with active treatment in the areas of higher contamination. In the Far Field area, due to the aerobic nature of the Site aquifer, dispersion and dilution are likely to be the predominant forms of natural attenuation. In addition, since 2000, decreasing

contamination concentrations have been observed near the source areas. EPA believes this dilution trend will continue in this very prolific, unconfined aquifer, in which groundwater migrates at approximately one foot per day. Based on preliminary modeling, it is expected that, in conjunction with active treatment in the Near Field areas, the estimated natural attenuation time frame in the Far Field areas is approximately 50 to 70 years. The MNA portion of each groundwater alternative listed below (with the exception of the No Action alternative), would include the installation and sampling of an estimated nine clusters of monitoring wells, in addition to surface water and sediment sampling in the water bodies bounding the Site's groundwater plume. The exact sampling frequency and protocol would be established during the remedial design (RD) phase of the cleanup.

For the groundwater alternatives, EPA chose to actively address groundwater above 1,000 ppb of PCE based on modeling which showed active treatment of areas of lower concentrations (100, 150, 200 and 250 ppb) would not appreciably speed up the groundwater cleanup time.

The time frames presented below for construction do not include the time necessary 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 five-year review will be conducted every five years after the initiation of the remedial action, until remediation goals are achieved.

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 alternatives selected for this Site.

A brief summary of the remedial alternatives developed for the Site is provided below. More detailed descriptions of the remedial alternatives can be found in the FS report.

Alternatives for Soil Source Areas

Alternative 1 – No Action

The No 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 Action Alternative. Furthermore, this alternative would not involve any monitoring of groundwater or institutional controls. Contaminants in the soil would continue to migrate into the groundwater, and VOC contamination would continue to migrate with groundwater downgradient. In addition, vapor phase contamination would continue to migrate into the indoor air of some structures overlying the plume.

Total Capital Cost	\$0
Operation and Maintenance	\$0
Total Present Net Worth	\$0
Time frame	N/A

Alternative 2 - In-Situ Soil Vapor Extraction/Air Sparging for Sun Cleaners and White Swan Source Area Soils

Alternative 2 includes the in-situ vapor extraction (ISVE) and air sparging (AS) of soil and shallow ground water in the two soil source areas. This alternative would involve the injection of air into the subsurface groundwater, enabling a phase transfer of VOCs from a dissolved state to the vapor phase. The contaminated air enters the unsaturated, contaminated soils, where a SVE system creates a negative pressure through a series of extraction wells. The extraction wells are used to collect the contaminated air, which is then treated to remove contaminants through the use of catalytic oxidizers or granular activated carbon (GAC). BOA has proposed that this alternative include the use of a series of recirculating groundwater remediation wells (RGRWs), which would apply the same principals as explained above, but would provide for both air sparging and ISVE to be implemented within well casings of a series of wells. Specific details of the implementation of this technology would be determined during the RD phase.

Active operation of the ISVE/AS system may be intermittent over the estimated 10 year time frame to achieve goals.

Total Capital Cost	\$1.8 million
Operation & Maintenance	\$1.8 million
Total Present Net Worth	\$3.6 million
Time frame	10 years

Alternative 3 -Excavation and Disposal of Soils at the Sun Cleaners and White Swan Source Areas

Alternative 3 would include excavation, removal, and off-site treatment and/or disposal of all soil containing more than 1 ppm of PCE from the White Swan and Sun Cleaners source areas. There are approximately 5,100 cubic yards of soils exceeding the cleanup criteria at the White Swan property and approximately 9,600 cubic yards at the Sun Cleaners property. Treatment or disposal would occur at RCRA-permitted facilities in accordance with regulatory requirements for these soils. Excavation would be accomplished with commonly used construction equipment, by methods widely used for impacted soils in cases where the soil contamination is relatively shallow, less than 25 feet below ground surface. Sheet piling and de-watering would be required as excavation would go below the water table to

maximize mass reduction. The contaminated groundwater generated during soil excavation would be collected and properly treated. Traffic controls would be required because of the close proximity to the Manasquan Traffic Circle and Sea Girt Avenue. This alternative would be completed in approximately one year. Demolition and disposal of the White Swan Bank building may be required to facilitate the excavation.

Total Capital Cost	\$8 million
Operation and Maintenance	\$0
Total Present Net Worth	\$8 million
Time frame	1 year

Alternative 4 - In-Situ Soil Vapor Extraction/Air Sparging at the Sun Cleaners Source Area and Excavation and Disposal of Soils at the White Swan Source Area

Alternative 4 includes ISVE/AS of soil and shallow groundwater in the Sun Cleaners source area (as described in Alternative 2) and excavation and off-site disposal of contaminated soils at the White Swan source area (as described in Alternative 3). ISVE/AS would be preferred at the Sun Cleaners source area as there is relatively low estimated PCE mass as compared to the White Swan source area. Excavation and off-Site disposal would be more appropriate at the White Swan source area because it contains a much higher mass of PCE contamination at a relatively shallow depth (less than 25 feet) compared to the Sun Cleaners source area. In addition, based on its topography and location, excavation would be much easier to implement at the White Swan source area compared to the Sun Cleaners source area. ISVE/AS is expected to be a slower process for removal of PCE compared to excavation due to mass transfer limitations. Significant mass removal by ISVE/AS could be expected at the Sun Cleaners source area over a period of roughly 10 years, and systems would be operated periodically until soil is remediated. Soil excavation at White Swan would take less than one year. Demolition and disposal of the White Swan Bank building may be required to facilitate the excavation.

Total Capital Cost	\$4.5 million
Operation and Maintenance	\$.9 million
Total Present Net Worth	\$5.4 million
Time frame	10 years (Sun) 1 year (White Swan)

Alternatives for Groundwater

Alternative 1 – No Action

The No Action Alternative was retained, as required by the NCP, and provides a baseline for comparison with other alternatives. Under this alternative, no remedial

actions would be implemented. Furthermore, this alternative would not involve any monitoring of groundwater or institutional controls. Contaminants in the groundwater would continue to migrate uncontrolled.

Total Capital Cost	\$0
Operation and Maintenance	\$0
Total Present Net Worth	\$0
Time frame	N/A

Alternative 2 -In-Situ Vapor Extraction and Air Sparging/MNA/ICs/Vapor Remediation

This alternative would treat contaminated groundwater in-situ in the Near Field areas, which generally contain PCE levels of greater than 1,000 ppb, through the use of the ISVE/AS technologies. ISVE/AS in the Near Field areas of highest groundwater contamination would involve the injection of air into the subsurface groundwater, enabling a phase transfer of VOCs from a dissolved state to the vapor phase. The contaminated air enters the unsaturated soils, where a SVE system creates a negative pressure through a series of extraction wells. The extraction wells are used to collect the contaminated air, which is then treated to remove contaminants through the use of catalytic oxidizers or GAC. BOA has proposed that this alternative be implemented through the use of a series of RGRWs, which would apply the same principals as explained above, but would provide for both air sparging and ISVE to be implemented within well casings of a series of wells. Specific details of the implementation of this technology would be determined during the RD phase of the project.

During the RD, an evaluation of individual Far Field “hot spots” for treatment through the ISVE/AS technology would be performed to assess the effectiveness of treatment.

MNA would be implemented in the Far Field portion of the groundwater contaminant plume, concurrent with ISVE/AS in the Near Field areas. Attenuation processes for VOCs in groundwater would be closely monitored concurrent with other aspects of the selected remedy. In addition, surface water and sediment sampling and analysis would be included in the long-term monitoring plan.

A CEA would be established to limit the installation of additional wells in the area of groundwater contamination until cleanup standards have been met.

This alternative would address indoor air contamination by continuing EPA’s current program of sampling sub-slab and indoor air associated with structures overlying the groundwater contaminant plume. Where elevated VOC levels are detected, vapor mitigation systems

would be installed and maintained. In addition, systems already installed at the Site would be maintained until the groundwater is remediated.

Total Capital Cost	\$5.4 million
Operation and Maintenance	\$5.4 million
Total Present Net Worth	\$10.8 million
Time frame (ISVE/AS)	10 years
Full Groundwater Restoration	Approx. 70 years

Alternative 3 - In-Situ Chemical Oxidation (ISCO)/MNA/ICs/Vapor Remediation

ISCO would involve injecting an oxidant or oxidant releasing compound into wells located within the most highly contaminated groundwater, generally containing PCE at levels of greater than 1,000 ppb in the Near Field areas. The oxidant would mix with the contaminants, and cause them to decompose. When the process is complete, only water and innocuous breakdown products would be left in the treated area. Monitoring would be required to determine the effectiveness of the treatment.

Although final details of the implementation of this alternative would be developed in the RD phase, for costing purposes, it was assumed that sodium permanganate would be the oxidant of choice. Lines of injection well clusters would be installed perpendicular to groundwater flow. Each cluster would be comprised of three wells installed to different depths. It is estimated that the implementation of this alternative would require the installation of approximately 40 injection well clusters near and downgradient of the Sun Cleaners source area and 19 injection well clusters near and downgradient of the White Swan source area. During the RD, an evaluation of individual Far Field “hot spots” for treatment through the ISCO technology would be performed to assess the effectiveness of treatment.

MNA would be implemented in the Far Field portion of the groundwater contaminant plume, concurrent with ISCO in the Near Field areas. Attenuation processes for VOCs in groundwater would be closely monitored concurrent with other aspects of the selected remedy. In addition, surface water and sediment sampling and analysis would be included in the long-term monitoring plan.

A CEA would be established to limit the installation of additional wells in the area of groundwater contamination until cleanup standards have been met.

This alternative would address indoor air contamination by continuing EPA’s current program of sampling sub-slab and indoor air associated with structures overlying the groundwater contaminant plume. Where elevated VOC

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.

Total Capital Cost	\$7.9 million
Operation and Maintenance	\$ 3.7 million
Total Present Net Worth	\$11.6 million
Time frame (ISCO)	10 years
Full Groundwater Restoration	Approx. 70 years

Alternative 4 – Extraction and Treatment/MNA/ICs/Vapor Remediation

Alternative 4 would include construction and operation of a groundwater treatment plant and an extraction well system to collect and treat contaminated groundwater in the Near Field areas immediately downgradient from both source areas. This alternative would target the most highly contaminated groundwater, generally containing PCE at levels of greater than 1,000 ppb. It is estimated that two extraction wells would be required for each source area and an additional three may be needed to address downgradient hot spot areas pending further evaluation in the RD. A groundwater extraction and treatment system would be constructed and operated for approximately 30 years. It would consist of groundwater extraction wells, the associated underground piping and a treatment plant. The extraction system layouts and flow rates would be designed to maximize capture of contaminated groundwater from different areas, then combined and pumped to a treatment plant.

Treatment of groundwater in the plant would be achieved by several methods including air stripping and GAC adsorption units, and the treated water would likely be discharged to a surface water body such as Judas Creek, the sanitary sewer system, or re-injected into the aquifer.

During RD, it would be determined if additional extraction wells would be used to treat hot spots areas within the Far Field portion of the groundwater plume.

Monitored Natural Attenuation for the Far Field area of the plume would be the same as discussed above for Alternatives 2 and 3.

A CEA would be established to limit the installation of additional wells in the area of groundwater contamination until cleanup standards have been met.

This alternative would address indoor air contamination by continuing EPA's current program of sampling sub-slab and indoor air associated with structures overlying the groundwater contaminant plume. Where elevated VOC levels are detected, vapor mitigation systems would be installed and maintained. In addition, systems already installed at the Site would be maintained until the groundwater is remediated.

Total Capital Cost	\$7.3 million
Operation and Maintenance	\$6.2 million
Total Present Net Worth	\$13.5 million

levels are detected, vapor mitigation systems would be installed and maintained. In addition, systems already installed at the Site would be maintained until the groundwater is remediated.

Time frame (Pump & Treat) 30 years
Full Groundwater Restoration Approx. 70 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 can be found in the FS.

Overall Protection of Human Health and the Environment

The No Action Alternatives for soil and groundwater are not protective of human health and the environment. While source area soils do not pose a direct risk to human health, they contribute to groundwater contamination at the Site, which poses unacceptable levels of risk to human health. Under the No Action alternative, VOC contamination in soils would continue to migrate to groundwater. Groundwater contamination would continue to migrate uncontrolled, where it may continue to impact human health and the environment.

All other soil alternatives provide adequate protection of human health and the environment and are expected to comply with ARARs.

All groundwater alternatives (other than No Action) are considered protective. They all include treatment of the Site's most highly contaminated groundwater, and include MNA, institutional controls, and appropriate indoor air mitigation to minimize potential exposure to contaminated groundwater and vapors emanating from groundwater until the alternatives are implemented, and remediation goals have been achieved.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

The three broad categories of ARARs include chemical-specific, location-specific and action-specific ARARs. ARARs have been established for groundwater at this Site to restore the aquifer to drinking water standards. No soil ARARs are required to protect against direct contact with Site soils, as this exposure does not pose unacceptable risks. However, modeling was performed to develop a soil cleanup standard for PCE, the primary contaminant of concern that would be protective of groundwater. The soil cleanup standard for PCE is 1 part per million (ppm). All soil remediation alternatives, except the No Action alternative, would meet this standard eventually. The No Action alternative would

not meet standards in a reasonable time frame. Of the two active remediation technologies, excavation would achieve soil ARARs more quickly, in 1 year, and ISVE would take approximately 10 years. The ISVE and excavation technologies would also comply with location- and action-specific ARARs such as the Resource Conservation and Recovery Act.

All of the groundwater alternatives would eventually meet the groundwater ARARs. The primary contaminant of concern, PCE, has a NJ GWQC of 1 ppb. The No Action Alternative would not meet ARARs in a reasonable time frame, and would not assure that residential drinking water standards are met in the short term. The alternatives which include active treatment (Alternatives 2, 3 and 4) would assure that potable water met the chemical-specific ARAR for PCE in a much shorter time frame compared to the No Action alternative. All alternatives would comply with location- and action-specific ARARs such as the Freshwater Wetlands Protection Act and the Federal Clean Water Act.

MNA is a component of each alternative, with the exception of the No Action alternative. MNA would be used to address lesser contaminated groundwater in the Far Field area of the Site. With the performance of an active remediation of the most contaminated groundwater in the Near Field, modeling has shown that Far Field groundwater would be restored to drinking water standards in a much shorter time frame than without remediation (roughly 70 years vs. 400 years).

Each alternative, with the exception of the No Action alternative, includes ongoing indoor air sampling and installation of remediation systems within buildings to prevent exposure to unacceptable levels of PCE in indoor air.

Long-Term Effectiveness and Permanence

The highest degree of permanence and long term effectiveness is achieved for those alternatives that result in a greatest removal of contaminants from the Site. The No Action Alternative would not be effective in the long term because no actions will be taken to address the contamination. Some attenuation of contaminants can be expected over time, but this would not be measured or monitored under Alternative 1.

For soil, Alternative 2, ISVE/AS, would be effective for removal of soil contamination in the source area. Since it is expected that the full remediation would take place within 10 years, it would be both effective in the long term and permanent. The magnitude of risk remaining after implementation of ISVE/AS or excavation for soil contamination would be similar. ISVE/AS (Alternatives 2 and 4) would achieve contaminant reductions through in-

situ treatment, while excavation (Alternatives 3 and 4) would rely on physical removal of the contaminated material. ISVE/AS is estimated to require active treatment operations for up to 10 years, compared to 1 year for excavation. Excavation would have a higher degree of certainty of reduction of contaminants since all contaminated material would be physically removed. ISVE/AS is expected to be effective at reducing contamination, but since it is an in-situ technology, it may not achieve 100% removal of VOCs, as would be achieved by excavation.

For groundwater, active treatment in the Near Field areas under consideration would include ISVE/AS (Alternative 2), ISCO (Alternative 3), or extraction and treatment (Alternative 4). In comparing these alternatives, Alternatives 2 and 4 would likely have similarly high degrees of long-term effectiveness. Alternative 3, ISCO, could be effective in the long term, but would be more difficult to implement and manage, leading to more uncertainty with respect to its long-term effectiveness compared to Alternatives 2 and 4.

Reduction of Toxicity, Mobility, or Volume Through Treatment

The No Action Alternatives for both soil and groundwater would not treat the contaminants and would not reduce their toxicity, mobility, or volume through treatment.

For soils, Alternative 2, ISVE/AS would reduce the volume of the majority of the VOC contaminants in the soils (estimated at 99% removal) through treatment, thereby greatly reducing the volume of the contaminants. Alternative 3, excavation, would remove 100% of the volume of contaminants, but is not likely to include treatment in that the excavated soils would likely be disposed at an off-Site, licensed landfill. Alternative 4 would be effective in reducing toxicity, mobility and volume through treatment at the Sun Cleaners property. As stated, excavated soil from the White Swan Cleaners property may not require treatment at a waste disposal facility.

For groundwater, Alternative 2 (ISVE/AS), Alternative 3 (ISCO), and Alternative 4 (extraction and treatment) would all reduce the toxicity, mobility and volume of groundwater contaminants using different treatment technologies in the Near Field. ISCO would permanently destroy contaminants in-situ. ISVE/AS and extraction and treatment would remove contaminants in the groundwater and then treat the contaminants in the air or groundwater stream generated respectively.

Short-Term Effectiveness

The No Action Alternatives for soil and groundwater include no construction or monitoring, and would have no short-term impacts at the Site.

In addressing contaminated soils, Alternatives 2, 3, and 4 would all have some short-term impacts on workers and the local community, as the source areas to be remediated are located in a highly developed commercial area, near residential communities. Potential risks would include physical hazards near areas where heavy equipment is used and from increased vehicles traffic, and noise, air emissions, and hazards resulting from managing contaminated soils. These short-term risks can be managed through appropriate planning and monitoring during the construction. Air emissions generated during the ISVE/AS operations can be controlled and monitored. Disruption to the community would be relatively lower for ISVE/AS (Alternatives 2 and 4) compared to excavation (Alternatives 3 and 4), as excavation would require the transportation of contaminated soils from the source areas via existing roadways. However, ISVE/AS would require about 5 months to construct, and 10 years to operate intermittently, while excavation would take about 1 year to implement.

For the groundwater alternatives, Alternatives 2 (ISVE/AS), Alternative 3 (ISCO), and Alternative 4 (groundwater extraction and treatment), a number of short-term risks are possible including, physical hazards, noise, traffic near areas requiring heavy equipment for construction, emissions and dust. Additional significant short-term risks would be presented under Alternative 3 (ISCO), as this alternative would require handling and storage of a chemical oxidant in a densely populated residential community. The oxidant would need to be carefully managed. In addition, Alternative 3 (ISCO) would also have the potential to increase contaminated vapors in residential areas. Careful monitoring and management of vapors would be required to protect public health. All of the three active groundwater alternatives would present some disruption of the community; however, Alternative 3 would require the most disruption of private property and is the least effective in the short-term.

Implementability

The No Action Alternatives for soil and groundwater require no implementation.

For soils, each alternative considered would be technically implementable and uses proven, readily available technologies. A pilot study would be needed prior to the design of the remedy under Alternative 2 (ISVE/AS). Alternative 3 (Excavation) would be significantly more difficult to implement at the Sun Cleaners source area

compared to the White Swan source area for a number of reasons. The topography of the Sun Cleaners property includes a substantial steep slope, which may require specialized equipment to assure a safe exaction. In addition, the Sun Cleaners property is located on a highly congested traffic circle, which would require significant rerouting of traffic and disruption to the community. The White Swan property by comparison, would be easier to excavate as it is relatively level and located on a less traveled road. In addition, the excavation alternative would remove significantly more mass from the White Swan property compared to the Sun Cleaners property (4,360 pounds of PCE mass at White Swan vs. 140 pounds of PCE mass at Sun Cleaners).

For groundwater, each technology considered is technically implementable, proven and readily available. Issues required to implement all alternatives include acquisition of land, subsurface work within local streets and private property for installing system components. Alternative 2 (ISVE/AS) and Alternative 3 (ISCO) would have the greatest amount of infrastructure required on private property compared to Alternative 4 (extraction and treatment). For this reason, these alternatives would be more disruptive to the community during construction and operation compared with Alternative 4.

Alternative 2 (ISVE/AS) would require regular maintenance to prevent metals fouling in the system. Alternative 3 (ISCO) would present safety hazards associated with the storage and handling of chemical oxidants in residential areas. Further generation of contaminated vapors could be exacerbated through the implementation of ISCO and indoor air would need to be closely monitored.

Cost

There are no costs associated with the No Action Alternatives for soil and groundwater; however, it would provide no protection to human health or the environment. The following chart summarizes the costs for rest of the remedial alternatives.

Media	Source Area	Alternative	Capital Cost \$M	O&M \$M	Present Worth \$M
soil	WS & Sun	2-ISVE	1.8	1.8	3.6
soil	WS & Sun	3-Excavation	8.0		8.0
soil	WS and Sun	4-ISVE for Sun Excavation for WS	4.5	0.9	5.4

Ground water	WS & Sun	2-ISVE/ MNA	5.4	5.4	10.8
Ground water	WS & Sun	3-ISCO/ MNA	7.9	3.7	11.6
Ground water	WS & Sun	4-P&T/ MNA	7.3	6.2	13.5

State/Support Agency Acceptance

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

Community Acceptance

The community's opinion 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. The Record of Decision is the document that formalizes the selection of the remedy for a site.

SUMMARY OF THE PREFERRED ALTERNATIVE

The preferred alternative for the White Swan Cleaners/Sun Cleaners Area Groundwater Contamination Site is Alternative 4 for source soils and Alternative 4 for groundwater. Alternative 4 for soils would include the ISVE/AS technology to treat soils and associated groundwater at the Sun Cleaners source area and excavation and off-site disposal for soils at the White Swan source area. Demolition and disposal of the bank building may be necessary. Alternative 4 for groundwater would include: the extraction and treatment of the most highly contaminated groundwater in the Near Field portion of the groundwater plume; MNA for lesser contaminated groundwater in the Far Field portion of the groundwater plume, ongoing sub-slab and indoor air investigation and remediation, and ICs.

ISVE/AS would be implemented for soils at the Sun Cleaners source area and excavation would be implemented for soils at the White Swan source area. Soils located above the water table, as well as soils below the water table would be addressed, as these are principal threat wastes. A Site-specific soil cleanup goal of 1 ppm for PCE has been developed and would be protective of groundwater. Addressing soils to meet this cleanup standard is expected to address all Site contaminants. After completion of soil remediation activities, both properties containing contaminated soils would be restored and could be redeveloped.

The most highly contaminated groundwater at the Site, in the Near Field area, would be remediated through extraction and treatment. Extraction wells would be located adjacent to and downgradient the source areas to address the Site's most highly contaminated groundwater.

The groundwater treatment plant would treat the groundwater by removing the PCE and TCE using air strippers and activated carbon. The treated groundwater would be discharged to either to the local sewer/treatment facility, surface water or re-injected into the aquifer. Areas of elevated groundwater contamination (hot spots) in the Far Field area of the Site would be further evaluated and may be addressed through either the groundwater extraction and treatment system, or smaller localized treatment systems. Determinations regarding whether to address these hot spots will be made during the RD.

Lesser contaminated groundwater would be addressed through MNA. Attenuation processes for VOCs in groundwater would be closely monitored concurrent with other aspects of the selected remedy. Sediments would continue to be monitored to evaluate the impact of the remedy over time.

Indoor air contamination would be addressed by continuing EPA's current program of sampling sub-slab and indoor air associated with structures overlying the groundwater contaminant plume. Where elevated VOC levels are detected, vapor mitigation systems would be installed and maintained. In addition, systems already installed at the Site would be maintained until the groundwater is remediated.

The preferred alternative would prevent exposure to Site contaminants by addressing indoor air contamination as described above, and through the implementation of ICs, such as a CEA, until the aquifer is restored to drinking water standards. The total cost of the preferred alternative to address all Site contamination is estimated to be \$18.9 million.

As is EPA's policy, five-year reviews would be conducted until remediation goals have been met.

The preferred alternative was selected over the other alternatives principally because it is expected to achieve substantial long-term risk reduction through treatment of the principal threat waste, as well as the most highly contaminated groundwater contamination.

Based on information currently available, EPA believes the preferred alternative is protective of human health and the environment, complies with ARARs and provides the best balance of tradeoffs among the other alternatives with respect to the Superfund evaluation criteria. EPA expects the preferred alternative will satisfy the statutory requirements of CERCLA Section 1212(b).

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.

COMMUNITY PARTICIPATION

EPA provided information regarding the cleanup of the White Swan/Sun Cleaners Superfund Site to the public through public meetings, the Administrative Record file for the Site and announcements published in the *Coast Star* 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 White Swan/Sun Cleaners Superfund Site, please contact:

Matthew Westgate	Cecilia Echols
Remedial Project Manager	Community Relations
(212) 637-4422	(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 12.

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.

