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Office of
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Remedial Response

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September 1993
PB94-963830

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Superfund Record of Decision:

Naval Air Engineering Center (Operable Unit 23), NJ

50272-101

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15. Supplementary Notes

PB94-963830

16. Abstract (Limit: 200 words)

The Naval Air Engineering Center (Operable Unit 23) site is part of the 7,400-acre Naval Air Warfare Center Aircraft Division located in Lakehurst, Ocean County, New Jersey, approximately 14 miles inland from the Atlantic Ocean. Land use in the area is mixed undeveloped woodlands, open areas, and light commercial and industrial areas, with the closest residential area, the Borough of Lakehurst, located southeast of the facility. The Naval Air Engineering Center (NAEC), which lies within the Toms River Drainage Basin, contains over 1,300 acres of flood-prone areas. The estimated 65,400 people who reside in the vicinity of the NAEC, use municipal wells to obtain their drinking water supply. Some private wells exist, but these are used primarily for irrigation purposes. In 1916, Eddystone Chemical Company leased the property to develop an experimental firing range for testing chemical artillery shells. In 1919, the U.S. Navy assumed control of the property, and it formally was commissioned Naval Air Station (NAS) Lakehurst in 1921. In 1974, the NAEC was moved from the Naval Base in Philadelphia to NAS Lakehurst. The NAEC's mission is to conduct research, development, engineering, testing and systems integration, limited production, and procurement for aircraft and airborne weapons systems. Historically, various operations at NAEC have required the use, handling, storage, and occasional onsite

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Naval Air Engineering Center (Operable Unit 23), NJ
Seventeenth Remedial Action
Contaminated Medium: soil
Key Contaminants: VOCs (xylenes), other organics (PAHs)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 19
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) *See Instructions on Reverse* OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

Abstract (Continued)

disposal of hazardous substances. During the operational period of the facility, there have been reported and suspected releases of these substances into the environment. The Department of Defense's Installation Restoration Program (IRP) has identified 44 potentially-contaminated sites at NAEC, 16 of which have warranted further investigation to assess potential impacts. IRP investigations have revealed potential soil and ground water contamination at Site 13; which includes the former Fuel Farm No. 125 and a former tank farm located in Area B on the north site of Hangar 1. From 1930 until their removal in 1989, Fuel Farm 125 contained five 10,000-gallon underground fuel tanks which contained AVGAS, JP-4, JP-5, and MOGAS. The tanks had one end extended into an observation pit. From 1930 to 1960, condensate from each fuel tank was drained daily, via the extension, into the observation pit. It is estimated that approximately 450 gallons of waste fluid, containing water and fuel, were drained from each tank per year. In 1969, approximately 1,500 to 2,000 gallons of MOGAS were spilled. Most of the MOGAS was recovered, however an unknown amount drained into the sump at the bottom of the observation pit. Numerous other minor spills were reported; however, no estimate of the volume is available. These spills and the condensate disposal in the observation pit released organic contamination to soil and ground water at Site 13. The other tank farm accidentally was discovered in 1984 during installation of a steam pipe. It consisted of four 10,000-gallon gasoline tanks, which subsequently were removed, and the area was backfilled. The dates of operation of this tank farm are unavailable. Investigations of the site revealed organic-contaminated soil and ground water in the vicinity of Site 13. Ground water contamination at this site currently is being remediated through an interim action documented in a 1992 ROD. Previous 1991 and 1992 RODs addressed OUs 1, 2, 3, and 4, and 5, 6, and 7, respectively. This ROD addresses soil contamination at Site 13, as OU23. Other 1993 RODs address OUs 8, 9, 10, 11, 12, 13, 14, 15, and 22. The primary contaminants of concern affecting the soil are VOCs, including xylenes; and other organics, including PAHs.

The selected remedial action for this site includes treating approximately 700 yd^3 of contaminated soil by installing and operating a soil vapor extraction system and treating the extracted vapor using carbon adsorption. The estimated present worth cost of this remedial action is $256,000, which includes an estimated annual O&M cost of $30,000 for 5 years.

PERFORMANCE STANDARDS OR GOALS:

Chemical-specific cleanup goals were not provided; however, the soil will be treated to meet the State's soil cleanup criteria (SCC) or risk-based levels, whichever is more stringent.

ROD FACT SHEET

SITE

Name :	NAWC Lakehurst
Location/State :	Lakehurst, New Jersey
EPA Region :	II
HRS Score (date):	49.48 (July 22, 1987)

ROD

Date Signed:	September 27, 1993
Remedy:	Soil Vapor Extraction
Operating Unit Number:	OU-23 (Site 13)
Capital cost:	112,000
Construction Completion:	December, 1994
O & M in 1995:	$30,000 (.909)
1996:	$30,000 (.826)
1997:	$30,000 (.751)
1998:	$30,000 (.683)
1999:	$30,000 (.621)
Present worth:	$256,000

LEAD

Enforcement	
Federal Facility	
Primary contact	Jeffrey Gratz (212) 264-6667
Secondary contact	Robert Wing (212) 264-8670
Main PRP	U.S. Navy
PRP Contact	Lucy Bottomley (908) 323-2612

WASTE

Type	Petroleum, light fraction
Medium	Soil
Origin	Spills
Est. quantity	700 cubic yards

LAKEHURST

RECORD OF DECISION FOR SITE 13

OU-23

NAVAL AIR WARFARE CENTER AIRCRAFT DIVISION LAKEHURST, NEW JERSEY September 14, 1993

RECORD OF DECISION
DECLARATION
SITE 13
NAVAL AIR WARFARE CENTER
AIRCRAFT DIVISION
LAKEHURST, NEW JERSEY

FACILITY NAME AND LOCATION

Naval Air Warfare Center
Aircraft Division
Lakehurst, New Jersey 08733

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for one site (Site 13) , located at the Naval Air Warfare Center, Aircraft Division (NAWCADLKE) in Lakehurst, New Jersey (Figure 1). The selected remedial action was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision is based on the Administrative Record for these sites, which is available for public review at the Ocean County Library, 101 Washington Street, Toms River, New Jersey.

Both the United States Environmental Protection Agency (USEPA), Region II Acting Administrator, and the Commissioner of the New Jersey Department of Environmental Protection and Energy (NJDEPE) concur with the selected remedy.

DESCRIPTION OF THE SELECTED REMEDY

The United States Department of the Navy, the lead agency for this Site, has selected In-Situ Vapor Extraction as the selected remedy for Site 13. Implementation of this alternative entails extracting contaminants from the subsurface soils in vapor phase. The subsurface soil will be remediated to risk based levels,and the New Jersey soil clean up criteria.

It should be noted that this Record of Decision (ROD) addresses only Site 13 and it is not intended to represent the remedial action status for other areas of concern at NAWCADLKE. Each site's conditions and concerns have been or will be addressed in separate RODs. Ground water contamination at this site is currently being remediated through an interim action documented in a previous ROD.

DECLARATION STATEMENT

The United States Department of the Navy has determined that remedial action is necessary at Site 13 to ensure protection of human health and the environment.

This Record of Decision addresses Site 13. Other areas of concern at NAWCADLKE have been or will be the subject of separate Records of Decision. The location of this Site within NAWCADLKE is shown in Figures 1 and 2.

Captain Leroy Farr Commanding Officer Naval Air Warfare Center Aircraft Division Lakehurst, New Jersey	13 SEP 93 (Date)

With the concurrence of:

William J. Muszynski, P.E. Acting Regional Administrator U.S. Environmental Protection Agency, Region II	9/27/93 (Date)

SITE DESCRIPTION

NAWCADLKE is located in Jackson and Manchester Townships, Ocean County, New Jersey, approximately 14 miles inland from the Atlantic Ocean (Figure 1). NAWCADLKE is approximately 7,400 acres and is bordered by Route 547 to the east, the Fort Dix Military Reservation to the west, woodland to the north (portions of which are within Colliers Mills Wildlife Management Area), Lakehurst Borough and woodland, including the Manchester Wildlife Management Area, to the south. NAWCADLKE and the surrounding area are located within the Pinelands National Reserve, the most extensive undeveloped land tract of the Middle Atlantic Seaboard. The groundwater at NAWCADLKE is classified by NJDEPE as Class I-PL (Pinelands).

NAWCADLKE lies within the Outer Coastal Plain physiographic province, which is characterized by gently rolling terrain with minimal relief. Surface elevations within NAWCADLKE range from a low of approximately 60 feet above mean sea level in the east central part of the base, to a high of approximately 190 feet above mean sea level in the southwestern part of the base. Maximum relief occurs in the southwestern part of the base because of its proximity to the more rolling terrain of the Inner Coastal Plain. Surface slopes are generally less than five percent.

NAWCADLKE lies within the Toms River Drainage Basin. The basin is relatively small (191 square miles) and the residence time for surface drainage waters is short. Drainage from NAWCADLKE discharges to the Ridgeway Branch to the north and to the Black and Union Branches to the south. All three streams discharge into the Toms River. Several headwater tributaries to these branches originate at NAWCADLKE. Northern tributaries to the Ridgeway Branch include the Elisha, Success, Harris and Obhanan Ridgeway Branches. The southern tributaries to the Black and Union Branches include the North Ruckles and Middle Ruckles Branches and Manapaqua Brook. The Ridgeway and Union Branches then feed Pine Lake; located approximately 2.5 miles east of NAWCADLKE before joining Toms River. Storm drainage from NAWCADLKE is divided between the north and south, discharging into the Ridgeway Branch and Union Branch, respectively. The Paint Branch, located in the east-central part of the base, is a relatively small stream which feeds the Manapaqua Brook.

Three small water bodies are located in the western portion of NAWCADLKE: Bass Lake, Clubhouse Lake, and Pickerel Pond. NAWCADLKE also contains over 1,300 acres of flood-prone areas, occurring primarily in the south-central part of the base, and approximately 1,300 acres of prime agricultural land in the western portion of the base.

There are 913 acres on the eastern portion of NAWCADLKE that lie within Manchester Township and the remaining acreage is in Jackson Township. The combined population of Lakehurst Borough, Manchester and Jackson Townships, is approximately 65,400, for an area of approximately 185 square miles. The average population density of Manchester and Jackson Townships is 169 persons per square mile.

The areas surrounding NAWCADLKE are, in general, not heavily developed. The closest commercial area is located near the southeastern section of the facility in the borough of Lakehurst. This is primarily a residential area with some shops but no industry. To the north and south are State wildlife management areas which are essentially undeveloped. Adjacent to and south of NAWCADLKE are commercial cranberry bogs, the drainage from which crosses the southeast section of NAWCADLKE property.

For the combined area of Manchester and Jackson Townships, approximately 41 percent of the land is vacant (undeveloped), 57 percent is residential, one percent is commercial and the remaining one percent is industrial or farmed. For Lakehurst Borough, 83 percent of the land is residential, 11 percent is vacant, and the remaining 6 percent commercially developed.

In the vicinity of NAWCADLKE, water is generally supplied to the populace by municipal supply wells. Some private wells exist, but these are used primarily for irrigation and not as a source of drinking water. In Lakehurst Borough there is a well field consisting of seven 50-foot deep wells, located approximately two-thirds of a mile south of the eastern portion of NAWCADLKE. Three of the seven wells (four of the wells are rarely operated) are pumped at an average rate of 70 to 90 gallons per minute and supply drinking water for a population of approximately 3,000. Jackson Township operates one supply well in the Legler area, approximately one-quarter mile north of NAWCADLKE, which supplies water to a very small population (probably less than 1,000) in the immediate vicinity of NAWCADLKE.

The history of the site dates back to 1916, when the Eddystone Chemical Company leased from the Manchester Land Development Company property to develop an experimental firing range for the testing of chemical artillery shells. In 1919, the U.S. Army assumed control of the site and named it Camp Kendrick. Camp Kendrick was turned over to the Navy and formally commissioned Naval Air Station (NAS) Lakehurst, New Jersey on June 28, 1921. The Naval Air Engineering Center (NAEC) was moved from the Naval Base, Philadelphia to Lakehurst in December 1974. At that time, NAEC became the host activity, thus, the new name NAEC. In January 1992, NAEC was renamed the Naval Air Warfare Center Aircraft Division Lakehurst, due to a reorganization within the Department of the Navy.

Currently, NAWCADLKE's mission is to conduct programs of technology development, engineering, developmental evaluation and verification, systems integration, limited manufacturing, procurement, integrated logistic support management, and fleet engineering support for Aircraft-Platform Interface (API) systems. This includes terminal guidance, recovery, handling, propulsion support, avionics support, servicing and maintenance, aircraft/weapons/ship compatibility, and takeoff. The Center provides, operates, and maintains product evaluation and verification sites, aviation and other facilities, and support services (including development of equipment and instrumentation) for API systems and other Department of Defense programs. The Center also provides facilities and support services for tenant activities and units as designed by appropriate authority.

NAWCADLKE and its tenant activities now occupy more than 300 buildings, built between 1919 and 1989, totaling over 2,845,000 square feet. The command also operates and maintains: two 5,000-foot long runways, a 12,000-foot long test runway, one-mile long jet car test track, four one and one-quarter mile long jet car test tracks, a parachute jump circle, a 79-acre golf course, and a 3,500-acre conservation area.

In the past, the various operations and activities at the Center required the use, handling, storage and occasionally the on-site disposal of hazardous substances. During the operational period of the facility, there have been documented, reported or suspected releases of these substances into the environment.

INITIAL INVESTIGATIONS

As part of the DOD Installation Restoration Program and the Navy Assessment and Control of Installation Pollutants (NACIP) program, an initial Assessment Study was conducted in 1983 to identify and assess sites posing a potential threat to human health or the environment due to contamination from past hazardous materials operations.

Based on information from historical records, aerial photographs, field inspections, and personnel interviews, the study identified a total of 44 potentially contaminated sites. An additional site, Bomarc, was also investigated by NAWCADLKE. The Bomarc Site is the responsibility of the U.S. Air Force and is located on Fort Dix adjacent to the western portion of NAWCADLKE. A Remedial Investigation (RI) was recommended to confirm or deny the existence of the suspected contamination and to quantify the extent of any problems which may exist. Following further review of available data by Navy personnel, it was decided that 42 of the 44 sites should be included in the Remedial Investigation. Two potentially contaminated sites, an ordnance site (Site 41) and an Advanced Underground Storage Facility (Site 43), were deleted from the Remedial Investigation because they had already been addressed. In 1987 NAWCADLKE was designated as a National Priorities List (NPL) or Superfund site under the federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

STATUTORY DETERMINATIONS

NJDEPE Soil Cleanup Criteria (SCC) were utilized as guidance for the cleanup of soil at Site 13. NJDEPE SCC includes soil cleanup levels for residential and non-residential direct contact scenarios and separate impact to ground water soil cleanup criteria for the protection of ground water. A brief discussion of the criteria follows.

NJDEPE SCCs:

The NJDEPE soil cleanup criteria are To Be Considered (TBC) criteria for determining the need for site cleanup. Although the NJDEPE soil cleanup criteria are not promulgated requirements, these criteria are considered an appropriate means by which to assess the risk to human health and the environment posed by contaminants found in soil. Therefore, NAWCADLKE has been determining the need for site cleanup based upon NJDEPE SCC as well as EPA risk-based levels and other factors, such as aiding the effectiveness and duration of existing groundwater remediation systems.

The cleanup criteria provide health based levels for residential use, non-residential use and impact to groundwater (subsurface) land uses and/or impacts. NAWCADLKE has assumed a non-residential land use due to its mission and facilities is support of Naval aviation. Due to our location in the Pinelands National Preserve (Class I-PL (Pinelands)) and the shallow groundwater table, the most stringent of the surface and subsurface (impact to groundwater) non-residential cleanup criteria have been utilized in our site comparisons.

To satisfy the requirement for establishing EPA risk-based clean-up criteria, an Endangerment Assessment was performed in October 1992 which included calculated Preliminary Remedial Goals or PRGs. The PRGs are chemical specific criteria which were developed using fate and transport and the exposure equations associated with the relevant pathways. The PRGs determined by calculation the contaminant concentrations in affected media that would result in acceptable exposure levels. PRGs were developed for each site based upon one or more (current or potential) land-use scenarios. Typically the NJDEPE SCC are more stringent than the calculated PRGs. With this in mind, the SCC are also considered preliminary clean-up goals at those sites at the NAWCADLKE facility which are determined to require active remediation.

ENVIRONMENTAL INVESTIGATIONS

Phase I of the Remedial Investigation (RI-Phase I) was conducted from 1985 to 1987 to (a) confirm or refute the existence of contamination at potentially contaminated sites identified during previous studies; and (b) develop recommendations for further Phase II investigations. The results of the RI-Phase I were presented in a report issued in 1987.

Phase II of the RI was initiated in the summer of 1988 to: (a) confirm the results of the Phase I study, specifically the presence or absence of contamination; (b) identify where contamination is located; (c) assess the potential for contaminant migration; (d) define the sources of contamination; and (e) support a feasibility study and final actions at the sites. Based on the results of the Phase II investigation, several remedial actions were initiated.

Phase III of the RI was initiated in the summer of 1991 to: (a) confirm the presence or absence of contamination at sites where the results of previous investigations were not definitive; (b) delineate the lateral and vertical extent of contamination; (c) collect and evaluate data to perform a risk assessment and assess the need for remedial action at sites.

These investigations indicated that contamination is present at levels of concern for impact to groundwater at Site 13.

It should be noted that the NJDEPE Soil Cleanup Criteria (SCC), as well as EPA risk based NAWCADLKE Preliminary Remediation Goals (PRGs), were utilized as guidance for the cleanup of soil at Site 13. NJDEPE SCC includes cleanup levels for residential and non-residential direct contact scenarios, and separate impact to groundwater soil cleanup criteria for the protection of groundwater.

Site 13: Site Description and Background

Site 13 includes the former Fuel Farm No. 125 and a former tank farm located in Area B on the north side of Hangar 1 (Figure 2). Fuel Farm 125 originally contained five 10,000 gallon underground fuel tanks which contained AVGAS, JP-4, JP-5, and MOGAS from 1930 until their removal in April 1989. This removal was performed under the direction of NAWCADLKE. The tanks were filled via an underground fuel line running from the railroad tracks on the east side of Hangar 1. Fuel lines also ran from the fuel farm into Hangar 1 so that blimps could be fueled inside the hangar. The tanks had one end extended into an observation pit. From 1930 until approximately 1960, it was common practice to drain the condensate from each fuel tank daily, into the observation pit. This produced an estimated 1.25 gallons of waste fluid, which consisted of water and fuel, per day. It is estimated that 450 gallons of waste fluid was drained from each of the five tanks each year.

In 1969, a major MOGAS spill occurred in which approximately 1,500 to 2,000 gallons were released. According to personnel interviewed, most of the MOGAS was recovered. The spill was contained in the observation pit, although an unknown amount drained into the sump at the pit bottom. Numerous other minor spills have been reported at the site, however no estimate of the volume is available.

A second tank farm was located fifty yards to the east of fuel farm 125. This tank farm consisted of four 10,000 gallon gasoline tanks. These tanks were found by accident in 1984 during a steam pipe installation. The tanks were subsequently removed and the area was back filled.

Site 13: Summary of Remedial Investigation

During Phase II of the RI, two soil borings were drilled at the site and two samples were collected from each boring. In both borings, targeted contaminants were only detected in the deeper samples (S13-2 and S13-4) collected from a depth of 32 to 34 feet, and not in the shallower samples (S13-1 and S13-3) collected at 4 to 9 feet (Figure 4). This result is consistent with the fact that the volume of space that was occupied by the tanks in both the fuel farm 125 and the tank farm were back filled with clean soil.

Soil contamination in both borings consisted of high levels of VOCs and minimal levels of PAHs. High levels of petroleum hydrocarbons were only detected in S13-2. During the Phase III of the RI, two additional soil borings were drilled at the site, SB13-2, at the location of the former fuel farm 125, and SB13-1, approximately 150 feet east of SB13-2 (Figure 4), at the location of the former tank farm. The borings were drilled to depths of 32 and 40 feet and two samples were collected for analysis from each boring. The results from the analysis of boring SB13-2 confirmed the findings of Phase II, that the soil at Site 13 is contaminated with fuel components, at depths from about 25 feet below the ground surface to below the water table, at the location of fuel farm 125. The findings of SB13-1 did not confirm the presence of contamination at the former tank farm. The soil above approximately 25 feet does not appear to be contaminated. The lateral extent of the deep soil contamination appears to be limited to the immediate area of former Fuel Farm 125.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Proposed Plan for Site 13 was issued to interested parties on June 7, 1993. On June 16 and 17, 1993, a newspaper notification inviting public comment on the Proposed Plan appeared in The Asbury Park Press and The Ocean County Observer. On June 18, 1993 a notification also appeared in The Air Scoop, the Center's weekly publication. The comment period was held from June 21, 1993 to July 21, 1993. The newspaper notification also identified the Ocean County Library as the location of the Information Repository.

A Public Meeting was held on June 30, 1993 at the Manchester Branch of the Ocean County Library at 7:00 p.m. At this meeting representatives from the Navy, USEPA and NJDEPE were available to answer questions about the Site, and the preferred alternative. A list of attendees is attached to this Record of Decision as Appendix A. Comments received and responses provided during the public hearing are included in the Responsiveness Summary, which is part of this Record of Decision. No written comments were received during the public comment period. A transcript of the meeting is available as part of the Administrative Record.

The decision document presents the selected action (i.e., In Situ Vapor Extraction) for Site 13 of NAWCADLKE in Ocean County, New Jersey, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan (NCP). The decision for the Site is based on the information contained in the Administrative Record, which is available for public review at the Ocean County Library, 101 Washington Street, Toms River, New Jersey.

SCOPE AND ROLE OF RESPONSE ACTION

The FFS for Site 13 evaluates several possible alternatives for remediating the sites and this ROD identifies the Preferred Alternative for remediating the Site contamination. The Remedial Action Objective (RAO) of the remedy is to prevent further contamination of the ground water from leaching of the contaminants from the soil.

SUMMARIES OF SITE CHARACTERISTICS

The location of the site within NAWCADLKE is shown in Figures 1 and 2. A map of the site is provided in Figure 3.

Summaries of the chemicals detected in the analyses of soil samples collected at the site are provided in Table 1.

The results of the Remedial Investigations, including the analytical data summarized in Table 1, indicate that soil conditions at Site 13 pose no unacceptable risks to human health and/or the environment. However in order to expedite remediation of the ground water in Area B, vapor extraction will be completed at this Site.

SUMMARY OF SITE ENDANGERMENT ASSESSMENT

The Endangerment Assessment (EA) process was performed at NAWCADLKE to assess the potential current and future human health risks and potential environmental impacts posed by contaminated soil detected during past site investigations.

This is a summary of the Endangerment Assessment for Site 13 (Former Fuel Farm No. 125 and former tank farm). The assessment of this site was conducted using all available data generated during previous remedial investigations (RI). The media that was the subject of the site specific EA is soil.

For Site 13 the EA Findings Summary is a summary of the complete assessment, which is documented in the Endangerment Assessment. The EA is part of the NAWCADLKE Administrative Record.

CONTAMINANTS OF CONCERN

For soil, the organic COCs include total petroleum hydrocarbons (TPHC), xylene, ethylbenzene, and naphthalene. For inorganic parameters, there were no COCs.

LAND USE AND EXPOSURE ASSUMPTIONS

Four different scenarios representing current and potential future land uses were evaluated to assess applicability to the site. Evaluated scenarios included military, light industrial, construction and residential land uses. For each of these scenarios, human exposure is effected by mechanisms that include direct contact, inhalation and ingestion.

For soil, data used to calculate human health risk for Site 13 were the most contaminated samples which were collected at depths of 25 to 40 feet below the ground surface. For this reason, soil exposure scenarios involving direct exposure to surface soil are not applicable. Rather, a hypothetical construction scenario involving direct exposure to subsurface soils was assumed.

HUMAN HEALTH RISK AND HAZARD FINDINGS

For soil, the results of the EA for contaminated subsurface soil at Site 13 indicate that hazards resulting from noncarcinogens are not elevated for any chemical above EPA's hazard index criteria value of 1.0. The hazard index values have a single contaminant maximum of 0.00197. Similarly, the overall site soil hazard represented by the hazard quotient or sum of the chemical-specific hazard indices also does not exceed a value of 1.0. The overall hazard quotient estimated for soil is 0.00368. None of the soil contaminants of concern at this site are currently classified by EPA as potential human carcinogens and hence, carcinogenic risk estimates are not presented for the site soils.

These risk findings are qualified by noting the absence of EPA approved indices of toxicity for TPHC. For this reason, TPHC results do not contribute to the overall noncarcinogenic hazards posed by the site. Nevertheless, TPHC concentrations of up to 8,700 mg/kg (parts per million) were detected in soil at the site.

SUMMARY

In summary, the EA demonstrates that direct contact with subsurface soil at Site 13 does not pose elevated carcinogenic risks or noncarcinogenic hazards. However, in consideration of the fact that contaminants detected in soil represent a continuing source of BTEX contamination in groundwater at, and down gradient from Site 13, it is prudent to further consider the need for treatment of soils at Site 13.

Summary of Remedial Alternatives

Under CERCLA the remedial alternative selected must protect both human health and the environment, be cost effective, and comply with statutory requirements. Permanent solutions to contamination problems are to be achieved wherever possible. All of the remedial alternatives applicable to Site 13, as discussed in more detail in the FFS, are summarized below.

ALTERNATIVE 1: No Action

Estimated Construction Cost:	$ 0
Estimated Net O&M Cost:	$ 0

This alternative involves no additional actions at the site. No contaminants would be treated or contained and the existing health and environmental risks would remain. No further action to control the potential release of contaminants into the ground water would be taken.

ALTERNATIVE 2: Groundwater Monitoring

Estimated Construction Cost:	$0
Estimated Net O&M Cost:	$60,000 per year
Estimated Present Worth:	$630,000

This alternative would provide no reduction in risk to human health or the environment or reduce contamination at the site. Long term monitoring of the site can be accomplished by using existing monitoring wells utilizing personnel skilled in sampling. This alternative would allow the natural attenuation process to continue. The monitoring would be performed quarterly for thirty years. If contamination levels started to rise an active form of remediation may have to be pursued.

ALTERNATIVE 3: Soil Capping and Ground Water Monitoring

Estimated Construction Cost:	$58,000-178,000
Estimated Net O&M Cost:	$60,000-70,000
Estimated Present Worth:	$664,000

This alternative would act as a source control action by minimizing the infiltration of precipitation into the contaminated soil, thus reducing the amount of leachate. Prior to capping fill would be required to establish a 3 to 5 percent grade over the area. The fill material can be obtained at the center and would be spread and compacted with 6-inch lifts to provide uniform support for the cap and to minimize settlement. Maintenance and monitoring of this alternative would include inspection of the cap to detect signs of erosion or settlement. Since the contamination would still be present at the site ground water monitoring would still have to be performed down gradient of the site. The monitoring would be performed quarterly for thirty years.

ALTERNATIVE 4: In-Situ Vitrification

Estimated Construction Cost:	$475,000
Estimated Net O&M Cost:	$75,000
Estimated Present Worth:	$1,244,000

This alternative consists of a technology which is a permanent control of the contamination source by destroying or immobilizing contaminants, and generating a stable crystalline mass using electricity. The volume to be vitrified for this site would be 126,000 cubic feet. The selected electrode spacing would be the standard 15 foot by 15 foot square array and the electrodes would be put in using standard drilling techniques.

An off-gas hood would provide confinement for any gases that are released during the vitrification process. The system requirements would depend on the size of the site and the moisture content of the soil. The two factors that can affect power draw during vitrification are buried metals and water. High soil moisture content significantly increases the power needed for this process. Neither of these two conditions exist at Site 13.

It is estimated that the run time for the process would be 1500 hours or roughly 63 days. This estimate is based on soil moisture of 5 percent, low heat loss through the surface and a 15 foot electrode spacing.

Following vitrification the area would have to be filled with clean soil due to the 25 to 30 percent volume loss due to the increase of the density of the mass from the process. In addition, ground water monitoring would have to be accomplished to ensure the site would pose no future risks.

ALTERNATIVE 5: In-Situ Vapor Extraction

Estimated Construction Cost:	$112,000
Estimated Net O&M Cost:	$30,000
Estimated Present Worth:	$256,000

This alternative reduces the volume of contaminants by extracting the volatile and semi volatile organic compounds from the soil. A secondary benefit of this alternative is the enhanced biodegradation of contaminants which typically occurs when additional oxygen is made available to subsurface microorganisms. The volume of the contaminants will be reduced because they are removed and collected. The mobility of the contaminants in the soil is also reduced by their removal. The vapor extraction process is as follows: Extraction wells are placed in a grid type pattern throughout the site. Air vacuum pumps are attached to the wells. Air is drawn through the soil into the wells by the pumps. The discharge of air is blown through activated carbon filters to draw off the contaminants. Operation of this system should remove the contaminants within two years based upon estimates for other sites. Maintenance for this system will be basic pump maintenance and changing of the carbon filters as required. Vapor analysis will be conducted, to determine when the contamination has been reduced to acceptable levels.

ALTERNATE 6: In-Situ Bioremediation

Estimated Construction Cost:	$45,000
Estimated Net O&M Cost:	$71,000
Estimated Present Worth:	$786,000

This alternative produces a reduction of volume of contaminants by the introduction of micro-organisms which use the volatile and semi-volatile compounds for sustenance. The bacteria would survive on the pollution compounds alone, producing harmless waste products, such as water and CO_2. The process is started by installing several injection wells. The microbes are then injected into the ground along with a nutrient rich formula. The microbes are monitored by periodic sampling to ensure their continued growth The remediation effort could be enhance by adding a recovery system and continually drawing the microbes through the soil.

Evaluation of Alternatives

During the detailed evaluation of remedial alternatives, each alternative is assessed against the nine evaluation criteria, which are summarized below.

Overall Protection of Human Health and the Environment draws on the assessments conducted under the other evaluation criteria and considers how the alternative addresses site risks through treatment, engineering, or institutional controls.

Compliance with ARARs evaluates the ability of an alternative to meet Applicable or Relevant and Appropriate Requirements (ARARs), and/or provides the basis for a waiver.

Long Term Effectiveness and Permanence evaluates the ability of an alternative to provide long term protection of human health and the environment and the magnitude of residual risk posed by untreated waste or treatment residuals.

Reduction of Toxicity, Mobility or Volume Through Treatment evaluates an alternatives ability to reduce risks through treatment technology.

Short Term Effectiveness addresses the cleanup time frame and any adverse impacts posed by the alternative during the construction and implementation phase until cleanup goals are achieved.

Implementability is an evaluation of the technical feasibility, administrative feasibility and availability of services and material required to implement the alternatives.

Cost includes an evaluation of capital costs, annual operation and maintenance (O&M) costs, and net present worth costs.

Agency Acceptance indicates the EPA's and States response to the alternatives in terms of technical and administrative issues and concerns.

Community Acceptance indicates the response of the community to the alternatives.

This section will compare all of the alternatives for Site 13 using the nine criteria outlined above.

ALTERNATIVE 1: NO ACTION
ALTERNATIVE 2: GROUND WATER MONITORING
ALTERNATIVE 3: CAPPING AND GROUND WATER MONITORING
ALTERNATIVE 4: IN-SITU VITRIFICATION
ALTERNATIVE 5: IN-SITU VAPOR EXTRACTION
ALTERNATIVE 6: IN-SITU BIOREMEDIATION

Overall Protection of Human Health

Alternatives 1 and 2 provide no protection to human health or the environment. Alternative 3 would reduce risk at the site; but since contaminated soil would be left in place, there would still be some risk at the site. Alternatives 4 and 5 and 6 provide the most protection because they are in-situ alternatives which eliminate or immobilize the contamination at the site.

Compliance with ARARs

Alternatives 1, 2 and 3 will not reduce the concentration of contaminants leaching into ground water and therefore will not aid in reducing contamination concentration in groundwater to below chemical specific groundwater ARARs. Alternatives 4, 5, and 6 will achieve chemical specific groundwater protection ARARs.

Long Term Effectiveness and Permanence

Alternatives 1 and 2 offer no effectiveness or permanence. Alternative 3 would provide protection. Alternatives 4 and 5 and 6 provide permanent long term protection by totally removing, or destroying all contaminants at the site.

Reduction of Toxicity, or Volume through Treatment

Alternatives 1 and 2 do not actively reduce toxicity, or volume of contamination. Alternative 3 has no effect on toxicity or volume. Alternative 4 reduces toxicity, and volume by destroying all contaminants. Alternative 5 reduces volume, and toxicity by removing the contaminants from the soil in a short amount of time. Alternative 6 is fair at reducing toxicity and volume of contaminants.

Short Term Effectiveness

Alternatives 1 and 2 do not change any short term risks that are presently at the site. Alternative 3 could be implemented rather quickly therefore rapidly reducing risk at the site. Alternative 4 would take some time to implement (1-2 years) therefore having a low effectiveness over the short term. Alternative 5 could be implemented quickly and the reduction of risk would start concurrently with the start of the system. Alternative 6 would take the longest (possibly years) to show some reduction in risks associated with the contamination and therefore would not have any short term effective.

Implementability

Alternative 2 is easily implemented and would require short set-up time. Alternative 3 would take approximately six months to implement. Alternative 4 is also a viable alternative, however the time required to complete the remediation will be approximately one to two years. Alternative 4 would require pilot studies. Alternative 5 is easily implemented and remediation results will begin to occur immediately. Alternate 6 is implementable however the time required for remediation to be completed may be prohibitive.

Cost
Alternative 5 has the least expense and will remove contamination. Alternatives 2 and 3 have medium cost but do not remove contamination and must be operated over a thirty year life. Alternative 6 has medium cost and removes contamination. Alternative 4 has high cost but will remediate the site.

Alternative 1:	$0
Alternative 2:	$630,000
Alternative 3:	$665,000
Alternative 4:	$1,243,000
Alternative 5:	$256,000
Alternative 6:	$786,000

State Acceptance
The State of New Jersey concurs with the selected remedial action.

Community Acceptance
All public questions were answered during the public meeting. No written comments were submitted for this Site.

THE SELECTED ALTERNATIVE

The selected action for Site 13 is alternative number 5, In-Situ Vapor Extraction. Implementing this alternative would entail installing several vapor extraction wells at the site. A system of manifolded piping would connect the wells to a vacuum pump. The vacuum pump would draw air through the soil and into the wells. This air, which would now contain the volatile organic compounds present in the soil, would be passed through a carbon adsorption unit to remove the volatile compounds.

Based upon the information provided in the RI and FFS , soils at Site 13 do not pose a significant threat to human health and the environment. However, contamination present in the soil may be a continuing source of groundwater contamination if it is not remediated. Groundwater contamination at Site 13 is currently being remediated through an action initiated in late summer, 1993. Through the selected remedial action of vapor extraction, the compounds presently impacting ground water quality would be removed, enhancing the effectiveness of the Areas A & B groundwater treatment system, thereby eliminating public health concerns.

The emissions from the vacuum extraction unit would be addressed by a carbon adsorption treatment system.

This alternative is expected to satisfy the Remedial Action Objective. This alternative will take approximately one year to complete installation. The expected time required to remove the contamination by this method is approximately two years. The operation of the vapor extraction system will be continued until no further significant contaminant level reduction is achieved. This alternative is the most cost effective of all of the action alternatives.