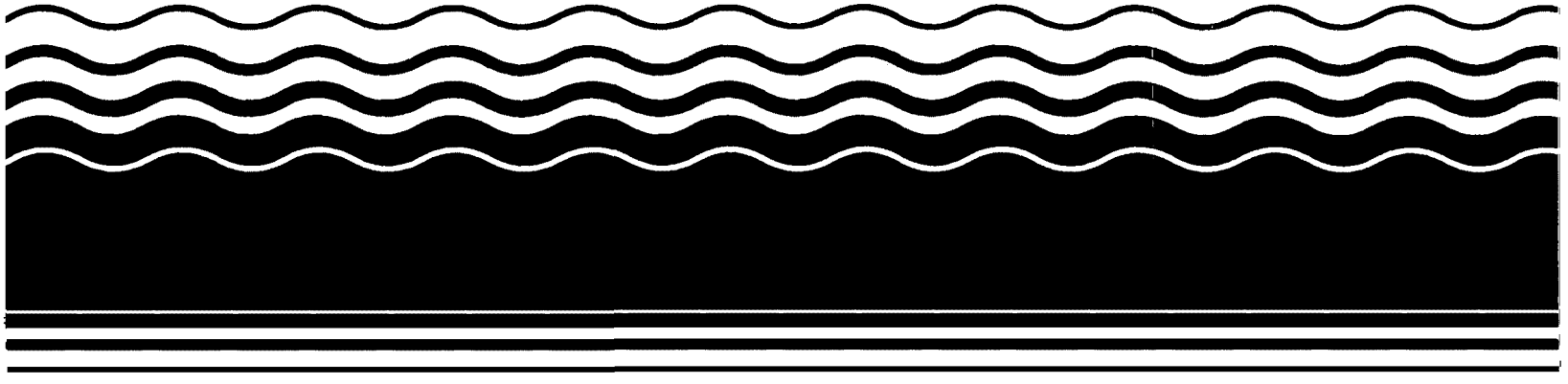
EPA/ROD/R02-95/248
August 1995

EPA Superfund Record of Decision:

Naval Air Engineering Station, Area I and J, Groundwater, Lakehurst, NJ 1/5/1995



INTERIM RECORD OF DECISION

AREA I AND J, GROUNDWATER
NAVAL AIR ENGINEERING STATION
LAKEHURST, NEW JERSEY

30 November 1994

30 November 1994

INTERIM RECORD OF DECISION
DECLARATION STATEMENT
AREA I AND J 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 I and J groundwater at the Naval Air Engineering Station in Lakehurst, New Jersey. The selected interim 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 Area I and J Groundwater (May 1993) and the Pre-Design Groundwater Remedial Investigation (Groundwater Modeling Study/Wetland Impact Study/Recharge Basin Study) for Areas I and J (April 1994). These reports and other information used in the remedy selection process are part of the Administrative Record file for Areas I and J, 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. The selected interim action is intended to be consistent with the final action for remediating groundwater

at Areas I and J. The final remedial action for Areas I and J will be proposed after three years of monitoring.

Both the United States Environmental Protection Agency (USEPA), Region II Deputy 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 interim alternative to address groundwater at Area I and J is: A Natural Restoration Study with Groundwater Monitoring. The NAES proposes to evaluate the effects of natural restoration for a period of three years. The data obtained from this investigation will be used to refine the existing contaminant transport model. The revised model will provide more accurate predictions of the time required for natural restoration of the entire plume. Upon completion of this interim action, a final Record of Decision will be prepared. The findings of this study will form the basis of the final Record of Decision.

The objectives of the proposed interim action are to: 1) show that contaminant concentrations are being reduced through the natural restoration process; 2) monitor contaminant plume migration and verify whether the plume has reached a steady state and 3) revise the mass transport model to determine rates of attenuation and site specific half-lives of contaminants to provide more accurate time-frame for remediation of the plume.

Extensive monitoring will be performed to show the effectiveness of this alternative and monitor the extent and migration of groundwater contamination (if any). To monitor the plume, the existing monitoring well network will be supplemented with additional monitoring wells. In addition, institutional controls will be implemented to protect human health.

STATUTORY DETERMINATIONS

A three year study has been selected to determine if natural restoration processes will be effective. This interim action alternative is protective of human health and the environment. The results of this action will aid in determining whether natural restoration will attain Federal and State applicable or relevant and appropriate requirements (ARARs) as part of the final action for Areas I and J.

29 Nov 94

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

With the concurrence of:

1/5/95

William J. Muszynski, P.E. (Date)
Deputy Regional Administrator
U.S. Environmental Protection Agency, Region II

DECISION SUMMARY
INTERIM RECORD OF DECISION
AREA I AND J, 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 shops 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, 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 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 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 (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 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.

NAES and its tenant activities now occupy more than 300 buildings, built between 1919 and 1989, totaling over 2,845,00 square feet. The command also operates and maintains: two 5,000-foot long runways, a 12,000-foot long test runway, one-mile long jet car test track, four one and one-quarter mile long jet car test tracks, a parachute jump circle, a 79-acre golf course, and a 3,500-acre conservation area.

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

SITE HISTORY

Areas I and J are located along the southern boundary of the NAES in the west central portion of the base (Figure 2). The NAES property boundary forms the southern border of Area I. Areas I and J are largely developed and include various facility buildings, including Steam Plant No. 2, the catapult launching facilities and the Runway Arrested Landing Site (RALS) facility (Figures 5-6). The catapult runway traverses Areas I and J and Taxiway No. 4 parallels the southern NAES property line in the eastern portion of the Area (Figure 5A). Groundwater flow in Areas I and J is in a generally east to southeast direction toward the facility boundary (Figure 7).

The Remedial Investigation (RI) in Areas I and J has revealed the existence of an extensive groundwater contaminant plume (Figures 2A, 3 and 4). The primary contaminants present in the groundwater are chlorinated volatile organic compounds (VOCs), which appear to occur in two discrete areas of highest concentration. One zone extends east of the base catapult area and the other area is to the south and east of the catapult runway. At the former area, detectible levels of VOCs appear to occur in a plume extending approximately 5,000 feet beyond the NAES boundary. In the latter area, the contaminant plume extends approximately 4,400 downgradient from the facility boundary. Upgradient of this area, lower levels (< 15 ppb) of contamination extend to the area near the Runway Arrested Landing Site (RALS) tower.

Areas I and J contain a wide range of potential contaminant sources generally related to past facility activities and possible associated releases. Reported or potential contaminant sources at these sites which may have contributed to the plume are summarized below:

AREA	SITE	REPORTED OR POTENTIAL CONTAMINANT SOURCES
J	3	Releases of contaminated waste water into the adjacent drainage swale has occurred during the past (Figure 6)
I	6	Contaminated sediment present in the holding ponds and drainage swales (Figure 5)
I	7	Potential disposal of various liquid wastes at the Catapult Test Facility Storage Area (Figures 5)
J	22	Former activities at the Jet Blast Deflector which may have resulted in the release of fuels or other liquid wastes into the ground

(Figure 6)

I	24	Testing of catapult equipment took place and associated releases of various liquid wastes may have occurred (Figure 5)
		A gravel and blacktop area in which catapult testing also occurred, located approximately 450 feet to the south/southeast of the catapult runway, and south of Site 24 (Figure 5)
		The area to the southwest of Building 453 and Site 25, in which the steam-cleaning of various equipment reportedly occurred (Figure 5)
		An area located adjacent to (on both the southeast and northwest sides of) Taxiway No. 4, approximately 3,450 feet northeast of Site 6, in which catapult testing also occurred (Figure 5A)
		The area surrounding the Conservation Club (Rod and Gun Club Building 525), located to the immediate northwest of Taxiway No. 4 where it was reported that various liquid wastes may have been disposed of around the building, which was formerly used for storage (Figure 5A)

These potential source areas were investigated as part of the Remedial Investigation for the entire facility. The remediation of these areas is being performed through previously signed 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 rehabilitated. 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).

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.

Groundwater monitoring wells were installed in Area I and J in 1982 and were monitored on a regular basis for the presence of free petroleum product. Additional investigations conducted at Areas I and J include:

Phase I Remedial Investigation (1985-1986) - Additional monitoring wells were installed and groundwater samples were collected from all new and existing wells for comprehensive chemical analysis. A visual inspection of the area was conducted to locate possible source areas. The Phase I groundwater analytical results can be found in the Phase I Remedial Investigation Report (April 1987) and the Feasibility Study (May 1993), both located in the Administrative Record. Table 1 contains a summary of contaminants which exceeded Federal or State cleanup standards during Phase I.

Soil Gas and Groundwater Screening Survey (May - June 1988) - A soil gas and groundwater screening survey was conducted at and downgradient from several sites in Area I and J to determine possible source areas. On the basis of the data, additional investigations were recommended.

Phase II Remedial Investigation (1988) - Additional monitoring wells were installed and two rounds of samples were collected from all new and existing wells for comprehensive chemical analyses. The Phase II groundwater analytical results for Areas I and J can be found in the Phase II Remedial Investigation Report (July 1990) and Feasibility Study (May 1993), both located in the Administrative Record. Table 1 contains a summary of contaminants which exceeded Federal or State cleanup standards during Phase II.

Phase III Remedial Investigation (1991-1992) - Analysis of groundwater, using the Hydropunch, at 39 locations allowed samples to be collected and analyzed at different depths of the plume (approximately 10, 30, 50, 70 feet below groundwater). The Hydropunch was used throughout potential source areas and downgradient (including off-base locations) to determine both the horizontal and vertical extent of detected groundwater contamination. Figures 8A, 8B, 8C and 8D show the estimated concentration of total chlorinated volatile compounds in groundwater at the four different sampling depths. The "A" zone is approximately 10 feet below the groundwater table, The "B" zone is approximately 30 feet below the groundwater table, the "C" zone is approximately 50 feet below the groundwater table and the "D" zone is approximately 70 feet below the groundwater table.

Monitoring wells were then installed throughout and downgradient of the plume in order to monitor plume migration and define the downgradient extent of the plume. The Phase III groundwater analytical results for Areas I and J can be found in the Phase III Remedial Investigation Report (October 1992) and Feasibility Study (May 1993), both located in the Administrative Record. Table 1 contains a summary of contaminants which exceeded Federal or State cleanup standards during Phase III.

Aquifer Characterization Investigation in Areas I and J (February 1993) - The objective of this investigation was to develop data that could be used to design a groundwater remedial system capable

of capturing and treating the contaminated groundwater as discussed in the previous section. A preliminary groundwater flow model was developed based on the results of this study. This model, which provided an adequate representation of groundwater conditions at Areas I and J, was used in the preliminary design of remedial alternatives.

A long-term (72 hour) pumping test was conducted on a recovery well placed in the Area to obtain preliminary estimates of aquifer characteristics. This data was used to generate different pumping scenarios based on the recovery of plumes of different contaminant concentrations (>50 ppb, >10 ppb, >1 ppb). The pump test was performed 22-26 October 1992.

Within the study area, there are several surface water bodies, such as wetlands and streams, that may be impacted as a result of groundwater pumping (Figure 2B). As part of the aquifer characterization report, drawdown projections were estimated for the preliminary groundwater recovery scenarios.

The results of the report, concerning plume capture and impact to wetlands, have been used to develop the preliminary alternatives presented in the feasibility study for Area I and J groundwater.

Groundwater, Sediment and Surface Water Sampling and Analysis at Area I and J (July 1993) - Sediment and surface water samples were taken at six locations in the North Ruckles Branch, Black Branch and Manapaqua Brook. These samples were taken at locations where the plume appears to discharge to surface water. These samples were taken to determine if plume contaminants could be detected in the downgradient surface water bodies. The results indicate the presence of trace concentrations of volatiles in the North Ruckles and Black Branch sediment. No volatile contaminants were detected in surface water samples.

All the monitoring wells and supply wells in the Area were also sampled (in February 1993) to provide an overall set of well sampling data. Forty-three of the fifty-eight monitoring wells sampled had non-detectable levels of volatile organic

contamination. Remaining wells generally had low levels of chlorinated VOCs. No contamination was found in downgradient perimeter wells or supply wells. Data from the additional sampling round can be found in the Feasibility Study for Area I and J groundwater (May 1993) located in the Administrative Record.

Semi-Annual Groundwater Monitoring Report, August 1993 Monitoring Event, Perimeter Wells at Area I and J (October 1993) - Twenty (20) wells located along the downgradient perimeter of the contaminant plume are sampled semi-annually to assess the concentrations of VOCs along the downgradient perimeter of the plume and to compare the current results with previous results to assess potential plume migration or changes in the nature and/or extent of contamination.

During the August 1993 sampling round, VOCs were detected in only 5 of the 20 wells sampled. No VOCs were detected at concentrations exceeding applicable State or Federal groundwater standards. The downgradient and sidegradient extent of the plume did not appear to have migrated or changed significantly since the Phase III Investigation. In some of the wells sampled there appears to be a general reduction in contaminant levels.

Semi-Annual Groundwater Monitoring Report, February 1994 Monitoring Event, Perimeter Wells at Area I and J (May 1994) - Nineteen (19) wells located along the downgradient perimeter of the contaminant plume were sampled to assess the concentrations of VOCs along the downgradient perimeter of the plume and to compare the current results with previous results to assess potential plume migration or changes in the nature and/or extent of contamination.

During the February 1994 sampling round, VOCs were detected in only 4 of the 19 wells sampled and chlorinated VOCs were detected in only two of the wells. No VOCs were detected at concentrations exceeding applicable State or Federal groundwater standards. The contaminant levels in the perimeter wells appear to be reducing over time.

Pre-Design Groundwater Remedial Investigation (Groundwater Modeling Study/Wetland Impact Study/Recharge Basin Study), Areas I and J (April 1994) - A three part investigation was conducted between July 1993 and February 1994 to obtain data necessary for the design of a system to remediate VOCs present in Areas I and J groundwater. The investigation consisted of the following three studies which were conducted in parallel: 1) Groundwater Modeling Study; 2) Wetland Impact Study; and 3) Recharge Basin Study.

The goal of the modeling was to identify a groundwater recovery/recharge scheme that would allow optimal remediation of the contaminant plume while minimizing wetland impacts. A combination of on-site pumping and off-site monitoring was selected. The modeling effort, however, indicated that the effect of contaminant degradation is the most important attenuation mechanism for the plume. The benefit achieved by pumping is somewhat questionable considering that for realistic half-lives, the effect of recovery and treatment becomes insignificant compared to the mass loss due to degradation.

The results of the Wetlands Impact Study indicated that a wetland loss of 87 acres or more could result due to aquifer drawdown if the optimal pumping scenario was implemented to remediate the plume.

Summary

The results of the above investigations have revealed that the primary contaminants present in groundwater are chlorinated volatile organic compounds. The chlorinated compounds most commonly detected include cis-1,2-dichloroethene, 1,1-dichloroethene, 1,1-dichloroethane, 1,1,1-trichloroethane, trichloroethene and tetrachloroethene.

Benzene, toluene, ethylbenzene and xylene (BTEX) were detected at few locations and, with one exception, at low concentrations. BTEX in a shallow sample collected at one off-base location is believed to be attributable to an unidentified minor off-base

petroleum release and not related to activities at NAES.

Several metals (aluminum, cadmium, chromium, lead, and nickel) were detected sporadically at concentrations exceeding EPA and/or NJDEP groundwater standards in unfiltered samples. However, these metals were generally not detected in the filtered splits of these samples, indicating that their presence may be attributable to sediment in the samples and not to metals dissolved in groundwater. Also, established background levels for metals in groundwater at NAES were compared to the detected levels at Areas I and J. The NAES background levels of several metals were higher than the applicable groundwater standards. Only cadmium was detected above the NAES background levels. Cadmium, however, was only detected in one filtered sample and this result is considered suspect.

Based on the results of previous investigations, figures of the plume have been developed (see figures 8A-8D) which indicate the extent of the plume and most probable sources of contamination. Contamination appears to occur at low levels at and downgradient of the RALS facility. This was probably the result of releases of contaminated waste water into the drainage swale at Site 3 and, to a lesser extent, the former activities at the Jet Blast Deflector which may have resulted in the releases of liquid wastes (Figure 6).

The area of higher contamination to the south of the catapult runway appears to be the result of catapult testing which occurred on a gravel and blacktop area located approximately 450 feet to the south/southeast of the catapult runway and south of Site 24 (Figure 5).

The area of contamination which extends off-base, to the east of the catapult area, appears to emanate from the area where steam-cleaning of various equipment reportedly occurred, to the southwest of building 453 and Site 25. Contamination could also be from the area adjacent to Taxiway No. 4, in which catapult testing also occurred, and possibly from the area surrounding the Conservation Club (Bldg 525), where it was reported that liquid wastes may have been disposed (Figures 5 and 5A).

The downgradient extent of contamination appears to be bounded by the North Ruckles Branch and Black Branch. It does not appear that the plume has migrated since the Phase III Remedial Investigation (1991-1992). Sampling of downgradient perimeter wells indicates a general reduction in contaminant levels since sampling began in April 1992.

Based on the preliminary results of the mass transport modeling effort, the effects of contaminant degradation is the most important attenuation mechanism for the groundwater contamination in Areas I and J. Pumping of groundwater may have little effect on remediating the plume and may produce an unacceptable impact on wetlands.

TABLE 1

Volatile Organic Compounds Which

Exceeded Federal or State Groundwater Cleanup Standards

AREA I&J Groundwater Phase I Results (1986)

CONTAMINANT	DETECTED CONCENTRATIONS (ug/l)	EPA MCL (1) (ug/l)	NJDEP PQL (2) (ug/l)
1,2-Dichloroethene	ND-20.1	70.0	2.0
Trichloroethene	ND-3.61	5.0	1.0
Tetrachloroethene	ND-38.1	5.0	1.0

AREA I&J Groundwater Phase II Results (1988)

CONTAMINANT	DETECTED CONCENTRATIONS (ug/l)	EPA MCL (1) (ug/l)	NJDEP PQL (2) (ug/l)
Methylene Chloride	ND-440J	5.0	2.0
Trichloroethene	ND-140	5.0	1.0
Tetrachloroethene	ND-3J	5.0	1.0
1,1,1-Trichloroethane	ND-29	200.0	1.0
1,2-Dichloroethene	ND-44	70.0	2.0

J - Quantitation is approximate due to limitations identified during data validation.

ND - Nondetect

TABLE 1 (cont.)

Volatile Organic Compounds Which

Exceeded Federal or State Groundwater Cleanup Standards

AREA I&J Groundwater Phase III Results (1992)

CONTAMINANT	DETECTED CONCENTRATIONS (ug/l)	EPA MCL (1) (ug/l)	NJDEP PQL (2) (ug/l)
Vinyl Chloride	ND-23.1	2.0	2.0
Chloroform	ND-1.81	100.0	1.0
1,1-Dichloroethene	ND-4.08	7.0	2.0
cis-1,2-Dichloroethene	ND-170J	70.0	2.0
Benzene	ND-4.55	5.0	1.0
Trichloroethene	ND-64.6	5.0	1.0
Toluene	ND-24.1	1000.0	5.0
Tetrachloroethene	ND-39.3	5.0	1.0
Ethylbenzene	ND-7.5	700.0	5.0
Xylenes	ND-55.1	10,000.0	2.0 (m+p) 1.0 (o)

J - Quantitation is approximate due to limitations identified during data validation.

ND - Nondetect

TABLE 1 (cont.)

Volatile Organic Compounds Which

Exceeded Federal or State Groundwater Cleanup Standards

AREA I&J Groundwater Additional Sampling (1993)			
CONTAMINANT	DETECTED CONCENTRATIONS (ug/l)	EPA MCL (1) (ug/l)	NJDEP PQL (2) (ug/l)
1,2-Dichloroethene	ND-170	70.0	2.0
1,1,1-Trichloroethane	ND-5J	200.0	1.0
Trichloroethene	ND-8J	5.0	1.0
Tetrachloroethene	ND-2J	5.0	1.0
Vinyl Chloride	ND-33	2.0	2.0

Notes:

J - Quantitation is approximate due to limitations identified during data validation.

ND - Nondetect

(1) 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.

(2) On 13 January 1993, the revised N.J.A.C. 7:9-6 which include 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). PQLs will be used to determine compliance with groundwater quality criteria for Class I-PL groundwater.

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.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Proposed Plan for Areas I and J groundwater was issued to interested parties on July 8, 1993. Based on additional studies performed in Areas I and J, the Proposed Plan was revised and issued on August 26, 1994. On September 13 and 14, 1994, a newspaper notification inviting public comment on the revised Proposed Plan appeared in The Ocean County Observer. On September 13, 14, 15 and 16, 1994, the notification appeared in The Asbury Park Press. On September 14, 1994 the notification also appeared in The Advance News. The comment period was held from September 14, 1994 to October 14, 1994. The newspaper notification also identified the Ocean County Library as the location of the Information Repository.

A Public Meeting was held on September 14, 1994 at the Manchester Branch of the Ocean County Library at 7:00 p.m.. At this meeting representatives from the Navy, USEPA and NJDEP were available to answer questions concerning Areas I and J groundwater, 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. A transcript of the meeting is available as part of the Administrative Record.

During the public comment period from September 14, 1994 through October 14, 1994, no written comments were received pertaining to Areas I and J groundwater.

This decision document presents the selected alternative (i.e., Study of Natural Restoration with Groundwater Monitoring) for Areas I and J groundwater, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan (NCP). The decision for Areas I and J 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

Studies conducted between 1985 and 1992 showed that the groundwater in Areas I and J had been contaminated with various VOCs as a result of past operations dating back to the 1960s and 1970s. In 1993, the Navy proposed and the regulatory agencies (U.S. Environmental Protection Agency and New Jersey Department of Environmental Protection) concurred that a groundwater extraction, treatment and recharge system was the preferred option to remediate the contaminated groundwater. In 1993 and 1994, additional studies, including a Numerical Groundwater Modeling Study and a Wetlands Impact Study were conducted to design the optimum groundwater extraction and recharge system capable of remediating the contamination while at the same time minimizing the potential adverse impact on wetlands. The results of these studies indicated the following: 1) Due to natural attenuation, the extent of the contaminant plume may have reached a quasi-steady state and, therefore, no further significant migration of the plume would occur; 2) The effect of pumping could be insignificant compared to the mass loss of contaminants resulting from natural attenuation of the plume; 3) Groundwater

recovery would probably result in the loss of approximately 87 acres of wetlands.

As a result of new sampling data and the findings of the 1994 groundwater modeling and wetlands studies, the NAES revised the Proposed Plan for public review and comment.

SUMMARY OF SITE RISKS

In April 1992, a facility-wide 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.

This is a summary of the Endangerment Assessment (EA) findings for groundwater in Areas I and J. The assessment of this site was conducted using all available data generated during previous remedial investigations (RI). This assessment is conservative since the highest levels of contamination detected were used to calculate risk even though these contaminant levels may not represent the concentration throughout the plume and may no longer be detected at these elevated levels.

This risk summary is limited to groundwater, the only media addressed in this Record of Decision. All other media associated with these areas are addressed in separate documents. This summary will discuss (1) the chemicals identified by the EA addendum 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

The EA focused on the Area contaminants which are likely to pose the most significant risks to human health and the environment. Eight contaminants of concern (COCs) were selected for evaluation in the EA addendum (see Table 2). The selection of these chemicals was based on EPA maximum contaminant levels (MCLs) and frequency of detection throughout the Area. For Area I and J groundwater, COCs were determined to be the following chlorinated aliphatic hydrocarbons: 1,2-dichloroethene, 1,1-dichloroethane, 1,1,1-trichloroethane, trichloroethene, tetrachloroethene, cis-1,2-dichloroethene, chloroform and vinyl chloride.

TABLE 2
Comparison of Highest Detected Contaminant Concentrations to Federal MCLs and State PQLs
Areas I and J

	CRITERIA			EXCEEDANCES	
CONTAMINANT OF CONCERN	MAXIMUM LEVEL (ug/l)	USEPA MCL (ug/l)	NJDEP PQL (ug/l)	EPA MCL	NJDEP PQL
1,2-Dichloroethene	170	70.0	2.0	YES	YES
1,1-Dichloroethane	900J	--	--	NO	NO
1,1,1-Trichloroethane	29	200.0	1.0	NO	YES
Trichloroethene	140	5.0	1.0	YES	YES
Tetrachloroethene	39.3	5.0	1.0	YES	YES
cis-1,2-Dichloroethene	170J	70.0	2.0	YES	YES
Chloroform	1.81	100.0	1.0	NO	YES
Vinyl Chloride	33	2.0	5.0	YES	YES

J - Quantitation is approximate due to limitations identified during data validation.

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 I and J, a light industrial land use scenario was quantified for direct exposure to contaminated groundwater via incidental ingestion. Due to the fact that the groundwater contamination plume in these Areas extends beyond the NAES boundary a residential land use scenario was also quantified for potential future land use conditions.

HUMAN HEALTH RISK AND HAZARD FINDINGS

For groundwater, the results of the EA for the current light industrial land use scenario at Areas I and J indicate that hazards resulting from noncarcinogens are not elevated for any chemical above EPA's hazard index criteria value of 1.0. The overall area hazard represented by the hazard quotient, or sum of the chemical-specific hazard indices, was also below a value of 1.0. The overall hazard quotient estimated for groundwater is 3.2×10^{-1}. Carcinogenic risk estimates for groundwater at Areas I and J are within EPA's acceptable risk range of 10^{-6} to 10^{-4}. The overall area groundwater risk represented by the sum of the chemical-specific risk estimates is 1.66×10^{-4}.

The results of the EA for the potential future residential land use scenario at Areas I and J indicate that hazards resulting from noncarcinogens are elevated above EPA's hazard index criteria value of 1.0. The overall hazard quotient, or sum of the chemical-specific hazard indices estimated for groundwater is 2.02. Carcinogenic risk estimates for groundwater at Areas I

and J are above EPA's acceptable risk range of 10^{-6} to 10^{-4}. The overall area groundwater risk represented by the sum of the chemical-specific risk estimates is 1.21×10^{-3}.

ECOLOGICAL ASSESSMENT

As part of the Endangerment Assessment, a Baseline Ecological Evaluation (BEE) was conducted at NAES. The objective of the BEE was:

- To identify contaminants at each site that are of ecological concern
- To identify whether sensitive ecological receptors are present or may have been present at the contaminated site
- To identify potential exposure pathways to sensitive ecological receptors that exist or may have existed
- To determine whether or not sensitive ecological receptors are being or potentially may be adversely impacted by contaminants

Areas I and J contain several surface water bodies. The Black Branch, North Ruckles Branch and Manapaqua Brook exist in this Area. Cranberry bogs are located to the north-east of Areas I and J. Several large wetland areas cover a majority of Areas I and J (Figure 2B). Wetlands border the Black Branch and Ruckles Branch located in the west and south sections of the site. Wetlands also exist upgradient of the northern plume within the NAES property. This wetland area is the largest single wetland area on base.

The BEE contains information obtained from a comprehensive endangered species study conducted in 1988. This study indicates that wetlands in Area I and J contain an endangered amphibian and several endangered plants.

The Pine Barrens treefrog is a State endangered species. It inhabits low areas with standing acid water (pH from 4.2 to 5.2) in pitch pine lowlands, pine oak and oak pine stands, white cedar

swamps and bogs, and red maple swamps of the pinelands. The treefrog must have acid water plus proper conditions of humidity and plant cover for breeding. Inimical factors for the treefrog are habitat destruction, particularly from draining wetlands.

The Barratt's sedge is a threatened pinelands plant. It can be found growing in areas of pitch pine lowlands. It is a wetlands species occurring in swales and the margins of bogs and Atlantic white cedar swamps. Inimical factors include succession of habitat due to wetland disturbances and degradation.

The pale beaked rush is a rare species which can be found in sedge and grass bogs and seepage areas adjacent to stream corridors. This plant is vulnerable to wetland disturbance.

The slender nut rush is a listed pinelands protected plant. This plant lives in moist to sandy pine barren thickets, swales, and depressions. Inimical factors include succession of wetlands.

The two-flowered bladderwort is a state endangered plant. Its habitat is open water of ponds and streams, also boggy or sandy shores. This plant is possibly vulnerable to disturbances of wetland habitat.

The wetlands and surface water of the Manapaqua Brook, Black Branch and North Ruckles Branch may be receiving very low levels of chlorinated organics. Sampling of sediment and surface water at downgradient locations, where the Area I and J groundwater contaminant plume appears to discharge into the streams, has indicated low levels of volatiles in the North Ruckles Branch and Black Branch sediment but that surface water is not being impacted. It appears that the downgradient Black Branch and North Ruckles Branch may be acting as a hydraulic containment for the plume. Currently, the levels of contamination in the area wetlands are close to background levels and no visible effects on the ecology of the area appear to exist.

The potential environmental impacts of each remedial alternative on surface water and wetlands will be addressed in the development and analysis of each individual alternative.

However, any alternative that involves pumping may have a negative effect on the endangered species indicated above, especially since the species are vulnerable to wetland disturbance.

ENDANGERMENT ASSESSMENT SUMMARY

The results of the RI and EA indicate that contaminants present in groundwater at Areas I and J do not currently pose a concern relative to current land use conditions within the affected area. Active remediation of groundwater contamination in the area may be necessary to address future residential use concerns. The results of the RI and EA indicate that, currently, there is no ecological risk present. The potential wetlands loss and impact to endangered species associated with pumping in Areas I and J may present a greater negative impact than if the contaminants are allowed to remain and reduce through natural restoration.

DESCRIPTION OF ALTERNATIVES

Under CERCLA, the alternative selected must be protective of human health and the environment, cost effective, and in accordance with statutory requirements. Permanent solutions to contamination are to be achieved wherever possible. The remedial alternatives considered for the site 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.

5.1 Remedial Alternative No. 1:

Natural Restoration Study/ Groundwater Monitoring

Estimated Capital Cost: $550,000
Estimated Annual O&M Cost: $250,000
Estimated Implementation Timeframe: 6 months (to establish a workplan for monitoring of natural restoration and establish a complete monitoring well network)

This alternative consists of a groundwater monitoring program and rigorous study of the natural attenuation processes at the site. This 3 year monitoring and study program would verify whether the contaminant plume has reached a quasi-steady state and evaluate whether natural restoration is a viable process alternative at the site. During this period, data obtained from the program will be entered into a previously developed 3-dimensional numerical model for Areas I and J. Model parameters such as degradation and retardation rates will be determined and the transport model will be revised to: (a) provide more accurate predictions of plume migration (if any); and (b) evaluate whether the plume is being remediated as a result of natural restoration processes. The model will also be used to estimate a completion time for natural remediation of the entire plume. An extensive monitoring well network will be set up, using both new and existing wells (see alternatives 2 and 3). A downgradient "line of compliance" (LOC) will also be established. This LOC will consist of a series of monitoring wells located at the downgradient extent of the plume which will be required to meet cleanup objectives (EPA MCLs and State PQLs).

The information from this proposed study/action will be used to make a final remedial action determination for Areas I and J. The design for a treatment system indicated under Alternative 2 is in the process of being prepared. This will allow for implementation of active pumping and treating of groundwater within a year if it becomes necessary, either during this

proposed interim action or as part of a final action for Areas I and J.

5.2 Remedial Alternative No. 2:

Capture of the Maximum Amount of Contamination With Limited Impact to Wetlands, Physical/Chemical Treatment, Discharge to Groundwater

Estimated Capital Cost: $3,000,000
Estimated Annual O&M Cost: $1,200,000
Estimated Implementation Timeframe: 1-2 years

This alternative will consist of a groundwater remediation system. The groundwater remediation system involves groundwater recovery (pumping), treatment, and recharge of the treated groundwater to the aquifer. Contaminated groundwater would be extracted from the ground through a series of groundwater recovery wells strategically located to create a zone of capture that will intercept the higher levels of contamination while limiting wetland loss.

Based on the BEE, an ecological issue of concern at Area I and J is that the wetlands may be adversely effected by pumping of the hydraulically linked aquifer. To evaluate the impact of pumping on Area wetlands, a wetlands impact study was performed. The results of this study indicated that the wetland loss which could potentially result from the implementation of this alternative is 87 acres or more. The report also suggests that populations of wetlands species may decline in the drawdown area.

This alternative provides a balance between protection of human health and the environment. The higher levels of contamination are removed and treated while limiting drawdown on wetlands as much as possible.

For this alternative the extracted groundwater would be diverted through underground piping to a treatment unit which

will be constructed in Area I. The system will be designed based on "performance" specifications to be provided by the Navy, which will require compliance with NJDEP Groundwater Discharge Effluent Limitations, Air Pollution Control Requirements and other applicable regulations. It is currently planned that the proposed groundwater recovery and treatment system will operate continuously, 24 hours per day, 365 days per year.

The treated groundwater, which will meet NJDEP Discharge Effluent Limitations, will be discharged to groundwater through infiltration basins.

Extensive monitoring of the site would be implemented by using existing monitoring wells, which will be supplemented by additional monitoring wells to create an effective monitoring well network. A "downgradient line of compliance" will be established. This line of compliance will consist of a series of monitoring wells located at the downgradient extent of the plume which will be required to meet cleanup standards (EPA MCLs and State PQLs). Existing and new monitoring wells, located throughout and downgradient of the plume, would be monitored during treatment operation to confirm that contaminant levels of concern have not migrated to the downgradient line of compliance and to evaluate the treatment system performance. If contaminant levels of concern are discovered in well(s) which are part of the downgradient line of compliance, the well(s) where the high levels were detected will immediately be resampled and appropriate actions will be taken. These actions may include but not be limited to, installation of additional wells, modifications of the existing pumping rates, modifications of the pumping well arrays (i.e. pumping other wells), etc. The monitoring well network would be effective in providing data to show the effectiveness of treatment as well as other attenuation mechanisms, and indicate the extent of the contaminant plume.

5.3 Remedial Alternative No. 3:

Capture of the Plume above ARARs, Physical/Chemical Treatment, Discharge to Groundwater

Estimated Capital Cost: $4,500,000
Estimated Annual O&M Cost: $1,800,000
Estimated Implementation Timeframe: 1-2 years

This alternative will consist of a groundwater remediation system. The groundwater remediation system involves groundwater recovery (pumping), treatment, and recharge of the treated groundwater to the aquifer. Contaminated groundwater would be extracted from the ground through a series of groundwater recovery wells strategically located to create a zone of capture that will intercept the extent of the VOC plume above cleanup standards. For Area I and J groundwater, EPA MCLs and State PQLs will be considered cleanup standards. Contaminant levels detected at lower levels than PQLs are considered unreliable based on lab detection limits.

The plume extent and migration would be monitored through an extensive monitoring well network.

For this alternative the extracted groundwater will be diverted through underground piping to a treatment unit which will be constructed in Area I. The system will be designed based on "performance" specifications to be provided by the Navy, which will require compliance with NJDEP Groundwater Discharge Effluent Limitations, Air Pollution Control Requirements and other applicable regulations.

Extensive monitoring of the site would be implemented by using existing monitoring wells, which will be supplemented by additional monitoring wells to create an effective monitoring well network.

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. **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.

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

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

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

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

7. **Cost** includes an evaluation of capital costs, annual

operation and maintenance (O&M) costs, and net present worth costs.

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 1 will monitor the effects of natural restoration for an "interim" period of three years to determine if this process will be effective at reducing contamination. Alternative 1 provides overall protection of human health through extensive monitoring throughout the area of contamination and along the plume boundary.

Alternatives 2 and 3 would provide protection of human health through active pumping and treatment of groundwater. However, based on modeling, these alternatives would induce significant drawdowns on area wetlands which may be detrimental to the wetlands and the species which rely on these wetlands for their habitat.

Initial studies conducted for this Area indicate that the effect of pumping on remediating the plume is questionable when

compared to the ability of natural restoration to reduce the mass of contaminants.

As part of all three alternatives, measures to restrict groundwater usage and access within the areas of contamination would also be implemented to minimize risk to human health.

Compliance with ARARs - For all remedial alternatives considered, a detailed sampling plan and analytical schedule will be developed to ensure compliance with ARARs. For all remedial alternatives, a downgradient "line of compliance" (LOC) will be established. This LOC will consist of a series of monitoring wells located at the downgradient extent of the plume (outside the area of contamination). If contaminant levels above ARARs are discovered in well(s) which are part of the downgradient LOC, the well(s) where the high levels were detected shall immediately be resampled. The sampling results will be presented to the regulatory agencies and appropriate action will be taken. Appropriate action may include, but not be limited to, installation of additional monitoring wells, or implementation of active treatment.

Alternative 1 will comply with ARARs at the line of compliance. The purpose of Alternative 1 is to determine whether ARARs will be reached within the area of contamination through the natural restoration process. Active pumping and treatment would be implemented should it become necessary.

For this Record of Decision, compliance with ARARs would be determined at a downgradient "line of compliance".

Long-Term Effectiveness and Permanence - If the processes of natural restoration proves to be effective based on the findings of the three year investigation, long-term monitoring will be proposed as a final action for Areas I and J groundwater. Long-term permanence will be ensured since monitoring wells throughout and downgradient of the plume are monitored until all levels within the plume have been reduced

below ARARs. Should natural attenuation prove ineffective, then a pump and treat remedy would be proposed as a final action for Areas I and J.

Reduction of Toxicity, Mobility or Volume - Alternative 1 studies the effectiveness of natural restoration to reduce contamination. Initial studies indicate that the natural restoration process may be capable of reducing toxicity and volume of contamination. The last three sampling rounds indicate that the plume is not migrating but is in a quasi-steady state.

Implementation of Alternative 1 will not reduce toxicity of the contaminants nor limit the mobility or volume of the plume through treatment. However, it will provide information as to the ability of natural biodegradation to reduce site risks. The sampling information will be utilized to determine if additional remedial action is necessary for protection of human health and the environment.

Alternative 2 actively treats the higher levels of contamination and uses natural restoration to reduce the remainder of the contamination. Some wetland loss would occur.

Alternative 3 would reduce the volume and migration of contaminants by capturing and treating all contamination but would cause extensive loss of wetlands.

Short-Term Effectiveness - In Alternative 1, a short-term, three year natural restoration investigation will be conducted. This study will be effective at providing more accurate predictions of plume migration and evaluate whether the plume is being remediated as a result of the natural restoration process.

Remedial action Alternatives 2 and 3 in the short-term, would halt the continued downgradient migration of contaminated groundwater from source areas on the base.

Implementability - Alternative 1 is easiest to

implement. This alternative can be implemented in several months with the installation of several monitoring well clusters, preparation of a monitoring plan and workplan for natural restoration monitoring.

Alternatives 2 is the most implementable treatment option due to the size of the plume to be captured, the number of recovery wells necessary and the required pumping rate.

Alternatives 3 would be much more difficult to implement due to the much larger extent of the plume to be captured, greater number of recovery wells and higher pumping rate.

The recovery and treatment options would take 1-2 years to implement.

Cost - Alternative 1, the natural attenuation/long term monitoring alternative, has the lowest associated cost. Alternative 2 is the least expensive treatment alternative. The cost for Alternative 2 is much lower than the cost for Alternative 3 due to the number of recovery wells and the size of the treatment system necessary based on recovery rates.

State Acceptance - The NJDEP and The Pinelands Commission concur with the Proposed Alternative.

Community Acceptance - Except for some initial reservations by a downgradient property owner, the community appears to accept the selected remedy. Community Acceptance is addressed in the responsiveness summary of this document.

THE SELECTED ALTERNATIVE

The selected interim alternative to address groundwater at Area I and J is Alternative 1: Natural Restoration Study/ Groundwater Monitoring.

Based on: (1) initial data in the Groundwater Modeling

Report which indicates that natural attenuation may be an effective remediation process in Areas I and J; (2) the Wetlands Impact Study, which shows that even under the most efficient pumping scenario, there would be a loss of approximately 87 acres of wetlands and (3) more than 2 years of groundwater monitoring data which indicates that the contaminant plume may have reached a steady state, Alternative 1 has been selected to address groundwater contamination in Areas I and J.

The NAES will evaluate the effects of natural restoration for a period of three years. The data obtained from this investigation will be used to refine the existing contaminant transport model. The revised model will provide more accurate predictions of the time required for natural restoration of the entire plume. Upon completion of this interim action, a final Record of Decision will be prepared. The findings of this study will form the basis of the final Record of Decision.

The objectives of the selected interim action are to: 1) show that contaminant concentrations are being reduced through the natural restoration process; 2) monitor contaminant plume migration and verify whether the plume has reached a steady state and 3) revise the mass transport model to determine rates of attenuation and site specific half-lives of contaminants to provide a more accurate time-frame for remediation of the plume.

A workplan to study natural restoration will be prepared. To monitor the plume, the existing monitoring well network will be supplemented with additional monitoring wells. The number and location of these wells will be presented in a monitoring plan to be prepared concurrently with the natural restoration workplan.

Institutional controls will be implemented to protect human health. The NAES will request the State and Township to impose the appropriate restrictions on groundwater use in the area of groundwater contamination (no one is currently drinking this water). Pursuant to N.J.A.C. 7:9-6.6D, NJDEP will establish a Classification Exception Area (CEA). In accordance with this section of the regulation, NJDEP shall restrict or require the

restriction of potable groundwater uses within any CEA where there is or will be an exceedance of the Primary Drinking Water Standards. The NAES will also provide for limited access to the area.

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 1 has been selected as the preferred interim alternative to address the groundwater in Areas I and J for the following reasons:

- This alternative will provide protection of human health by meeting ARARs at an established downgradient line of compliance. A combination of extensive monitoring and institutional controls will ensure protection of human health.
- The effects of natural restoration appear to be a significant mechanism for reduction of contaminants in Areas I and J. This alternative will study the natural restoration process in great detail to determine if it is a viable way of reducing contaminant concentrations to acceptable levels.
- This alternative will protect the environment. It does not impact the Area wetlands and endangered species as would the treatment alternatives presented.
- This alternative is easily implemented and cost effective.

INTERIM RECORD OF DECISION
RESPONSIVENESS SUMMARY
AREA I AND J, GROUNDWATER
NAVAL AIR ENGINEERING STATION

The purpose of this responsiveness summary is to review public response to the Proposed Plan for Areas I and J 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 I and J groundwater is divided into the following sections:

OVERVIEW - This section briefly describes the Focused Feasibility Study (FFS) process used to develop and evaluate remedial responses for Areas I and J groundwater, 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 I and J are located at NAES in Ocean County, Lakehurst, New Jersey. This responsiveness summary addresses public response to the Proposed Plan, proposing a three year study of the natural restoration processes with extensive groundwater monitoring.

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 at the four Sites. 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.

NAES mailed the Proposed Plan for this Area to concerned parties on the list described above. On September 13 and 14, 1994, a newspaper notification inviting public comment on the revised Proposed Plan appeared in The Ocean County Observer. On September 13, 14, 15 and 16, 1994, the notification appeared in The Asbury Park Press. On September 14, 1994 the notification also appeared in The Advance News. 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 September 14, 1994 through October 14, 1994.

A Public Meeting was held on September 14, 1994, at 7:00 p.m. at the Manchester Branch of the Ocean County Library, Colonial Drive, Manchester, New Jersey. The Area Investigations, Area evaluation process and the proposed remedial alternative were discussed. NAES representatives present included: CAPT Leroy Farr, Commanding Officer; CDR Joseph LoFaso, Public Works Officer; Robert Kirkbright, Engineering Director; Lucy Bottomley, Supervisory Environmental Engineer; Michael Figura, Environmental Engineer; and Carole Ancelin, Public Affairs Officer. Mr. Jeffrey Gratz, represented the USEPA's Federal Facility Section; Ms. Donna Gaffigan represented the NJDEP's Bureau of Federal Case Management. The complete attendance list is provided in Appendix A to this Record of Decision.

SUMMARY OF MAJOR QUESTIONS AND COMMENTS

Written Comments

During the public comment period from September 14, 1994 through October 14, 1994, no written comments were received pertaining to Areas I and J groundwater.

Public Meeting Comments

The following is a summary of major questions and comments received at the Public Meeting held on September 14, 1994. A complete transcript of the Public Meeting is provided in the Information Repository at the Ocean County Library, Toms River NJ.

Question No. 1

In the previous proposed plan how much did it cost to pump and treat the groundwater?

Response

The previous proposed plan (issued 8 July 1993) for Area I and J groundwater proposed to pump and treat the higher levels of contamination and allow the lower levels to reduce naturally. The total cost to construct and run the proposed groundwater recovery and treatment system for 30 years is currently estimated to be approximately 38 million dollars.

Question No. 2

How much would it cost to construct the treatment facility?

Response

The cost to construct the previously proposed groundwater recovery and treatment system is estimated to be approximately 3 million dollars. As part of the selected alternative, the Navy will prepare the specification to construct and operate the groundwater treatment facility. This will allow for implementation of active pumping and treating of groundwater within a year if it becomes necessary, either during this proposed interim action or as part of a final action for Areas I and J.

Question No. 3

Mr. Blackwell Albertson, a resident of Beckerville Road, expressed concern that the plume was migrating toward his property. He indicated that the plume should be actively treated.

Response

Currently, twenty downgradient monitoring wells are sampled semi-annually to assess the concentrations of VOCs along the downgradient perimeter of the contaminant plume and to compare the current results with previous results to assess potential plume migration or changes in the nature and/or extent of contamination. Over the past two years of sampling, no levels

were detected at concentrations exceeding applicable State or Federal groundwater standards. The extent of the plume does not appear to have migrated or changed significantly since the Phase III investigation conducted in 1991-1992. The contaminant levels in the perimeter wells appear to be reducing over time.

As part of this selected alternative, forty-one additional monitoring wells will be added to the existing forty-nine monitoring wells in the Area. Extensive monitoring of the Area will be implemented using both existing and additional monitoring wells to create an effective monitoring well network. A "downgradient line of compliance" will be established. This line of compliance will consist of a series of monitoring wells located at the downgradient extent of the plume which will be required to meet cleanup standards. If contaminant levels of concern are discovered in these downgradient well(s) appropriate action will be taken. These actions may include additional sampling, additional monitoring well installation and/or initiation of active treatment.

Question No. 4

Mr. Albertson indicated that when investigations were initiated at the base he was assured that contamination did not leave the base.

Response

During the initial Remedial Investigations conducted from 1985 to 1990, the Navy had not discovered contamination leaving the base. It was not until the Phase III Remedial Investigation (initiated in 1991) that contamination was discovered at and downgradient of the base boundary.

Question No. 5

Mr. Albertson indicated that additional wells existed which were not shown during the Public Hearing.

Response

Figures 8A through 8D show all existing off-base sampling points. On September 15, 1994, Ms. Lucy Bottomley and Mr. Michael Figura of the NEAS Environmental Branch accompanied Mr. Albertson to the locations where he said he saw additional wells installed. Although we were unable to locate the wells, Mr. Albertson will contact the Environmental Branch if he can find the wells. Mr. Albertson was shown the line of compliance the Navy is establishing and was presented the sampling plan and additional wells planned by the Navy. Mr. Albertson expressed that his concerns have been alleviated now that he has seen the locations of the additional monitoring wells to be installed.

Question No. 6

What wells in the area have been sampled?

Response

There are currently forty-nine (49) monitoring wells located throughout Areas I and J. All the monitoring wells and supply wells in the Area were sampled in February 1993, to provide an overall set of well sampling data. Twenty downgradient wells have been sampled semi-annually since February 1993. No contamination exceeding applicable State or Federal groundwater standards were found in the downgradient perimeter wells.

One private well was sampled in February 1992. The well is located on Mr. Stevenson's property at 183 Beckerville Road. This well was sampled because it was the closest private well to the Area I and J plume. No contamination exceeding applicable State or Federal groundwater standards were found in this well.

Question No. 7

Is Mr. Stevenson's the only private well that was sampled? Why didn't the Navy sample all the private wells located downgradient of the plume?

Response

Mr. Stevenson's well (the nearest downgradient potable well) was the only private well sampled. No contamination exceeding applicable State or Federal groundwater standards were found in this well. The downgradient private wells were not sampled because it does not appear that contamination has migrated past the downgradient monitoring wells in the Area. It is not the Navy's obligation to sample off-base private wells. The NJDEP's function is to do testing off-base and then determine appropriate action if necessary.

Question No. 8

What types of contamination do you have in Areas I and J groundwater?

Response

The primary contaminants present in groundwater are chlorinated volatile organic compounds. The chlorinated compounds most commonly detected include cis-1,2-dichloroethene, 1,1-dichloroethene, 1,1-dichloroethane, 1,1,1-trichloroethane, trichloroethene and tetrachloroethene.

Benzene, toluene, ethylbenzene and xylene (BTEX) were detected at few locations and, with one exception, at low concentrations. BTEX in a shallow sample collected at one off-base location is believed to be attributable to an unidentified minor off-base petroleum release and not related to activities at NAES.

Several metals (aluminum, cadmium, chromium, lead, and nickel) were detected sporadically at concentrations exceeding EPA and/or NJDEP groundwater standards in unfiltered samples. However, these metals were generally not detected in the filtered splits of these samples and were not detected significantly above unfiltered background concentrations.

Question No.9

Mr. Dieter Rauch, a resident of Nicoletti and Johnson Avenues located approximately one mile east of the base, indicated that three weeks ago, 13 of 26 homes located in his neighborhood tested positive for mercury. He indicated that he met with the Township but no one can determine the source. He indicated that the Ocean County Board of Health, the Mayor of Manchester Township, Congressman Smith and the EPA were also contacted. He questioned if the mercury was coming from the base.

Response

The primary contaminants present in Areas I and J groundwater are chlorinated volatile organic compounds. Several metals (aluminum, cadmium, chromium, lead, and nickel) were detected sporadically at concentrations exceeding EPA and/or NJDEP groundwater standards in unfiltered samples. However, these metals were generally not detected in the filtered splits of these samples and were not detected significantly above unfiltered background concentrations. Mercury was not found in Areas I and J above EPA or NJDEP groundwater standards.

The NJDEP Bureau of Well Field Remediation (a sub-group of Safe Drinking Water) is investigating the problem. Mr. Rocky Richards, heads the investigating group and can be reached at (609) 984-5862.

Question No. 10

Areas I and J were mainly polluted during the 1960s?

Response

The groundwater in Areas I and J was contaminated by activities conducted during the 1960s and early 1970s. Page 8 of this document lists the reported or potential contaminant sources.

Question No. 11

How does the Navy know where the contamination was going the first ten or twenty years after its release?

Response

When chlorinated solvents are poured on the ground surface they travel vertically through the soil until they reach groundwater. Once they reach groundwater they may become dissolved in the groundwater and begin to move with the groundwater. As the contaminants move away from the source they tend to spread out and reduce in concentration due to natural attenuation and dilution.

The extensive monitoring well network throughout Areas I and J has been used to identify the extent of contamination resulting from past releases. The results show the higher levels of contamination at and near the source areas (areas where contaminants were released onto the ground surface). Contaminant levels decrease downgradient of the source areas to non-detectable levels near the downgradient surface water bodies.

A groundwater contaminant transport model has been produced to simulate the plume migration at Areas I and J. The model is calibrated by simulating the release of contaminants at source areas and comparing the subsequent migration to field conditions. This model can then be used to predict future migration of the plume. The three year study to be conducted, will provide data to allow a more accurate prediction of future plume migration and natural attenuation.

Question No. 12

Ms. Gisela Tsambaou, a resident of Pine Lake Park, indicated that her groundwater was polluted with similar chemicals as those in Areas I and J.

Response

Many contaminated sites throughout the state have

chlorinated solvents. These chemicals were commonly used in the past for degreasing operations.

Question No. 13

What is natural restoration?

Response

Natural restoration is the use of naturally occurring attenuation mechanisms, such as biodegradation, to reduce the total amount of contaminant dissolved in groundwater. Natural restoration permits the degradation of organic contaminants under natural, in situ, conditions. Natural Restoration is an important process at contaminated sites because it limits pollutant migration and reduces contaminant mass in the subsurface.

Identifying the impact of natural restoration at a site involves a comprehensive sampling program in conjunction with extensive modeling of contaminant fate and transport.

Question No. 14

Rather than pumping, you are just going to let the contamination sit?

Response

Rather than pumping, the Navy is going to conduct a rigorous three year study of the natural restoration processes at the Area. Ongoing sampling has indicated that the plume has reached a steady state and may be reducing over time. An extensive contaminant transport model prepared for the Area indicates that even with conservative degradation rates natural attenuation will be effective at reducing contamination over time. The study will identify if natural restoration is an effective process at this site.

Extensive monitoring throughout and downgradient of the plume will be conducted to protect human health. The design to

construct a treatment system will be prepared. This design can be implemented within a year should active treatment of the plume become necessary.

Question No. 15

Mr. Albertson stated that he did not believe that the plume would reduce through natural attenuation but only through dilution.

Response

Removal of contaminants by natural processes has been evaluated in field and laboratory investigations. Both types of investigations demonstrate that natural restoration can be effective at remediating groundwater contamination. Research has documented microbial systems that destroy chlorinated organic contaminants. Natural restoration has shown to be an effective remedial process at many sites.

An extensive three year study of the natural processes at Areas I and J will be conducted to determine if natural restoration will be effective at reducing contaminants to acceptable levels.

Appendix A

Attendance List for Public Meeting Held September 14, 1994

14 Sept 94

NAVAL AIR ENGINEERING STATION
PUBLIC MEETING
AREAS I AND J GROUNDWATER

SIGN-IN SHEET

NAME	AFFILIATION/ADDRESS	HOW DID YOU HEAR OF THE MEETING? CIRCLE ONE
Michael Figura	NAES	POSTERS RADIO NEWSPAPER MAIL
[illegible]	"	POSTERS RADIO N/A NEWSPAPER MAIL
Dorothy Peterson	"	POSTERS RADIO N/A NEWSPAPER MAIL
Carole Fencelin	"	POSTERS RADIO N/A NEWSPAPER MAIL
Rob Cressem	O.C. Newswatch & Adelphi Cable	POSTERS RADIO NEWSPAPER MAIL
RALPH MONTE	COURT REPORTER	POSTERS RADIO NEWSPAPER MAIL
Donna L Gaffigan	NJDEPE	POSTERS RADIO NEWSPAPER MAIL
[illegible]	Asbury Park Press	POSTERS RADIO NEWSPAPER MAIL
Jill Saraffin	NAES	POSTERS RADIO NEWSPAPER MAIL
Jeffrey Gratz	EPA - Region II	POSTERS RADIO NEWSPAPER MAIL
CAPT Leroy Farr	NAES LAKEHURST	POSTERS RADIO NEWSPAPER MAIL
Susan Marshall	1716 9th Av. Manchester Lakes Comm. Toms River 08759	POSTERS RADIO NEWSPAPER MAIL
LUCY BOTTOMLEY	NAES	POSTERS RADIO NEWSPAPER MAIL
Theresa Lettman	Pinelands Pres. Alliance Pemberton	POSTERS RADIO NEWSPAPER MAIL
Bob Previtè	NAES Lakehurst	POSTERS RADIO NEWSPAPER MAIL
JOSEPH L. FASO	NAES LAKEHURST	POSTERS RADIO NEWSPAPER MAIL
LARRY LEMIG	NAES LAKEHURST	POSTERS RADIO NEWSPAPER MAIL
GISELA TSAMBIKOU	1162 BEACON ST. PINE LAKE PARK	POSTERS RADIO NEWSPAPER MAIL
JACK KOCZAN	Dames & Moore	POSTERS RADIO NEWSPAPER MAIL

If interested in future mailings, please provide your full address.

9493 COPIES

NAVAL AIR ENGINEERING STATION
PUBLIC MEETING
AREAS I AND J GROUNDWATER

SIGN-IN SHEET

NAME	AFFILIATION/ADDRESS	HOW DID YOU HEAR OF THE MEETING? CIRCLE ONE
Constantine Tsentat	Dames & Moore 12 Bluebird Ct E	POSTERS RADIO NEWSPAPER MAIL
[illegible]	3288 Johnson AVE Lakehurst	POSTERS RADIO NEWSPAPER MAIL
Jean & Blackwell Allerton	13 S Beckerville Rd Lakehurst	POSTERS RADIO NEWSPAPER MAIL
		POSTERS RADIO NEWSPAPER MAIL
		POSTERS RADIO NEWSPAPER MAIL
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		POSTERS RADIO NEWSPAPER MAIL
		POSTERS RADIO NEWSPAPER MAIL

If interested in future mailings, please provide your full address.

updated 9-20-94

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

Mr. Frank Montarelli, Public Affairs (908) 323-2620
Naval Air Engineering Station
Lakehurst, NJ 08733-5000

Commander J. M. LoFaso (908) 323-2601
Public Works Officer
Naval Air Engineering Station
Lakehurst, NJ 08733-5000

Northern Division, Naval Facilities Engineering Command

Mr. Lonnie Monaco (215) 595-0555
Northern Division
Naval Facilities Engineering Command
Code 182
10 Industrial Highway
Mail Stop 82
Lester, PA 19113-2090

Federal Elected Officials

Senator William Bradley (908) 688-0960
1705 Vauxhall Road
P.O. Box 1720
Union, NJ 07083

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

Congressman H. James Saxton (609) 261-5800
100 High Street
Mount Holly, NJ 08060

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

Assemblywoman Marlene L. Ford (908) 899-1208
2611 Spruce Street
Point Pleasant, NJ 08742

U.S. Environmental Protection Agency Officials

Ms. Laura Livingston (212) 264-6723
Federal Facilities Coordinator
Room 1104
U.S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, NY 10278

Mr. Steven Katz (212) 264-2515
Superfund Community Relations Coordinator
U.S. Environmental Protection Agency
Region II
External Programs Division, Room 905
26 Federal Plaza
New York, NY 10278

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

Commanding Officer
Attn: Joyce Patterson
NEESA Code 112E2
1001 Lyons St. Suite 1
Port Hueneme, CA 93043-4340

New Jersey Pinelands Commission

Mr. Todd DeJesus (609) 894-9342
The Pinelands Commission
P. O. Box 7
New Lisbon, NJ 08064

Ocean County Officials

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

Mr. Joseph H. Vicari, Director (908) 244-2121
Ocean County Board of Freeholders
P.O. Box 2191
Toms River, NJ 08754

Mr. Joseph Przywara, Coordinator (908) 341-9700
Ocean County Health Department
Environmental Health
2191 Sunset Avenue
Toms River, NJ 08753

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

Dover Township Officials

Hon. J. Mark Mutter (908) 341-1000
Mayor of Dover Township
P.O. Box 728
33 Washington Street
Toms River, NJ 08754

Ms. Janet Carson (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. Wynn A. Mauer, Chairman
Manchester Township Municipal Utilities Authority
One Colonial Drive
Lakehurst, NJ 08733

Mr. William Jamieson, Jr., Chairman
Manchester Township Environmental Commission
One Colonial Drive
Lakehurst, NJ 08733

Jackson Township Officials

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

Borough of Lakehurst Officials

Hon. Alton Tilton (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 (908) 341-3653
1616 Seventh Avenue
Toms River, NJ 08757

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

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

<u>Media Organizations</u>

Advance News (908) 657-8936
2048 Route 37 West
Lakehurst, NJ 08733

Alyn Ackerman 1-800-822-9770
Asbury Park Press
3601 Highway 66
P.O. Box 1550
Neptune, NJ 07754-1550

Ms. Debra Coombe (908) 244-7171
Newark Star Ledger
44 Washington Street
Toms River, NJ 08753

New Egypt Press
37 Main Street
P.O. Box 288
New Egypt, NJ 08533
(609) 758-2112

Ocean County Leader
P.O. Box 1771
Point Pleasant Beach, NJ 08742
(908) 899-1000

Ms. Lisa Peterson
Ocean County Review
P.O. Box 8
Seaside Heights, NJ 08751
(908) 793-0147

Ocean County Reporter
8 Robbins Street
P.O. Box 908
Toms River, NJ 08753
(908) 349-1501

Mr. Sam Christopher
Ocean County Observer
8 Robbins Street
CN 2449
Toms River, NJ 08753
(908) 349-3000

RADIO

Mr. Shawn Marsh
WJLK Radio
Press Plaza
Asbury Park, NJ 07712
(908) 774-7700

Ms. Joan Jones
WJRZ Radio
22 West Water Street
P.O. Box 100
Toms River, NJ 08754
(908) 270-5757

Mr. Doug Doyle
WOBM Radio
U.S. Highway 9
Bayville, NJ 08721
(908) 269-0927

Mr. Gary Myervich
Adelphia Cable
830 Highway 37 West
Toms River, NJ 08753
(908) 341-8818

Mr. Abi Montefiore
Monmouth Cable
P.O. Box 58
Belmar, NJ 07719
(908) 681-8222

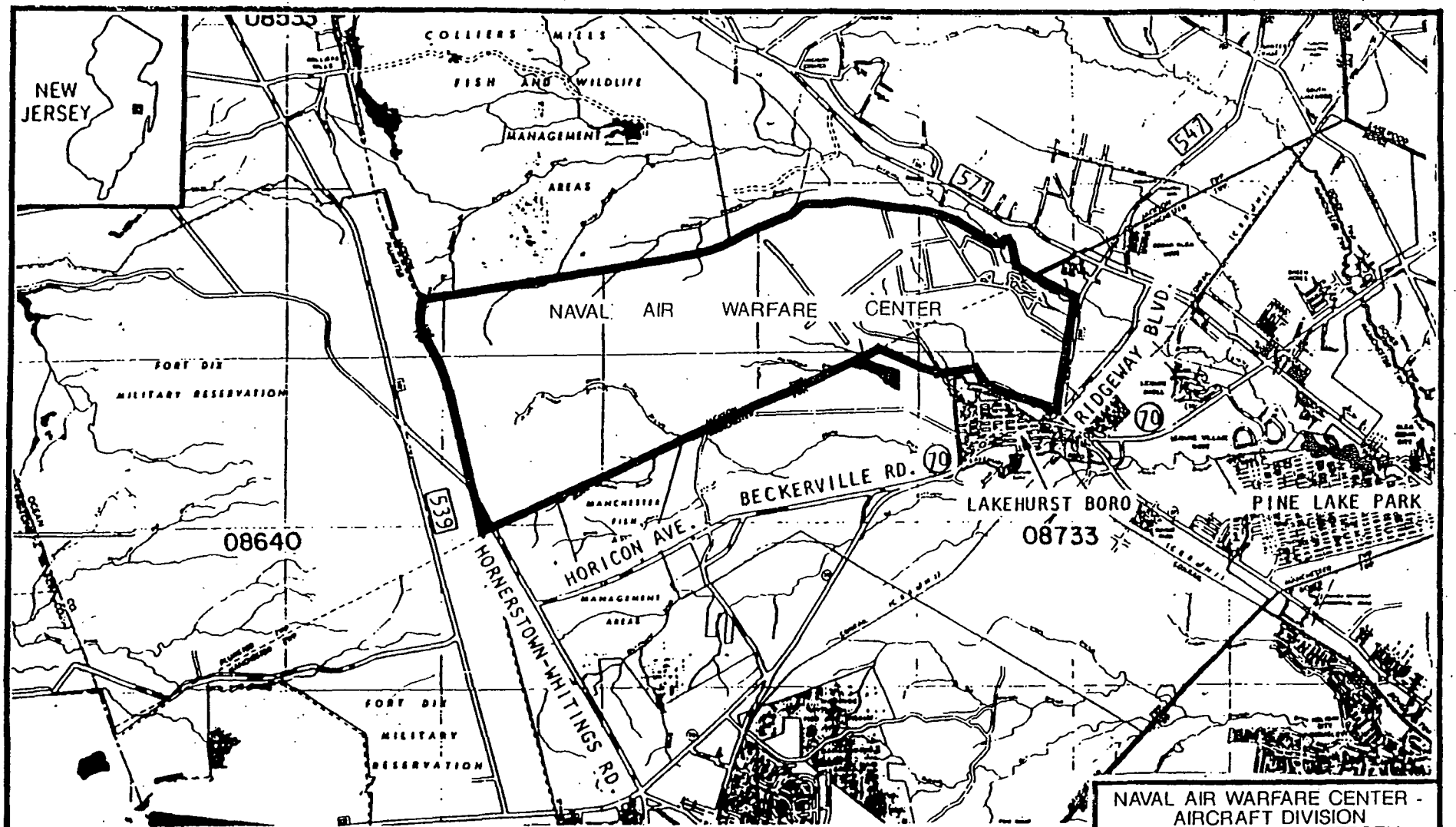
Federal and State Case Managers

Mr. Jeffrey Gratz, Project Manager (212) 264-6667
U.S. Environmental Protection Agency
Region II
26 Federal Plaza, Room 2930
New York, NY 10278

Ms. Donna Gaffigan, Case Manager (609) 633-1455
Bureau of Federal Case Management, CN 028
New Jersey Department of Environmental
Protection and Energy
401 East State Street
Trenton, NJ 08625-0028

Ms. Linda Welkom, Geologist (609) 292-8427
Bureau of Groundwater Pollution Abatement
New Jersey Department of Environmental
Protection and Energy
401 East State Street
Trenton, NJ 08625

Mr. Kevin Schick (609) 984-1825
Bureau of Environmental Evaluation
and Risk Assessment
New Jersey Department of Environmental
Protection and Energy
401 East State Street
Trenton, NJ 08625



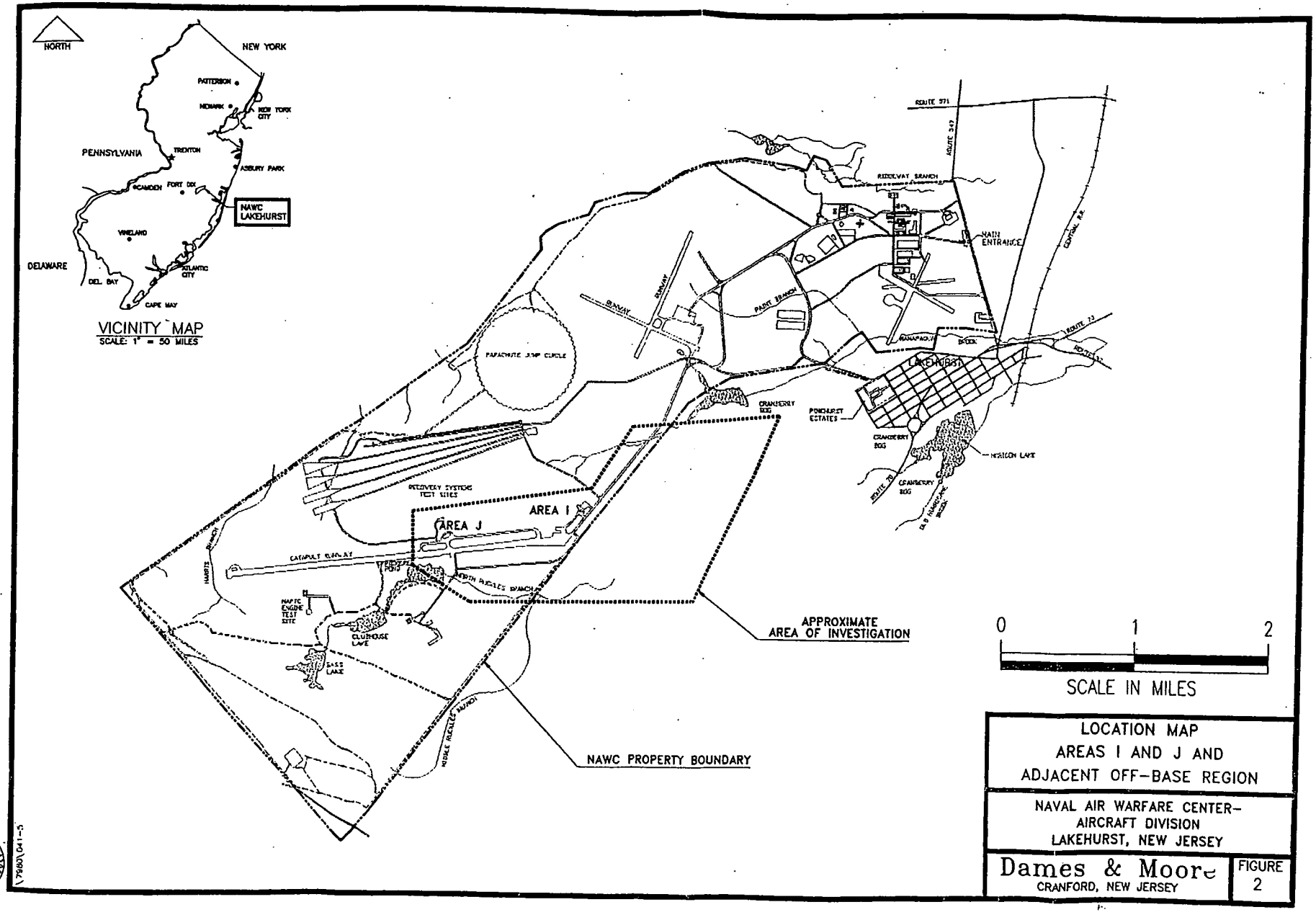
REFERENCE:
HAGSTROM MAP OF
OCEAN COUNTY, NEW JERSEY

NAVAL AIR WARFARE CENTER -
AIRCRAFT DIVISION
LAKEHURST, NEW JERSEY

VICINITY MAP

Dames & Moore
CRANFORD, NEW JERSEY

FIGURE 1



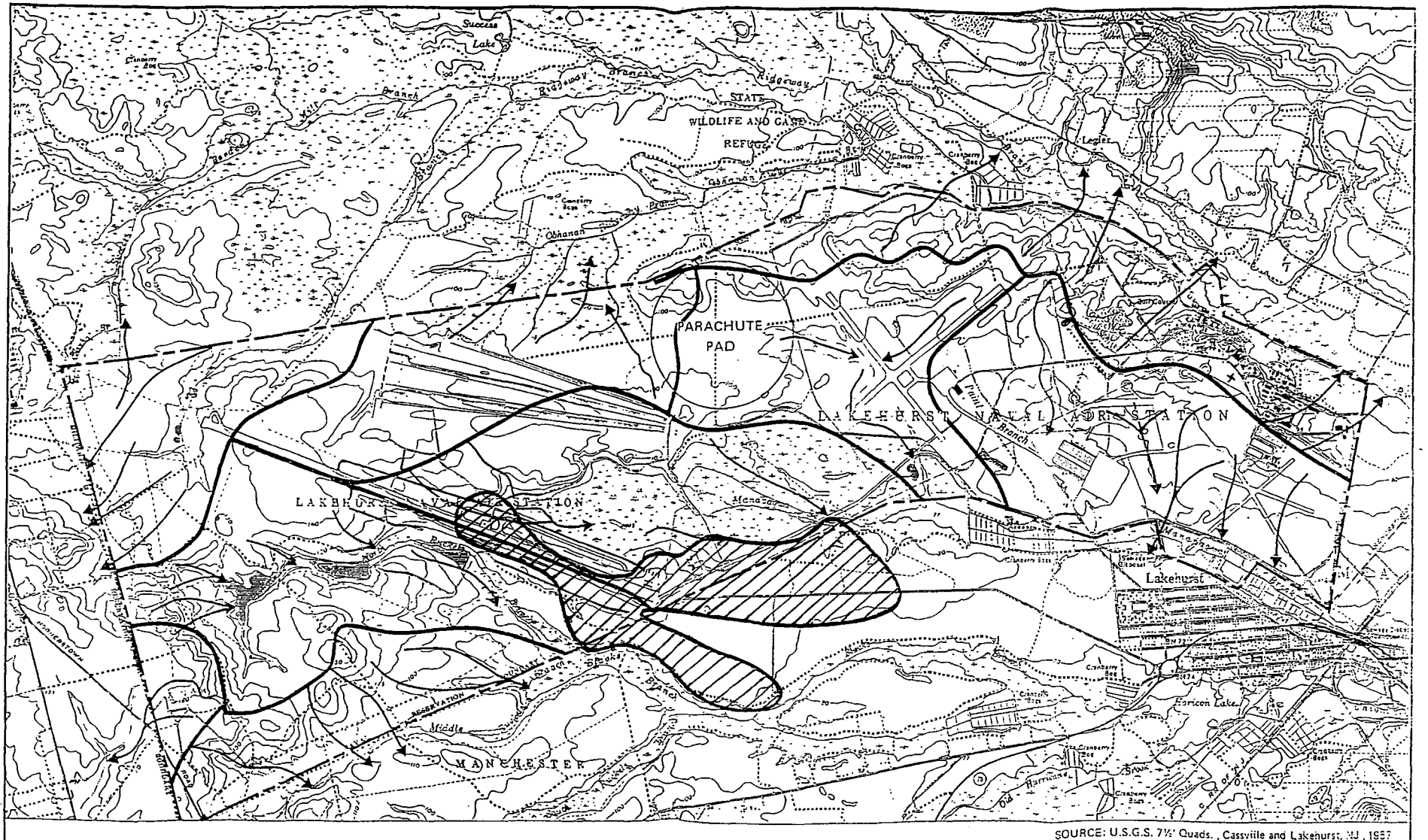
LOCATION MAP
AREAS I AND J AND
ADJACENT OFF-BASE REGION

NAVAL AIR WARFARE CENTER-
AIRCRAFT DIVISION
LAKEHURST, NEW JERSEY

Dames & Moore
CRANFORD, NEW JERSEY

FIGURE 2

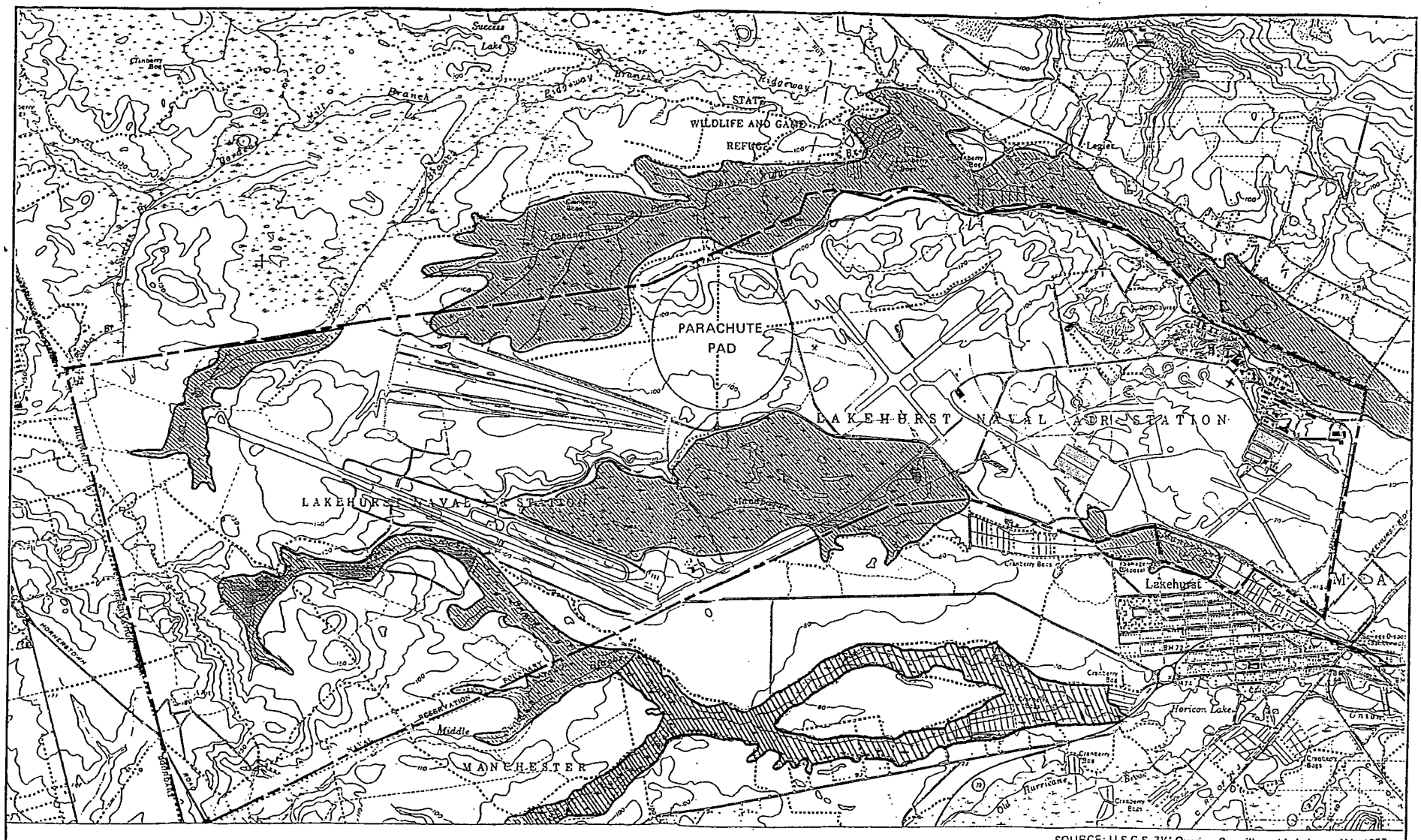
7980\041-0



SOURCE: U.S.G.S. 7½' Quads., Cassville and Lakehurst, NJ, 1957 Photorevised 1971

FIGURE 2-A
SURFACE DRAINAGE PATTERNS AND TRIBUTARIES
NAVAL AIR WARFARE CENTER
LAKEHURST, NEW JERSEY

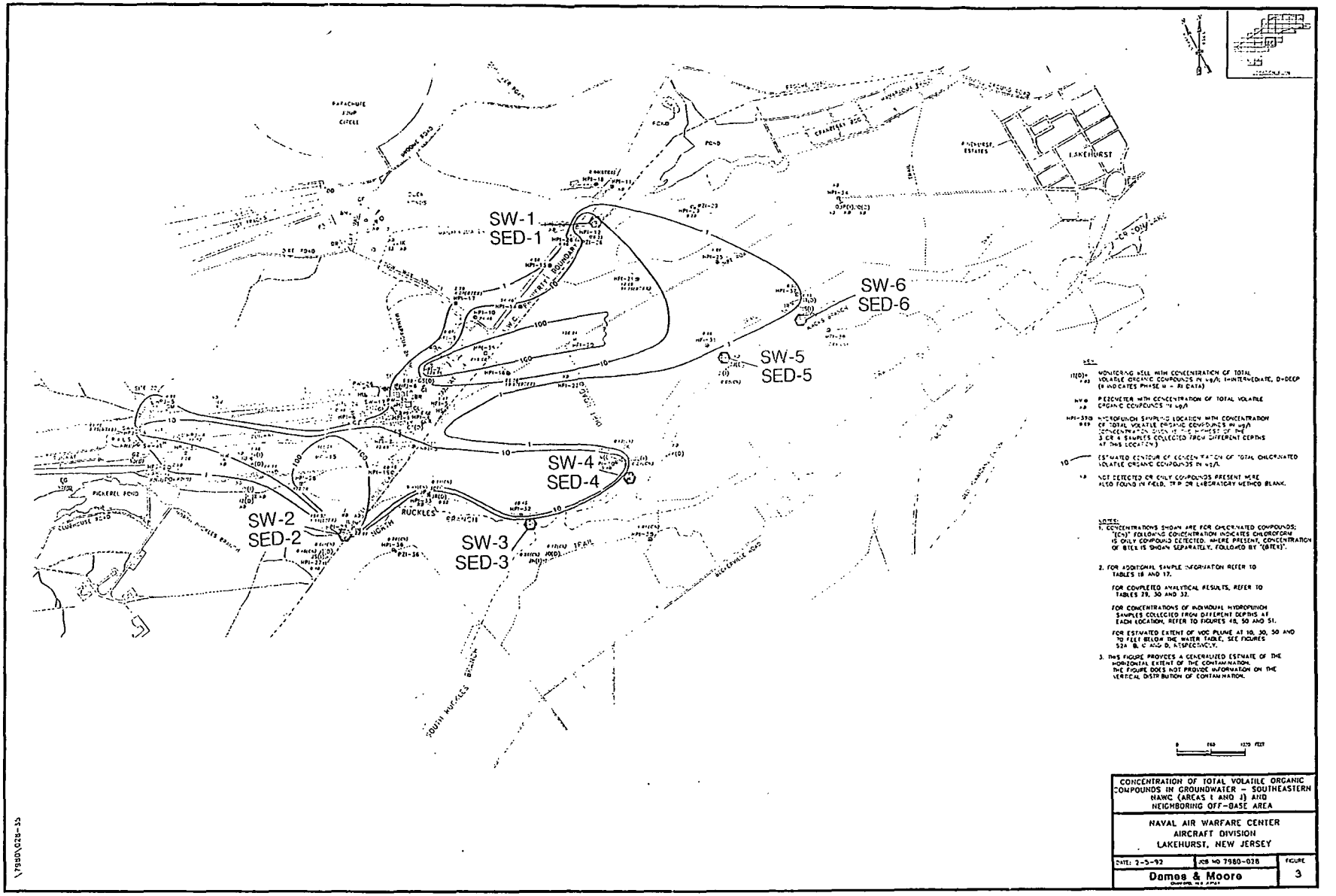
Dames & Moore



SOURCE: U.S.G.S. 7½' Quads., Cassville and Lakehurst, NJ, 1957
Photorevised 1971

FIGURE 2-8
WETLANDS AND NEIGHBORING PALUSTRINE REGIONS
NAVAL AIR WARFARE CENTER
LAKE HURST, NEW JERSEY

Dames & Moore



CONCENTRATION OF TOTAL VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER – SOUTHEASTERN NAWC (AREAS I AND J) AND NEIGHBORING OFF-BASE AREA

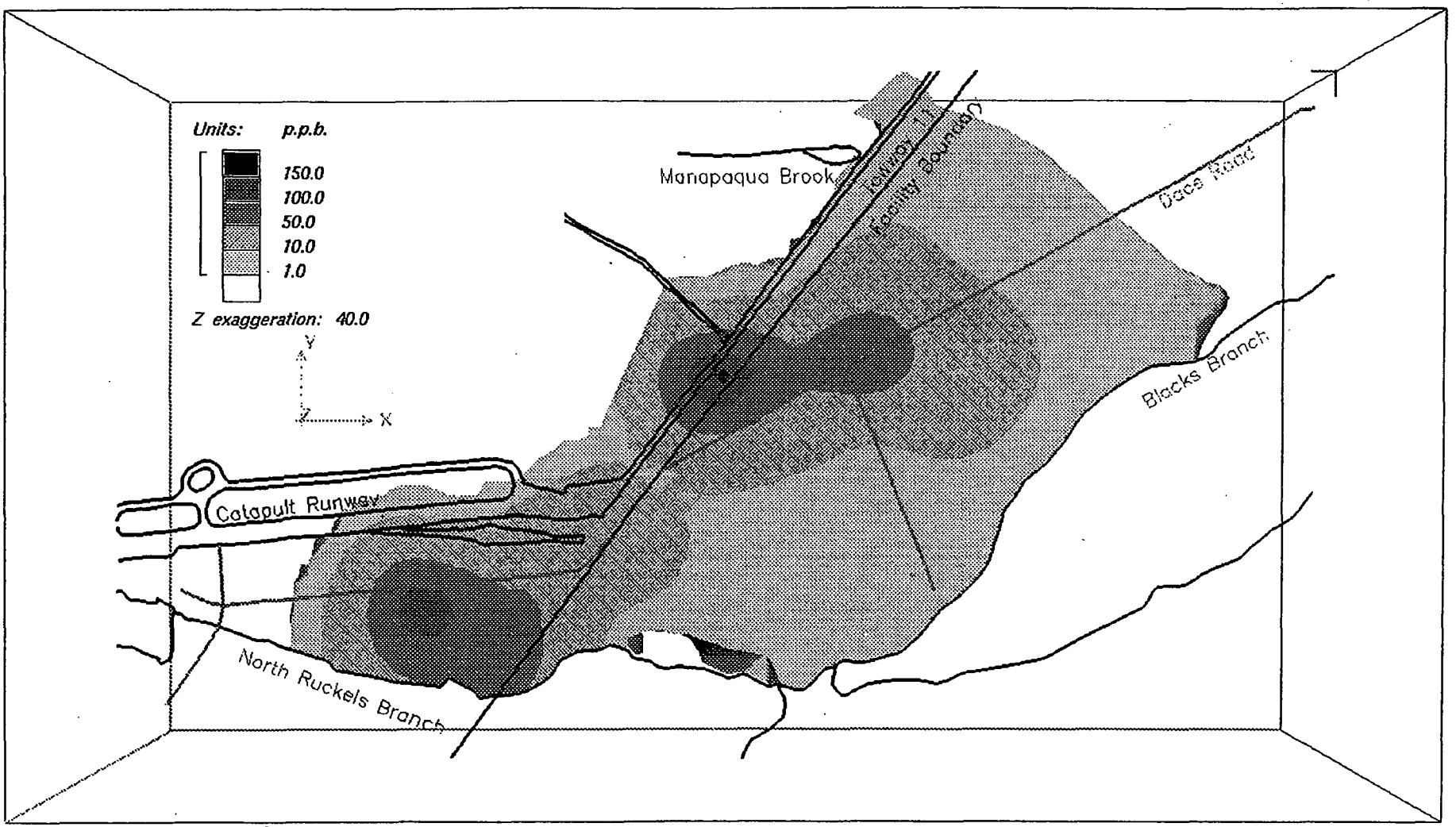
NAVAL AIR WARFARE CENTER
AIRCRAFT DIVISION
LAKEHURST, NEW JERSEY

DATE: 2-5-92 | JOB NO 7980-028 | FIGURE 3

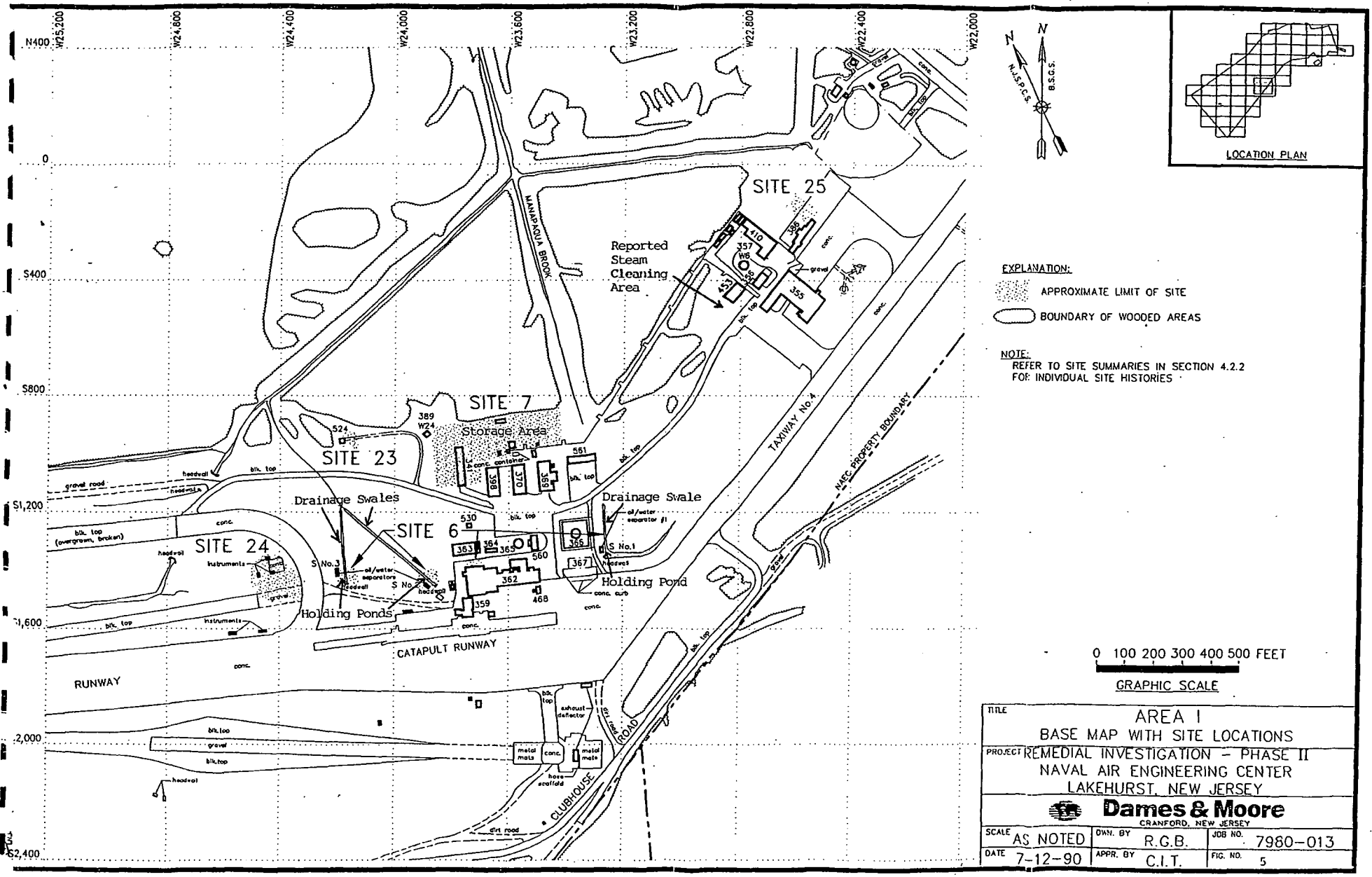
Dames & Moore

\7980\028-55

Total VOCs NAWC Areas I&J



Map View, Cut at 28 ft elevation (figure 4)



LOCATION PLAN

EXPLANATION:

APPROXIMATE LIMIT OF SITE

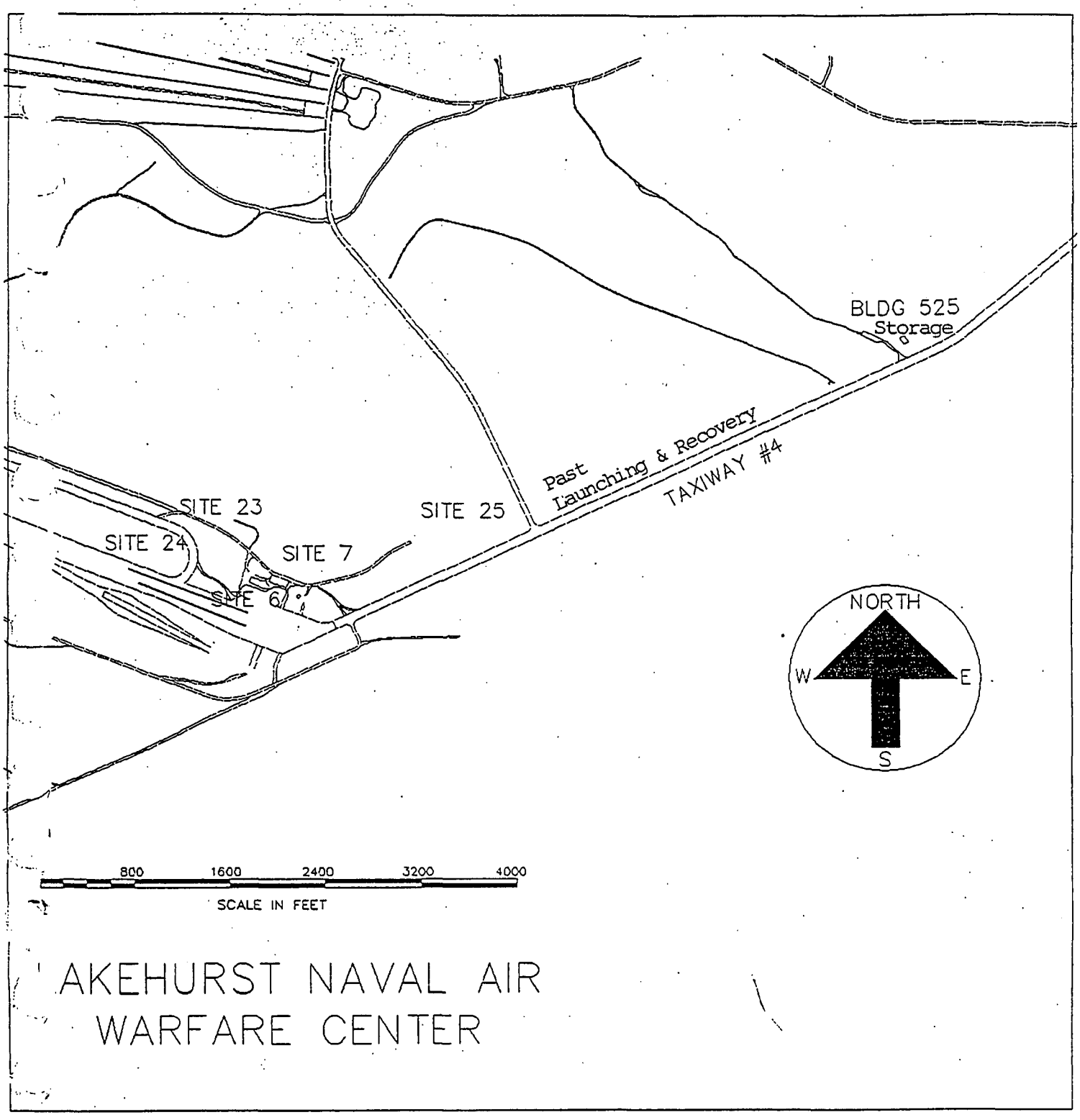
BOUNDARY OF WOODED AREAS

NOTE:
REFER TO SITE SUMMARIES IN SECTION 4.2.2 FOR INDIVIDUAL SITE HISTORIES

0 100 200 300 400 500 FEET

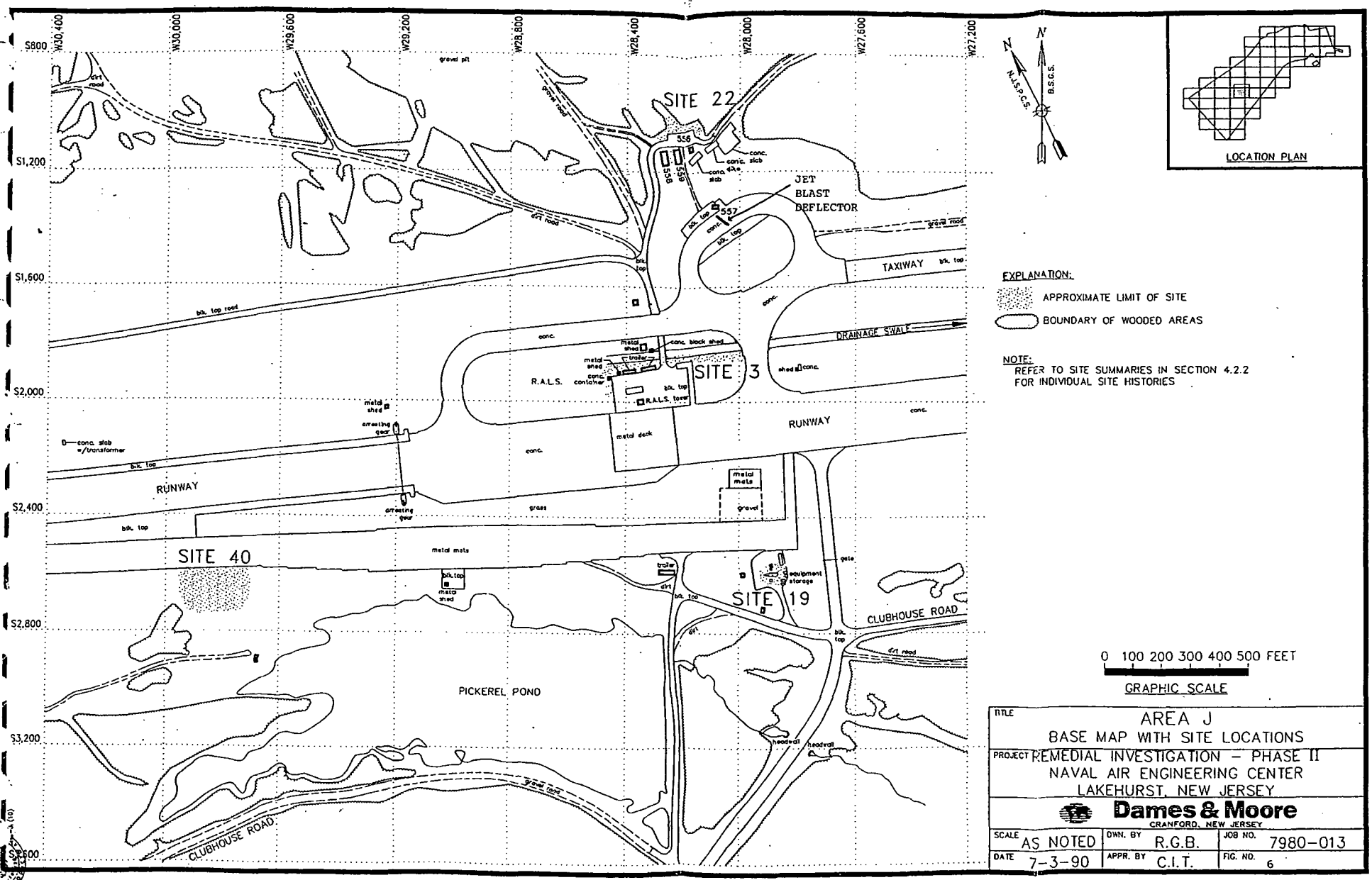
GRAPHIC SCALE

TITLE	AREA I BASE MAP WITH SITE LOCATIONS		
PROJECT	REMEDIAL INVESTIGATION - PHASE II NAVAL AIR ENGINEERING CENTER LAKEHURST, NEW JERSEY		
	Dames & Moore CRANFORD, NEW JERSEY		
SCALE AS NOTED	DWN. BY R.G.B.	JOB NO. 7980-013	
DATE 7-12-90	APPR. BY C.I.T.	FIG. NO. 5	



AREA I

FIGURE 5A



LOCATION PLAN

EXPLANATION:

APPROXIMATE LIMIT OF SITE

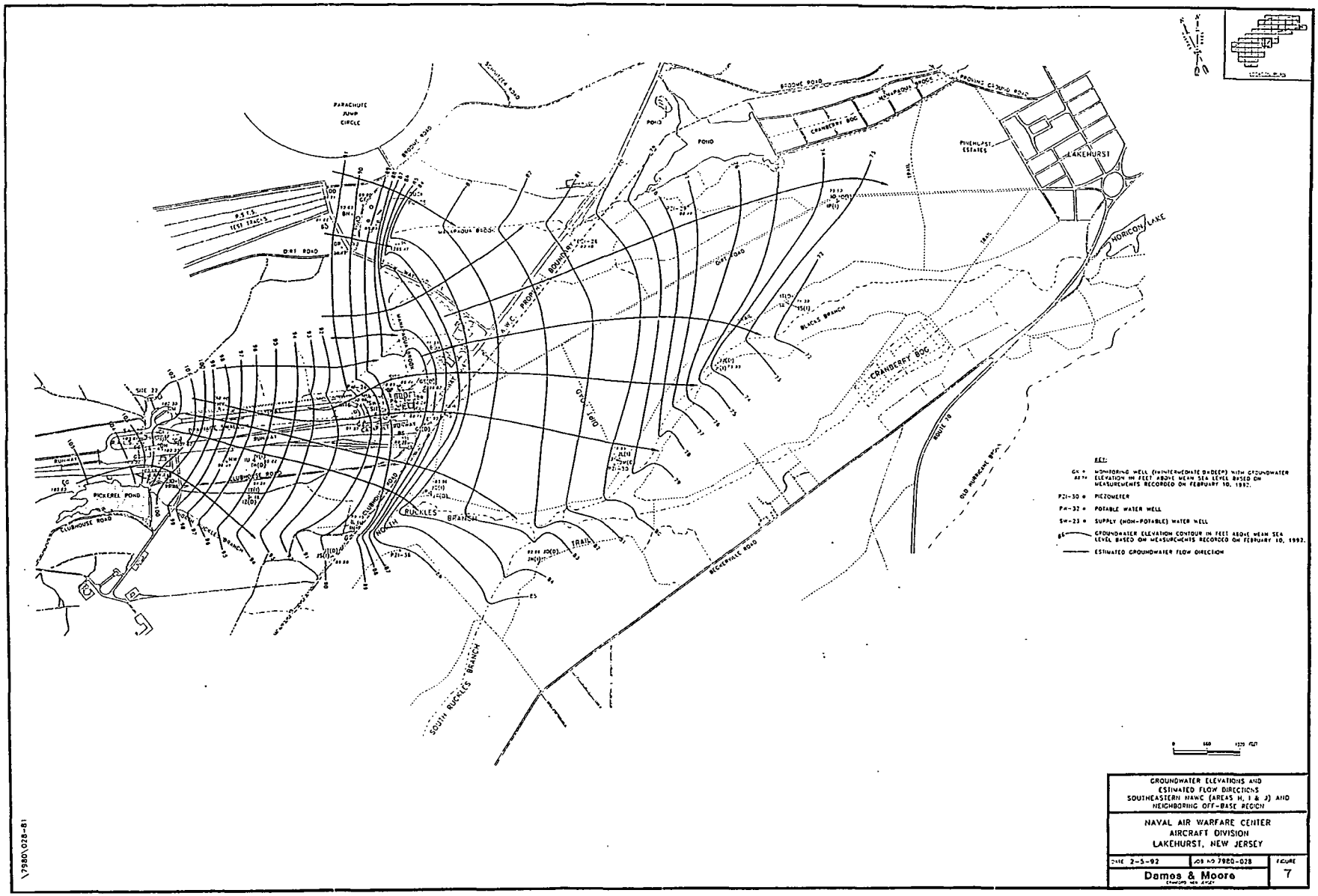
BOUNDARY OF WOODED AREAS

NOTE:
REFER TO SITE SUMMARIES IN SECTION 4.2.2 FOR INDIVIDUAL SITE HISTORIES

0 100 200 300 400 500 FEET

GRAPHIC SCALE

TITLE	AREA J BASE MAP WITH SITE LOCATIONS
PROJECT	REMEDIAL INVESTIGATION – PHASE II NAVAL AIR ENGINEERING CENTER LAKEHURST, NEW JERSEY
	Dames & Moore CRANFORD, NEW JERSEY
SCALE AS NOTED	DWN. BY R.G.B. / JOB NO. 7980-013
DATE 7-3-90	APPR. BY C.I.T. / FIG. NO. 6



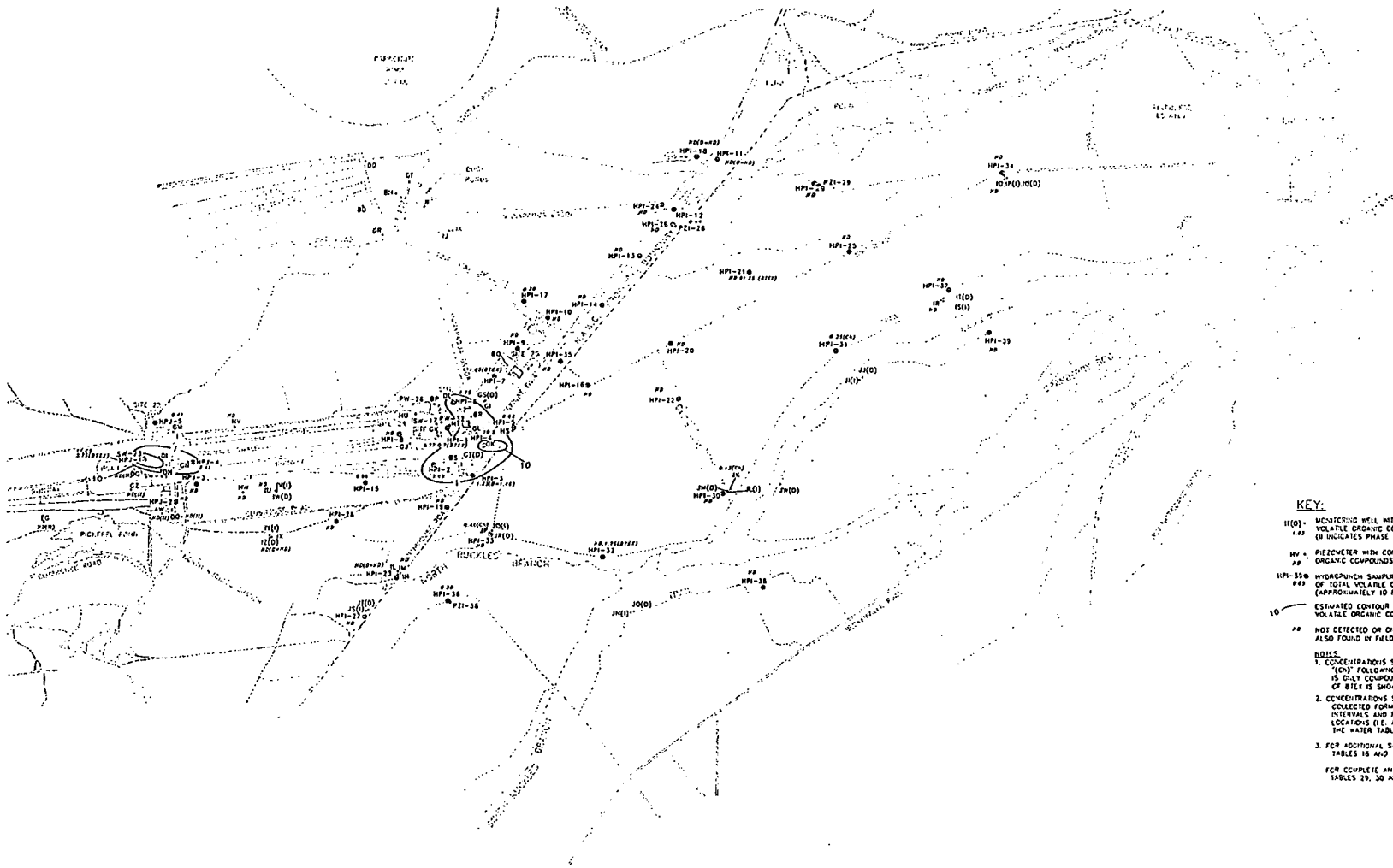
GROUNDWATER ELEVATIONS AND ESTIMATED FLOW DIRECTIONS SOUTHEASTERN NAWC (AREAS H, I & J) AND NEIGHBORING OFF-BASE REGION

NAVAL AIR WARFARE CENTER
AIRCRAFT DIVISION
LAKEHURST, NEW JERSEY

DATE 2-5-92 | JOB NO 7980-028 | FIGURE 7

Dames & Moore

\7980\028-81

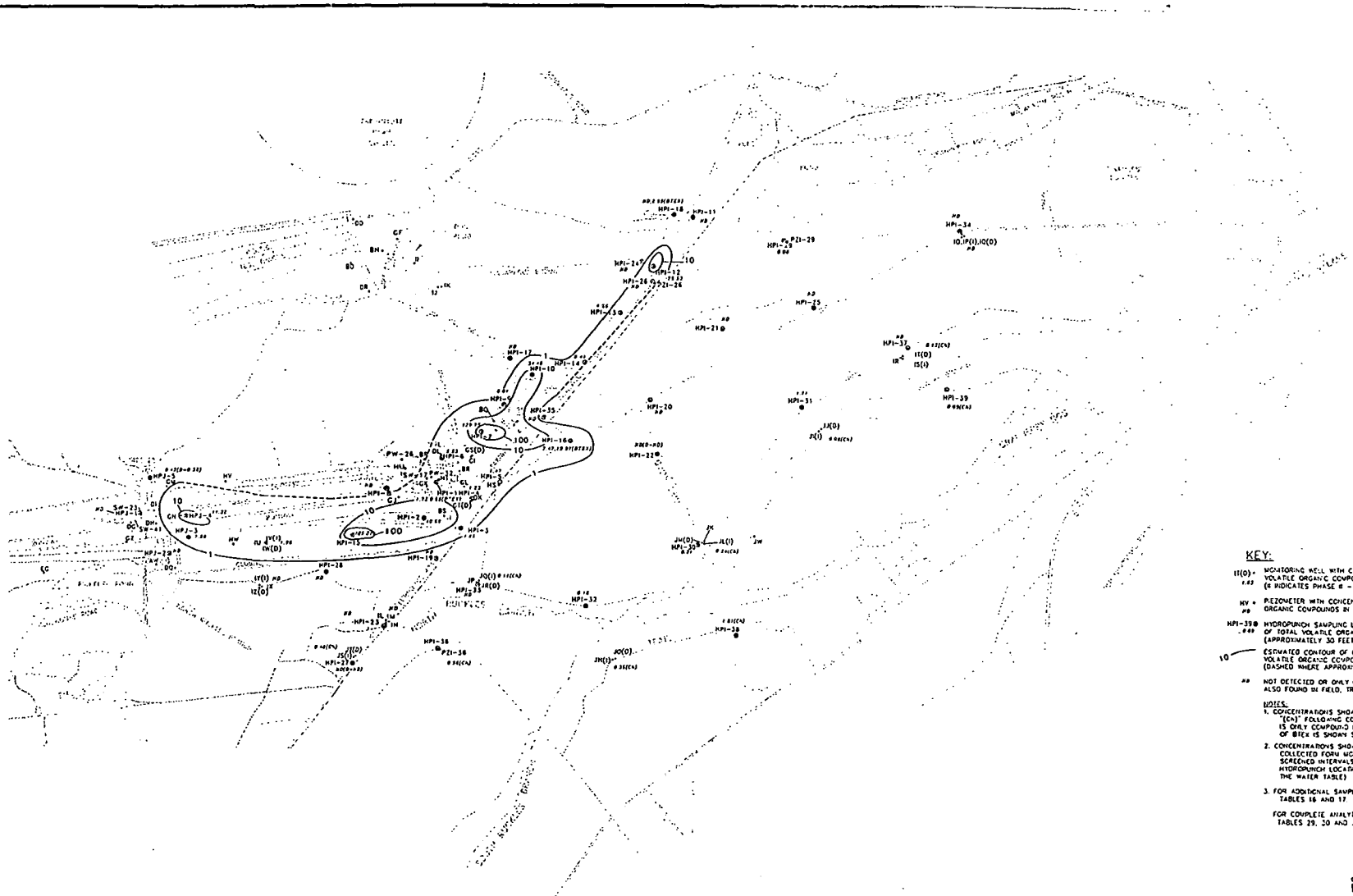


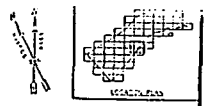
CONCENTRATION OF TOTAL CHLORINATED VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER, "A" ZONE - SOUTHEASTERN NAWC (AREAS I AND J) AND NEIGHBORING OFF-BASE AREA

NAVAL AIR WARFARE CENTER
AIRCRAFT DIVISION
LAKEHURST, NEW JERSEY

DATE 6-30-92	JOB NO 7980-028	FIGURE
Dames & Moore		8A

\7980\028-94





KEY:

IT(D) • MONITORING WELL WITH CONCENTRATION OF TOTAL VOLATILE ORGANIC COMPOUNDS IN ug/l; I=INTERMEDIATE, D=DEEP (# INDICATES PHASE # - RI DATA)

HV • PIEZOMETER WITH CONCENTRATION OF TOTAL VOLATILE ORGANIC COMPOUNDS IN ug/l.

HPI-39 ● HYDROPUNCH SAMPLING LOCATION WITH CONCENTRATION OF TOTAL VOLATILE ORGANIC COMPOUNDS IN ug/l - "B" SAMPLES (APPROXIMATELY 30 FEET BELOW WATER TABLE)

10 ESTIMATED CONTOUR OF CONCENTRATION OF TOTAL CHLORINATED VOLATILE ORGANIC COMPOUNDS IN ug/l (DASHED WHERE APPROXIMATED DUE TO LACK OF DATA)

ND NOT DETECTED OR ONLY COMPOUNDS PRESENT WERE ALSO FOUND IN FIELD, TRIP OR LABORATORY METHOD BLANK.

NOTES:

1. CONCENTRATIONS SHOWN ARE FOR CHLORINATED COMPOUNDS. "(CH)" FOLLOWING CONCENTRATION INDICATES CHLOROFORM IS ONLY COMPOUND DETECTED. WHERE PRESENT, CONCENTRATION OF BTEX IS SHOWN SEPARATELY, FOLLOWED BY "(BTEX)".
2. CONCENTRATIONS SHOWN ARE FOR GROUNDWATER SAMPLES COLLECTED FORM MONITORING WELLS WITH "INTERMEDIATE" SCREENED INTERVALS AND FROM THE "B" DEPTH INTERVAL AT HYDROPUNCH LOCATIONS (I.E. APPROXIMATELY 30 FEET BELOW THE WATER TABLE)
3. FOR ADDITIONAL SAMPLE INFORMATION REFER TO TABLES 16 AND 17.

FOR COMPLETE ANALYTICAL RESULTS, REFER TO TABLES 29, 30 AND 32.

0 650 1300 FEET

CONCENTRATION OF TOTAL CHLORINATED VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER, "B" ZONE - SOUTHEASTERN NAWC (AREAS I AND J) AND NEIGHBORING OFF-BASE AREA

NAVAL AIR WARFARE CENTER
AIRCRAFT DIVISION
LAKEHURST, NEW JERSEY

DATE: 9-30-92	JOB NO 7980-028	FIGURE
Dames & Moore		8B

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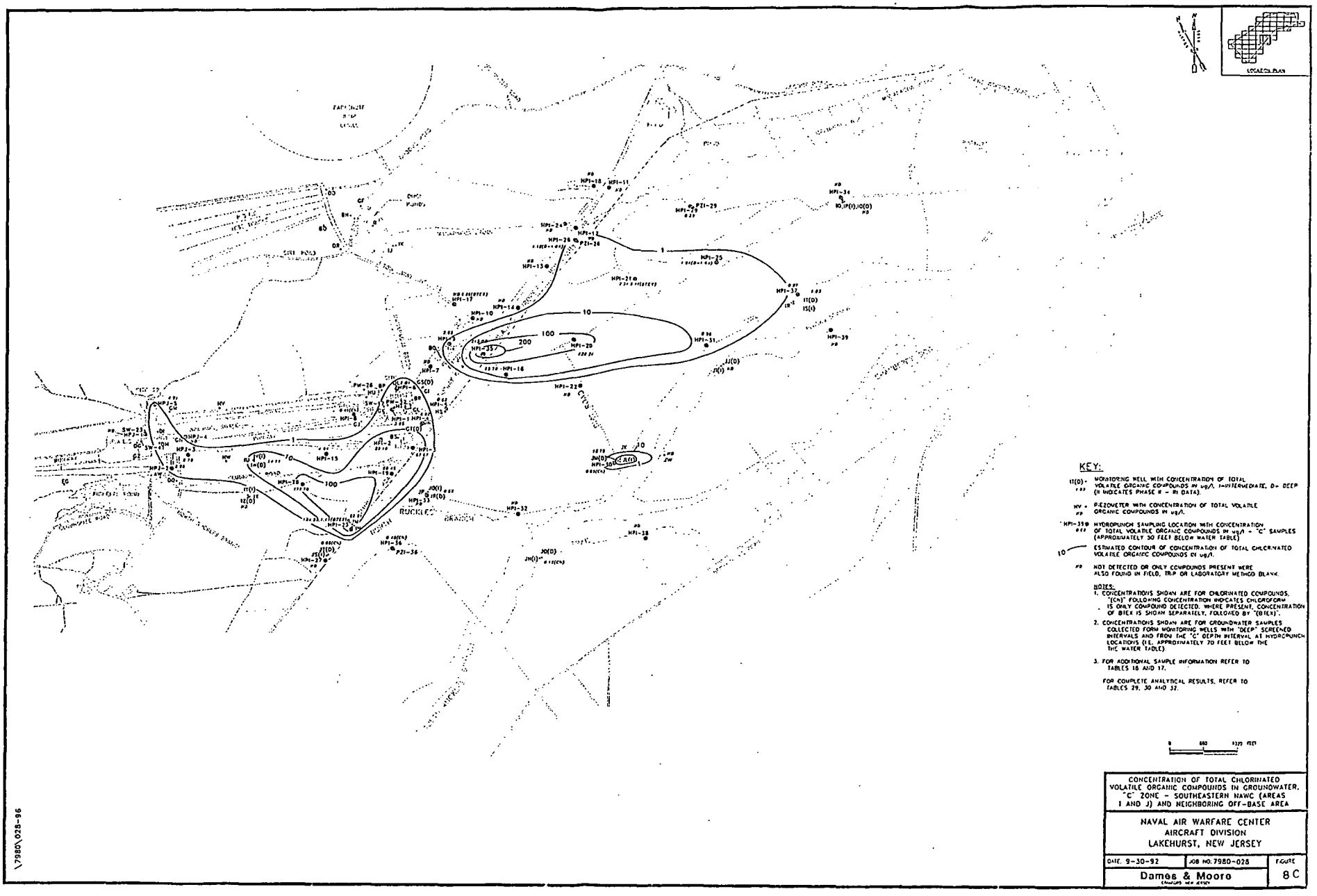
KEY:
I(D) - MONITORING WELL WITH CONCENTRATION OF TOTAL VOLATILE ORGANIC COMPOUNDS IN ug/l. I=INTERMEDIATE, D= DEEP (N INDICATES PHASE II - RI DATA).
HV - PIEZOMETER WITH CONCENTRATION OF TOTAL VOLATILE ORGANIC COMPOUNDS IN ug/l.
HPI-39 - HYDROPUNCH SAMPLING LOCATION WITH CONCENTRATION OF TOTAL VOLATILE ORGANIC COMPOUNDS IN ug/l - "C" SAMPLES (APPROXIMATELY 50 FEET BELOW WATER TABLE)
10 - ESTIMATED CONTOUR OF CONCENTRATION OF TOTAL CHLORINATED VOLATILE ORGANIC COMPOUNDS IN ug/l.
ND - NOT DETECTED OR ONLY COMPOUNDS PRESENT WERE ALSO FOUND IN FIELD, TRIP OR LABORATORY METHOD BLANK.
NOTES:
1. CONCENTRATIONS SHOWN ARE FOR CHLORINATED COMPOUNDS. "(CH)" FOLLOWING CONCENTRATION INDICATES CHLOROFORM IS ONLY COMPOUND DETECTED. WHERE PRESENT, CONCENTRATION OF BTEX IS SHOWN SEPARATELY, FOLLOWED BY "(BTEX)".
2. CONCENTRATIONS SHOWN ARE FOR GROUNDWATER SAMPLES COLLECTED FORM MONITORING WELLS WITH "DEEP" SCREENED INTERVALS AND FROM THE "C" DEPTH INTERVAL AT HYDROPUNCH LOCATIONS (I.E. APPROXIMATELY 70 FEET BELOW THE THE WATER TABLE)
3. FOR ADDITIONAL SAMPLE INFORMATION REFER TO TABLES 16 AND 17.
FOR COMPLETE ANALYTICAL RESULTS, REFER TO TABLES 29, 30 AND 32.
0 650 1300 FEET
LOCATION PLAN
CONCENTRATION OF TOTAL CHLORINATED VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER, "C" ZONE - SOUTHEASTERN NAWC (AREAS I AND J) AND NEIGHBORING OFF-BASE AREA
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FIGURE
8C
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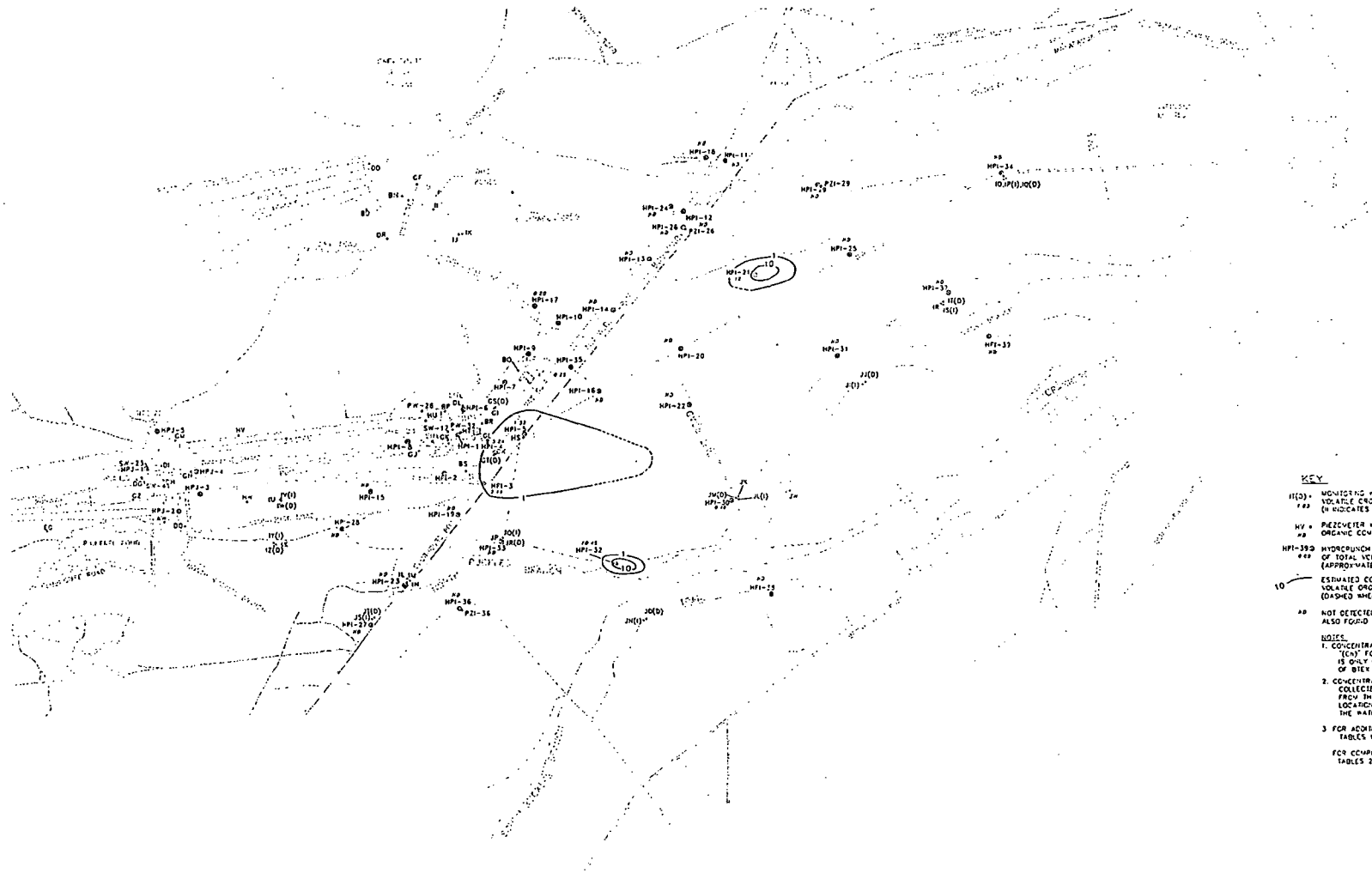

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NAVAL AIR WARFARE CENTER
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DATE 9-30-92	JOB NO 7980-028	FIGURE 8D

Dames & Moore

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ROD FACT SHEET

SITE

Name	:	Naval Air Engineering Station (NAES) Lakehurst (OU-16)
Location/State	:	Lakehurst, Ocean Co., New Jersey
EPA Region	:	II
HRS Score	:	49.48
EPA Site ID #	:	NJ7170023744

ROD

Date Signed:	NAES - Nov. 29, 1994; EPA - Jan. 5, 1995
(Interim) Remedy:	3 year study of effectiveness of natural biodegredation
Op. Unit No.:	OU-16
Capital cost:	$550,000
Const. Completion:	6/95
O & M in 1995:	none
1996:	$250,000
1997:	$250,000
1998:	$250,000
Present worth:	$1,300,000 (assumes 3 years O & M)

LEAD

Enforcement	Federal Facility lead, EPA oversight
Primary contact	Jeffrey Gratz (212) 637-4320
Secondary contact	Bob Wing (212) 637-4332
Federal Facility	Navy - NAES Lakehurst
FF Contact	Lucy Bottomley (908) 323-2612

WASTE

Type	Gasoline, Jet fuel, solvents
Medium	Groundwater
Origin	assorted spills
Est. quantity	Plume size (> 5ppb): >1 mile long, 1/2 mile wide