NAVAL AIR ENGINEERING STATION, Lakehurst, NJ

Final

Record of Decision for

Areas A & B Groundwater

7 May 1997

DNV-3W6.CDR

7 May 1997

RECORD OF DECISION
DECLARATION STATEMENT
AREAS A AND B GROUNDWATER
NAVAL AIR ENGINEERING STATION

FACILITY NAME AND LOCATION

Naval Air Engineering Station
Lakehurst, New Jersey 08733

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected alternative to address Areas A and B groundwater at the Naval Air Engineering Station in Lakehurst, New Jersey. The selected alternative 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 Substance Pollution Contingency Plan.

This decision is based on information contained in the Remedial Investigation (RI) Report (October 1992), the Endangerment Assessment (EA) Report (October 1992), the Focused Feasibility Study for Areas A and B Groundwater (July 1996), the Proposed Plan for Areas A and B Groundwater (February 1997), and sampling data obtained from the Area A interim pump and treat facility (December 1993 - October 1996). These reports and other information used in the remedy selection process are part of the Administrative Record file for Areas A and B, which is available for public review at the Ocean County Library in Toms River, New Jersey.

This document provides background information on the Area, presents the selected alternative, reviews the public's response to the Proposed Plan and provides answers to comments raised during the public comment period.

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

DESCRIPTION OF THE SELECTED REMEDY

The selected alternative to address groundwater at Areas A and B is: continued operation of the existing groundwater treatment facility with modifications to enhance system performance.

The objectives of the selected action are to: 1) protect human health and the environment by reducing the downgradient migration of contaminated groundwater; 2) remediate source areas with the highest concentration of contaminants through the ongoing operation of a vapor extraction system at Site 13 and the installation of a dual phase extraction system at Area A-west; and 3) reduction of Areas A and B groundwater contamination to meet applicable or relevant and appropriate requirements (ARARs).

STATUTORY DETERMINATIONS

This final action for Areas A and B is protective of human health and the environment. The results of this action will attain Federal and State applicable or relevant and appropriate requirements (ARARs).

28 Apr. 1997

Captain Leroy Farr (Date)
Commanding Officer
Naval Air Engineering Station
Lakehurst, New Jersey

With the concurrence of:

7-7-97

Jeanne Fox (Date)
Regional Administrator
U.S. Environmental Protection Agency, Region II

DECISION SUMMARY
RECORD OF DECISION
AREAS A AND B GROUNDWATER
NAVAL AIR ENGINEERING STATION

SITE DESCRIPTION

The Naval Air Engineering Station (NAES) is located in Jackson and Manchester Townships, Ocean County, New Jersey, approximately 14 miles inland from the Atlantic Ocean (Figure 1). NAES 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. NAES 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 NAES is currently classified by NJDEP as Class I-PL (Pinelands).

NAES lies within the Outer Coastal Plain physiographic province, which is characterized by gently rolling terrain with minimal relief. Surface elevations within NAES 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.

NAES 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 NAES 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 NAES. 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 NAES before joining Toms River. Storm drainage from NAES 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 NAES: Bass Lake, Clubhouse Lake, and Pickerel Pond. NAES 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 NAES 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 NAES 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 commercial establishments but no industry. To the north and south are State wildlife management areas which are essentially undeveloped. Adjacent to and south of NAES are commercial cranberry bogs, the drainage from which crosses the southeast section of NAES 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 NAES, water is generally supplied to the populace by municipal supply wells. Some private wells exist that provide drinking water, however, the majority are for irrigation only. 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 NAES. 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 NAES, which supplies water to a very small population (probably less than 1,000) in the immediate vicinity of NAES.

The history of the site dates back to 1916, when the Eddystone Chemical Company leased property from the Manchester Land Development Company 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 (NAWCADLKE), due to a reorganization within the Department of the Navy. In January 1994, the NAWCADLKE was renamed the Naval Air Engineering Station (NAES), due to continued reorganization within the Department of the Navy.

Currently, NAES's mission is to support 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 Station 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 Station also provides facilities and support services for tenant activities and units as designed by appropriate authority.

NAES and its tenant activities now occupy more than 300 buildings, built between 1919 and 1996, 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 Station 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.

SITE HISTORY

In the early 1980s an initial assessment study identified 44 "Sites" or locations of potential contamination at NAES. The sites were grouped into "Areas" based on geographic location. Groundwater at Areas A and B is considered to be a single unit since a continuous plume exists at both areas.

Areas A and B are adjacent to one another and located in the northeastern portion of the NAES (Figure 2). Due to its large size, Area A has been subdivided into two adjacent sections, Area A-East and Area A-West. Area A-East includes Sites 14, 29 and 37 (Figure 3), and Area A-West includes Sites 12, 18, 26, 33, 42 and 44 (Figure 4). Area B is located in the northeastern portion of the NAES to the immediate south of Area A (Figure 5). Sites 9, 13, 15, 36 and 39 are located within Area B.

The Ridgeway Branch forms the northern boundary of Area A. Route 547 is coincident with the NAES property boundary and forms the eastern boundary of Area A-East. Along the northern edge of Area A, to the south of and adjacent to the Ridgeway Branch, is a wetland area. The remainder of Area A to the south and west of the wetlands is developed land consisting of various facility buildings and roads. Included in Area A-East are the Defense Property Disposal Office (DPDO) storage yard and the Construction Battalion (CB) Compound. Area A-West encompasses the Hill water supply system which consists of potable water supply wells PW-37, PW-5 and PW-9. The Hill water system provides potable water to NAES facilities. Also included in Area A-West are Steam Plant No. 1 (Building 15), the location of the former wastewater treatment facility (no longer operating), and numerous buildings housing various NAES departments and operations.

Area B consists entirely of developed land, primarily various facility buildings, including Hangars 1, 2 (Bldg. 148) and 3 (Bldg. 149). A large percentage of Area B is paved; no stream or other surface water bodies are present in the area. The nearest facility boundary to Area B, Route 547, is approximately 2,000 feet to the east. The general direction of groundwater flow in Areas A and B is to the northeast, toward the wetlands and Ridgeway Branch.

The results of previous investigations and removal actions have documented the absence or removal of contamination posing a threat to human health or the environment at Sites 9, 12, 15, 18, 26, 33, 36, 37, 39, 42, and 44 in Areas A and B. Proposed Remedial Action Plans (PRAPs) were prepared for these sites, proposing the "no-action" alternative, and released for public comment. Following the 30-day public comment period, the Navy with USEPA and NJDEP concurrence concurrence issued a Record of Decision (ROD), which determined that no further investigation and/or remediation was necessary at these Sites. The ROD for Sites 15, 18 and 26 was issued on September 16, 1991. The ROD for Site 44 was issued on December 31, 1991. The ROD for Sites 9, 12, 33, 36, 37, 39, and 42 was issued on September 14, 1993.

More extensive remedial actions were implemented for Sites 13, 14 and 29, as discussed in this document.

On March 16, 1992, an interim ROD was signed by the Navy and USEPA for recovery and treatment of groundwater at Areas A and B. The NJDEP also concurred with the Record of Decision. This final ROD presents the selected alternative for groundwater in Areas A and B. It does not address other areas of concern at NAES, or sites other than those in Areas A and B. Other sites and areas have been addressed in separate Records of Decision.

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 NAES. The Bomarc Site is the responsibility of the U.S. Air Force and is located on Fort Dix adjacent to the western portion of NAES. 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 through previous investigations or standard removal procedures. In 1987 NAES was designated as a National Priorities List (NPL) or Superfund site under the federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

REMEDIAL INVESTIGATIONS

A series of investigations were conducted between 1985 and 1992 to determine the extent of contamination at Areas A and B. Monitoring wells were installed and groundwater samples were collected from all wells for comprehensive chemical analyses. Analysis of groundwater samples revealed contamination with

volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and petroleum hydrocarbons (PHCs). Figure 6 presents a more recent depiction of the extent and concentrations of VOC concentrations in groundwater during treatment system O&M. The table on page 9 provides a summary of the volatile organic contaminants detected above EPA and/or NJDEP standards. A detailed description of the investigations and results is contained in the Focused Feasibility Study for Areas A and B Groundwater.

REMEDIAL ACTIONS

Area A and B Pump & Treat (1991)

The Navy determined that it had sufficient data to perform an interim remedial action at Areas A and B. Although an in-depth risk assessment and comprehensive feasibility study had not been completed, a decision to halt groundwater plume migration and treat groundwater contamination from Areas A and B was made. The proposed plan was submitted to the public in August, 1991. A ROD memorializing the interim action was signed, with NJDEP concurrence, by the Navy and USEPA on March 16, 1992.

The interim remedial action implemented includes groundwater pumping, treatment and recharge of treated water back to the aquifer. Groundwater is extracted via six recovery wells at a combined rate of 585 gallons per minute. Four recovery wells are located at the downgradient edge of Area A-East controlling the migration of contamination into the downgradient wetlands, Ridgeway Branch and toward off-base residential property. A recovery well is located within Area A-West to treat a smaller area of groundwater contamination. A recovery well is located downgradient of Site 13 to treat the higher levels of contamination migrating from this source area in Area B. Figure 7 provides recovery well and treatment system locations.

The extracted groundwater is pretreated to remove metals, free product and solids. To treat the VOCs in the extracted groundwater, the water is passed through air stripping columns. Granular activated carbon polishing filters are used for residual VOC and SVOC removal. The air stripper emissions are treated by granular activated carbon air filters before being discharged to the atmosphere. The treated water is recharged to the aquifer via an irrigation/subsurface infiltration area located upgradient of the contaminated groundwater to form a "closed loop" treatment system.

The treatment system was designed by the Navy and awarded for construction in November 1991. Construction of the facility was completed and operation began in October 1993. This interim remedial action was implemented to halt the spread of contaminated groundwater from entering ecologically sensitive areas.

The interim action cost $3,100,000 to construct. Additionally the system costs approximately $445,000 per year to operate and maintain, approximately $120,000 per year for power, and approximately $120,000 per year for project oversight.

Landfill Study/Excavation at Site 29 (April 1992)
Numerous damaged (crushed or broken) drums were unearthed along the northern edge of the former landfill (Site 29) during the summer of 1992. A geophysical survey and test pit investigation was conducted from September 1992 through January 1993 to delineate the extent of buried drums at Site 29. Based on the findings of these investigations, a source removal effort was conducted from April 21 through June 18, 1993. This effort resulted in the removal of 417 buried drums and approximately 1,100 cubic yards of contaminated soil. The contaminated soil was recycled on site into asphalt during the summer of 1994 using a portable cold mix bituminous stabilization plant. The asphalt produced by this process was utilized at the NAES for the paving of existing gravel roads and parking lots. A Record of Decision for this Site was signed on August 9, 1994 calling for no further remedial action for Site 29 soils.

Remedial Action/Soil Removal at Site 14 (1994)
Petroleum contaminated soil from an old fire-training area was removed pursuant to a September 14, 1993 ROD. The soil was excavated and asphalt batched on-site as discussed above. The asphalt produced was used to pave on-base roads in accordance with the ROD.

Remedial Action/Vapor Extraction at Site 13 (1995)
The delineated contamination in the soil at Site 13 corresponds to an area directly under former Fuel Farm 125. This area is approximately sixty feet by sixty feet. Pursuant to a September 14, 1993 ROD, two vertical vapor extraction wells and two vertical vapor injection wells were installed at the site. The placement of these wells was chosen to ensure the total coverage of the site. Valves are placed in the system as a means to control the amount of air injected and extracted from each point. The system consists of air extraction and thermal oxidation treatment as well as fresh air injection to provide oxygen to the site in order to stimulate bio-remediation. The system is being switched to carbon adsorption for treatment due to the successful removal of contaminants and the decreasing levels requiring treatment. System performance is monitored through biweekly sampling of system influent and effluent and soil gas sampling at four key locations.

Free-product Recovery at Area A-West (1995)
Free product recovery of the weathered fuel product at Area A-west was initiated in August 1995 using a SkimRite™ active free product skimming system. The system consists of a pump, skimmer, and controller assembly which is inserted into the well. The system has air supply and air return lines which are connected to an external air compressor. Free product collected by the skimmer is pumped through a product discharge hose directly into a 55 gallon drum equipped with a float switch which shuts off the system when the drum is full. Over a three month period beginning in August 1995 approximately 30 gallons of free product were recovered from Area A-west and disposed of as hazardous waste. Due to problems with free product separation, the use of this system was discontinued after three months of operation.

Remedial Action/Sediment Removal at Site 14 Wetlands (1996)
Sediment contaminated with petroleum hydrocarbons was removed from the wetlands at Site 14 in November 1996. Approximately 450 cubic yards of sediment were excavated and recycled.

Summary of Remedial Actions

Previous remedial and removal actions at several sites in Areas A and B have addressed sources of groundwater contamination. In addition, the vapor extraction system installed at Site 13 will be capable of reducing soil contamination to acceptable levels and thus remove a main source of groundwater contamination in Areas A and B. Based on the results of the interim remedial action for groundwater, it appears that the existing system is capable of remediating groundwater contamination. However, modifications to the existing groundwater recovery system will be implemented as part of the final alternative to further optimize the remediation of area groundwater.

Volatile Organic Compounds Which Exceeded EPA MCLs and/or NJDEP PQLs

Contaminant	Highest Levels Detected During Remedial Investigation (ug/l)	Highest Levels Detected During Interim Treatment (ug/l)	Highest Levels Detected in Last Sampling Round (October 1996) (ug/l)	USEPA MCL (ug/l)	NJDEP PQL (ug/l)
Benzene	380	370	120	5	1
Toluene	2000	140	110	1000	5
Ethylbenzene	190	51	49	700	5
Xylene (total)	580	137	130	10,000	2
Bromoform	ND	3	ND	-	0.8
Carbon Tetrachloride	6.7	ND	ND	-	2
Chloroform	ND	3.88	ND	100	1
Dibromochloromethane	8	ND	ND	-	1
1,2-Dichloroethane	180	10	0.55	-	2
1,1-Dichloroethene	23	1.1	1.1	7	2
1,2-Dichloroethene	2400	1000	69	70	2
1,2-Dichloropropane	ND	58	1.4	-	1
1,1,2,2-Tetrachloroethane	ND	3	ND	-	1
Tetrachloroethene	720	155.48	17	5	1
1,1,1-Trichloroethane	170	24	6.7	200	1
Trichloroethene	253	680	29	5	1
Vinyl Chloride	2000	8.9	8.9	2	5

MCL - Maximum Contaminant Levels
PQL - Practical Quantitation Levels
ND - not detected

Primary Maximum Contaminant Levels (MCLs) are Federally enforceable contaminant levels allowable in public drinking water supplies. They have been established from health-based data by EPA's Office of Drinking Water Regulations (40 CFR 141) established under the authority of the Safe Drinking Water Act. MCLs are periodically revised as more information becomes available. When MCLs are not available, proposed MCLs were used as the comparison criteria for some analytes.

On 13 January 1993, the revised N.J.A.C. 7:9-6 which includes the Groundwater Quality Criteria was signed. The criteria establish the groundwater classifications for the Pinelands, including Class I-PL (Preservation Area) and Class I-PL (Protection Area). The actual groundwater criteria are the natural quality and background quality, respectively (N.J.A.C. 7:9-6.7). However, for some constituents natural quality is often much lower than can be measured in a laboratory, therefore, some measurable criteria are necessary to determine compliance. Practical Quantitation Levels (PQLs) are the lowest concentration of a constituent that can be reliably achieved among laboratories within specified limits of precision and accuracy during routine laboratory operating conditions. PQLs will be used to determine compliance with groundwater quality criteria for Class I-PL groundwater.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Proposed Plan for Areas A and B was issued to interested parties on December 30, 1996. On December 21 and 22, 1996, a newspaper notification inviting public comment on the Proposed Plan appeared in The Ocean County Observer and The Asbury Park Press. The comment period was held from January 7, 1997 to February 7, 1997. The newspaper notification also identified the Ocean County Library as the location of the Information Repository.

A Public Meeting was held on January 15, 1997 at the Manchester Branch of the Ocean County Library from 6:00 to 8:00 p.m. At this meeting representatives from the Navy, USEPA and NJDEP were available to answer questions concerning Areas A and B and the preferred alternative. The attendance list is provided in 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. A transcript of the meeting is available as part of the Administrative Record.

During the public comment period from January 7, 1997 through February 7, 1997, no written comments were received from the public pertaining to Areas A and B. On February 4, 1997, the NJDEP submitted additional comments to the Proposed Plan for Areas A and B groundwater. The Proposed Plan was revised to include these comments. A copy of the Proposed Plan for Areas A and B groundwater, dated February 5, 1997, has been placed in the Administrative Record for NAES located at the Ocean County Library, Toms River, NJ.

This decision document presents the selected alternative (i.e., continued groundwater treatment with dual phase extraction and groundwater sparging) for Areas A and B, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan (NCP). The decision for Areas A and B groundwater 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

Based on the levels of contamination detected in Areas A and B groundwater during Phase I and II of the Remedial Investigation, an interim Focused Feasibility Study (August 19, 1991) was prepared to evaluate alternatives for controlling contaminated groundwater migration. The 1991 Areas A and B Focused Feasibility Study indicated that the implementation of an interim action consisting of groundwater pumping, treatment and recharge would be most effective at containing the groundwater contaminants. An interim ROD for this action was issued on March 16 1992. Documentation supporting the interim action conducted at Areas A and B can be found in the Administrative Record for the NAES, at the Ocean County Library in Toms River, NJ.

The decision to recover and treat groundwater in Areas A and B was made to protect human health and the environment by preventing the further migration of groundwater contamination. The selected interim

remedy was not a final action for groundwater. The interim action for groundwater was the first cleanup phase of the remediation of Areas A and B. Separate final remedial actions were taken to remediate Areas A and B soil and sediment. This proposed plan and associated feasibility study investigate further action necessary to meet applicable or relevant and appropriate requirements (ARARs) for groundwater and will serve as the basis for making a final groundwater cleanup decision at Areas A and B.

SUMMARY OF SITE RISKS

In April 1992, an overall endangerment assessment for NAES was conducted. The objective of this Endangerment Assessment (EA) was to assess the potential current and future human health risks and potential environmental impacts posed by contaminated soils, groundwater, sediment, and surface water at NAES. Based on available information, NAES was considered to be a potential public health concern because of the risk to human health caused by the possibility of exposure to hazardous substances via contaminated groundwater, soil, sediment, and surface water.

AREA A&B RISK

This is a summary of the Endangerment Assessment (EA) findings for Areas A and B groundwater. Soil and sediment contamination in Areas A and B either has been addressed or is being addressed. The assessment of these areas was conducted using all available data generated during previous remedial investigations (RI). This summary will address (1) the chemicals identified 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, and (4) a summary interpretation of the EA findings with regard to need for site remediation..

Contaminants of Concern

For Areas A and B groundwater, contaminants of concern were determined to be the following: mercury, benzene, toluene, ethylbenzene, xylenes (BTEX), 1,1-dichloroethene, 1,2-dichloroethene, tetrachloroethene, 1,1,1-trichloroethane, trichloroethene, vinyl chloride, naphthalene, pentachlorophenol, and phenol.

Land Use and Exposure Assumptions

Four different scenarios representing current and potential future land uses were evaluated to assess applicability to the site. Evaluated scenarios included military, light industrial, construction and residential land uses. For each of these scenarios, human exposure is effected by mechanisms that include direct contact, inhalation and ingestion. Based on current land use conditions within Areas A and B, a light industrial land use scenario was quantified for direct exposure to contaminated groundwater via incidental ingestion. Although future residential land use conditions were not investigated as part of the risk characterization for Areas A and B, groundwater cleanup levels are based on residential land use assumptions.

Human Health Risk and Hazard Findings

For the contaminant levels detected in groundwater during the Remedial Investigation, the Hazard Index for noncarcinogens is 3.38, which is above the EPA's Hazard Index criteria value of 1.0. The Hazard Index values ranged from a minimum value of 4.89×10^{-5} for phenol to a maximum of 2.35 for 1,2-dichloroethene. Carcinogenic risk estimates for levels detected in groundwater during the Remedial Investigation are above EPA's acceptable risk range of 1×10^{-4} to 1×10^{-6} and New Jersey's acceptable risk of 1×10^{-6}. The overall area groundwater risk represented by the sum of the chemical-specific risk estimates is 1.34×10^{-2}. The risk estimates ranged from a minimum of 1.26×10^{-6} for pentachlorophenol to a maximum of 1.32×10^{-2} for vinyl chloride.

For the contaminant levels detected in groundwater monitoring wells during interim treatment, the Hazard Index for noncarcinogens is 0.29 which is below the EPA's Hazard Index criteria value of 1.0. The Hazard Index values ranged from a minimum value of 4.89×10^{-5} for phenol to a maximum of 0.21 for mercury. Carcinogenic risk estimates for levels detected in groundwater during treatment are within the EPA's acceptable risk range of 1×10^{-4} to 1×10^{-6} and above New Jersey's acceptable risk of 1×10^{-6}. The overall area groundwater risk represented by the sum of the chemical-specific risk estimates is 7.20×10^{-5}. The risk estimates ranged from a minimum of 1.26×10^{-6} for pentachlorophenol to a maximum of 3.75×10^{-5} for benzene.

These risk numbers are based on non-residential assumptions. If residential assumptions are used, the risk numbers would be higher and would fall out of the EPA acceptable risk range.

Ecological Assessment

As part of the Endangerment Assessment, a Baseline Ecological Evaluation (BEE) was conducted to obtain a description of the ecosystems at NAES.

Currently, it does not appear that groundwater is having an impact on the ecology of Areas A and B. However, groundwater is hydraulically connected to downgradient wetlands and surface water which does have ecological receptors.

An Ecological Characterization and Field Sampling Study was conducted for the Site 14 wetlands. This document can be found in the administrative record for NAES.

Endangerment Assessment Summary

In summary, the results of the EA indicate that contaminants present in groundwater at Areas A and B pose a concern relative to current and potential future exposed populations. Therefore, alternatives for the remediation of groundwater contamination in these Areas are warranted.

SUMMARY OF REMEDIAL ACTION ALTERNATIVES

Under CERCLA, the alternative selected must be protective of human health and the environment, in accordance with statutory requirements and cost effective. Permanent solutions to contamination are to

be achieved wherever possible. The remedial alternatives considered for the area are summarized below. Detailed descriptions of the remedial alternatives can be found in the FFS (May 1993), which is available in the Administrative Record for NAES.

All alternatives include the establishment of a classification exception area (CEA) pursuant to N.J.A.C. 7:9-6.6.

ALTERNATIVE 1: NO ACTION

Estimated Construction Cost: $ 99,600
Estimated Net O&M Cost: $ 0
Estimated Implementation Time Frame: immediately

The groundwater contamination present in Areas A and B is believed to be a result of past activities conducted at various sites. Contaminated soil currently undergoing treatment in Areas A and B may still provide a source of contamination for groundwater. This alternative involves no action to control or remove groundwater contamination at Areas A and B. Under this alternative, the existing treatment of groundwater would be discontinued and the equipment abandoned or removed.

This alternative has been included to provide a baseline for the comparison of other alternatives.

ALTERNATIVE 2: NATURAL REMEDIATION/GROUNDWATER MONITORING - DISCONTINUE EXISTING GROUNDWATER TREATMENT

Estimated Construction Cost: $ 205,000
Estimated Net O&M Cost: $ 115,600/yr
Estimated Implementation Time Frame: 1 year

This alternative involves groundwater monitoring of the aquifer and study of the natural remediation processes occurring within the Area. The existing groundwater treatment system would be discontinued. Extensive monitoring of the plume extent and migration would be monitored through the existing well network and additional monitoring wells if necessary. Contaminants would not be treated but would be allowed to reduce naturally. The natural remediation occurring at the site would be studied to determine if the microorganisms at the site have the potential to degrade the VOCs to harmless products.

Additional costs involve the installation of up to 10 additional monitoring wells and an initial restoration study to prove that this process will effectively remediate the Area. Annual O&M costs include quarterly sampling and analysis and project oversight.

ALTERNATIVE 3: CONTINUE EXISTING TREATMENT - GROUNDWATER PUMPING, TREATMENT, AND RECHARGE; AND FREE-PRODUCT RECOVERY AT AREA A-WEST

Construction Cost: $ 3.1 million
Estimated Additional Construction Cost: $ 0
Estimated Net O&M Cost: $ 628,000/yr
Estimated Implementation Time Frame: already implemented

This alternative involves groundwater pumping from the existing recovery wells located in Areas A and B (Figure 7).

At the existing treatment facility, a tank serves as an initial flow equalizer. A pretreatment unit is used for metals, free products and solids removal. Air stripping columns and granular activated carbon polishing filters are used to treat the volatile organic contaminants in the extracted groundwater. The air stripper emissions are treated by granular activated carbon air filters and clean air is discharged to the atmosphere. The treated groundwater, which meets Primary Safe Drinking Water Standards is recharged to the aquifer at two irrigation/infiltration areas located upgradient of the recovery wells to form a closed loop system. Treated groundwater is spray irrigated over soils in Areas A and B during temperate months and is infiltrated during winter months. This alternative has been effective at halting the continued migration of the contaminated plume. The construction cost provided for this alternative was the cost to build the existing facility. No additional construction cost would be incurred under this alternative.

The only modifications to the existing system included under this alternative would be modifications to the sampling frequency. Based on previous sampling results, it is appropriate to reduce the frequency of sampling. The sampling of monitoring wells will be reduced from quarterly to biannually for VOCs and annually for SVOCs and metals. The sampling of deep monitoring wells that have not detected any contamination may be discontinued. The frequency of sampling for semi-volatile organic compounds in the treatment process will also be reduced to annually for system influent and quarterly for system effluent.

ALTERNATIVE 4: MODIFICATIONS TO EXISTING TREATMENT

Estimated Construction Cost: $ 3.1 million
Estimated Additional Construction Cost: $161,000
Estimated Net O&M Cost: $ 727,900/yr
Estimated Implementation Time Frame: 1 year

This alternative would utilize the existing treatment system, however this alternative will require modifications of the existing system which include changes in recovery well locations and design, recovery rates, and potential modification to existing treatment technologies, and/or the implementation of additional groundwater treatment technologies. Modifications to the existing groundwater recovery

system would be made based on the results of the interim treatment system performance and quarterly data and additional modeling conducted in February 1996 during the design phase of the project.

Proposed changes in the recovery system include the following. The pumping rate of RWAB-4 would be increased from 80 gpm to 125 gpm to improve the capture of contamination from Area B and limit potential migration of contamination past this well. This modification would be implemented to improve contaminant recovery and accelerate the remediation of groundwater.

An additional well may be placed at the location of the high levels of benzene detected near the wetlands in Area A-east. Locating a well this close to the wetlands, however, may have adverse impacts on the wetlands. The construction cost for this alternative was the cost to construct the existing treatment system. An additional construction cost of $161,000 would be incurred under this alternative.

Natural remediation occurring in Areas A and B is considered to be part of this alternative

Modifications to the sampling frequency are also included as part of this alternative. Based on previous sampling results, it is appropriate to reduce the frequency of sampling. The sampling of monitoring wells will be reduced from quarterly to biannually for VOCs and annually for SVOCs and metals. The sampling of deep monitoring wells that have not detected any contamination may be discontinued. The frequency of sampling for semi-volatile organic compounds in the treatment process will also be reduced to annually for system influent and quarterly for system effluent.

Under this general alternative, four potential modifications to the existing treatment system will be developed individually. Costs associated with each should be considered additional to those shown in Alternative 4.

The individual development presented here is conducted to aid any future decision making processes which center on treatment system optimization. However, in the detailed analysis of alternatives, modification will be treated as a single alternative.

The influent data from the recovery system proposed as Alternative 4 will be reviewed to determine if modifications to the current treatment system are necessary. These modifications could include one or several of the following alternatives.

Elimination of pH Adjustment for Treatment

Sodium hydroxide is currently used in the Areas A and B treatment process for pH adjustment. The pH of the plant influent is raised to allow metal hydroxides to precipitate out of solution. The use of this chemical is currently increasing the sodium content in the Area groundwater. Under this alternative the reduction and possible elimination of pH adjustment would be investigated. The cost savings resulting from the elimination of sodium hydroxide for treatment would be approximately $40,000 per year. The effects of this change on treatment system performance would be investigated to determine implementability.

Open Aeration to Treat Groundwater

Based on the existing levels of VOCs in the treatment system influent, controls on air emissions are not required. If the influent levels from the new recovery system to be installed under Alternative 4 continue to meet these requirements, the use of alternate open aeration treatment would be investigated. The use of this technology would require no pretreatment of groundwater. However, the level of contaminants entering the system would have to meet the NJDEP air pollution control requirements. The discharge requirements would have to meet applicable Federal and State requirements. The cost to implement this type of treatment varies depending on the type of open aeration system chosen.

If the use of open aeration is implemented, the use of surface infiltration basins may be required to return treated water back to the aquifer. This type of discharge system would be more capable of handling precipitated iron than subsurface infiltration since the basins are more easily maintained.

The following additional technologies will be implemented to accelerate the remediation of groundwater contamination in Areas A and B.

Free Product Recovery

The free product recovery currently being conducted at Area A-West could be modified to accelerate the remediation of groundwater contamination. Free product skimming currently being conducted at Area A-west could be enhanced through the addition of additional wells to skim groundwater over a larger area. Combined product recovery and groundwater extraction could be implemented by installing a specialized combination well which contains a peristaltic skimmer to remove free product. With this system, the cone of depression created by groundwater pumping would allow floating product to accumulate and be removed from the well more efficiently. A dual phase extraction system could also be installed at Area A-west which would efficiently recover the floating product while simultaneously promoting biological treatment. The cost to install a dual phase extraction system at Area A-west is $125,000 plus $90,000 per year for system operation and maintenance.

Sparging

A line of sparge points placed along the wetlands in Area A-east would prevent groundwater contamination from entering the downgradient wetlands. This system would also be used to remediate the higher levels of contamination detected at well KB located adjacent to the wetlands. The placement of a recovery well at this location may cause an adverse drawdown in the wetlands therefore a passive remediation system may be better suited to remediate this area of contamination. The sparge system would be designed to provide a continuous "wall" of sparge points along the downgradient extent of Area A-east. Vapor extraction could be used to enhance the effectiveness of a sparge system. The cost to install a sparge system at Area A-east is $200,000 plus $80,000 per year for operation and maintenance.

An air permit equivalency would be obtained from the NJDEP, if required, for modifications to existing system or additional treatment systems to be installed.

6.0 EVALUATION 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. **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.

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

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

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

6. **Cost** includes an evaluation of capital costs, annual operation and maintenance (O&M) costs.

7. **Compliance With ARARs** evaluates the ability of an alternative to meet Applicable or Relevant and Appropriate Requirements (ARARs) established through Federal and State statutes and/or provides the basis for invoking a waiver.

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

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

The first two criteria, protection of human health and the environment and compliance with Applicable or Relevant and Appropriate Requirements (ARARs) are considered by the EPA to be threshold criteria which each alternative must meet. The next five are balancing criteria, and the final two are considered modifying criteria.

ANALYSIS OF ALTERNATIVES

Overall Protection of Human Health and Environment -
Alternative 4 provides the greatest overall protection of human health and the environment through a combination of groundwater recovery and treatment and in-situ treatment. Based on the results of the interim action (Alternative 3) additional technologies will be implemented to treat both free-product and groundwater in Area A-west and treat groundwater contamination in Area A-east. Therefore, Alternative 4 provides advantages over Alternative 3 through more extensive treatment.

Alternative 3 provides protection of human health and the environment through treatment of groundwater and extensive monitoring. However, pH adjustment and chemical addition under this alternative may have an adverse effect on the aquifer. Removal of these problems may be implemented under Alternative 4.

Alternative 2 offers no groundwater treatment. This alternative would provide protection of human health through extensive monitoring of groundwater migration and natural remediation.

Alternative 1, which offers no groundwater treatment or monitoring, is not protective.

Long-Term Effectiveness and Permanence -
Alternative 4 provides the overall most effective and permanent options for protection of human health and the environment through combined active and passive treatment. Long term permanence is ensured since monitoring wells throughout and downgradient of the plume are monitored until all levels within the plume have been reduced below ARARs. The estimated time for this alternative to meet ARARs through the combined effects of treatment and natural remediation is less than 10 years.

Alternative 3 would provide long-term protection of human health through the removal and treatment of all contamination migrating from the sites in Areas A and B. The estimated time for this alternatives to capture and treat all contamination above ARARs is 10 to 15 years.

Alternative 2 provides no active treatment and is not considered to be effective because the current levels of contamination appear to be too high for natural remediation to effectively control contaminant migration. This alternative would be effective toward the closing stages of restoration when pumping is no longer an effective option.

Alternative 1 provides no treatment and is not considered effective.

Reduction of Toxicity, Mobility or Volume Through Treatment -
Alternative 4 treats the largest volume of contamination by optimizing groundwater contaminant recovery and applying additional treatment technologies to the existing groundwater treatment system. The mobility and volume are reduced through enhanced capture and treatment of the plume.

Alternative 3 offers less reduction of toxicity, mobility or volume than Alternative 4.

Alternatives 1 and 2 offer no reduction of toxicity, mobility or volume through treatment of the contaminated media.

Short-Term Effectiveness -
Remedial action Alternatives 3 and 4 in the short-term, would halt the continued migration of contaminated groundwater downgradient of residual source areas. Alternative 4 would accelerate the existing rate of treatment. The estimated cleanup duration for Alternative 4 is less than 10 years to reach ARARs. The estimated time to reduce all contamination below ARARs for Alternative 3 is 10 to 15 years.

Alternative 2 is effective at monitoring the movement of contamination but would not prevent the short term migration of contamination.

Alternative 1 provides no treatment of groundwater and is not considered to be effective in the short-term because residual risks are not reduced.

Implementability -
Alternative 1 offers the greatest implementability. This alternative involves the shutdown of the existing treatment facility and no further action.

Alternative 3 has already been implemented as an interim measure. This alternative requires continued operation and maintenance of the existing treatment facility.

Alternative No. 2 involves the shut down of treatment and continued monitoring of the aquifer. This alternative can be implemented in several months with the initiation of a study to determine the natural remediation occurring within the aquifer.

Alternative No. 4 would be more difficult to implement due to the additional design and construction required.

Cost -
Alternative No. 1, the no action/long term monitoring alternative, has the lowest associated cost. Alternative No. 2 natural remediation/monitoring alternative has the second lowest cost. The cost for Alternative No. 3 involves operation and maintenance costs only. Alternative No. 4 involves modification of the recovery system and/or additions to the existing treatment system. Due to the potential decrease in the estimated time for completion from 10-15 years for Alternative 3 to 10 years for Alternative 4, the reduced O&M costs may make Alternative 4 less costly.

Compliance with ARARs -
EPA considers drinking water Maximum Contaminant Levels (MCLs) and because of the location of NAES within the Pinelands, State Practical Quantitation Levels (PQLs), whichever is more stringent for each contaminant of concern, to be ARARs

Alternative No. 1 does not comply with ARARs because no remedial action takes place. Alternative No. 2 will not reduce contamination to meet ARARs in a reasonable time frame before the contamination migrates to areas that could potentially harm human health and the environment. Alternatives 3 and 4 are designed to meet ARARs.

An air permit equivalency would be obtained from the NJDEP, if required, for modifications to existing system or additional treatment systems to be installed.

Agency and Community Acceptance -
Agency and Community Acceptance are addressed in the Responsiveness Summary Section of this document..

THE SELECTED ALTERNATIVE

The selected alternative to address groundwater at Areas A and B is Alternative 4: Modifications to Existing Treatment.

The existing groundwater treatment system will be modified to improve the capture of contaminated groundwater. Modifications to recovery well pumping rates will be implemented as part of the proposed action. Also, modifications will be made to improve the effectiveness of remediation by adding a sparge wall along the downgradient edge of the plume, along the edge of the wetlands in Area A-east and a dual phase extraction system in Area A-west to enhance recovery of the product which continues to act as a source in this area. Additional modifications to treatment are also included as part of the proposed action and could be implemented based on system influent concentrations after recovery system modifications are implemented if necessary.

A classification exception area (CEA) will be established pursuant to N.J.A.C. 7.9-6.6.

The objectives of the proposed action for groundwater are to: 1) protect human health and the environment by reducing the downgradient migration of contaminated groundwater; 2) remediate source areas with the highest concentration of contaminants through the ongoing operation of a vapor extraction system at Site 13 and the installation of a dual phase extraction system at Area A-west; and 3) ensure groundwater quality complies with ARARs.

RECORD OF DECISION
RESPONSIVENESS SUMMARY
AREAS A AND B
NAVAL AIR ENGINEERING STATION

The purpose of this responsiveness summary is to review public response to the Proposed Plan for Areas A and B groundwater. It also documents the Navy's consideration of comments during the decision making process and provides answers to any comments raised during the public comment period.

The responsiveness summary for Areas A and B is divided into the following sections:

OVERVIEW - This section briefly describes the remedial alternative recommended in the proposed plan and any impacts on the proposed plan due to public comment.

BACKGROUND ON COMMUNITY INVOLVEMENT - This section describes community relations activities conducted with respect to the area of concern.

SUMMARY OF MAJOR QUESTIONS AND COMMENTS - This section summarizes verbal and written comments received during the public meeting and public comment period.

OVERVIEW

Areas A and B are located at the NAES in Ocean County, Lakehurst, New Jersey. This responsiveness summary addresses public response to the Proposed Plan, proposing continued operation of the existing groundwater treatment system with modifications made to improve the effectiveness of remediation.

The Proposed Plan and other supporting information are available for public review at the information repository located at the Ocean County Library, 101 Washington Street, Toms River, New Jersey.

BACKGROUND ON COMMUNITY INVOLVEMENT

This section provides a brief history of community participation in the investigation and interim remedial planning activities conducted for Areas A and B. Throughout the investigation period, the USEPA and NJDEP have been reviewing work plans and reports and have been providing comments and recommendations which are incorporated into the appropriate documents. A Technical Review Committee (TRC), consisting of representatives of the Navy, the USEPA, the NJDEP, the Ocean County Board of Health, the New Jersey Pinelands Commission, other agencies and communities surrounding NAES was formed and has been holding periodic meetings to maintain open lines of communication and to inform all parties of current activities.

Prior to public release of site-specific documents, NAES's public relations staff compiled a list of local public officials who demonstrated or were expected to have an interest in the investigation. Local

environmental interest groups were also identified and included on this list. The list is attached as Appendix B to this Record of Decision.

On December 21 and 22, 1996, a newspaper notification inviting public comment on the Proposed Plan appeared in The Ocean County Observer and The Asbury Park Press. The public notice summarized the Proposed Plan and the preferred alternative. The announcement also identified the time and location of a Public Meeting and specified a public comment period, and the address to which written comments could be sent. Public comments were accepted from January 7, 1997 to February 7, 1997. The newspaper notification also identified the Ocean County Library as the location of the Information Repository.

A Public Meeting was held on January 15, 1997, from 6:00 to 8:00 p.m. at the Manchester Branch of the Ocean County Library, Colonial Drive, Manchester, New Jersey. At this meeting representatives from the Navy, USEPA and NJDEP were available to answer questions concerning Areas A and B groundwater and the preferred alternative. NAES representatives present included: CAPT Leroy Farr, Commanding Officer; CAPT Michael Dougherty, Executive Officer; Robert Kirkbright, Director of Public Works Engineering; Lucy Bottomley, Supervisory Environmental Engineer; and Environmental Branch personnel: Dorothy Peterson, Greg Bury, Ray Hahn, Jill Sarafin, Bob Previte, Michael Figura, Carol Uhrich, Larry Lemig, Bill Korosec, and Joe Rhyner; and Carole Ancelin, Public Affairs Officer. Mr. Jeff Gratz, represented the USEPA's Federal Facility Section; Ms. Donna Gaffigan represented the NJDEP's Bureau of Federal Case Management and Mr. Kevin Schick represented the NJDEP's Bureau of Environmental Evaluation and Risk Assessment. The complete attendance list is provided in Appendix A.

SUMMARY OF MAJOR QUESTIONS AND COMMENTS

Written Comments

During the public comment period from January 7, 1997 through February 7, 1997, no written comments were received from the public pertaining to Areas A and B.

On February 4, 1997, the NJDEP submitted additional comments to the Proposed Plan for Areas A and B groundwater. The Proposed Plan was revised to include these comments. A copy of the Proposed Plan for Areas A and B groundwater, dated February 5, 1997, has been placed in the Administrative Record for NAES located at the Ocean County Library, Toms River, NJ.

Public Meeting Comments

Question 1: Does the Navy take samples to determine if any contamination from off-base sources could be migrating onto the base?

During three phases of remedial investigations conducted at NAES, soil, sediment, surface water, and groundwater samples were collected from areas of known or suspected contaminant releases into the

environment. These areas were determined through interviews with base personnel, literature searches and site inspections. The only off-base source of contamination that has been identified as having the potential to enter the base property was the Bomarc Site. The results for this site are addressed in the Record of Decision for Area L (September 16, 1991) and are not included as part of this Area.

An elevated area which runs east-west through the base acts as a groundwater divide. Groundwater flow on the base migrates to the Ridgeway Branch to the north and the Black and Union Branches to the south. Therefore, it is unlikely that any groundwater contamination from off-base sources could migrate onto the base.

NAES samples 42 wells in Areas A and B and several hundred wells across the base semi-annually to monitor groundwater quality and movement. A basewide groundwater model is used to predict groundwater contaminant movement in order to protect human health and the environment.

Question 2: What is involved with the groundwater treatment in Areas A and B and how often does the system operate?

Groundwater is extracted via six recovery wells at a combined rate of 585 gallons per minute. Four recovery wells are located at the downgradient edge of Area A-East controlling the migration of contamination into the downgradient wetlands, Ridgeway Branch and toward off-base property. A recovery well is located within Area A-West to treat a smaller area of groundwater contamination. A recovery well is located downgradient of Site 13 to treat the higher levels of contamination migrating from this source area in Area B.

The extracted groundwater is pretreated to remove metals, free product and solids. To treat the VOCs in the extracted groundwater, the water is passed through air stripping columns. Granular activated carbon polishing filters are used for residual VOC and SVOC removal. The air stripper emissions are treated by granular activated carbon air filters before being discharged to the atmosphere. The treated water is recharged to the aquifer via an irrigation/infiltration area located upgradient of the contaminated groundwater to form a "closed loop" treatment system.

The treatment system in Areas A and B operates continuously 24 hours per days.

A transcript of the Public Meeting is provided in the Information Repository at the Ocean County Library, Toms River NJ.

STATUTORY DETERMINATIONS

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.

Based on the consideration of alternatives, Alternative 4 has been selected as the preferred alternative to address the groundwater in Areas A and B for the following reasons:

- The selected alternative will provide protection of human health and the environment through active treatment of groundwater. The remedial system will be designed to meet ARARs. Extensive monitoring will be used to ensure protection of human health.

- The treatment system described in the selected alternative has already been implemented and will continue to be operated with modifications made to enhance system performance.

APPENDIX A

Attendance List for Public Meeting Held January 15, 1997

NAVAL AIR ENGINEERING STATION
Public Meeting January 15, 1997

SIGN-IN SHEET

NAME	ADDRESS (for future mailings)	HOW DID YOU HEAR OF THE MEETING? CIRCLE ONE
Dorothy Peterson	NAES	POSTERS RADIO NEWSPAPER MAIL
Bob Previte	NAES	POSTERS RADIO NEWSPAPER MAIL
Carole Lenahan	NAES/NAWCAD	POSTERS RADIO NEWSPAPER MAIL
Cindy Vosseller	733 Sixth Ave. Toms River NJ 08757	POSTERS RADIO NEWSPAPER MAIL work
Lucy Bottomley	NAES	POSTERS RADIO NEWSPAPER MAIL
[illegible]	NAES	POSTERS RADIO NEWSPAPER MAIL work
Bob Carr	Lakehurst	POSTERS RADIO NEWSPAPER MAIL
Linda Cooper	2132 Rt 37 W. Lakehurst NJ 08733	POSTERS RADIO NEWSPAPER MAIL
Bill Cooper	2132 Rt 37 Lakehurst NJ 08733	POSTERS RADIO NEWSPAPER MAIL
CAPT LeRoy Farr	NAES Lakehurst	POSTERS RADIO NEWSPAPER MAIL
Theresa Lettman	1401 Broadway Blvd. Manchester Twp.	POSTERS RADIO NEWSPAPER MAIL
Jeff Gratz	EPA Region II	POSTERS RADIO NEWSPAPER MAIL
D/ Adam	11 Bu[illegible] DR STR, N.J.	POSTERS RADIO NEWSPAPER MAIL
Kevin Schick	NJDEP/SRP/BEERA	POSTERS RADIO NEWSPAPER MAIL
		POSTERS RADIO NEWSPAPER MAIL

→ PLEASE CONTINUE ON BACK →

NAVAL AIR ENGINEERING STATION
Public Meeting January 15, 1997

SIGN-IN SHEET

NAME	ADDRESS (for future mailings)	HOW DID YOU HEAR OF THE MEETING? CIRCLE ONE
COLEMAN John	9D Robin CRICE/HURST NJ 08733	POSTERS RADIO NEWSPAPER MAIL
Bill Shaw	79 Circle DR Lakehurst NJ	POSTERS RADIO NEWSPAPER MAIL
Tony PICARONI	NAWCAD/NAES LAKE	POSTERS RADIO NEWSPAPER MAIL
Kevin W. Pace	PO Box 328, Lakehurst, NJ	POSTERS RADIO NEWSPAPER MAIL
ANN E. KROL	865-A Liverpool Circle LAKEHURST, N.J. 08733	POSTERS RADIO NEWSPAPER MAIL
ANTHONY J. KROL	"	POSTERS RADIO NEWSPAPER MAIL
Stephen Rudowski	NAES Safety.	POSTERS RADIO NEWSPAPER MAIL
Bill Korosec	NAES	POSTERS RADIO NEWSPAPER MAIL
LARRY CEMIG	NAES	POSTERS RADIO NEWSPAPER MAIL
BOB KUKERLIGHT	NAES	POSTERS RADIO NEWSPAPER MAIL
Donna L Gaffigan	NJDEP	POSTERS RADIO NEWSPAPER MAIL
LAWRENCE L. LYON	NAES	POSTERS RADIO NEWSPAPER MAIL
David Folis	NAWCAD TRN	POSTERS RADIO NEWSPAPER MAIL
[illegible]	Asbury Park Press	POSTERS RADIO NEWSPAPER MAIL
Susan MACADAM	15 Harrison Pl. Lakehurst.	POSTERS RADIO NEWSPAPER MAIL Library

SIGN IN SHEET

Larry Moniz	O.C. Observer
Marie Sailer Fey	Borough of Lakehurst 5 Union Ave. Lakehurst, N.J. 08733
Capt Mike Doughty	NAES LAKEHURST
L Cooper	
Mike Figura	NAES
John J. Lord	Heritage Minerals.
Carl Jablonski	NAVY CRNST
Bob Waters	Manchester Twp.
Dr Fred Felice	Super Ocean County Voc-Tech
GARY SYLVESTER	- MANCHESTER TWP DEPT. OF P.W./UTILITIES
MAURA HORN	MONTGOMERY WATSON
Bud Albert	Dover Twp.
	Manchester Twp Env Comm.
GREG MINNICK	NAVFAC LKE / TOMS RIVER
John Berryman	704 OAK St Lakehurst
JOHN HARRINGTON	COUNCILMAN MANCHESTER

updated 2-18-97

APPENDIX B
LIST OF CONCERNED PARTIES

Naval Air Engineering Station - Lakehurst

Captain L. Farr (908) 323-2380
Commanding Officer
Naval Air Engineering Station
Lakehurst, NJ 08733-5000

Ms. Carole Ancelin, Public Affairs (908) 323-2811
Naval Air Engineering Station
Lakehurst, NJ 08733-5000

Commander Mike Murtha (908) 323-2601
Public Works Officer
Naval Air Engineering Station
Lakehurst, NJ 08733-5000

Northern Division, Naval Facilities Engineering Command

Mr. Lonnie Monaco (610) 595-0567
Northern Division
Naval Facilities Engineering Command
Code 182
10 Industrial Highway
Mail Stop 82
Lester, PA 19113-2090

Federal Elected Officials

Senator Frank R. Lautenberg (609) 757-5353
208 White Horse Pike
Suite 18-19
Barrington, NJ 08007

Senator Robert Torricelli (201) 639-2860
1 Newark Center
16th Floor

Newark, NJ 07102

Congressman Dick Zimmer (908) 788-1952
36 West Main St.
Suite 201
Freehold, NJ 07728

Congressman Christopher H. Smith (908) 350-2300
100 Lacey Road
Suite 38A
Whiting, NJ 08759

Congressman Frank Pallone, Jr. (201) 571-1140
540 Broadway
Room 118
Long Branch, NJ 07740

State Elected Officials

Senator Leonard T. Connors, Jr. (609) 693-6700
620 West Lacey Road
Forked River, NJ 08731

Assemblyman Jefferey Moran (609) 693-6700
620 West Lacey Road
Forked River, NJ 08731

Assemblyman Christopher J. Connors (609) 693-6700
620 West Lacey Road
Forked River, NJ 08731

Other Federal Agencies

Mr. Steve Aoyama (404) 639-6070
Agency for Toxic Substances and
Disease Registry
1600 Clifton Road
Mail Stop E-56
Atlanta, GA 30333

New Jersey Pinelands Commission

Mr. Todd DeJesus (609) 894-9342
The Pinelands Commission
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New Lisbon, NJ 08064

Ocean County Officials

Mr. Alan W. Avery, Jr., Director (908) 929-2054
Ocean County Planning Board
P.O. Box 2191
Toms River, NJ 08754-2191

Mr. John C. Bartlett, Director (908) 244-2121
Ocean County Board of Freeholders
P.O. Box 2191
Toms River, NJ 08754

Mr. Joseph Przywara, Acting Health Coordinator (908) 341-9700
Ocean County Health Department
P.O. Box 2191
175 Sunset Avenue
Toms River, NJ 08754

Mr. A. Jerome Walnut, Chairman (908) 505-3671
Ocean County Environmental Agency
1623 Whitesville Road
Toms River, NJ 08755

Dover Township Officials

Hon. George Whittman (908) 341-1000
Mayor of Dover Township
P.O. Box 728
33 Washington Street
Toms River, NJ 08753

Ms. Janet Larson, Chairperson (908) 341-1000
Dover Township Environmental Commission
P.O. Box 728
33 Washington Street
Toms River, NJ 08754

Manchester Township Officials

Hon. Jane Cardo Cameron (908) 657-8121
Mayor of Manchester Township
One Colonial Drive
Lakehurst, NJ 08733

Mr. Warren Sweeney, Chairman
Manchester Township Environmental Commission
One Colonial Drive
Lakehurst, NJ 08733

Jackson Township Officials

Vicki Rickabaugh, Mayor
Municipal Building
95 W. Veterans Highway
Jackson, NJ 08527

Mr. Richard Bizub, Chairman (908) 928-0900
Jackson Township Environmental Commission
128 Willow Drive
Jackson, NJ 08527

Borough of Lakehurst Officials

Hon. Stephen Childers (908) 657-4141
Mayor of Lakehurst Borough
5 Union Avenue
Lakehurst, NJ 08733

Mr. Robert J. Morris (908) 657-4141
Municipal Clerk, Borough of Lakehurst
5 Union Avenue
Lakehurst, NJ 08733

Plumsted Township Officials

Hon. Ronald S. Dancer (609) 758-2241
Mayor of Plumsted Township
P.O. Box 398
New Egypt, NJ 08533-0398

Community Groups and Interested Citizens

Pine Lake Park Association
100 Oakdale Drive
Toms River, NJ 08754

Mr. Holmes Ertley (908) 657-4690
699C Friar Court
Lakehurst, NJ 08733

Mr. John Lewis (908) 657-1890
315 Beckerville Road
Lakehurst, NJ 08733

Ms. Candy Vesce
733 Sixth Ave.
Pine Lake Park
Toms River, NJ 08757

Ms. Theresa Lettman
Pinelands Preservation Alliance
120-34B White Bogs Road
Browns Mills, NJ 08015
(609) 893-4747

Ms. Susan Marshall
1716 Ninth Ave.
Toms River, NJ 08757

Ms. Gisela Tsambikou
1162 Beacon St.
Pine Lake Park
Toms River, NJ 08757

Mr. Dieter Rand
3288 Johnson Ave.
Lakehurst, NJ 08733

Mr. & Mrs. Blackwell Albertson
135 Beckerville Rd.
Lakehurst, NJ 08733

Heritage Minerals, Inc.
Attn: Ms. Adele Hovnanian
One Hovchild Plaza
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Tinton Falls, NJ 07753

Chuck Lindstrom
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Jackson, NJ 08527

Ben Epstein
Ocean County Citizens for Clean Water
2230 Agin Court Road
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Media Organizations

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Ms. Debra Coombe
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New Egypt Press
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New Egypt, NJ 08533
(609) 758-2112

Ocean County Leader
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Ms. Lisa Peterson
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Ocean County Reporter
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Mr. Sam Christopher
Ocean County Observer
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Radio

Mr. Shawn Marsh
WJLK Radio
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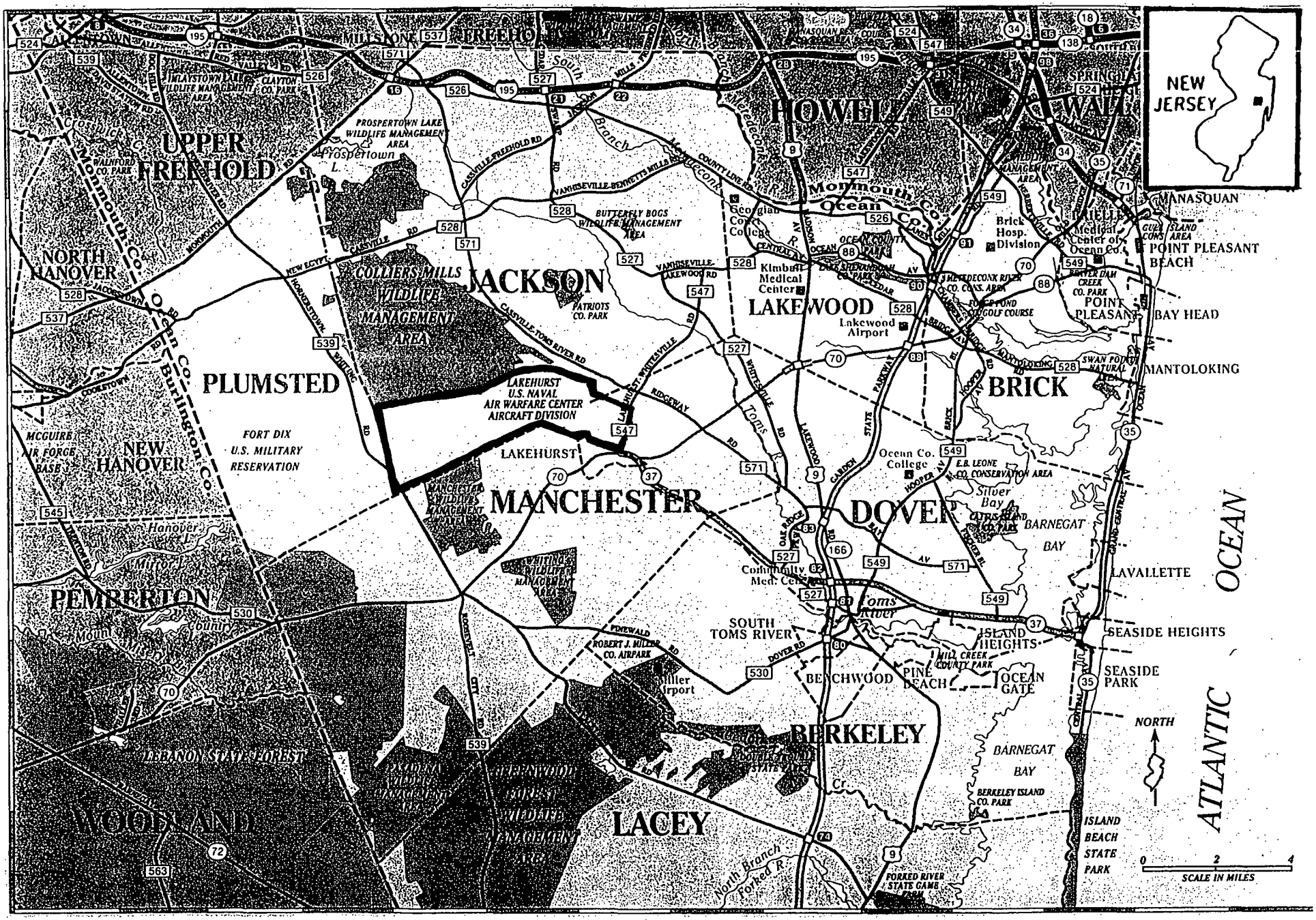
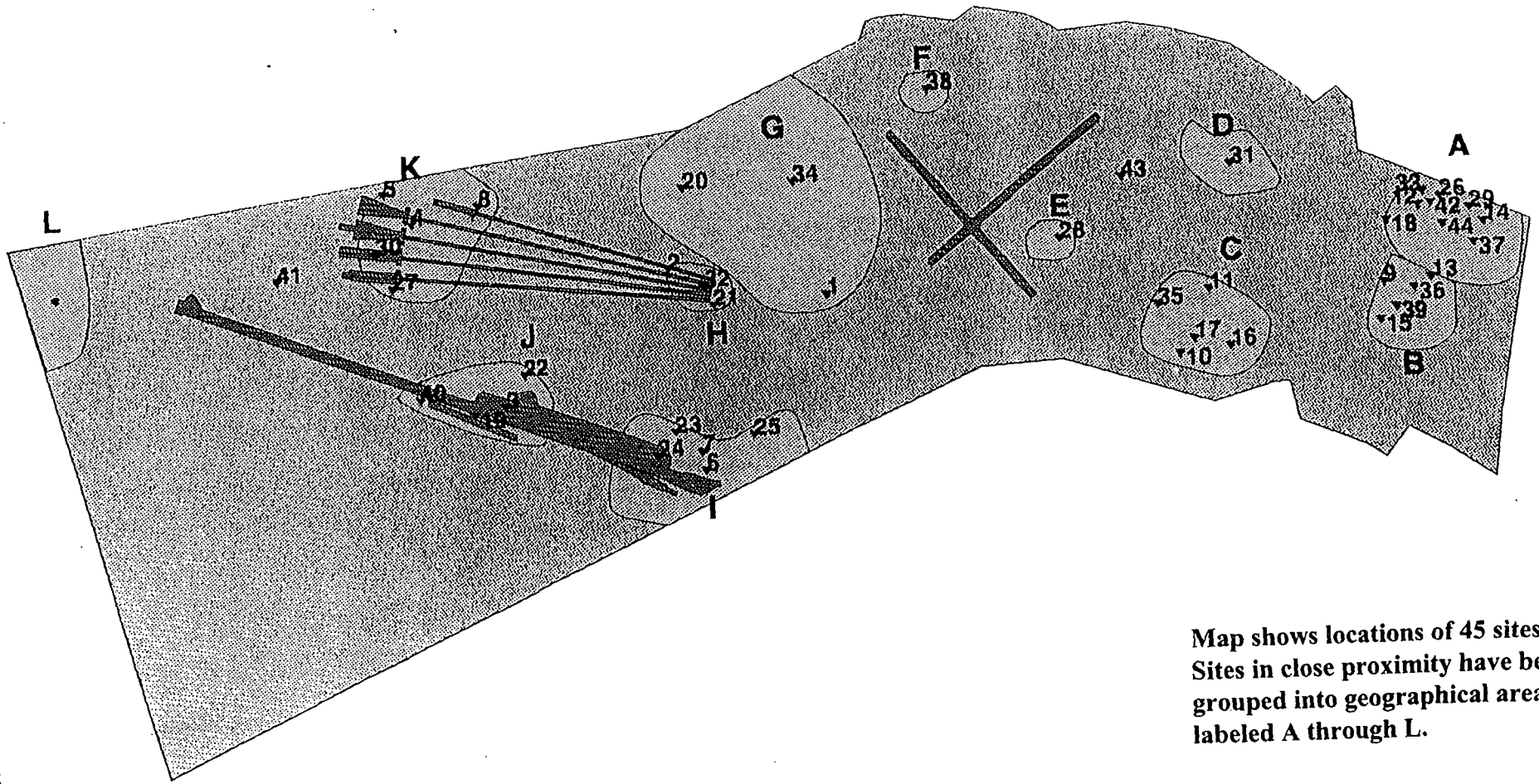
FIGURES



Naval Air Engineering Station Vicinity Map **Figure 1**

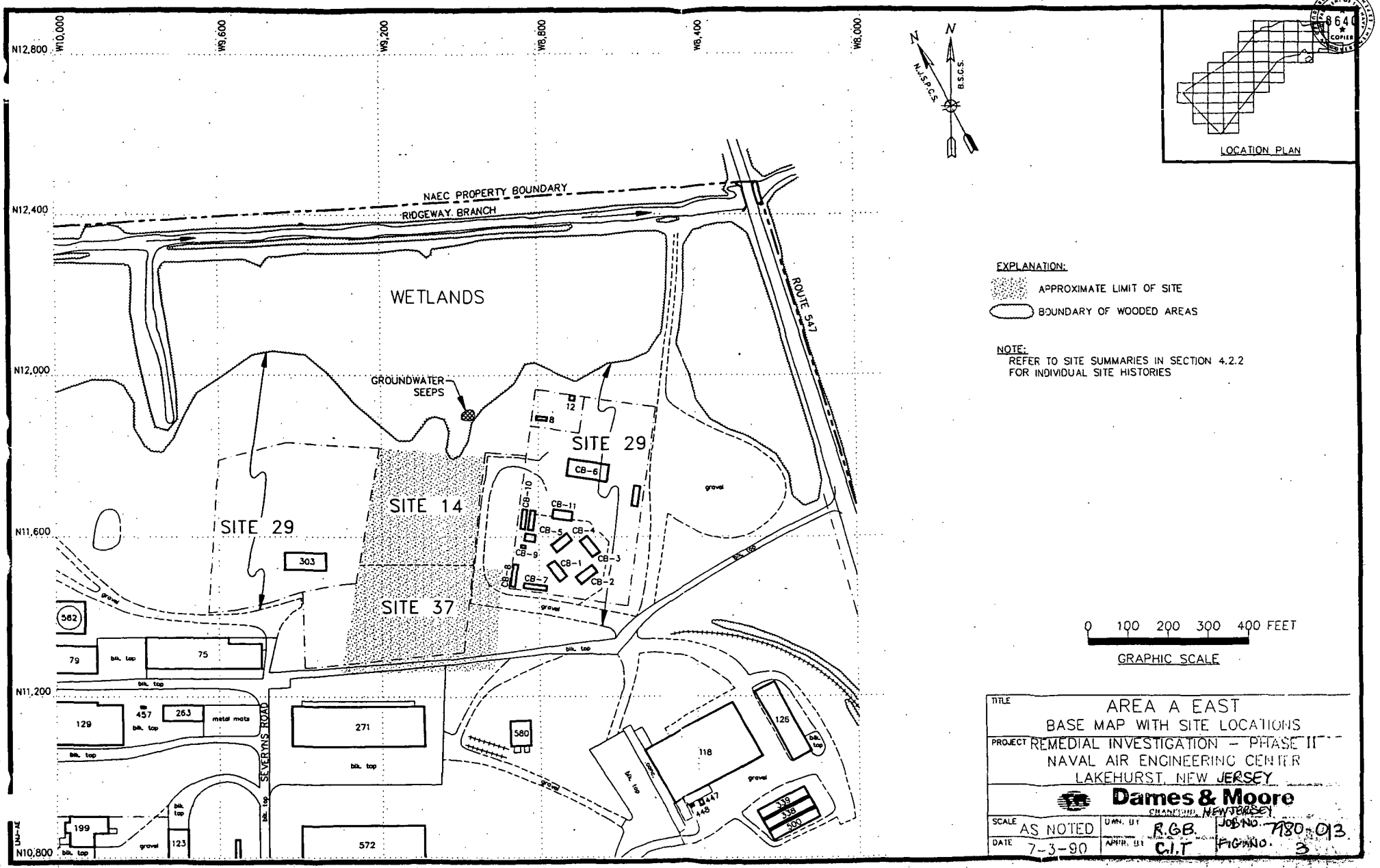
NAES Lakehurst NPL Sites



Map shows locations of 45 sites. Sites in close proximity have been grouped into geographical areas labeled A through L.

8 MARCH 1995

FIGURE 2

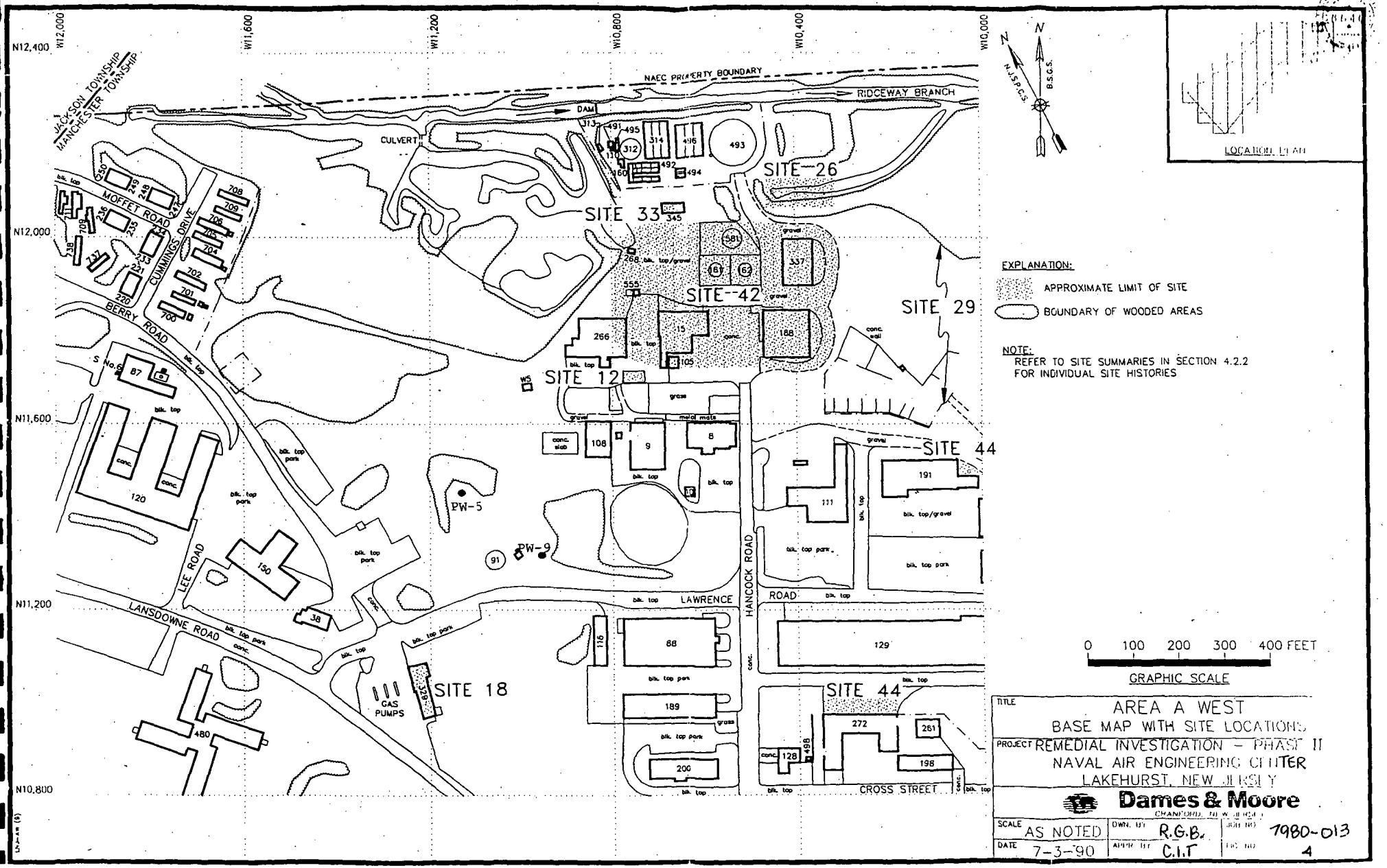


TITLE: AREA A EAST
BASE MAP WITH SITE LOCATIONS

PROJECT: REMEDIAL INVESTIGATION – PHASE II
NAVAL AIR ENGINEERING CENTER
LAKEHURST, NEW JERSEY

Dames & Moore
CHANTILLY, VIRGINIA

SCALE: AS NOTED	DWN. BY: R.G.B.	JOB NO.: 7180-013
DATE: 7-3-90	APPR. BY: C.I.T	FIG NO.: 3

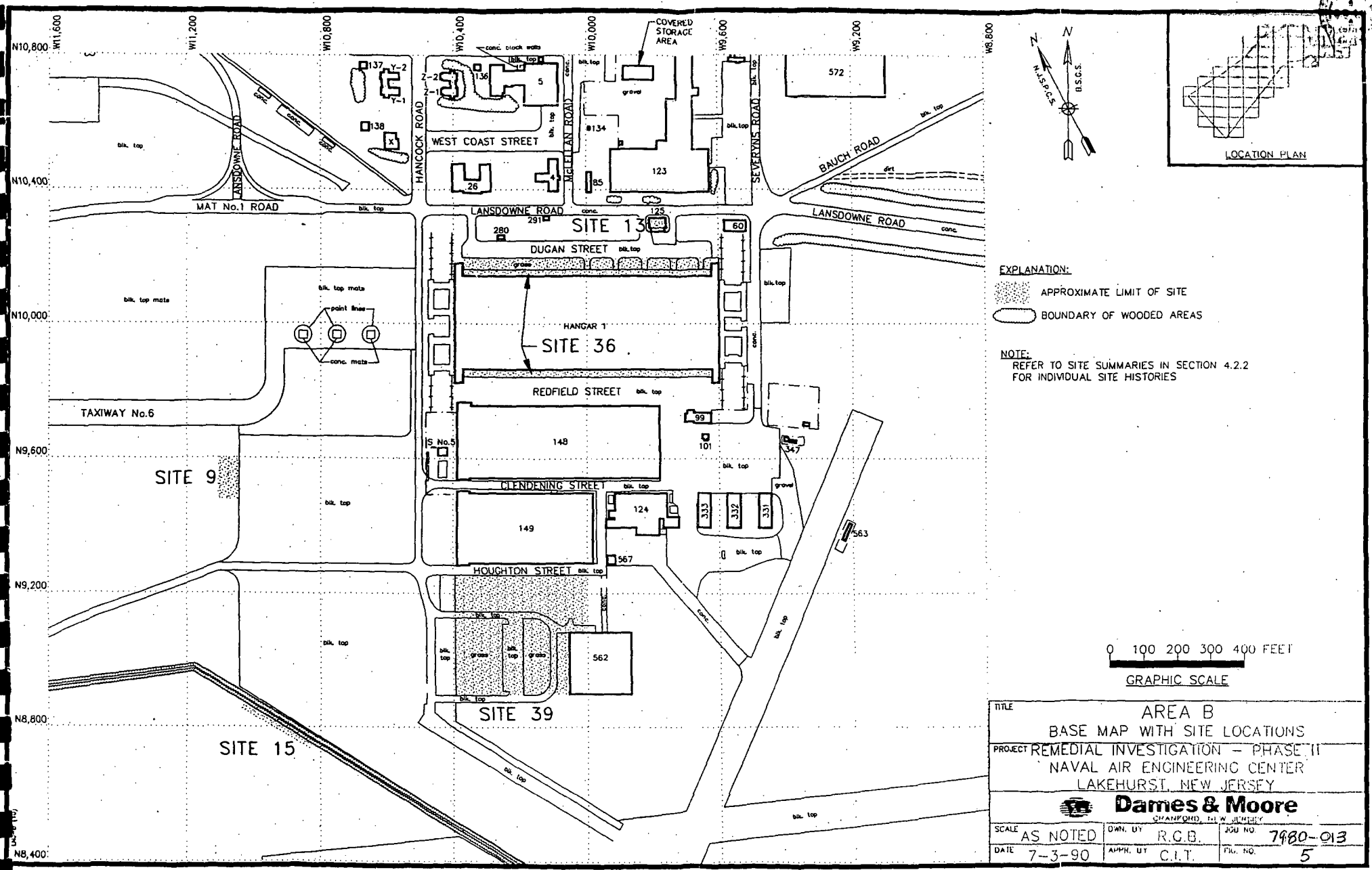


TITLE: AREA A WEST
BASE MAP WITH SITE LOCATIONS

PROJECT: REMEDIAL INVESTIGATION – PHASE II
NAVAL AIR ENGINEERING CENTER
LAKEHURST, NEW JERSEY

Dames & Moore
CHANTILLY, VIRGINIA

SCALE	AS NOTED	DWN. BY	R.G.B.	JOB NO.	7980-013
DATE	7-3-90	APPR. BY	C.I.T	FIG. NO.	4

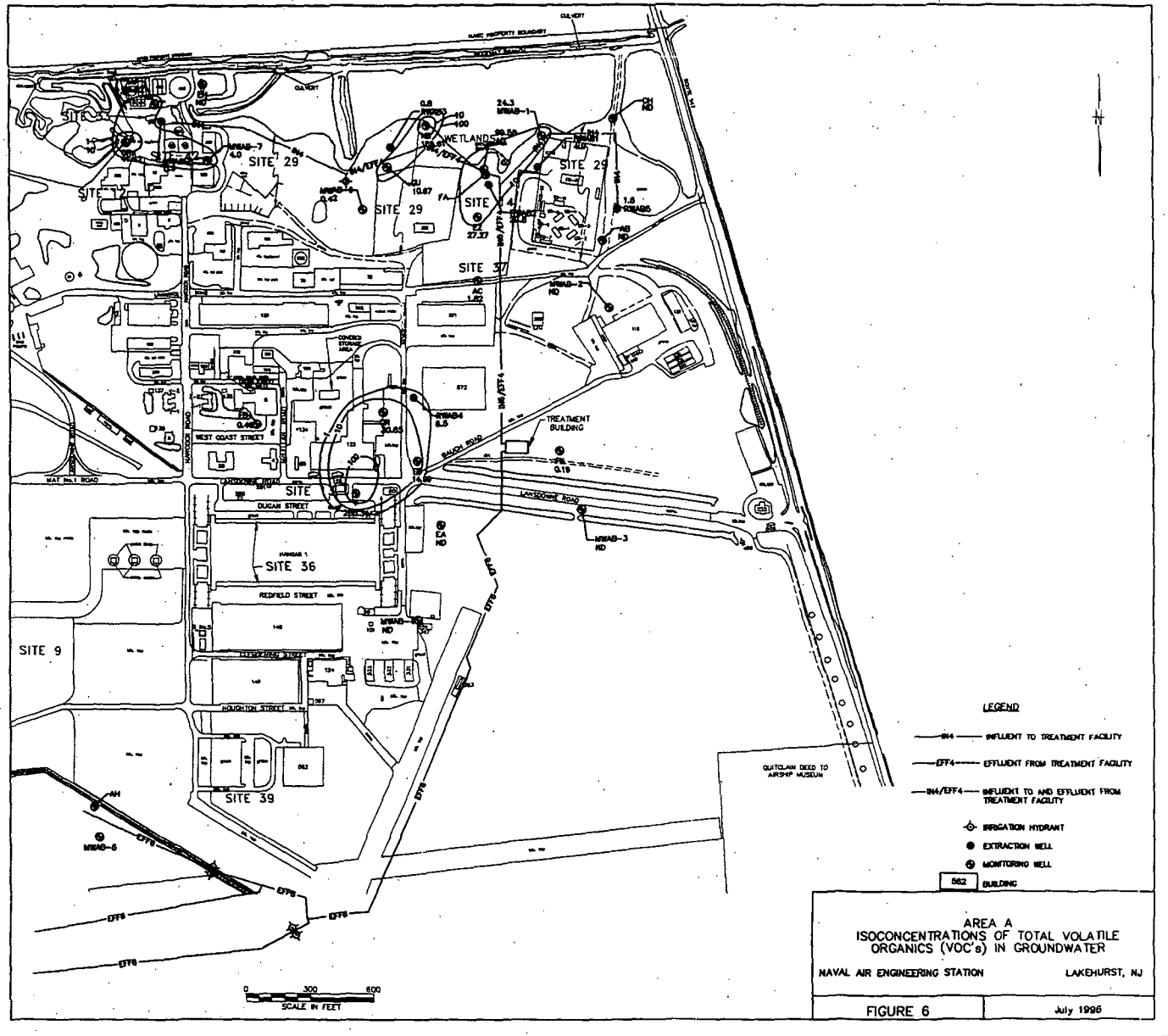


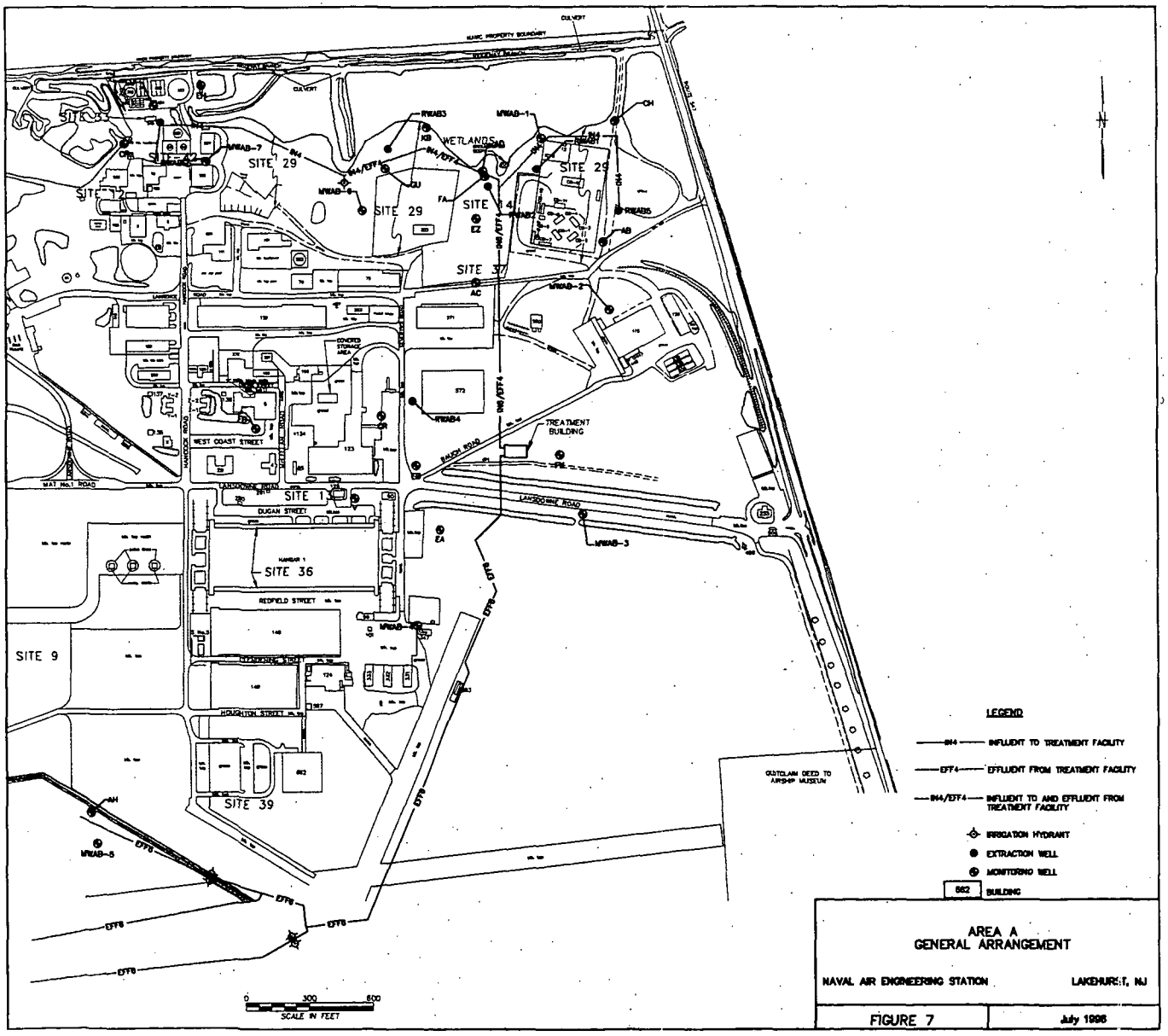
TITLE
AREA B
BASE MAP WITH SITE LOCATIONS

PROJECT
REMEDIAL INVESTIGATION – PHASE II
NAVAL AIR ENGINEERING CENTER
LAKEHURST, NEW JERSEY

Dames & Moore
CRANFORD, NEW JERSEY

SCALE	DWN. BY	JOB NO.
AS NOTED	R.G.B.	7980-013
DATE	APPR. BY	FIG. NO.
7-3-90	C.I.T.	5


SITE 29
SITE 37
SITE 36
SITE 9
SITE 39
WETLANDS
TREATMENT BUILDING
LAKEHURST ROAD
WEST COAST STREET
DUGAN STREET
REDFIELD STREET
HOUGHTON STREET
MAT No.1 ROAD
MWAB-1
MWAB-2
MWAB-3
MWAB-4
MWAB-5
MWAB-6
MWAB-7
EFF4
EFF6
OUTLEAN DEED TO AIRSHIP MUSEUM
0 300 600
SCALE IN FEET
LEGEND
IN4 INFLUENT TO TREATMENT FACILITY
EFF4 EFFLUENT FROM TREATMENT FACILITY
IN4/EFF4 INFLUENT TO AND EFFLUENT FROM TREATMENT FACILITY
IRRIGATION HYDRANT
EXTRACTION WELL
MONITORING WELL
562 BUILDING
AREA A
ISOCONCENTRATIONS OF TOTAL VOLATILE ORGANICS (VOC's) IN GROUNDWATER
NAVAL AIR ENGINEERING STATION
LAKEHURST, NJ
FIGURE 6
July 1996


SITE 29
SITE 29
SITE 29
SITE 14
SITE 37
SITE 1
SITE 36
SITE 9
SITE 39
WETLANDS
TREATMENT BUILDING
MWAB-1
MWAB-2
MWAB-3
MWAB-4
MWAB-5
MWAB-6
MWAB-7
RWAB3
RWAB4
RWAB5
IN4/EFT4
EFT4
WEST COAST STREET
DUGAN STREET
REDFIELD STREET
HOUGHTON STREET
LANSDOWNE ROAD
MAT No.1 ROAD
HANCOCK ROAD
BAUER ROAD
QUITCLAIM DEED TO AIRSHIP MUSEUM
SCALE IN FEET
LEGEND
IN4 INFLUENT TO TREATMENT FACILITY
EFT4 EFFLUENT FROM TREATMENT FACILITY
IN4/EFT4 INFLUENT TO AND EFFLUENT FROM TREATMENT FACILITY
IRRIGATION HYDRANT
EXTRACTION WELL
MONITORING WELL
BUILDING
AREA A
GENERAL ARRANGEMENT
NAVAL AIR ENGINEERING STATION
LAKEHURST, NJ
FIGURE 7
July 1998