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United States Environmental Protection Agency

Office of Emergency and Remedial Response

EPA/ROD/R02-93/213
September 1993

PB94-963814

EPA

Superfund Record of Decision:

Naval Air Engineering Center (Operable Unit 13), NJ

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 Batch Recycling/Offsite Disposal
Operating Unit Number:	OU-13 (Sites 3 and 6)
Capital cost:	$472,000
Construction Completion:	December, 1994
O & M in 1993:	N/A
1994:	
1995:	
1996:	
Present worth:	$472,000 (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, Sediment
Origin	Assorted spills
Est. quantity	3,000 cubic yards

NAWC
Aircraft Division
NAVAL AIR WARFARE CENTER
LAKEHURST

RECORD OF DECISION FOR SITES 3 AND 6

OU-13

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
SITES 3 AND 6
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 two individual sites (Sites 3 and 6), 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 these Sites, has selected Excavation with On-Site Recycling and Off-Site Disposal as the selected remedy for Sites 3 and 6. Implementation of this alternative entails excavation and removal of all contaminated sediments at both sites above EPA risk based levels, New Jersey soil clean up criteria and NOAA guidance for sediment.

DECLARATION STATEMENT

The United States Department of the Navy has determined that remedial action is necessary at Sites 3 and 6 to ensure protection of human health and the environment.

This Record of Decision addresses Sites 3 and 6. Other areas of concern at NAWCADLKE have been or will be the subject of separate Records of Decision. The locations of these Sites within NAWCADLKE are shown in Figure 1, 2 and 3.

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 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 2,845,000 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 both sites. 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 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 Lakehurst 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 Sites 3 and 6.

The individual Site histories and summaries of past remedial and removal activities at each of the Sites are provided in the following sections.

Site 3: Site Description and Background

Site 3, the Runway Assisted Landing Site (RALS) is an underground facility were shipboard type arresting gear is located. The facility is located under a metal deck in a test runway such that testing of the arresting gear can be accomplished utilizing aircraft. A portable control tower is also present at the site (See figure 4). Contamination at this site is situated in a drainage swale which is approximately 20 feet wide and 4000 feet long. Historically, ground and rain water that infiltrated into the underground RALS test facility mixed with contaminants in the facility and was discharged into the swale through a 6-inch pipe. Usually, the discharge into the swale flows for a short distance eastward and eventually infiltrates into the ground. However, during periods of high water table or after heavy rain the flow may continue eastward the full 4000 feet of the swale and possibly reach the Manapaqua Brook. Contaminants entering the discharge were trichloroethene, hydraulic fluid and ethylene glycol. It is estimated that the contamination in the swale occurred from 1958, when discharge operations began, until 1986 when discharge procedures were changed. This change in procedures included banning the use of chlorinated solvents in the facility. Additional procedures have also been established to prevent discharge of contaminants into the bilges of the test facility. Studies conducted over the last 5 years assessing discharge quality have determined that the discharge contains water similar in quality to the ground water found in this area. Because of this, the RALS discharge will be connected to a proposed ground water treatment facility to be constructed in the area.

Site 3: Summary of Remedial Investigations

During the fall of 1988, two samples were taken from test pits excavated at Site 3. One shallow pit was excavated in an area where high levels of petroleum hydrocarbons were detected in soil gas and the second pit was excavated near monitoring well GZ. No significant levels of contaminants were detected. All contaminants of concern for soil at Site 3 are listed in Table 1.

During 1988, two rounds of sediment samples were collected from three different location of the drainage swale at the site. One sample was taken at the point where the effluent from RALS discharges into the swale while the other two were 400 and 800 feet from the discharge point. The sample collected at the discharge point was contaminated with high levels of base/neutral compounds, some metals and Total Petroleum Hydrocarbons (TPHC). Further downstream, no contamination was evident. Further samples taken at 2400 feet and at the end of the swale (4000 feet) again showed no significant levels of contaminants. This leads to the conclusion that contamination is limited to the sediment in the drainage swale in the immediate vicinity of the RALS discharge.

In the summer and fall of 1992, six samples were taken from the swale at the RALS facility. Three samples were taken at the RALS discharge point, and at 84 and 180 feet from this point. Three additional samples were taken at the discharge point and at 5 and 10 feet from the discharge point. The samples were analyzed for Volatile Organic Compounds (VOC), Base Neutral (B/N) and TPHC. Significant concentrations of contaminants were not detected, however the information from this round of sampling confirmed that sediment contamination is limited to the immediate vicinity of the RALS discharge. All contaminants of concern for sediment at Site 3 are listed in Table 2.

Surface water samples taken near the RALS discharge in 1985 showed 1,1,1-trichloroethane at a maximum level of 160 ppb and 1,1-dichloroethane at a maximum level of 150 ppb. In addition elevated levels of petroleum hydrocarbons and chromium were detected in one sample. Further testing done since this time at further distances downstream of the discharge showed no significant contamination. It is thought that the sampling in 1985 represents the low quality of the discharge from the RALS discharge at the time and that water in the area of the discharge was influenced by the contaminated sediment at this point. Presently, the discharge quality has been improved. However, water is still being adversely influenced in the immediate area of the contaminated sediment through direct sediment contact.

Site 6: Site Description and Background

Site 6 consists of a Catapult Test Facility and associated support buildings including a Power Plant and Photographic lab (See Figure 5). During operations of the two test catapults, industrial waste water is generated and accumulates in the bilges of the facility. From 1958, the time the facility was built, until approximately 1978, the bilges were pumped out into three holding ponds in the area that were baffled so they would act as oil water separators. Oily waste in the ponds was removed through sewage pumping contracts on a yearly basis. The effluent from the ponds was allowed to drain into swales which eventually discharged into the Manapaqua Brook. Wastes introduced into the ponds included water- soluble hydraulic fluid, ethylene glycol, trichloroethylene and 30-weight lubricating oil. The holding ponds were replaced in the late 1970s with three oil/water separators which discharge into the same swales. In 1986, an equalization basin equipped with oil water separators was constructed to enhance the efficiency of the existing oil/water separators. This facility has a New Jersey Pollution Discharge Elimination System (NJPDES) permit.

A small storage area for solvents and other liquids was located approximately 10 feet north of Steam Power Plant No. 2. Leakage from the facility caused an oil-stained area about 15 feet by 15 feet at the site. However, the type or quantity of materials spilled there are unknown. This area was cleaned up during a spill response at the site.

Numerous spills of oil and catapult grease occurred at Catapult Lift Station No. 2 between 1985 and 1989. Estimates of the total quantity spilled during this time frame are over 1000 gallons. However, it is not known how much of this material was recovered and how much leaked into the ground. At the time of the latest spill at this site, all of the stained surface soil was removed and disposed of as hazardous waste.

There are currently four underground and one above ground storage tanks in the Site 6 area containing fuel oil, diesel fuel and

MOGAS. Two of the underground storage tanks are empty and no longer in use. Quantities of petroleum are closely monitored for the two active tanks and all records indicate that no leakage has occurred. The above ground tank is in a containment. No major spills have occurred from the tanks at this site.

Site 6: Summary of Remedial Investigation

In 1988, five test pits were excavated at the site in areas of visible surface staining to a depth of approximately 4 feet. Soil samples where collected from two of the test pits, one near the corner of the equalization basin (Building 363) and one 100 feet west of the basin. No significant contamination was detected. There was no visual staining noted in the test pits. All contaminants of concern for soil at Site 6 are listed in Table 3.

In addition to the soil samples, sediment samples were also taken from Site 6. During 1988, sediment samples were taken from the three holding ponds, the confluence of the drainage swales leading from the holding ponds and a retention basin near the southeast corner of Building 561. In addition, two rounds of sediment samples were taken from the Manapaqua Brook at three locations approximately 900 to 1300 feet downstream from Site 6. Samples of the sediment from the three holding ponds revealed high levels of Semi-Volatile Organic Compounds (SVOCs), metals and TPHCs. High levels of TPHC and Polyaromatic Hydrocarbon (PAH) were detected in the first round sample from the convergence of the swales. However, second round samples showed no contamination. Samples taken from the retention basin also showed moderate levels of TPHC. Moderate levels of TPHC were also detected in the sediment samples taken from the western drainage swale which received discharge from a holding pond. No significant contamination was found in the samples taken at the further distances from the site.

From July 1991 to April 1992, additional sediment samples were taken at the three holding ponds and the confluence of the drainage swales emanating from oil/water separators No. 2 and No. 3. In addition, samples were collected from the dredge spoils adjacent to the four sediment sample locations described above. The dredge spoils were created by dredging of the swales onto their embankments which was performed by NAWCADLKE personnel in the early 1980s. Sediment samples taken from the holding ponds again revealed elevated levels of metals and TPHC. Holding Pond 3 was by far the most contaminated with a TPHC level of 56,000 mg/kg and elevated levels of cadmium, copper and lead. In general, TPHC levels in the dredge piles were higher at the surface of the pile than at a deeper (1 to 2 foot) level. The dredge spoils at the convergence of the swale had the highest level of TPHC at 49,000 mg/kg followed by pond 3 at 2200 mg/kg.

Ponds 1 and 2 dredge spoils showed low levels of contamination. The convergence of the swales showed a TPHC level of 2500 mg/kg in the surface layer while at 1 to 2 foot the contamination was at a slightly lower level.

Additional sampling to determine contamination extent was conducted in the summer of 1992. Samples were taken at a depth of one to two feet and analyzed for VOC, B/N and TPHC. Results for swale 1 showed significant TPHC (1400-130,000 ppm) contamination for the 115 feet examined parallel to taxiway No. 4. A sample taken in the entrance of the holding pond adjacent to building 561 showed low levels of TPHC contamination. Swale 2 had trace amounts of TPHC contamination. Swale 3 also had significant TPHC contamination (580-23,000 ppm) with no other significant compounds found. Examination of the sediment at the convergence of swale 2 and 3 and the dredged spoils adjacent to each of the swales revealed moderate levels of TPHC. All contaminants of concern for sediment at Site 6 are listed in Table 4.

Surface water samples taken in 1988 from the western most swales emanating from site 6 revealed trichloroethane (13 ppb), toluene (22 ppb), and 1,2 dichloroethene (4 ppb). However, these compounds were not detected in a second round of sampling. Ethylene Glycol was also detected in three first round samples. A sample taken approximately 1200 feet from Site 6 in 1989 showed no contamination. The surface water contamination at this site is thought to be due to contaminated sediment and a leaky fluid cooler located at the site at the time of sampling that discharged non-contact cooling water into the swales.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Proposed Plan for Sites 3 and 6 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 July 7, 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 two Sites, 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 and On-base Recycling and Off-Site Disposal) for Sites 3 and 6 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 Sites 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 Sites 3 and 6 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 contamination of ground water and surface water from leaching of contaminants from the sediment.

2. Remediate sediment to levels that are protective to human health and the environment.

3. Prevent human contact with contaminated dry sediment and vapors and dust from dry sediment.

SUMMARIES OF SITE CHARACTERISTICS

The locations of both of the Sites within NAWCADLKE are shown in Figure 1, 2 and 3. Maps of the individual sites are provided in Figures 4 and 5.

Summaries of the chemicals detected in the analyses of soil, sediment and surface water samples collected at each of the Sites are provided in Tables 1 through 4.

The results of the Remedial Investigations, including the analytical data summarized in Tables 1 through 4, indicate that sediment conditions at Sites 3 and 6 pose unacceptable risks to human health and/or the environment.

SUMMARY OF SITE ENDANGERMENT ASSESSMENT

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

For both sites, 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 would be effected by mechanisms that include direct contact, inhalation and ingestion.

More complete EA information for Sites 3 and 6 can be found in Volume VI of the Phase III RI, which is available as part of the NAWCADLKE Administrative Record.

Remediation of ground water is discussed in a separate ROD, therefore, further discussion of ground water within the following summaries is not included.

For both sites, the summaries 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.

SITE 3 RUNWAY ARRESTED LANDING SITE (RALS)
Endangerment Assessment Summary

This is a summary of the endangerment assessment (EA) findings for Site 3 (Drainage ditch at Runway Arrested Landing Site (RALS)). Media subjects of the site-specific EA for this site were soil, surface water, and sediment.

CONTAMINANTS OF CONCERN

For soil, COCs were determined to be benzoic acid, Aroclor-1254 (a type of PCB), beta-BHC and mercury.

For sediment, COCs included a large number of volatile organic compounds that included chlorinated aliphatics, a large variety of PAHs, pesticides and miscellaneous other organics, including TPHC. Human health risk sediment COCs also included inorganics (metals). From an ecological perspective, additional COCs included inorganics such as copper and zinc.

For surface water, COCs were a subset of the sediment COCs including organics and inorganics (metals). From an ecological perspective, additional COCs included various inorganics such as copper, iron and zinc.

LAND USE AND EXPOSURE ASSUMPTIONS

For soil, a light industrial land use was assumed because the site is adjacent to existing facilities that involve a significant worker population. In this land use scenario, direct exposure to contaminated soil could occur via incidental ingestion and inhalation.

For sediment, a transient scenario was assumed due to vegetative overgrowth within the swale. In addition, because the swale discharges to a tributary to Manapaqua Brook, the sediment results were compared to NOAA aquatic criteria for sediments for protection of aquatic life.

For surface water, criteria for the protection of aquatic life were considered.

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 value estimated for mercury was 2.01×10^{-3}, which also represents the hazard quotient for soil. Carcinogenic risk estimates for soil at Site 3 also are not elevated for any chemical above EPA's criteria risk level of 10^{-6}. The risk estimates ranged from a minimum of 6.65×10^{-9} for beta-BHC to a maximum of 1.21×10^{-7} for aroclor-1254. The overall site soil risk represented by the sum of the chemical-specific risk estimates is 1.28×10^{-7}.

For sediment, results of the EA indicate that hazards for noncarcinogens are not elevated above EPA's hazard index criteria value of 1.0 at a value of 2.70×10^{-1}. The sum of the Carcinogenic risks at the site are 4.81×10^{-6}.

ECOLOGICAL ASSESSMENT

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) sediment criteria. This evaluation of sediments at Site 3 revealed that numerous metals and PAHs exceed their respective criteria.

SITE 3 CONCLUSION

In summary, although the human health risk assessment results do not indicate unacceptable health risks, the ecological assessment findings suggest potential ecological impacts if the monitored sediments and surface water near the site reach receiving natural water bodies without substantial attenuation of contamination. Since stabilization of the contaminated sediments at their present location may be difficult to ensure, evaluation of sediment removal options warrants consideration. For soil, the endangerment assessment indicates that remediation is not required.

Due to the fact that the contaminated surface water at Site 3 is in close proximity to sediment contamination, the problem of contaminated surface water will be readdressed following remedial actions occurring at the site. Once remediation is completed, extensive surface water sampling will be conducted to ensure that surface water contamination is no longer a concern.

SITE 6 CATAPULT TEST FACILITY
Endangerment Assessment Summary

This is a summary of the endangerment assessment (EA) findings for Site 6 (Catapult Test Facility). Media subjects of the site-specific EA for this site were soil, surface water, and sediment.

CONTAMINANTS OF CONCERN

For soil, the contaminants of concern were limited to cadmium and lead.

For sediment, COCs included a large number of volatile organic compounds that included aromatics and a large variety of PAHs. Also, sediment COCs included inorganics such as cadmium, lead, mercury and nickel.

For surface water, COCs were a subset of the sediment inorganic COCs. From an ecological perspective, additional COCs included various other inorganics such as chromium and selenium.

LAND USE AND EXPOSURE ASSUMPTIONS

For soil, a light industrial land use was assumed due to the site's location adjacent to various facility buildings and operations. In this land use scenario direct exposure to contaminated soil could occur via incidental ingestion and inhalation.

For sediment, at this site, the portion of the sediments that were within the holding pond areas of the three swales were treated within the EA as if they were soil, due to the potential for the holding ponds to become dry and expose sediment. The same exposure assumptions as specified for soil were assumed. For the sediment that is downstream of the holding ponds, a transient scenario was used since this soil is always underwater.

For surface water, during storm events, surface water has the potential to discharge into tributaries to the Manapaqua Brook. Therefore, criteria for the protection of aquatic life were considered.

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 value estimated for cadmium was 1.18×10^{-3}, which also represents the hazard quotient for soil. Carcinogenic risk estimates for soil at Site 6 also are not elevated for any chemical above EPA's criteria risk level of 10^{-6}. Only one carcinogen (also cadmium) contributed to the risk potential. The risk estimate for cadmium and soil overall is 9.84×10^{-9}.

Due to the uncertainty regarding lead toxicity, neither a non-carcinogenic hazard or carcinogenic risk estimate is provided for the lead. Lead was detected at a maximum concentration of 20.1 mg/kg in soil at Site 6. It is noteworthy, however, that this maximum observed lead concentration is well below the USEPA criteria value for lead which is 500 mg/kg for surface soils.

For sediment in the holding ponds, the results of the EA indicate that hazards resulting from noncarcinogens are elevated above EPA's hazard index criteria value of 1.0. The hazard index values ranged from a minimum of 8.44×10^{-5} for toluene to a maximum of $3.50 \times 10^{+1}$ for naphthalene. The overall hazard quotient estimated for soil is $3.85 \times 10^{+1}$. Carcinogenic risk estimates for soil at Site 6 also are elevated above EPA's criteria risk level of 10^{-6}. The risk estimates ranged from a minimum of 3.16×10^{-7} for cadmium to a maximum of 6.03×10^{-2} for several PAHs. The overall site soil risk represented by the sum of the chemical-specific risk estimates is 2.77×10^{-1}.

For sediment downstream of the holding ponds, the hazard index was calculated to be 7.53×10^{-3}. No carcinogenic compounds were detected in concentrations large enough to support a risk for this medium.

For surface water, evaluation of criteria intended for the protection of aquatic life reveals exceedances for iron, lead, and mercury.

ECOLOGICAL ASSESSMENT

To evaluate the potential for ecological effects associated with contaminants in sediment and surface water samples, results were compared to criteria established by NOAA as effects range - low (ER-L) sediment criteria. The ER-L number is a reference number that is used to identify the presence of contamination exceeding levels potentially harmful to aquatic life. The ER-L level is defined as the level where adverse effects may begin or are predicted among sensitive life stages and/or species. This evaluation of sediments at Site 6 revealed that numerous metals and PAHs exceeded their respective criteria (See Table 4). The evaluation of surface water results also indicated exceedances of applicable criteria by various inorganics.

SITE 6 CONCLUSION

In summary, both the human health risk assessment results and the ecological assessment findings suggest potential detrimental human health and ecological impacts. Since stabilization of the contaminated sediments at their present location may be difficult to assure, evaluation of sediment removal options warrants consideration. For soil, the endangerment assessment findings indicate that contamination does not pose an unacceptable risk to human health and the environment.

Surface water contamination at Site 6 is minimal and is being caused by its contact with the heavily contaminated sediment at the site. The remediation of sediment at the site will alleviate surface water contact with contaminants and thus surface water contamination. The problem of contaminated surface water will be readdressed following remedial actions occurring at the site. Once remediation is completed, extensive surface water sampling will be conducted to ensure that surface water contamination is no longer a concern.

SUMMARY

In summary, the EA demonstrates that soil at the two sites and sediment at Site 3 do not pose human health risks in excess of EPA acceptable levels. However, sediment at Site 6 does pose human health risks. In addition, the sediment at both sites do pose unacceptable ecological hazards. Surface water at both sites is being influenced by the contaminated sediment and will be readdressed following sediment remediation.

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 Sites 3 and 6, are summarized below.

ALTERNATIVE 1: No Action

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

This alternative involves no additional actions at the sites. No contaminants would be treated or contained and the existing health and environmental risks would remain. 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: $ 60,000/110,000 (site 3/6)
Net Present Worth: $ 630,000/1,155,000 (site 3/6)

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 ground water and can be accomplished by using the extensive array of existing monitoring wells utilizing personnel skilled in sampling. Sampling would be conducted quarterly for a period of thirty years. If contaminant levels started to increase, an active form of remediation would have to be pursued.

ALTERNATIVE 3: Capping and Ground Water Monitoring

Estimated Construction Cost: $ 30,000/302,000 (site 3/6)
Estimated Net Annual O&M Cost: $ 91,000/116,000 (site 3/6)
Net Present Worth: $ 663,000/1,509,000 (site 3/6)

This alternative would act as a source control action by minimizing the infiltration of precipitation into the contaminated sediment, 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 the 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, ground water monitoring would still have to be performed downgradient of the site.

ALTERNATIVE 4: Excavation and Off-Site Disposal

Estimated Construction Cost:	$207,000/1,940,000 (site 3/6)
Estimated Net Annual O&M Cost:	$0
Net Present Worth:	$207,000/1,940,000 (site 3/6)

This alternative includes the removal of all contaminated sediment from the sites through excavation. The volume of excavation would be site dependent. Approximately 296 cubic yards would be excavated from Site 3, while 2850 cubic yards would have to be removed from Site 6 to meet remediation goals. Sediment excavation could be accomplished with a 1.0 cu. yd. drag line which could easily excavate to the depths required at Sites 3 and 6. Once removed, the sediment would be disposed of at a landfill as industrial waste or at a hazardous waste landfill, depending upon its petroleum hydrocarbon content. The contaminated sediment 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 and Off-Site Recycling and Off-Site Disposal

Estimated Construction Cost:	$52,000/442,000 (site 3/6)
Estimated Net Annual O&M Cost:	$0
Net Present Worth:	$52,000/442,000 (site 3/6)

This alternative includes the excavation of all contaminated sediment from the site as described in Alternative 4. Once the waste is removed, it would be analyzed for petroleum content and other contaminants. All portions of the sediment that have a petroleum concentration greater than 30,000 ppm or Resource Conservation and Recovery Amendment (RCRA) hazardous waste characteristics (approximately 10% of the estimated volume for each site) would be sent to a hazardous waste landfill for treatment and disposal as described in Alternative 4. The remaining sediment would be sent to a permitted off-base plant for reuse in the making of asphalt. Shipping of the petroleum contaminated sediment 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 On-Site Recycling and Off-Site Disposal

Estimated Construction Cost:	$50,000/422,000 (site 3/6)
Estimated Net Annual O&M Cost:	$0
Net Present Worth:	$50,000/422,000 (site 3/6)

This alternative includes the excavation of all contaminated sediment from the site as described in Alternative 4. Once the waste is removed, it would be analyzed for petroleum content and other contaminants. All portions of the sediment that contain a petroleum concentration greater than 30,000 ppm or hazardous waste characteristics will be sent to a hazardous waste landfill for disposal as described in Alternative 4. A portable asphalt batching system would be brought on base to allow reuse of contaminated sediment containing petroleum concentrations below 30,000 ppm and not having RCRA hazardous waste characteristics in making asphalt for the base roads.

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

ALTERNATIVE 7: Excavation and On-Site Thermal Treatment

Estimated Construction Cost:	$168,000/710,000 (site 3/6)
Estimated Net Annual O&M Cost:	$0
Net Present Worth:	$168,000/710,000 (site 3/6)

This alternative includes the excavation of all contaminated sediment 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 sediment and sediments containing contaminants such as those present at sites 3 and 6.

Three waste streams would be generated by this technology: solids (ash and treated sediment) 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 chlorides, 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 obtained prior to implementing this process.

Following excavation, sampling will be done to determine that the site meets remediation goals. The site would be leveled with clean fill as needed.

ALTERNATIVE 8: Excavation and On-Site Recycling/On-Site Thermal Treatment

Estimated Construction Cost:	$136,000/389,000 (site 3/6)
Estimated Net Annual O&M Cost:	$0
Net Present Worth:	$136,000/389,000 (site 3/6)

This alternative includes the excavation of all contaminated sediment from the site as described in Alternative 4. Once the sediment is removed, it would be analyzed for total petroleum hydrocarbon and hazardous waste characteristics. All portions of the sediment that are not suitable for recycling would be treated at an on-site thermal treatment unit as described in Alternative 7. A portable asphalt batching plant would then be brought on base to use the recyclable contaminated sediment in making asphalt for the base roads.

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

ALTERNATIVE 9: In-Situ Vitrification and Ground Water Monitoring

Estimated Construction Cost:	$134,000/957,000 (site 3/6)
Estimated Net Annual O&M Cost:	$62,000/120,000 (site 3/6)
Net Present Worth:	$780,000/2,211,000 (site 3/6)

This alternative consists of a technology which is a permanent control of the contamination source by destroying and immobilizing contaminants using electricity generating a stable crystalline mass. The area to be vitrified would be the 200 feet directly downstream of the RALS discharge at Site 3 and the three swales that are in-situ to Site 6. To perform this process, the water flow through the swales would need to be diverted and the surface devegetated and leveled. The swales would then be allowed to dry before the vitrification process begins. 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.

An off-gas hood would provide confinement for any gases that are released during the vitrification process.

System requirements would depend on the size of the site and the moisture content of the sediment. Two factors that can affect power draw during vitrification are buried metals and water. High sediment moisture content also significantly increases the power needed for this process. A pilot study would be necessary prior to implementation.

Estimated run time for the process is 1.5 years for Site 3 and 3.5 years for Site 6. Estimates for both sites were made based on sediment 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 sediment due to the 25 to 30 percent volume loss due to the increased density of the mass from the process. In addition, ground water monitoring would be conducted quarterly for a period of thirty years to ensure that 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 evaluation 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 Applicable or Relevant and Appropriate Requirements (ARARs) evaluates the ability of an alternative to meet 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 alternatives ability to reduce risks through treatment technology.

5. Short Term Effectiveness address 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 capital costs, annual operation and maintenance (O&M) costs, and net present worth costs.

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

9. Community Acceptance discusses public questions and comments on the RI/FFS reports and the Proposed Plan.

This section will compare all of the alternatives for sites 3 and 6 using the nine criteria outlined above.

ALTERNATIVE 1: NO ACTION
ALTERNATIVE 2: GROUND WATER MONITORING
ALTERNATIVE 3: CAPPING AND GROUND WATER MONITORING
ALTERNATIVE 4: EXCAVATION AND OFF-SITE DISPOSAL
ALTERNATIVE 5: EXCAVATION AND OFF-SITE RECYCLING AND OFF-SITE DISPOSAL
ALTERNATIVE 6: EXCAVATION AND ON-SITE RECYCLING AND OFF-SITE DISPOSAL
ALTERNATIVE 7: EXCAVATION AND ON-SITE THERMAL TREATMENT
ALTERNATIVE 8: EXCAVATION AND ON-SITE RECYCLING/ON-SITE THERMAL TREATMENT
ALTERNATIVE 9: IN SITU VITRIFICATION AND GROUND WATER MONITORING

Overall Protection of Human Health and the Environment

Alternatives 1 and 2 provide no protection to human health or the environment since they leave all contamination present at both sites that the EA and NOAA guidance showed to pose both human health and ecological risks. Alternative 3 would reduce risk at the site by preventing water filtration through the contaminated sediment, but would leave the contaminated sediment at the site; potential impacts to ground water would still exist and the alternative would not meet RAOs. 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 sites. Alternatives 6, 7 and 8 would have minimal short term health risks due to excavation, however, both alternatives provide a permanent means of protecting human health. Alternative 9 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 for the continued leaching of sediment contaminants into ground water above chemical specific ground water ARARs. Alternative 3 would comply with ARARs but residual source areas would remain. Alternative 4 through 9 would 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, 6, 7 and 8 provide permanent long term protection by totally removing all contaminants from the sites. Alternative 9 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 greatly reduces mobility of contamination, however, toxicity and volume remain unchanged. Alternatives 4, 5 and 6 remove the contaminants from the sites; they are transferred to a more secure location where mobility is reduced. Alternatives 7 and 8 reduce toxicity, mobility and volume by destroying contaminants. Alternative 9 also 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 sites. Alternative 3 could be implemented within a 2 year time frame and therefore rapidly reduce risk at the sites. Alternatives 4, 5, 6, 7 and 8 could also be implemented quickly (under 1 year); however, over the short term there may be possible releases of contaminants during processing of the waste. Alternative 9 would take the longest time to implement (1.5 to 3.5 years), therefore having a very low effectiveness over the short term.

Implementability

Site 3

Alternative 2 is easily implemented and would require a short set-up time frame. Alternative 3 is attainable only after the flow of water through the swale is diverted into another ditch. In addition, grading the site would be difficult due to its present elevation compared with its surroundings. Alternative 4, 5, and 6 still require the digging of a diversionary ditch yet are much more readily implemented and would require about 1 year to complete. Alternatives 7 and 8 also require a diversionary ditch and may take slightly longer to complete because of delays from regulatory requirements associated with thermal treatment. Alternative 9 is also a viable alternative if the flow through the swale is alleviated.

Site 6

Alternative 2 is easily implemented and would require a short set-up time frame. Alternative 3 is attainable only after the flow of water through the three swales is permanently diverted downstream of the contaminated swales. In addition, grading of the site would be difficult due to its present elevation compared with its surroundings. Alternative 4, 5, and 6 are much more readily implemented and would require approximately 1 year to complete. Alternatives 7 and 8 may take sightly longer than 4 , 5, and 6 due to regulatory requirements for thermal treatment. Alternative 9 is also a viable alternative if the flow through the swale is alleviated.

Cost

Alternative 2 has costs associated only with Operations and Maintenance (O&M) and also does not meet any RAOs. Alternative 3 has significant capital and O&M costs but does meet some of the RAOs for the sites. Alternatives 4, 5, 6, 7, and 8 have only capital costs associated with their remedial efforts and all will meet all RAOs. Alternative 9 also meets all RAOs, however, its capital and O&M costs are extremely high. The present worth costs for each site and each alternative are as follows:

ALTERNATIVE NO.	SITE 3	SITE 6
1	$0	$0
2	$630,000	$1,155,000
3	$663,000	$1,509,000
4	$207,300	$1,940,000
5	$51,500	$442,000
6	$49,900	$422,000
7	$168,800	$710,000
8	$135,880	$388,900
9	$780,000	$2,211,000

State Acceptance

The state of New Jersey concurs with the selected remedy.

Community Acceptance

All public questions were answered during the Public Meeting. No additional written questions or comments were received during the Public comment period.

SELECTED REMEDY

The United States Department of the Navy, the lead agency for these Sites, has selected Excavation with On-Site Recycling and Off-Site Disposal as the selected remedy for Sites 3 and 6. Implementation of this alternative entails excavation and removal of all contaminated sediments at both sites above EPA risk based levels, New Jersey soil clean up criteria and NOAA guidance for sediment.

By excavating the contaminated sediment, the possibility of further bioaccumulation of contaminants in aquatic receptors is removed, thereby reducing ecological and human health risks associated with the two sites. Few short-term impacts exist for the preferred alternative. Short term concerns, which include disturbance of the sediment resulting in the release of contamination to surface water during excavation, will be addressed in a detailed design plan.

Excavated sediment will be sorted based on prior sampling results. Each sorted pile will be tested for TPHC and RCRA hazardous waste characteristics. 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 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 sediment which would produce the worst case air emission scenario. The sediment would be batched at the maximum rate for one hour. The sediment, air emissions and resulting asphalt are required to 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 the two sites.

This preferred alternative provides excellent protection to human health and the environment by removing all sources of contamination above EPA risk based levels and NJDEPE Soil Clean up Criteria. Remedial Action Objectives will be met once these clean up levels have been achieved.

For each site, the clean-up time frame would be approximately one year once the preferred alternative is initiated.

For both sites, excavation of the area of contamination would be accomplished when the swales are dry using a crane with a drag line. The excavated sediment would be staged in small mounds with each mound being sampled according to EPA guidelines.

The preferred alternative utilizes permanent solutions and treats the majority of contaminated sediments from the two sites satisfying the statutory preference for treatment as a remedy.

It should be noted that this Record of Decision (ROD) addresses only Sites 3 and 6 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 these two sites will be addressed in the ROD for Areas I and J ground water.