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Superfund Record of Decision:

Naval Air Engineering Center (Operable Unit 11), NJ

50272-101

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16. Abstract (Limit: 200 words)

The Naval Air Engineering Center (Operable Unit 11) 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 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

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Naval Air Engineering Center (Operable Unit 11), NJ
Eleventh Remedial Action
Contaminated Media: soil, sediment
Key Contaminants: VOCs (benzene, PCE, TCE, toluene, xylenes), other organics (oils, PAHs, pesticides), metals (lead)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 24
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(See ANSI-Z39.18) *See Instructions on Reverse* OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

Abstract (Continued)

required the use, handling, storage, and occasional onsite disposal of hazardous substances. During the operational period of the facility, there have been reported and suspected improper 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 revealed soil and ground water contamination at the old fire fighting training area (Site 14). From the 1920s or 1950s to 1980, a mixture of flammable materials, including solvents, AVGAS, and JP fuels were placed and ignited into two 20 by 40 foot fire fighting training pits. Although much of the material burned, a significant quantity may have leached into the subsurface. An estimated 10,000 gallons of flammable material was burned each year; possibly totalling 600,000 gallons of mixed flammable waste fuels. The site also consists of a wetlands area downhill from the site to where the overflow from the fire pits drained, causing contamination of the sediment. Sediment samples collected during phase investigations revealed high levels of VOCs, SVOCs, and TPH in the onsite soil and sediment. Two RODs signed in 1991 and 1992 addressed OUs 1, 2, 3, and 4, and 5, 6, and 7, respectively. This ROD addresses the contaminated soil and sediment for Site 14, as OU11. A 1992 ROD addressed an interim remedy to recover and treat the contaminated ground water, as OU7. Other 1993 RODs address OUs 8, 9, 10, 12, 13, 14, 15, 22, and 23. The primary contaminants of concern affecting the soil and sediment are VOCs, including benzene, PCE, TCE, toluene, and xylenes; other organics, including oils, PAHs, and pesticides; and metals, including lead.

The selected remedial action for this site includes excavating, analyzing, and sorting approximately 1,200 yd^3 of contaminated soil and 75 yd^3 of contaminated sediment; disposing of soil and sediment with a TPH concentration greater than 30,000 mg/kg offsite in a hazardous waste treatment and disposal facility; conducting onsite recycling of the remaining soil and sediment into cold mix asphalt or conducting offsite recycling into hot batch asphalt; shipping offsite or containerizing onsite the petroleum-contaminated soil and sediment; backfilling the excavated areas with clean fill, as necessary; and sampling to determine that the site meets remediation goals. The estimated present worth cost for this site is $124,000.

PERFORMANCE STANDARDS OR GOALS:

Soil and sediment cleanup goals are based on State soil cleanup goals, To Be Considered (TBC) criteria, EPA risk-based levels, and National Oceanic and Atmospheric Administration (NOAA) sediment quality criteria. Chemical-specific cleanup goals were not provided; however, a soil and sediment excavation goal of TPH 30,000 mg/kg will be used to further segregate and dispose of the contaminated source material at a hazardous waste treatment and disposal facility.

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:	Asphalt Batching and Offsite Disposal
Operating Unit Number:	OU-11 (Site 14)
Capital cost:	$124,000
Construction Completion:	December, 1994
O & M in 1993:	
1994:	
1995:	
1996:	
Present worth:	$124,000 (no O & M)

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 Hydrocarbons
Medium	Soil and Sediment
Origin	Fire training exercises, spills
Est. quantity	Several hundred cubic yards

NAWC
Aircraft Division
NAVAL AIR WARFARE CENTER
LAKEHURST

RECORD OF DECISION
FOR
SITE 14

OU-11

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

NAVAL AIR WARFARE CENTER • ENVIRONMENTAL MANAGEMENT • LAKEHURST, NJ

93-09-10

RECORD OF DECISION
DECLARATION
SITE 14
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 14), located at the Naval Air Warfare Center, Aircraft Division (NAWCADLKE) in Lakehurst, New Jersey (Figures 1 and 2). 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 Excavation with On Site Recycling and Off Site Disposal as the selected remedy for Site 14. Implementation of this alternative entails excavating contaminated soil and sediment from the site, that is above EPA risk based levels or the New Jersey soil clean up criteria.

It should be noted that this Record of Decision (ROD) addresses only Site 14 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 14 to ensure protection of human health and the environment.

This Record of Decision addresses Site 14. Other areas of concern at NAWCADLKE have been or will be the subject of separate studies and Records of Decision. The locations of this Site within NAWCADLKE is shown in Figures 1, 2 and 3.

13 SEP 93

Captain Leroy Farr
Commanding Officer
Naval Air Warfare Center
Aircraft Division
Lakehurst, New Jersey

(Date)

With the concurrence of:

9/27/93

William J. Muszynski, P.E.
Acting Regional Administrator
U.S. Environmental Protection Agency,
Region II

(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 Mill 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 2,845,00 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 14. 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. The National Oceanic and Atmospheric Administration (NOAA) guidance for sediment was used as a screening aid to determine ecological risk. A brief discussion of each of the criteria follows.

NJDEPE SCCs:

The NJDEPE soil cleanup criteria are To Be Considered (TBC) criteria for determining 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 the NAWCADLKE facility which are determined to require active remediation.

NOAA

Since no chemical specific ARARs exist for sediment contamination, the National Oceanic and Atmospheric Administration (NOAA) sediment quality criteria have been utilized at NAWCADLKE as TBC cleanup criteria for sediment. These criteria are provided in the 1990 report, "The Potential for Biological Effects of Sediment-sorbed Contaminants Tested in the National Status and Trends Program".

This report assembled and reviewed currently available information in which estimates of the sediment concentrations of chemicals associated with adverse biological effects have been determined or could be derived. The biological data for each compound was statistically calculated. An Effects Range-Low (ER-L), a concentration at the low end of the range in which effects had been observed, and a Effects Range-Median (ER-M), a concentration approximately midway in the range of reported values associated with biological effects, were derived.

In a very qualitative sense, the ER-L value can be taken as a concentration above which adverse effects may begin or are predicted among sensitive life stages and/or species. The ER-M value is taken as a concentration above which effects were frequently or always observed or predicted among most species.

NAWCADLKE has utilized the chemical specific ER-L and ER-M values to determine the need for sediment remediation. Where values have generally exceeded ER-M, further evaluation, site visits, and contaminant specific literature searches have been conducted to refute or confirm the potential for existing or future adverse ecological effects. Site information and NOAA criteria have been weighed to determine if sediment remediation is advantageous or potentially destructive to the aquatic habitat (as may be the case with excavation of sediment).

For sediments requiring remediation, the NOAA criteria are considered preliminary clean-up goals. ARARs affecting the chosen remedial alternative for sediments include the Clean Water Act (40 CFR 404) which prohibit actions that may adversely impact a wetland unless no other alternatives are available, and the NJ Water Supply Management Act (NJAC 58:1A-1 et.seq.) which require permits for groundwater diversion during recovery operations. Other ARARs which may apply include the Endangered Species Act (16 USC 1531) where adverse impacts on endangered species or their habitats must be considered in the implementation of a remedial action.

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 significant contamination is present at levels of concern at Site 14.

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 and sediment at Site 14. 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. In addition, the National Oceanic and Atmospheric Administration screening levels were used as guidelines for the protection of aquatic life.

Site 14: Site Description and Background

Site 14, the old fire fighting training area, is located between the Construction Battalion (CB) compound and the Defense Reutilization and Marketing Office (DRMO) storage yard in the northeastern corner of the NAWCADLKE (Figure 2). The northern limit of the site borders the wetlands and the Ridgeway Branch is approximately 400 feet to the north. The water table at Site 14 is approximately 9 to 12 feet below the surface and the groundwater flow is to the north/northeast toward the wetlands and Ridgeway Branch.

The site contains two 20 by 40 foot fire fighting training pits, into which a mixture of flammable materials including solvents,

AVGAS, and JP fuels were placed and ignited. It is not known when the training began in this area. Reported estimates range from the 1920's to the 1950's and continued until 1980. Although much of the material burned, a significant quantity may have leached into the subsurface. It is estimated that 10,000 gallons of flammable materials were burned each year. Assuming the worst case of the area being in operation since 1920, as much as 600,000 gallons of mixed flammable waste fuels may have been burned.

The site also consists of a wetlands area downhill from the site to where the overflow from the fire pits drained. This caused contamination of the sediment. The lateral extent of the sediment contamination appears to be 150 feet long and 20 feet wide from the base of the steep embankment, down grade from site 14. The vertical extent of the sediment contamination is within the first foot of the surface.

Summary of Remedial Investigation

During the Phase II Investigation, five test pits were excavated at Site 14, to depths ranging from 3 to 5 feet. One soil sample was collected from each pit. The primary soil contaminants were Polycyclic Aromatic Hydrocarbons (PAH) and Total Petroleum Hydrocarbons (TPHC).

During the Phase III Investigation, four soil borings, SB14-1 through SB14-4, were drilled in the vicinity of Site 14 at depths ranging from 7 to 10 feet. Two samples were collected from each boring for chemical analysis. The highest levels of soil contamination were detected in boring SB14-1. Total targeted Volatile Organic Compounds (VOC) concentrations in the 2 to 4 foot and 8.5 to 10 foot samples were 24,550 and 154,000/109,300 ug/kg (duplicate samples), respectively. Ten volatile Tentatively Identified Compounds (TICs) were detected in each sample at total concentrations of 85,500 and 542,000/236,300 ug/kg, respectively. TPHC concentrations in the samples were 69,000 and 82,000/55,000 mg/kg, respectively. Contamination at levels exceeding the SCC in borings SB14-2 and SB14-3 were limited to TPHC and no contaminants were detected at concentrations exceeding the SCC in boring SB14-4.

Analysis of sediment samples collected during the Phase II Investigation from the groundwater seep down gradient from the site revealed high levels of semi-volatile organic compounds (SVOCs) and TPHC. Analysis of additional sediment samples collected during the Phase III Investigation confirmed these results. An additional sediment sample (SEDAE-2) was collected from the wetland area to the immediate north of Site 14 and approximately 150 feet west of the groundwater seep. Analysis of this sample revealed elevated levels of TPHC (88,000 mg/kg). See figure 3 for sample locations. All contaminants of concern for

sediment at Site 14 are listed in Table 1. The table compares the maximum detected level of each contaminant with the NOAA value. All contaminants of concern for soil at site 14 are listed in Table 2. The table compares the maximum detected level for each contaminant to the NJDEPE SCC and the Lakehurst Preliminary Remediation Goal (PRG) value, which is based upon the risk to human health.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Proposed Plan for Site 14 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., Excavation with On Site Recycling and Off Site Disposal) for Site 14 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 14 evaluates several possible alternatives for remediating the sites and this ROD identifies the Preferred Alternative for remediating the Site contamination. The Remedial Action Objectives (RAO) of the remedy are to:

1. Prevent further exposure of sensitive aquatic organisms and/or species to sediment contamination.

2. Prevent contamination of surface water due to leaching of contaminants from sediment.

3. Remediate soil and sediment as necessary to levels that are protective of human health and the environment.

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 and sediment samples collected at the Site are provided in Tables 1 and 2.

The results of the Remedial Investigations, including the analytical data summarized in Tables 1 and 2, indicate that soil conditions at Sites 14 pose no unacceptable risks to human health and/or the environment. However, in order to expedite remediation of the ground water at and around Site 14, excavation of the contaminated soils will be accomplished at this Site. The sediment at Site 14 poses risk to the environment, therefore a removal action will be performed.

SUMMARY OF ENDANGERMENT ASSESSMENT

An Endangerment Assessment (EA) conducted at NAWCADLKE to assess the potential current and future human health risks and potential environmental impacts posed by contaminated soils, groundwater, sediment and surface water detected during past and on-going site investigations.

More complete EA information for Site 14 can be found in Volume VI of the Phase III RI, which is available as part of the NAWCADLKE Administrative Record.

The groundwater at Site 14 is the subject of an interim remedial action to recover and treat groundwater. Therefore, groundwater is not further discussed within the following summary.

For Site 14, the summary will discuss (1) the chemicals identified by the EA as contaminants of concern (COCs), (2) the land use assumptions upon which estimates of potential human exposure to site contaminants are based, (3) the quantitative estimates of carcinogenic risk and noncarcinogenic hazard, (4) a summary of the ecological concerns at the site and, (5) a summary interpretation of the EA findings with regard to need for site

remediation.

CONTAMINANTS OF CONCERN

For soil, COCs included one metal, (lead) and various volatile and semi-volatile organic compounds. Volatile organic compounds included aromatic alkylbenzenes (ethylbenzene, toluene and xylenes) and chlorinated aliphatic compounds (including tetrachloroethene and trichloroethene). Semi-volatile organic compounds included PAHs (chrysene and 2-methylnaphthalene) and 4-methylphenol. Three pesticides (delta-BHC, 4,4'-DDD and 4,4'-DDT) and total petroleum hydrocarbons (TPHC) were determined to be COCs.

For sediment, polycyclic aromatic hydrocarbons (e.g., phenanthrene, fluoranthene), volatile organic compounds (benzene and 2-butanone), one pesticide (4,4'-DDD) and the metals potassium, lead, mercury, nickel and zinc were determined to be COCs.

For surface water, COCs included one volatile aromatic compound (benzene), two chlorinated aliphatic compounds (1,1-dichloroethane and 1,1-dichloroethene), one semi-volatile organic compound (4-methylphenol) and two pesticides (delta-BHC and 4,4'-DDD).

LAND USE AND EXPOSURE ASSUMPTIONS

For soil, a light industrial land use was assumed due to the sites relative location to existing facilities. By this land use scenario, direct exposure to contaminated soil could occur via incidental ingestion and inhalation.

For sediment, frequent direct human exposure was determined to be highly unlikely due to the nature of the sediment body which is a heavily wooded wetlands swamp. It is not likely that this wetlands area downgradient of Site 14 would be used for recreational purposes (e.g., fishing, swimming). Potential ecologic exposure to sediments is a possibility. Future use is assumed to be the same as current use.

For surface water, frequent direct human exposure was also determined to be highly unrealistic and, therefore, direct human exposure was not considered an applicable scenario. Future use is assumed to be the same as current use.

HUMAN HEALTH RISK AND HAZARD FINDINGS

For soil, the results of the EA 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 ranged from a minimum of 1.47×10^{-7} for 4-methylphenol to a

maximum of 5.13×10^{-4} for 1,2-dichloroethene. The overall hazard quotient estimated for soil is 7.78×10^{-4}. Carcinogenic risk estimates for soil at Site 14 also are not elevated for any chemical above EPA's "point of departure" risk level of 10^{-6}. The risk estimates ranged from a minimum of 3.47×10^{-9} for trichloroethene to a maximum of 1.54×10^{-7} for chrysene. The overall site soil risk represented by the sum of the chemical-specific risk estimates is 2.17×10^{-7}, due primarily to chrysene.

For surface water and sediment, based upon the transient exposure scenario, risks and hazards to human health are minimal.

ECOLOGICAL ASSESSMENT FINDINGS

To evaluate the potential for ecological effects associated with contaminants in sediment samples, results were compared to criteria established by NOAA as effects range-low (ER-L) and range-medium (ER-M) sediment criteria. This evaluation of sediments at Site 14 revealed that the following chemicals exceeded the ER-L: zinc, and five different PAHs, in one sample. None of these sediment COCs exceeded the ER-M, however.

SUMMARY

In summary, the calculated risks to human health posed by soil contamination at Site 14, as presented above, do not exceed the upper limit of EPA's risk criteria range and hence, do not necessarily warrant remedial action. It should be noted, that significantly elevated levels of TPHC (up to 82,000 mg/kg) were present in soil at Site 14. Because toxicity data is not available for many of the compounds classified as TPHC, a risk assessment value is not provided. However, because the contaminants in the soil and sediment continue to be a source of ground and surface water contamination, remediation at Site 14 is recommended.

Summary Of Remedial Alternatives

Under CERCLA, the 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 whenever possible and there is a bias for treatment of waste rather than disposal. All of the Remedial alternatives, which are discussed in more detail in the Feasibility Study for Site 14, are summarized below.

ALTERNATIVE 1: No Action (Sediment and Soil)

Estimated Construction Cost:	$ 0
Estimated Net Annual O&M Cost:	$ 0
Estimated Net Present Worth:	$ 0

This alternative involves no additional actions at the site. No contaminants would be treated or contained. No further action to control the source would be taken.

ALTERNATIVE 2: Ground Water Monitoring

Estimated Construction Cost:	$ 0
Estimated Net Annual O&M Cost:	$ 60,000
Estimated Net 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 would evaluate the effects of the source area on groundwater and can be accomplished by using the extensive array of existing monitoring wells. Sampling would be conducted quarterly for a period of thirty years. If contaminant levels started to increase, an active form of remediation may have to be pursued.

ALTERNATIVE 3: Soil Capping and Ground Water Monitoring

Estimated Construction Cost:	$ 2,000
Estimated Net Annual O&M Cost:	$ 61,000
Estimated Net Present Worth:	$ 635,000

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, backfill would be required to establish a 3 to 5 percent grade over the area. The backfill material can be obtained at the center and would be spread and compacted in 6-inch lifts to provide uniform support for the cap and to minimize settlement. Upon completion of cap construction, the area would be vegetated to decrease erosion and promote the development of a stable surface. 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, groundwater monitoring would still have to be performed downgradient of the site.

ALTERNATIVE 4: Excavation and Off-Site Disposal

Estimated Construction Cost:	$554,000
Estimated Net Annual O&M Cost:	$0

Estimated Net Present Worth: $554,000

This alternative includes the removal of all contaminated soil and sediment from the site through excavation. The volume of excavation is estimated to be 1200 cubic yards of soil and 75 cubic yards of sediment. Sediment excavation could be accomplished with a 1 cu. yd. dragline which could easily excavate the area at Site 14. Soil excavation would be accomplished using a backhoe and or a clamshell. Once removed, the soil and sediment would be disposed of at a landfill as an industrial waste or at a hazardous waste landfill depending on its hazardous waste characteristics. The contaminated soils would either be containerized or bulk transported depending on contamination levels.

Following excavation, sampling would be performed to determine that the site meets remediation goals. Clean fill would be applied as needed.

ALTERNATIVE 5: Excavation with Recycling and Off-Site Disposal

Estimated Construction Cost: $124,000
Estimated Net Annual O&M Cost: $0
Estimated Net Present Worth: $124,000

This alternative includes the excavation of all contaminated sediment and soil from the site as described in Alternative 4. Once the waste is removed it would be analyzed for TPHC and other contaminants. All portions of the sediment and soil that have a TPHC concentration greater than 30,000 ppm would be sent to a hazardous waste landfill for disposal as described in alternative 4. The remaining sediment and or soil would either be sent to a permitted off-base plant for reuse in the making of hot batch asphalt or kept for recycling in cold mix asphalt batching on base. Shipping of the petroleum contaminated sediment or soil would be done as described in alternative 4.

Following excavation, sampling would be performed to determine that the site meets remediation goals. Clean fill would be applied as necessary.

ALTERNATIVE 6: Excavation and Thermal Treatment

Estimated Construction Cost: $355,000
Estimated Net Annual O&M Cost: $0
Estimated Net Present Worth: $355,000

This alternative includes the excavation of all contaminated sediment and soil from the site as described in Alternative 4. Once the waste is removed it would be thermally treated. Thermal treatment involves the permanent removal of contaminants by exposure to elevated temperatures, typically greater than 1000°F, which causes the volatilization, combustion, and destruction of the contaminants. This process has been proven effective in treating both sediments and soil containing contaminants such as those present at Site 14. A portable system may be brought on site for this option, or if permitting constraints preclude the use of a portable system, the material would be transported to a licensed treatment facility.

Three waste streams would be generated by this technology: solids (ash and treated sediment and soil) from the treatment system, water from the air pollution control (APC) system, and air emissions. Solids would remain on site and, after testing, may be used as fill material. Liquid waste from the APC system that contains substances such as caustic high chlorines, volatile metals, trace organics, metal particulates and inorganic particulates would be treated prior to discharge. Flue gases would be treated by the APC system prior to discharge from the stack. Permits or permit equivalents for the discharges of the process would be attained prior to implementing this process.

Following excavation sampling would be done to determine that the site meets remediation goals. The site would be filled with clean soil as needed.

ALTERNATIVE 7: In-Situ Vitrification and Ground Water Monitoring

Estimated Construction Cost: $188,000
Estimated Net Annual O&M Cost: $74,000
Estimated Net Present Worth: $955,000

This alternative consists of a technology which is a permanent control of the contamination source by destroying and immobilizing contaminants, and generating a stable crystalline mass using electricity. The area of sediment to be vitrified would be 100 feet by 20 feet. The area of soil to be vitrified is two rectangles of 20 by 40 feet. The selected electrode spacing would be the standard 15 foot by 15 foot square array and the electrode would be put in using a standard drilling technique.

The 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. A pilot scale study would be needed prior to implementation.

Estimated run time for the process is 1.5 years for Site 14. Estimate for the site was made based on soil moisture of 5 percent, low heat loss through the surface and a 15 foot electrode spacing.

Following vitrification the area would be backfilled 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 be conducted quarterly for a period of thirty years to ensure the site would pose no future risks.

COMPARATIVE ANALYSIS OF ALTERNATIVES

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

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

2. 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.

3. 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 wastes or treatment residuals.

4. Reduction of Toxicity, Mobility or Volume through Treatment evaluates an alternative's ability to reduce risks through treatment technology.

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

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

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

8. Agency Acceptance indicates whether the EPA and State concur with, oppose or have no comment on the preferred alternative in terms of technical and administrative issues and concerns.

9. Community Acceptance evaluates the issues and concerns the public may have regarding the alternatives.

This section will compare all of the alternatives for Site 14 using each of the nine criteria outlined above.

Site 14 Old Fire Fighting School

ALTERNATIVE 1: NO ACTION
ALTERNATIVE 2: GROUND WATER MONITORING
ALTERNATIVE 3: CAPPING OF SOIL AND GROUND WATER MONITORING
ALTERNATIVE 4: EXCAVATION WITH OFF-SITE DISPOSAL
ALTERNATIVE 5: EXCAVATION WITH RECYCLING AND OFF-SITE DISPOSAL

ALTERNATIVE 6: EXCAVATION WITH THERMAL TREATMENT
ALTERNATIVE 7: IN-SITU VITRIFICATION AND GROUNDWATER MONITORING

Overall Protection of Human Health
Alternatives 1 and 2 provide no protection to human health or the environment, because the contamination is neither controlled or removed. Alternative 3 would reduce risk at the site, by preventing direct contact with the soil, but by leaving the contaminated soil at the site, threat to groundwater would still exist. Also, the sediment is not addressed. Alternatives 4 and 5 have potential for health risks over the short term due to the transportation of the contamination over public roadways; however, once completed these two alternatives would eliminate health and environmental risks at the site. Alternative 6 would also have short term health risks; however, it also would provide a permanent means of protecting human health. Alternative 7 provides the most protection because it is an in-situ alternative and eliminates or contains all contamination at the site.

Compliance with ARARs
Alternatives 1 and 2 would allow the continued leaching of soil contaminants into groundwater, at levels above chemical specific groundwater ARARs. Alternative 3 would prevent leaching of the contaminants into the groundwater, however, the source areas will remain, and, therefore the SCC would not be met. Alternatives 4, 5, 6 and 7 comply with ARARs.

Long Term Effectiveness and Permanence
Alternatives 1 and 2 offer neither effectiveness or permanence. Alternative 3 would provide partial protection. Alternatives 4, 5 and 6 provide permanent long term protection by totally removing all contaminants from the site. Alternative 7 would also be considered a long term and permanent solution because all of the contamination would either be destroyed or immobilized.

Reduction of Toxicity, Mobility or Volume through Treatment
Alternatives 1 and 2 do not reduce any toxicity, mobility or volume of contamination at the site. Alternative 3 partially reduces mobility of contamination; however, toxicity and volume remain unchanged. Alternatives 4, 5 and 6 remove the contaminants from the site; they are transferred to a more secure location where mobility is reduced. Alternative 6 also reduces volume and toxicity. Alternative 7 reduces toxicity, mobility and volume by destroying or immobilizing all contaminants.

Short Term Effectiveness
Alternatives 1 and 2 do not change any short term risks at the site. Alternative 3 could be implemented within 2 years time therefore rapidly reducing risk at the site. Alternatives 4, 5, and 6 could also be implemented quickly (under 1 year), however excavation presents problems over the short term by possible release of contaminants during the process. A pilot study would

have to be performed for the implementation of either alternatives 5 or 6. Alternative 7 would take the longest time to implement, because of the need for pilot studies and analysis, therefore having a very low effectiveness over the short term.

Implementability

Alternative 2 is easily implemented and would require a short set-up time frame. Alternative 3 is implementable only after grading. Alternative 4, 5 and 6 can be implemented and would require about 1 year to complete. Alternative 7 is also a viable alternative if the area is de-watered.

Cost

Alternative 1 has no cost associated but does not remove contamination. Alternative 4, 5 and 6 have minimal cost. Alternatives 2 and 3 have medium cost. Alternative 7 has high cost. The total cost, for each alternative proposed for the site, has been developed and is presented in the table below.

Alternative 1:	$0
Alternative 2:	$630,000
Alternative 3:	$635,000
Alternative 4:	$554,000
Alternative 5:	$124,000
Alternative 6:	$355,000
Alternative 7:	$955,000

State Acceptance

The State of New Jersey concurs with the 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 alternative for Site 14 is alternative 5 which is excavation with a combination of recycling and off site disposal. Implementation of the preferred alternative entails excavation and removal of all contaminated soil and sediments above EPA risk based levels and New Jersey soil cleanup criteria at Site 14.

By excavating the contaminated soil and sediment, the preferred alternative removes the possibility of further bioaccumulation of contaminants in aquatic receptors thereby reducing adverse ecological effects associated with this site. Human health risks associated with the site are reduced by the elimination of the source area for groundwater contamination. Few short-term impacts exist for the preferred alternative. Short term concerns, which include the disturbance of the sediment resulting in the release of contamination to surface water during excavation would be addressed in a detailed design plan which will be submitted to the EPA and NJDEPE.

Excavated soil or sediment will be sorted based on prior sampling results and each pile will be tested for TPHC and RCRA hazardous waste characteristics. Soil or sediment which contains concentrations of TPHC greater than 30,000 mg/kg or exceeds RCRA hazardous waste limits will be further segregated and disposed of at a hazardous waste treatment and disposal facility. The remainder of the soil and sediment will be asphalt batched on-site by transportable cold mix processing equipment. The asphalt produced by this process will be utilized at NAWCADLKE for the paving of designated existing gravel roads and parking lots.

The roads and parking lots will consist of a gravel course, a sub-base of cold mix asphalt made from the excavated soil and a final cap of hot mix asphalt for the wearing course.

Prior to full scale production of asphalt, a demonstration will be conducted at NAWCADLKE. This demonstration will be conducted indoors and will treat soil which would produce the worst case air emission scenario. The soil would be batched at the maximum usage rate for one hour. The soil, air emissions and resulting asphalt must meet specific NJDEPE permit requirements.

If this process cannot meet NJDEPE and EPA requirements through engineering controls, the soil will be sent to a permitted off-base asphalt recycling facility, as outlined in Alternative 5, which utilizes a hot-mix process.

Long term adverse impacts are not anticipated with the preferred alternative since no long term changes in the environment are being made.

The preferred alternative is the most cost effective of all the

remedial technologies for Site 14.

This selected remedial action provides excellent protection of human health and the environment by removing all soil contamination above NJDEPE soil cleanup criteria, and sediment above NOAA ER-L. This will prevent further leaching of contaminants into groundwater and, Remedial Action Objectives will be met once these cleanup levels have been achieved.

For Site 14, the cleanup time frame would be approximately one year once the selected remedial action is initiated.

The selected remedial action utilizes permanent solutions and treats (or reuses) the majority of the contaminated soil and sediment, satisfying the statutory preference for treatment as a remedy.

It should be noted that this Record of Decision addresses only Site 14 and it is not intended to represent the remedial action status for the rest of the areas of concern at NAWCADLKE. Each site's conditions and concerns have been or will be addressed in separate Records of Decision. Groundwater contamination which exists beneath Site 14 is being addressed pursuant to a Record of Decision signed in 1992 which requires the recovery and treatment of contaminated groundwater. The system should be operational in early summer, 1993.