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September 1991

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Superfund Record of Decision:

Naval Air Engineering Center (Operable Unit 3), NJ

50272-101

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	14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The 7,400-acre Naval Air Engineering Center (NAEC) site is an active air base in Jackson and Manchester Townships, Ocean County, New Jersey. Activities conducted onsite include program research, engineering, development testing and evaluation, and various warfare support services. Land in the area includes residential areas, woodlands, vast wetlands, and associated floodplain areas. The site lies within the Toms River Drainage Basin, and adjacent to and south of the site are commercial cranberry bogs that drain into and out of the southeast section of the site. Approximately 65,400 residents of the townships are serviced by several municipal supply wells located within 1 mile of the site to the southeast and north. From 1916 to 1919, the Eddystone Chemical Company conducted chemical artillery testing onsite. In 1921, the U.S. Navy took control of the site and conducted operations involving the use, handling, storage, and onsite disposal of hazardous substances in various onsite buildings. This Record of Decision addresses Operable Unit 3, which includes eight separate sites and a region known as Area L. The sites include a disposal area (site 15), a gas station (site 18), an inactive disposal area (site 23), a contractor disposal area located along a drainage swale (site 26), recovery systems test sites

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Naval Air Engineering Center (Operable Unit 3), NJ
Fourth Remedial Action
Contaminated Medium: None
Key Contaminants: None

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report)	21. No. of Pages
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(See ANSI-Z39.18) *See Instructions on Reverse* OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

Abstract (Continued)

(site 27), a recovery systems track site (site 30), a parachute jump circle (site 34), and a soil stabilization field test site (site 40). Area L is located in the northwestern corner of the facility in the vicinity of a BOMARC missile explosion area. The explosion resulted in the limited spread of a radioacative material, plutonium. The results of the Remedial Investigation show no evidence of significant contamination at the eight sites and Area L. At most sites, contaminants were not detected. In instances where contaminants were detected the levels were usually well below State and Federal action levels. Furthermore, investigations conducted from 1985 to 1990 in Area L also concluded that no significant levels of radiological contamination were present in ground water, soil, or sediment in this area. Therefore, there are no contaminants of concern affecting this site.

The selected remedial action for this site includes no further action because no significant levels of contaminants exist at the eight sites and Area L. No additional action is necessary to protect human health or the environment. There are no costs associated with this no action remedy.

PERFORMANCE STANDARDS OR GOALS: Not applicable.

RECORD OF DECISION

FOR
SITES 15,18,23,26,27,30,34,40
AND AREA L

NAVAL AIR ENGINEERING CENTER
LAKEHURST, NEW JERSEY
SEPTEMBER 16, 1991

ROD FACT SHEET

SITE

Name:	Naval Air Engineering Center (NAEC), Lakehurst (OU-3)
Location/State:	Lakehurst, Ocean Co., New Jersey
EPA Region:	II
HRS Score:	49.48
NPL Rank:	Group 4

ROD

Date Signed:	NAEC - Sept. 19, 1991; EPA - Sept. 30, 1991
Remedy	No Action
Capital Cost:	N/A
O & M:	N/A
Present Worth:	N/A

LEAD

Enforcement:	Federal Facility lead, EPA oversight
NAEC Primary Contact:	Lucy Bottomley (908)-323-2612
EPA Primary Contact:	Jeffrey Gratz (212)-264-6667

WASTE

No contamination

RECORD OF DECISION
DECLARATION
SITES 15, 18, 23, 26, 27, 30, 34, 40 AND AREA L
NAVAL AIR ENGINEERING CENTER

FACILITY NAME AND LOCATION

Naval Air Engineering Center
Lakehurst, New Jersey 08733

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for eight individual sites (Sites 15, 18, 23, 26, 27, 30, 34 and 40) and one Area (Area L), located at the Naval Air Engineering Center (NAEC) in Lakehurst, New Jersey. The selected remedial action was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision is based on the administrative record for these sites, which is available for public review at the Ocean County Library, 101 Washington Street, Toms River, New Jersey.

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

DESCRIPTION OF THE SELECTED REMEDY

The United States Department of the Navy, the lead agency for this Site, has selected no action as the remedy for Sites 15, 18, 23, 26, 27, 30, 34, 40 and Area L.

DECLARATION STATEMENT

The U.S. Department of the Navy has determined that no additional remedial action is necessary at Sites 15, 18, 23, 26, 27, 30, 34, 40 and Area L to ensure protection of human health and the environment. At Sites 15, 18, 23 and 30, previous remedial responses have eliminated the need to conduct additional remedial action. At the remaining sites and Area L, no contamination was detected that would require remedial action to protect human health and the environment.

This Record of Decision concerns Sites 15, 18, 23, 26, 27, 30, 34, 40 and Area L only. The locations of these eight sites and Area L within the NAEC are shown in Figure 2.

David Raffetto — 19 Sep 91

Captain David Raffetto
Commanding Officer
Naval Air Engineering Center
Lakehurst, New Jersey

(Date)

With the concurrence of:

30 Sept 91

Constantine Sidamon-Eristoff
Regional Administrator
U.S. Environmental Protection Agency, Region II

(Date)

SITE DESCRIPTION

NAEC is located in Jackson and Manchester Townships, Ocean County, New Jersey, approximately 14 miles inland from the Atlantic Ocean (Figure 1). NAEC 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. NAEC and the surrounding area are located within the Pinelands National Reserve, the most extensive undeveloped land tract of the Middle Atlantic Seaboard.

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

NAEC 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 NAEC 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 NAEC. 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 NAEC before joining Toms river. Storm drainage from NAEC 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 NAEC: Bass Lake, Clubhouse Lake, and Pickerel Pond. NAEC 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 NAEC 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, whereas the density of Lakehurst Borough is 3,061 persons per square mile.

The areas surrounding NAEC 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 NAEC are commercial cranberry bogs, the drainage from which crosses the southeast section of NAEC 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 the NAEC, 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 NAEC. 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 the NAEC, which supplies water to very small population (probably less than 1,000) in the immediate vicinity of the NAEC.

SITE HISTORY

The history of the NAEC 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. Testing was accomplished in cooperation and agreement with the Russian Imperial Government until its fall in 1919. At that time, the U.S. Army assumed control of chemical warfare testing by the Eddystone Chemical Company and named the area Camp Kendrick. By the early fall of 1919, construction of Hangar No. 1 for the Navy had commenced. Camp Kendrick was turned over to the Navy and formally commissioned Naval Air Station (NAS), Lakehurst, New Jersey on June 28, 1921. 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 Lakehurst.

Currently, NAEC's mission is to conduct programs of research, engineering, development testing and evaluation, systems integration, limited production, procurement and fleet engineering support in the following areas: aircraft launching, recovery and landing aid systems; ground support equipment for aircraft and for airborne weapons systems to provide, operate and maintain test sites, facilities, and support services for tests of the above systems and equipment; and conduct research and development of equipment and instrumentation used in tests. NAEC supports

Department of Defense (DOD) standardization and specification programs, provides services and material, and operates and maintains aviation and other facilities in support of assigned programs.

NAEC and its tenant activities now occupy more than 300 buildings. built between 1919 and 1979, totaling over 2,845,000 square feet. The command also operates and maintains: two 5,000-foot long runways, a 12,000-foot long catapult and arrest runway, one 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.

The various operations and activities at NAEC 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 in some areas.

INITIAL INVESTIGATIONS

As part of the DOD Installation Restoration Program, the Navy developed the Navy Assessment and Control of Installation Pollutants (NACIP) program to "identify, assess and control environmental contamination from past methods of storage, handling, and disposal of hazardous substances at naval shore facilities".

As part of the NACIP program, an Initial Assessment Study (IAS) was completed in 1983 by the Naval Energy and Environmental Support Activity (NEESA) at NAEC. The purpose of the IAS was 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 IAS identified a total of 44 potentially contaminated sites, which were evaluated with regard to contamination characteristics, migration pathways, and pollutant receptors. The IAS concluded that "while none of the sites pose an immediate threat to human health or the environment, 16 warrant further investigation under the NACIP program, to assess potential impacts". 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. This Record of Decision concerns only Sites 15, 18, 23, 26, 27, 30, 34, 40 and Area L.

NAEC was designated in 1987 as a National Priorities List (NPL) site under CERCLA.

ENVIRONMENTAL INVESTIGATION/FEASIBILITY STUDY

NAEC's Remedial Investigation (RI) was conducted in two phases. Implementation of the verification phase (Phase I of the RI) was initiated in October 1984. 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) determine where contamination is present, characterize the extent of contamination, assess the potential for contaminant migration and define the sources of contamination; and (c) support a feasibility study and/or final actions at the Sites. Some additional investigations were conducted in July and August 1991 as an addendum to the Phase II program (i.e., RI Phase II-Addendum). Summaries of the resulting analytical data for Sites 15, 18, 23, 26, 27, 30, 34, 40 and Area L are provided in Tables 1 through 10.

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

SITE 15 - DISPOSAL AREA NEAR THE BUILDING 562 PARKING LOT

Site History

In 1981, a former NAEC employee stated that over a 20-year period, starting in the early 1950s, machine cuttings from Hangars 2 and 3 were disposed of at this site (Figure 3), which is adjacent to the south side of the Building 562 parking lot. It was also reported that this area was an alternate site for the disposal conducted at Site 9 - Hangar 2 Disposal Area. However, these reports were never confirmed.

Currently, no activities which involve the use, storage or disposal of hazardous substances occur at, or are being planned for, this site. The site is currently partially covered with grassy vegetation and several trees and there is no evidence of stained soils or other debris.

Summary of Remedial Investigations and Removal Actions

Pre-1985: One monitoring well (AH) was installed at the site under the direction of the NAEC. This well had been monitored on a regular basis by NAEC for the presence of floating product. None has been detected.

As part of the cleanup operations in early 1981, several small piles of brown rusty material (believed to be machine cuttings) which were present at the site were removed in one 55-gallon drum. No cuttings or stained soil remain at the site.

November 1985 - January 1986:	Remedial Investigation - Phase I. One groundwater sample was collected from monitoring well AH and analyzed for volatile organic compounds, total petroleum hydrocarbons, total organic halogens, lead and pH. No contamination was detected. Site observations did not reveal any visual evidence of surficial soil contamination. Furthermore, no stained or discolored soil was observed in three shallow test pits. Organic vapor analyzer (OVA) readings in two test pits excavated 15 feet northwest and 15 feet southeast of well AH were 1.6 ppm and 1.0 ppm, respectively. In the third test pit, excavated approximately 30 feet southwest of well AH, OVA readings did not exceed background levels.
May - June 1988:	A soil gas screening survey at the site detected no petroleum or chlorinated hydrocarbons in the soil gas.
August - December 1988:	Remedial Investigation - Phase II. Two rounds of groundwater samples were collected from monitoring well AH and analyzed for organic and inorganic parameters, total petroleum hydrocarbons and total organic carbon. The only contaminant detected in the groundwater at levels exceeding ARARs was chromium. Chromium was detected at an estimated concentration of 73.4 μg/l in the second round sample. The ARAR for chromium in groundwater is 50 μg/l. Three test pits were excavated at Site 15 and one soil sample was collected from a depth of 2.5 feet from one of the test pits. No metal or organic contaminants were detected in the analysis of this sample. In addition, no staining was observed in any of the test pits and no OVA readings above background levels were recorded.
July 1990:	Remedial Investigation - Phase II Addendum. To confirm the presence or absence of dissolved chromium in the groundwater at Site 15, filtered and unfiltered groundwater samples were collected from monitoring well AH. The samples were only analyzed for chromium, which was detected at levels exceeding ARARs during the August-December 1988 Phase II Remedial Investigation. Chromium was detected in the unfiltered sample at a concentration below the ARAR, but was not detected in the filtered

sample. Chromium was also detected at a level below ARAR in the laboratory method blank. Chromium is a naturally-occurring metal and its presence in unfiltered samples is attributable primarily to the presence of sediment in the samples. It was, therefore, concluded that no groundwater contamination exists at this site.

SITE 18 - NAVAL EXCHANGE GAS STATION

Site History

In 1981, interviews with Navy Exchange Service Station personnel indicated that the service station (Figure 4) had been discarding waste oils and possibly battery acids and solvents into a deck drain beginning in 1958. Available information indicated that the deck drain was connected to a dry well which was located to the east of the service station. Prior to 1985, the use of the deck drain for waste disposal was discontinued. The dry well at the site was removed in October 1988. The service station's underground storage tanks were removed in 1990. At the time of the removal, the tanks appeared to be in good condition. No evidence of tank leakage was observed and no staining or odors were noted in soil adjacent to the tanks.

This site is located approximately 400 feet southwest, and upgradient from, NAEC's main potable water supply well (PW-9). Currently, no activities involving the use, storage or disposal of hazardous substances occur at, or are being planned for this site.

Summary of Remedial Investigations and Removal Actions

Pre-1985: One monitoring well (AZ) was installed downgradient from the site under the direction of the NAEC. Testing of the water from potable water wells PW-5 and PW-9 was initiated by NAEC.

November 1985 - January 1986: Remedial Investigation - Phase I. Groundwater samples were collected from the two potable water wells located downgradient from the site (PW-5 and PW-9) and analyzed for volatile and base/neutral organic compounds, pesticides, herbicides, metals, chloride, fluoride, nitrate, sodium, sulphate, pH, radioactivity, total dissolved solids, surfactants and turbidity. No contamination was detected. Two soil samples were collected at depths of 5 feet and 10 feet from a boring drilled immediately adjacent to the dry well. Analysis of these samples for volatile organic compounds, pH and total petroleum hydrocarbons revealed no contamination.

May - June 1988: A soil gas screening survey conducted at the site revealed low levels of chlorinated hydrocarbons in the soil gas. Additional investigations were recommended.

August - December 1988: Remedial Investigation - Phase II. Two rounds of groundwater samples were collected from monitoring wells EK and AZ, located downgradient from the site. Groundwater samples from well EK were analyzed for the group of compounds on EPA's Target Compound and Target Analyte Lists (which includes volatile organic compounds, semi-volatile organic compounds, metals, pesticides and PCBs), as well as total petroleum hydrocarbons. The sample from well AZ was analyzed for volatile and semi-volatile organic compounds, pesticides, PCBs, petroleum hydrocarbons and radiological parameters. No contamination was detected.

Analysis of a sludge sample collected from within the dry well prior to its removal in October 1988 revealed low levels of volatile organic compounds, high levels of semi-volatile organic compounds and petroleum hydrocarbons, and moderate to high levels of eight metals. Following the excavation and removal of the dry well in October 1988, one soil sample was collected from immediately beneath the base of the dry well, at a depth of approximately 8.5 feet.

No staining was observed in the soil of the excavation. The only contaminants detected in the analysis of the post-removal sample were PHCs at 226 $\mu g/g$. Since targeted

semi-volatile compounds were not detected in this sample, it appears that the petroleum hydrocarbons were primarily non-targeted tentatively identified compounds.

The analytical data and the lack of stains on the floor and walls of the excavation suggest that releases of contaminants from the dry well were not significant and that contaminated sludge within the dry well apparently did not significantly impact soil or groundwater quality at or downgradient from the site.

SITE 23 - INACTIVE DISPOSAL AREA AT BUILDING 524

Site History

In 1983, interviews with base personnel and reviews of NAEC records indicated that during cleanup operations in early 1981, four separate areas that contained black and orange-brown stained soil were found at the southeast and northeast corners of Building 524 (Figure 5). The stained areas varied in size from 4 x 5 feet to 10 x 5 feet. Also found at the site were nine 55-gallon drums, and cardboard containers which were reported to be leaking solid resin "beads". These beads are non-hazardous and used for the removal of aluminum and iron from water at the steam plant. A former potable water well (PW-26) is located inside Building 524 and is reported to be 74 feet deep. Its screened interval is not known. The well is no longer in general use, but is used infrequently as a back-up source when needed.

Currently, no activities which involve the use, storage or disposal of hazardous substances occur at, or are being planned for, this site.

Summary of Remedial Investigations and Removal Actions

Pre-1985: Under the direction of NAEC, one monitoring well (BP) was installed approximately 325 feet east of Site 23. This well

had been monitored on a regular basis by NAEC for the presence of free-floating product. None has been detected.

As part of the cleanup operations, unknown quantities of surficial stained soil and nine 55-gallon drums containing solid resin beads were removed from the site under the direction of NAEC.

November 1985 - January 1986:

Remedial Investigation - Phase I. One groundwater sample was collected from the former potable well PW-26. The sample was analyzed for the New Jersey Standard Drinking Water Parameters, including volatile and base/neutral organic compounds, metals, pesticides, herbicides and various other parameters. No contaminants were detected. One groundwater sample was also collected from well BP. The sample was analyzed for priority pollutant volatile organic compounds, lead, total petroleum hydrocarbons (PHC), and total organic halogens (TOX). No significant contamination was detected.

An area of dark gray stained soil, approximately 5 feet in diameter, was observed north of Building 524. The stain was surficial (2-3 inches deep) and appeared to have been the result of an old minor spill. Measurements with an Organic Vapor Analyzer (OVA) in a shallow (1 ft.) test pit excavated within the stained soil and four additional shallow test pits excavated around Building 524 did not indicate the presence of any contamination associated with activities at the site.

August - December 1988:

Remedial Investigation - Phase II. Two rounds of groundwater samples were collected from the former potable water well PW-26 and monitoring well BP. The samples from well PW-26 were analyzed for PHC and the parameters included on the EPA's Target Compound List (organics) and Target Analyte List (inorganics). No contaminants were detected in these samples. The samples from well BP were analyzed for total petroleum hydrocarbons, ethylene glycol and the volatile and semi-volatile parameters included on the Target Analyte List. The only contaminant detected in these samples was toluene, which was present in the second round sample at a concentration below ARARs (16 μg/l). This result was qualified, due to the fact that toluene was also

detected in a laboratory blank. Toluene was not detected in the first round sample from this well.

No contamination was detected in the analysis of a soil sample collected at the site. In addition, no visible evidence of contamination was observed on the ground surface or in the test pit from which the sample was collected and no OVA levels were registered above background levels.

SITE 26 - CONTRACTOR DISPOSAL AREA NORTH OF BUILDING 337

Site History

Site 26 reportedly consisted of a 30 ft. by 50 ft. area north of Building 337, along a drainage swale leading to the Ridgeway Branch (Figure 6). This area was an apparent disposal site utilized by contractors for disposal of oil, roofing materials and assorted building debris. The debris was removed from the site in 1981. Site 26 is near, and possibly at the edge of, Site 42 (the former Base Landfill).

Currently, no activities involving the use, storage, or disposal of hazardous substances occur at, or are being planned for, this site.

Summary of Remedial Investigations and Removal Actions

1981	The debris was removed from the site.
November 1985 - January 1986	Remedial Investigation - Phase I. No data were collected at this site.
August - December 1988:	Remedial Investigation - Phase II. Two rounds of groundwater samples were collected from a shallow and deep well pair (EH and ET) located downgradient from the site and analyzed for EPA's organic and inorganic parameters, total petroleum hydrocarbons, and sanitary landfill conventional parameters. Elevated levels of lead (65 μg/l) were detected

in the first round sample collected from deep well ET. Lead was not detected in the second sampling round. The ARAR for lead is 50 μg/l.

Two rounds of surficial soil samples were collected from the reported disposal area north of Building 337. The pesticide 4,4-'DDT was detected in the first round sample at a concentration of 885 μg/kg and in the second round sample at a concentration of 4,700 μg/kg. The State action level for DDT in soil ranges from 1 to 10 mg/kg. The pesticide 4,4'-DDE was detected in the first round sample at a concentration of 635 μg/kg, but was not detected in the second round sample. The State action level for this pesticide in soil is determined by the State on a case-by-case basis. These pesticide concentrations are below EPA cleanup levels at CERCLA sites. PHC was detected in the second round sample at a concentration of 266 mg/kg, but was not detected in the sample collected during the first round. State action levels for PHC range from 100 mg/kg to 1,000 mg/kg, depending on the concentration of carcinogenic polycyclic aromatic hydrocarbons (PAHs). Levels of PAHs in these same samples were below State action levels. The presence of PHCs was probably attributable to non-targeted tentatively identified compounds (TICs).

January 1990: To evaluate the treatability of pesticides detected in soil samples during the Phase II Investigation, composite soil samples were collected for solidification/stabilization, soil washing and biological treatability studies. To confirm the presence of contaminants detected previously at this site, split portions of these composite soil samples were analyzed for volatile and base/neutral organic compounds, pesticides, total petroleum hydrocarbons, total organic carbon, nitrate and phosphate. However no contamination was detected and, therefore, treatability studies were not performed.

SITE 27 - RECOVERY SYSTEMS TEST SITES (RSTS) SCRAP DUMP

Site History

This site is located approximately 100 yards south of the arresting end of RSTS Track No. 5 (Figure 7). The size of the site, which was used as a disposal area between 1958 and 1980, is about 400 by 700 feet.

It has been reported that the material discarded here was scrap steel cable from arresting gear at various locations throughout NAEC. This cable is made with a grease-saturated manila core for lubrication of the cable strands.

The site was graded and seeded sometime prior to the initiation of the Phase I Investigation in 1985. Currently, the site is overgrown with vegetation and surrounded by trees. There is no visible evidence of past disposal activities. No activities which involve the use, storage or disposal of hazardous substances occur at, or are being planned for, this site.

Currently, no activities involving the use, storage or disposal of hazardous substances occur at, or are being planned for, this site.

Summary of Investigations/Remedial Actions

Pre-1985: In 1980, following a report of suspected contamination, an EPA contractor performed a survey at this site using an organic vapor analyzer (OVA). Approximately 25 analyses were obtained from 3.5 to 4-foot soil borings and only methane was detected at low concentrations. Prior to the initiation of the Phase I Remedial Investigation, the area was graded and seeded under the direction of NAEC. One monitoring well (AV) was installed at the southern boundary of the site. The well had been monitored on a regular basis

by NAEC for the presence of free-floating product. None has been detected.

November 1985 - January 1986: Remedial Investigation - Phase I. A visual inspection of the site revealed no evidence of surficial soil contamination. One additional monitoring well (DS) was installed at the northern boundary of the site. One groundwater sample was collected from this well and analyzed for total petroleum hydrocarbons and the priority pollutant organic and inorganic parameters. No contamination was detected. One additional groundwater sample was collected from well AV and analyzed for priority pollutant volatile organic compounds, total petroleum hydrocarbons, lead and total organic halogens. No contamination was detected.

May - June 1988: A soil gas screening survey conducted at the site confirmed the lack of contamination by volatile organic compounds.

August - December 1988: Remedial Investigation - Phase II. Two rounds of groundwater samples (total four samples) were collected from wells AV and DS. The samples were analyzed for total petroleum hydrocarbons, lead and the volatile and semi-volatile organic compounds included on the EPA's Target Analyte List. The two samples collected from well AV were also analyzed for total organic carbon. No contamination was detected. Although the wells were located along the northern and southern boundaries of the site and not directly downgradient, the absence of any evidence of soil or groundwater contamination indicates that the site is not a source of contamination. It should be noted that there are no reports indicating the direct disposal of liquid wastes on the ground at this site.

SITE 30 - RECOVERY SYSTEMS TRACK SITES, TRACK NO. 4 RECOVERY END

Site History

This site, located at the recovery end of Track No. 4, measures about 75 feet wide by 800 feet long (Figure 8). The site was used for creating aircraft crashes under controlled conditions for the purpose of evaluating fire-preventative jet fuel additives. The tests were conducted by launching fueled test aircraft down the track, allowing them to become momentarily airborne, and then crash on a mound of soil specially prepared for this purpose. The mound of soil was located on a paved area about 200 feet wide. The soil has since been removed. The only evidence of the site is a stained area on the pavement indicating the former location of the mound. A total of four aircraft were tested at this site, each with approximately 1,000 gallons of fuel on board. During the crash tests, JP-4, JP-5 and Jet A Gel antimisting fuel were reported to have been deposited on the ground. Aqueous Film Forming Foam (AFFF) was also used at this site to fight the ensuing fires.

Currently, no activities involving the use, storage, or disposal of hazardous substances occur at, or are being planned for, this site.

Summary of Remedial Investigations and Removal Actions

Pre-1985: One monitoring well (BT) was installed under the direction of NAEC at a distance of approximately 250 feet down-gradient from the former location of the earth mound. The well was monitored by NAEC for the presence of floating product. None was detected.

All of the soil which formed the mound at the end of the track was removed and disposed of at an off-site permitted hazardous waste disposal facility (Boyertown Sanitary Disposal, Gilbertville, Pennsylvania).

November 1985 - January 1986:

Remedial Investigation - Phase I. No evidence of stained soil was observed at the site. Analysis of one groundwater sample from the downgradient monitoring well BT for volatile organic compounds, lead, petroleum hydrocarbons, pH, conductivity, and total organic halides did not reveal any contamination. Additional investigations were recommended.

August - December 1988:

Remedial Investigation - Phase II. Two rounds of duplicate groundwater samples were collected from monitoring wells BT and analyzed for volatile, base/neutral and acid extractable compounds, petroleum hydrocarbons, lead, ethylene glycol, surfactants and total organic carbon.

Slightly elevated levels of lead (70.8 μg/l) were detected in one of the two (duplicate) second round groundwater samples collected from well BT, located downgradient from the site. The duplicate sample contained lead at a concentration of 42.2 μg/l. The ARAR for lead is 50 μg/l. Lead was not detected in the first round duplicate samples from this well.

Two rounds of surficial sediment samples were collected from a drainage swale located north of the site and analyzed for EPA's organic and inorganic parameters, total petroleum hydrocarbons and total organic carbon. Chromium was detected in the second round sediment sample collected from the drainage swale north of the site at an estimated concentration of 110 mg/kg, slightly above the State action level of 100 mg/kg. The concentration of chromium in the first round sample from this location was 7 mg/kg, well below the action level.

July 1990:

Remedial Investigation - Phase II Addendum. To confirm the presence or absence of dissolved lead previously detected in the groundwater at Site 30, filtered and unfiltered groundwater samples were collected from monitoring well BT. Lead was detected below the Federal Maximum Contaminant Level of 50 μg/l in the unfiltered sample and was not detected in the filtered sample, suggesting that the former presence of elevated levels of lead was probably due to the presence of sediment in the sample.

SITE 34 - PARACHUTE JUMP CIRCLE

Site History

The parachute jump circle is a large 4,000-foot diameter (approximately 290-acre) open circular field in the north central portion of NAEC (Figure 9), used for the practice of parachute landing. NAEC employees reported that the entire parachute jump circle was used to discharge used fuel (i.e., fuel which had been drained from aircraft). It was also stated that there was no favorite spot for disposal. Sometimes the fuel truck driver would open the valve and drive around the parachute circle to spread the fuel and sometimes he would park the truck and discharge at one spot. The method of disposal depended upon the way the driver decided to discharge the material.

According to personnel interviews and fuel handling records, used fuel was discharged at the parachute circle from 1950 to 1970 at the rate of about 100,000 gallons per year. Therefore, up to two million gallons of used fuel may have been discharged at the parachute circle area. Although no information was provided, it is possible that fuel disposal may also have occurred at the jump circle prior to 1950. In 1987, an airplane crash in the northeastern section of the jump circle resulted in the release of 5 to 10 gallons of AVGAS and motor oil.

Currently, no activities involving the use, storage, or disposal of hazardous substances occur at, or are being planned for, this site.

Summary of Remedial Investigations and Removal Actions

November 1985 - January 1986:	Remedial Investigation - Phase I. Groundwater samples were collected from four monitoring wells installed at the site (DW, DX, DZ and DY). The samples from wells DX, DZ and DY were analyzed for volatile organic compounds, lead, conductivity, total organic halogens, total petroleum hydrocarbons and pH. The groundwater sample from monitoring well DW was analyzed for volatile and base/-neutral organic compounds, metals, conductivity, cyanide, total petroleum hydrocarbons and pH. No contamination was detected in the analysis of the groundwater samples. Two soil samples collected at the site (each a composite from two different locations) and analyzed for volatile organic compounds, lead, total petroleum hydrocarbons and pH revealed no contamination.
May - June 1988:	Soil gas and groundwater screening surveys conducted at the site identified low levels of petroleum hydrocarbons in two groundwater samples. Additional investigations were recommended.
August - December 1988:	Remedial Investigation - Phase II. Two rounds of groundwater samples were collected from nine monitoring wells located at the site (including well D originally installed as a downgradient well for Site 20). Most of the samples were analyzed for EPA's organic and inorganic parameters and total petroleum hydrocarbons. No contaminants were detected at levels exceeding ARARs in any of the samples collected from the nine monitoring wells. Two wells (GC and FZ) were installed at two locations where the 1988 groundwater screening surveys had indicated elevated levels of benzene. However, the analyses of two groundwater samples from these wells did not confirm the presence of benzene or other VOCs.

During Phase II, four soil samples were collected at Site 34 at depths ranging from 7 to 18 feet below ground surface. All samples were collected above the water table. The samples were analyzed for EPA's organic and inorganic parameters, total petroleum hydrocarbons and total organic carbons.

The only contaminants detected in these samples at levels exceeding State action levels were PHCs, which were detected in two of the four samples at concentrations of 1,063 mg/kg and 2,264 mkg/kg. The interim State action level for PHC in soils at NAEC is 1,000 mg/kg, unless the levels of carcinogenic base/neutral extractable compounds exceed 10 mg/kg, in which case the PHC ARAR may be reduced to 100 mg/kg. Elevated levels of TICs were also detected in these samples. Targeted VOCs and SVOCs were not detected.

SITE 40 - SOIL STABILIZATION FIELD TEST SITE

Site History

In October 1969, a soil stabilization field test was conducted at NAEC as part of a study to correct the hazards associated with the raising of dust and foreign materials at Short Airfield in Tactical Support (SATS) runways. The study was also designated to find a method of increasing the load-bearing capacity of the soil. Site 40, the field testing area, is at a low elevation and almost level with the adjacent marshy area and nearby Pickerel Pond (Figure 10).

For the stabilization study, a 4,000 square foot area was divided into four strips of 100 feet by 10 feet each and cleared, graded, compacted, and scarified to a depth of 4 inches. Then chemicals were applied as follows: Aniline and ferric chloride solutions (used as a catalyst) were loaded into a pressure distributor truck and applied together, followed immediately by furfural. Then the soil and chemicals were mixed and compacted. The mixer broke down before the mixing operation in the third and

fourth strips and, as a result, the mixing in those two strips was done with the scarifier, which provided a rather poor mix. The average compacted thicknesses were 4 inches in the first strip, 4-1/2 inches in the second strip, and one inch in the third and fourth strips. The exact location of the test strips is not known, although the general area of the tests based on examination of historical aerial photography, is shown in Figure 11.

According to the study's report, the surplus aniline (approximately 69 gallons) remaining in the distributor was burned or buried. Also, the equipment was flushed out and cleaned with fuel oil, to be burned or buried, or with soapy lukewarm water, to be buried or discharged into sewer lines. Rag waste was buried or burned. The quantities of fuel oil, soapy water, and rags disposed of or the location of the burning or burying is unknown. The disposal procedure for the furfural (66 gallons surplus) and the ferric chloride solution (69 gallons surplus) is also unknown.

In November 1969, after two days of rain, there was no sign of erosion on the stabilized soil surface. A compressive strength test was run and the results were about 1/4 to 1/5 of laboratory results. The study, therefore, concluded that more efficient machinery was required in the field.

Aniline and furfural are on EPA's hazardous substances list due to their ignitability characteristics. Also, aniline is considered to be very toxic and furfural moderately toxic by ingestion, inhalation and skin absorption.

The product of the chemical reaction of aniline and furfural is N-2-(Furanylmethyl) benzene amine. Since furfural is very reactive and excess aniline and ferric chloride solutions were used, it is expected that all of the furfural was reacted. No available data was found to indicate that the compound produced is hazardous or toxic.

In September-October 1981, the area was found to still be devoid of vegetation and the soil surface was observed to be crusty. During the Phase I Investigation in November 1985-January 1986, the site was still devoid of vegetation, but there was no evidence of stained or crusty soil. Furthermore, it could not be confirmed whether or not the lack of vegetation was due to natural erosion or past activities at the site.

Currently, no activities involving the use, storage or disposal of hazardous substances occur at, or are being planned for, this site.

Summary of Remedial Investigations and Removal Actions

November 1985 - January 1986:	Remedial Investigation - Phase I. A groundwater sample was collected from monitoring well EG installed at the site and analyzed for base/neutral compounds, iron, pH, conductivity and chloride. Iron was detected at a concentration exceeding the ARAR. No other contaminants were detected. Three soil samples were collected at the site and analyzed for base/neutral compounds, iron, pH, aniline, furfural and chloride. The analysis revealed the presence of one semi-volatile organic compound, 1,2,4-trichlorobenzene at concentrations ranging from 86.4 μg/kg to 218 μg/kg. Additional investigations were recommended.
August - December 1988:	Remedial Investigation - Phase II. Two rounds of groundwater samples were collected from well EG and analyzed for EPA's organic and inorganic parameters, aniline and furfural. The only parameter detected above ARARs was iron, at a concentration of 449,000 μg/l, in the second round unfiltered sample. The ARAR for iron is 300 μg/l. In the first round sample, the concentration was 66,200 μg/l, but was qualified as unreliable. Aniline and furfural, the two parameters of concern, were not detected in these samples. While the iron level appears to be abnormally high, comparable concentrations were detected in other wells throughout the NAEC

(e.g., well GP, Area G, 392,400 μg/l; well BN, Area H, 318,000 μg/l; well AT, Area K, 684,000 μg/l). Although these wells are not all directly upgradient from Site 40, they are all far enough away from the site so as to be out of the range of potential impacts from activities at the site. The average concentration of iron in 282 groundwater samples collected throughout NAEC was 27,538 μg/l. A comparison of filtered and unfiltered samples collected at the same time from randomly selected wells throughout NAEC shows that the average iron concentration in unfiltered samples was 120,118 μg/l. In the filtered samples, the average concentration was drastically reduced to 3,204 μg/l. This suggests that the apparently abnormally high levels of iron in some wells are the result of the high sediment load in the samples. This hypothesis is supported by the fact that, in many cases, the levels of metals in the samples varied significantly between the two sampling rounds. For example, in well AT (Area K), the concentration of iron was 684,000 μg/l in the first round sample, but only 2,730 μg/l in the second round sample.

Five soil samples were collected from shallow (1 to 2-foot) test pits excavated at the site. Two background samples were collected: one from a marshy area about 400 feet south of the site, and one from a higher elevation area between the tarmac and Pickerel Pond, about 400 feet east of the site. These samples were analyzed for aniline, furfural, iron and base/neutral extractable compounds. Iron was detected at concentrations ranging from 1,700 mg/kg to 2,200 mg/kg in the five on-site samples. The iron concentrations in the two background samples were 2,100 mg/kg and 4,000 mg/kg. Therefore, the origin of iron in the on-site samples appear to be natural and cannot be attributed to site activities. It should be noted that the average concentration of iron in 100 samples collected at the NAEC during Phase II was 2,335 mg/kg. 1,2,4-Trichlorobenzene, detected in soil samples during Phase I, was not detected in Phase II. No aniline or furfural were detected.

Two sediment samples were collected from Pickerel Pond, downgradient from the site, and analyzed for EPA's organic and inorganic parameters, total petroleum hydrocarbons, aniline, furfural and total organic carbon. Chromium and nickel were detected at concentrations exceeding State action levels (420 and 180 mg/kg, respectively) in the second round

sample only. The State action level for both chromium and nickel is 100 mg/kg. Neither chromium nor lead were detected in soil, groundwater or surface water samples collected at the Site, and, hence, the levels encountered in one of the two sediment samples collected at the Site do not pose a significant risk to human health or the environment. These levels may be attributable to naturally occurring minerals in the sediment. Some TICs were detected in both samples. No aniline or furfural was detected.

Two surface water samples were collected from Pickerel Pond, downgradient from the site and analyzed for EPA's organic and inorganic parameters, aniline, furfural and total organic carbon. Low levels of trichloroethene (4 μg/l) were detected in the first round sample only. No aniline or furfural were detected. The source of trichloroethene has not been identified. Because of the detailed information available about activities at Site 40 (described in the Site History Section), Site 40 is not the source of trace trichloroethene contamination. It is possible that its presence is due to laboratory cross-contamination. Trichloroethene was detected at a concentration of 140 μg/l in a groundwater sample collected at Site 3, about 1,800 feet from the Pickerel Pond surface water sampling point. However, considering that: (a) the groundwater flow direction in the vicinity of Site 3 is to the southeast; and (b) the fact that VOCs were not detected in well GZ, located between Site 3 and Pickerel Pond, it is unlikely that Site 3 is the source of trichloroethene in Pickerel Pond.

July 1990: Remedial Investigation - Phase II Addendum: To confirm the presence or absence of dissolved iron in the groundwater at Site 40, filtered and unfiltered groundwater samples were collected from monitoring well EG. The samples were only analyzed for iron which was detected at levels exceeding ARARs during the Phase I and Phase II Remedial Investigations. During the Phase II Addendum, iron concentrations exceeded ARARs in both unfiltered duplicate samples (144,000 and 85,200 μg/l). Iron concentrations were significantly lower in the filtered samples, although still above ARARs at concentrations of 4,000 and 4,650 μg/l respectively.

AREA L - NORTHWESTERN CORNER OF NAEC

Area History

Area L includes the extreme northwestern corner of the NAEC. This area was of potential concern due to its proximity to the location of the explosion of a BOMARC missile. Background information on this explosion and subsequent investigations and remedial actions is presented below.

On June 7, 1960, an explosion and fire occurred at the BOMARC missile site located in Fort Dix Military Reservation, bordering the western boundary of NAEC. The missile was located in a launcher shelter approximately 1,800 feet northwest of the extreme northwest corner of NAEC (Figure 11).

The following background information is a summary of information included in a report prepared in 1977 by the U.S. Army Toxic and Hazardous Materials Agency:

> *The force of the explosion destroyed portions of the shelter roof. Flames rose to 20 feet and black smoke blanketed the area. At the time of the fire a gentle northeast wind, 5 to 8 knots, was blowing the smoke into surrounding areas. The nuclear warhead was burned, the missile was destroyed, and the launcher shelter was badly damaged. The Inhibited Red Fuming Nitric Acid (IRFNA) tank (oxidizer tank), although displaced, remained intact and contained acid. The residue of the burning warhead contaminated the concrete floor. In addition to the severely damaged roof, the floor was pitted, steel roof beams were deformed, and the concrete walls were pitted by flying objects. The shelter walls suffered some heat damage. The tritium bottle remained in good condition. The remains of*

the warhead and all residue from the floor were placed in plastic bags and then into sealed cans for ultimate disposal.

The fire burned from 1515 hours until 1545 hours before any effort was made to extinguish the flames. The area was flooded with water until 0645 hours on 8 June 1960. During the flooding of the BOMARC shelter, water flowed continuously under the front door, down the macadam street and into the drainage ditch outside the fenced-in BOMARC site. Radioactive material, Plutonium 239 and 241, traveled approximately 500 feet along the drainage ditch. A dam was constructed along the drainage ditch in an attempt to contain excess water and prevent spreading of radioactive material. It was reported that the water did not leave the military reservation nor did it endanger the water supply.

In the immediate vicinity of the shelter, alpha radiation was confined to the floor of the shelter under the warhead and in the water draining from the shelter into the drainage ditch. In addition to the shelter, decontamination was also required of the macadam ramp and the drainage ditch.

Decontamination of the entire area was started on 8 June 1960. At 0900 hours, air samplers were set up downwind from the accident site. A verbal report from the 2702D Explosive Ordnance Disposal Squadron indicated that the highest reading found on the filter paper was 1.59 counts per minute (CPM). At one point near the warhead, a reading of over 2,000,000 CPM was found. Contamination outside the shelter was a result of the flooding. At 1000 hours an alpha survey was made of the ramp outside of the shelter; the highest reading was 160,000 CPM. Officers from the Public Health Service surveyed 66 miles of off-post area and found no traces of contamination.

On 10 June 1960, the entire area was checked and monitoring equipment installed. Air samples were again taken. During the fire, tar had melted and spread in a thin layer on sections of the floor. Several sections of the floor containing tar showed readings of over 2,000,000 CPM. The count in the center of the road outside the shelter was also 2,000,000 CPM. The entire area was again washed down and allowed to dry. The count in the center of the road was still over allowable limits. In converting counts per minute to micrograms per square meter, the amount of plutonium (alpha) contamination was 5,000 micrograms per square meter. It has been established that any area contaminated by plutonium in excess of 1,000 micrograms per square meter is considered dangerous. Allowable surface levels for residential and urban areas would be 50 $\mu g/m^2$.

After the area was completely dry, the inside of the shelter was given a very thick layer of paint. Spray guns were used to ensure total coverage. The outside area was also painted, and brooms were used to spread the paint on the macadam. A total of 110 gallons of paint was used. After the paint had dried enough to walk on, readings were again taken. Areas that had previously shown 2,000,000 counts per minute, now read zero. Some of the fringe areas showed readings of 50 to 500 counts which presented no hazard.

Alpha radiation can be readily shielded by a one-inch thick air space, by painting or coating a contaminated surface, or simply by shielding with a piece of paper. Alpha radiation will not penetrate the skin of an individual, but can cause serious lung damage if inhaled. Painting or coating a surface is only a temporary solution to the problem. Proper decontamination would require removal of soil for burial.

Since 1960, many radiation surveys have been conducted around the BOMARC site. The USAF Radiological Health Laboratory, McGuire Air Force Base, New Jersey, has conducted surveys since 1960 and, in 1973, was directed by the Department of the Air Force to initiate an annual survey program. Surveys have also been conducted by the Army Environmental Hygiene Agency, and by the U.S. Army Radiation Team, Ballistics Research Laboratory, both at Aberdeen Proving Ground, Maryland, and by EG&G, Inc., Las Vegas, Nevada, an independent contractor who conducted the study for the Atomic Energy Commission.

All reports indicate that a problem does exist in and around the BOMARC site. Both the Army and Air Force Surgeon Generals agree that the area should be restricted and monitored and that, in its present condition, does in fact present a health hazard.

A memorandum issued by the U.S. Air Force in 1981 concluded that, on the basis of studies conducted at the BOMARC site:

1. Undisturbed, the present condition and use of the site does not present a radiological health hazard to persons on or off the site.

2. Levels of plutonium off the site, particularly the elevated levels in the drainage ditch, are most probably a result of the original accident and subsequent site recovery operations. No further significant migration of plutonium off the site is evident at this time.

3. Vertical migration of plutonium is confined to the top six inches of soil and appears to present no threat to groundwater supplies. Plutonium levels found in adjacent surface waters are comparable to general

background levels and are not believed to be from any current migration of contamination off the site.

Currently, no activities involving the use, storage or disposal of hazardous substances occur at, or are being planned for Area L.

Summary of Remedial Investigations and Removal Actions

November 1985 - January 1986:

Remedial Investigation - Phase I. Groundwater samples were collected from monitoring wells EJ and EI installed at the site and analyzed for lead, zinc (EI only), conductivity, gross alpha, gross beta, Plutonium-238, cesium 137, phosphorus, total organic halogens (EJ only), total petroleum hydrocarbons and pH. No levels above ARARs were detected in the groundwater samples.

Four soil samples were also collected. Two of the samples were analyzed for volatile organic compounds, lead, total petroleum hydrocarbons and pH. The other two samples were analyzed for phosphorus, gross alpha, gross beta, cesium 137, radium 226, thorium 232 and plutonium 238. No contaminants were detected above ARARs in the soils. A surface water sample collected from the Elisha Branch and analyzed for volatile organic and base/neutral organic compounds, metals, total cyanides, total phenolics, conductivity, total petroleum hydrocarbons, pH, gross alpha, gross beta, cesium 137, radium 226 and thorium 232 revealed no levels above ARARs.

September 1988 - January 1989:

Remedial Investigation - Phase II. Two rounds of groundwater samples were collected from monitoring wells EI and EJ and analyzed for volatile, base/neutral and acid extractable compounds, total petroleum hydrocarbons, radioactivity, phosphorus, lead and total organic carbon. The samples from well EJ were collected in duplicate. No significant levels of contamination were detected.

Two rounds of sediment samples collected from the Elisha Branch and analyzed in duplicate for the EPA's organic and inorganic parameters, total petroleum hydrocarbons, radioactivity, phosphorus and total organic carbon revealed no significant contamination above ARARs.

The primary environmental concern in Area L has been the potential for radiological contamination as a result of the BOMARC missile explosion at the adjacent Fort Dix Military Reservation. All available analytical data collected to date indicate no significant levels (above federal or State ARARs) of radiological contamination in groundwater, soil or sediment in Area L.

Cadmium and silver were detected at levels above ARARs in the second round sediment sample from location EB-2S in the Elisha Branch. However, levels of these two metals were below ARARs in a duplicate of this sample, and neither metal was detected in the first round sample from this location. It should be noted that these metals are naturally-occurring and their presence in sediment samples is probably of natural origin. These repeat analyses suggest the metals are not pervasive in the sediment and do not represent a significant concern. Phosphorous was detected in groundwater samples from monitoring wells EI and EJ, at a maximum concentration of 766 mg/l and in sediment from the Elisha Branch (EB-2S) at a maximum concentration of 369 μg/g. These concentrations may be natural background levels for this area. No ARARs exist for this element.

July 1990: Remedial Investigation - Phase II Addendum. To confirm the presence or absence of americium 241 and plutonium 239/240 in the groundwater, filtered and unfiltered samples were collected from monitoring wells EI and EJ. Plutonium 239/240 was not detected. Americium 241 was detected in one of the duplicate samples from well EJ at a very low concentration (0.33 +/- 0.27 pCi/l). Americium 241 was not detected in the other duplicate sample from this well or in the sample from well EI.

Historical laboratory analytical results for Area L are provided in Tables 9 and 10.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Proposed Remedial Action Plan (PRAP) for Sites 15, 18, 23, 26, 27, 30, 34, 40 and Area L was issued to interested parties on June 17, 1991. On June 17-19, 1991, a newspaper notification inviting public comment on the PRAP appeared in The Asbury Park Press, The Ocean County Observer, and The Advanced News. The comment period was held from June 19 to July 19, 1991. The newspaper notification also identified the Ocean County Library as the location of the Information Repository.

A public hearing was held on June 26, 1991. At this meeting representatives from the Navy, USEPA and NJDEP were available to answer questions about the eight Sites, Area L, and the No Action determination. A list of attendees is attached to this Record of Decision as Appendix A. Comments received and responses provided during the public hearing are included in the Responsiveness Summary, which is part of this Record of Decision. No written comments were received during the public comments period.

This decision document presents the selected remedial action (i.e., No Action) for Sites 15, 18, 23, 26, 27, 30, 34, 40 and Area L of NAEC in Ocean County, New Jersey, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan (NCP). The decision for the eight Sites and Area L is based on the administrative record which is available for public review at the Ocean County Library, 101 Washington Street, Toms River, New Jersey.

SCOPE AND ROLE OF RESPONSE ACTION

The results of environmental investigations show no evidence of significant contamination at Sites 15, 18, 23, 26, 27, 30, 34, 40 and Area L. In most cases, contamination was not detected. Because the available data indicate that conditions at Sites 15, 18, 23, 26, 27, 30, 34, 40 and Area L pose no unacceptable risks to human health or the environment, no action is necessary for these eight Sites and Area L.

SUMMARIES OF SITE CHARACTERISTICS

The locations of each of the eight Sites and Area L within the NAEC are shown in Figure 2. Maps of the individual Sites and Area L are provided in Figures 3 through 11. The entire NAEC is underlain by the Cohansey Formation, a water-table sand aquifer. The general direction of groundwater flow at NAEC is to the east-northeast. Chemicals detected in groundwater, soil, sediment and surface water analyses at each of the Sites are provided in Tables 1 through 10.

SUMMARIES OF SITE RISKS

The results of the Remedial Investigations, including the analytical data summarized in Tables 1 through 10, indicate that conditions at Sites 15, 18, 23, 26, 27, 30, 34, 40 and Area L pose no unacceptable risks to human health and the environment.

RECORD OF DECISION
RESPONSIVENESS SUMMARY
SITES 15, 18, 23, 26, 27, 30, 34, 40 AND AREA L
NAVAL AIR ENGINEERING CENTER

The purpose of this responsiveness summary is to review public response to the Proposed Remedial Action Plan for the eight Sites and Area L. It also documents NAEC's consideration of such comments during the decision making process and provides answers to any comments raised during the public comment period.

The responsiveness summary for the eight Sites and Area L is divided into the following three sections:

- Overview - This section briefly describes the process to develop and evaluate the appropriate remedial responses for the eight Sites and Area L, the No-Action alternative recommended in the PRAP 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

Sites 15, 18, 23, 26, 27, 30, 34, 40 and Area L are located at NAEC in Ocean County, Lakehurst, New Jersey. The eight Sites and Area L have been under

investigation for potential environmental contamination. This responsiveness summary addresses public response to the PRAP, proposing the No-Action Alternative, for the eight Sites and Area L only.

The PRAP 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 eight Sites and Area L. 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 NAEC was formed and has been holding periodic meetings to maintain open lines of communication and to inform all parties of current activities.

Prior to the public release of site-specific documents, NAEC'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 at Appendix B to this Record of Decision.

On June 17, 1991, NAEC mailed the PRAP for the eight sites and Area L to concerned parties on the list described above. On June 19, 1991, a public notice appeared in The Asbury Park Press and The Ocean County Observer, and in The

Advance News. The public notice summarized the PRAP and the preferred (No-Action) Alternative. The announcement also identified the time and location of a public hearing and specified a public comment period, and the address to which written comments could be sent. Public comments were accepted from June 19 through July 19, 1991.

A public meeting was held on June 26, 1991, at 7:30 p.m. at the Lakehurst Elementary School in Lakehurst, New Jersey. The Site investigations, Site evaluation process and the proposed remedial alternative (No-Action) were discussed. NAEC representatives included: Captain David J. Raffetto, the Commanding Officer of NAEC; Charles Mink, Deputy Public Works Department head; Robert Kirkbright, Engineering Director, Lucy Bottomley, Head Environmental Engineer; Aarti Dalal, Environmental Engineer. Mr. Jeffrey Gratz, represented the EPA's Federal Facility Section; Mr. Ian Curtis represented the NJDEP's Bureau of Federal Case Management; Mr. Kevin Schick represented NJDEP's Division of Hazardous Site Mitigation and Ms. Linda Welkom represented NJDEP's Division of Water Resources. 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 June 19 through July 19, 1991, no written comments were received pertaining to Sites 15, 18, 23, 26, 27, 30, 34, 40 or Area L.

Public Meeting Comments

Questions asked and responses provided during the June 26, 1991, public hearing are summarized below. The complete transcript of the questions asked and answers given during the hearing is provided in Appendix C to this Record of Decision.

Question: Mr. Ernie Colby, Ocean County Observer, asked how the location of the suspected contamination could be narrowed down so precisely for some of the Sites, particularly Site 15, based on reports or comments from NAEC employees.

NAEC Response:

The sites were selected based on a number of factors: one was a review of aerial photographs, another the review of facility records. A major factor that was used in determining locations of sites was interviews of both past and present employees. In almost all cases, someone at NAEC knew where the "site" was located. In fact, that's how the sites were identified in the first place.

With regard to Site 15, a well was installed in the area where the chips were discovered. A NAEC employee had said this was the spot where dumping occurred, so a well was installed there right away. When the remedial investigation was initiated in the mid and later 1980s, there was no evidence of surficial contamination.

Question: Mr. Joseph Bishop, WQMB-FM, asked if the Sites were going to be monitored, or if any further sampling was to be conducted in the future.

NAEC Response:

Following a process established by the USEPA, several alternatives were evaluated and it was finally determined that for these sites no additional action is required, including further monitoring or further remedial action.

Question: Mr. Ernie Colby, Ocean County Observer, asked if, with respect to Site 30, all the contamination in the earthen mound was removed?

NAEC Response:

The soil that was saturated with fuel was disposed of off-site as hazardous waste. The remaining soil was put in a borrow pit for other uses.

Question: Mr. Ernie Colby, Ocean County Observer. On Site 34 you mentioned that the fuel was taken out of airplanes and sprayed on the surface to prevent vegetation from growing. Can you review how or what happened to that fuel? I mean, why isn't it still there?

NAEC Response:

Several things could have happened: because this area is wide open, most of the fuel components would volatilize. Probably some of it would go into the ground. A lot of it would probably be treated naturally through biodegradation. Since this activity was discontinued by 1980, the microbial action would have probably treated most of the fuel in the soil. Apparently the quantities that entered the groundwater were small enough that because of dilution, nothing was detected in the wells that were installed around the Site, as well as in the middle of the circle.

Question: Ms. Terry Lettman, Manchester Township, asked why we wouldn't continue to monitor Site 40 due to the high levels of lead which were found there.

NAEC Response:

There were no high levels of lead, there were high levels of iron.

Question:

Ms. Lettman - But there was also trichloroethylbenzene and the report talks about some other chemicals. What I'm trying to get at, even if you take Site 40 where there was some discrepancy, at some point there was contamination detected and another point, later, there wasn't, why wouldn't you go back and monitor it anyway?

NAEC Response:

The reason that this was designated as a site was because of the use of aniline and furfural, which are both hazardous substances. When we did the original investigation, we focused on those two substances, which were not detected at any time. One of the soil samples that we collected had high levels of iron, but that was the only thing that was detected at the site.

Now, I think you may be referring to a sample that was collected from the pond. At the site itself, the two substances of concern, aniline and furfural, were never detected. Iron was detected, but then we had a lot of other samples that indicated that iron was not really a concern, and we looked at the levels of iron in the entire area and it's something that is naturally found at very high levels in this area anyway, and it really does not present a problem.

We may be going back to take samples from the pond to test for other parameters, but there was no evidence in the groundwater samples that we took from the well or the soil samples that we took from the site that aniline or furfural, the two substances of concern, were present.

Mr. Kevin Schick of the NJDEP:

She's actually right; 1,2,4-trichlorobenzene was detected in one of two samples during the first phase of RI there, but it was at very low levels and never repeated. One of the reasons we took additional samples the second time around was because we saw that contaminant. That's not volatile, it's something you might expect to find in a hydraulic fluid or a lubricating oil, and we never did find it again, and the levels found originally were not real levels of concern either.

So that's one of the reasons we feel confident that this area is not a concern. This contaminant was never found in the groundwater either.

TABLE 1

HISTORICAL SUMMARY OF ANALYTICAL DATA - SITE 15

Pre-1985

No data collected

Phase I Remedial Investigation (1985-1986)

Groundwater (Well AH)

No contamination detected

Soil

No data collected

Phase II Remedial Investigation (1988)

Groundwater (Well AH)

Metals (µg/l)

Chromium: ND - 73.4

Soil

No contamination detected

Phase II - Addendum (1990)

Groundwater (Well AH)

	Unfiltered	Filtered
Chromium (µg/l):	5.6(B)	ND

NOTES:

ND: Not Detected
(B): Detected in laboratory blank

For the complete set of analytical results summarized above, consult the RI Reports - Phases I, II and II-Addendum, which are part of the administrative record.

TABLE 2

HISTORICAL SUMMARY OF ANALYTICAL DATA - SITE 18

Pre-1985	Phase I Remedial Investigation (1985-1986)	Phase II Remedial Investigation (1988)
No data collected	**Groundwater** No contamination detected	**Groundwater** No contamination detected
	Soil No contamination detected	**Soil** (Post-excavation following dry well removal) Petroleum Hydrocarbons: 226.44 µg/g
		Dry Well Sediment Volatile Organic Compounds (µg/kg) 1,1,2,2-tetrachloroethane: ND - 6 Semi-Volatile Organic Compounds (µg/kg) 1,2-dichlorobenzene: ND - 15,000 Isophorone: ND - 18,000 2,4-Dimethylphenol: ND - 6,200 2-Methylnaphthalene: ND - 270,000 Dibenzofuran: ND - 970 Fluorene: ND - 2,600 Phenanthrene: ND - 10,000 Fluoranthene: ND - 5,000 Pyrene: ND - 5,500 Metals mg/kg) Arsenic: 112.7 Barium: 897.5 Cadmium: 15.5 Chromium: 118.5 Copper: 568 Lead: 12,629 Mercury: 3.1 Silver: 8.8 Pesticides (µg/kg) Heptachlor: 133.5 Miscellaneous (µg/g) Petroleum Hydrocarbons: 508,470.96

NOTES:

ND: Not Detected

For the complete set of analytical results summarized above, consult the RI Reports - Phases I, II and II-Addendum, which are part of the administrative record.

TABLE 3

HISTORICAL SUMMARY OF ANALYTICAL DATA - SITE 23

Pre-1985	Phase I Remedial Investigation (1985-1986)	Phase II Remedial Investigation (1988)
No data collected	**Groundwater**	**Groundwater**
	No contamination detected	No contamination detected
	Soil	**Soil**
	No data collected	No contamination detected

NOTES:

For the complete set of analytical results summarized above, consult the RI Reports - Phases I, II and II-Addendum, which are part of the administrative record.

TABLE 4

HISTORICAL SUMMARY OF ANALYTICAL DATA - SITE 26

Pre-1985	Phase I Remedial Investigation (1985-1986)	Phase II Remedial Investigation (1988)
No data collected	No data collected	**Groundwater**

Metals (µg/l)

Lead: ND - 65

Soil

Semi-Volatile Organic Compounds (µg/kg)

Benzoic Acid: ND - 130
Phenanthrene: 43 - 240
Fluoranthene: 85 - 310
Pyrene: 130 - 410
Benzo(a)anthracene: ND - 170
Chrysene: ND - 200
Benzo(b)fluoranthene: ND - 120
Benzo(k)fluoranthene: ND - 120
Benzo(a)pyrene: 43 - 140

Pesticides/PCBs (µg/kg)

4,4'-DDE: ND - 635
4,4'-DDT: 885 - 4,700

Miscellaneous Parameters

Petroleum hydrocarbons (µg/g): ND - 665.73

Sediment (Drainage Swale)

Semi-Volatile Organic Compounds (µg/kg)

Acenaphthene: ND - 40
Phenanthrene: 67 - 290
Anthracene: ND - 60
Fluoranthene: 150 - 300
Pyrene: 130 - 320
Benzo(a)anthracene: 77 - 150
Chrysene: 110 - 150
Benzo(b)fluoranthene: 90 - 180
Benzo(k)fluoranthene: ND - 90
Benzo(a)pyrene: 110 - 160
Indeno(1,2,3-c,d)pyrene: ND - 50
Benzo(ghi)perylene: ND - 50

Pesticides/PCBs (µg/kg)

4,4'-DDD: ND - 360

Miscellaneous Parameters (ug/g)

Petroleum hydrocarbons: 246.08 - 474.5

NOTES:

ND: Not Detected

For the complete set of analytical results summarized above, consult the RI Reports - Phases I, II and II-Addendum, which are part of the administrative record.

TABLE 5

HISTORICAL SUMMARY OF
ANALYTICAL DATA - SITE 27

Pre-1985	Phase I Remedial Investigation (1985-1986)	Phase II Remedial Investigation (1988)
Groundwater	Groundwater	Groundwater
	No contamination detected	No contamination detected
Soil	Soil	Soil
Organic Vapor Analyzer (OVA) measurements were recorded at 25 locations. The only compound present was methane, at low concentrations	No data collected	No data collected

NOTES:

For the complete set of analytical results summarized above, consult the RI Reports - Phases I, II and II-Addendum, which are part of the administrative record.

TABLE 6

HISTORICAL SUMMARY OF ANALYTICAL DATA - SITE 30

Pre-1985

No data collected

Phase I Remedial Investigation (1985-1986)

Groundwater

No contamination detected

Sediment

No data collected

Phase II Remedial Investigation (1988)

Groundwater

Metals (µg/l)

Lead: ND - 70.8

Miscellaneous

Surfactants: ND - .51 (mg/l)

Sediment

Metals (mg/kg)

Cr: 7.1 - 110

Phase II - Addendum (1990)

Groundwater (Monitoring Well BT)

	Unfiltered	Filtered
Lead (µg/l):	44.7	ND

NOTES:

ND: Not Detected

For the complete set of analytical results summarized above, consult the RI Reports - Phases I, II and II-Addendum, which are part of the administrative record.

TABLE 7

HISTORICAL SUMMARY OF ANALYTICAL DATA - SITE 34

Pre-1985	Phase I Remedial Investigation (1985-1986)	Phase II Remedial Investigation (1988)
No data collected	**Groundwater**	**Groundwater**
	No contamination detected	No contamination detected
	Soil	**Soil**
	No contamination detected	Petroleum Hydrocarbons: ND - 2,263.77 µg/g

NOTES:

ND: Not Detected

For the complete set of analytical results summarized above, consult the RI Reports - Phases I, II and II-Addendum, which are part of the administrative record.

TABLE 8

HISTORICAL SUMMARY OF ANALYTICAL DATA - SITE 40

Pre-1985

No data collected

Phase I Remedial Investigation (1985-1986)

Groundwater

Metals (mg/l)

Iron: 13,000

Soil

Semi-Volatile Organic compounds (µg/kg)

1,2,4-Trichlorobenzene: 86.4 - 218

Metals (mg/kg)

Iron: 2,300 - 4,280

Sediment

No data collected

Surface Water

No data collected

Phase II Remedial Investigation (1988)

Groundwater

Metals (µg/l)

Iron: 449,000

Soil

Semi-Volatile Organic Compounds (µg/kg)

No contaminants detected

Metals (mg/kg)

Iron: 1,700 - 4,000

Sediment

Volatile Organic Compounds (µg/kg)

Toluene: ND - 11

Metals (mg/kg)

Chromium: 17.4 - 420
Nickel: ND - 180

Surface Water

Volatile Organic Compounds (µg/l)

Trichloroethene: ND - 4

Phase II - Addendum (1990)

Groundwater (Monitoring Well EG)

	Unfiltered	Filtered
Iron:	144,000 (D - 85,200)	4,000 (D - 4,650)

NOTES:

ND: Not Detected

D: Duplicate Sample

For the complete set of analytical results summarized above, consult the RI Reports - Phases I, II and II-Addendum, which are part of the administrative record.

TABLE 9

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - AREA L

REMEDIAL INVESTIGATION - PHASE I (1985-1986)

Parameter	Unit	MDL	Monitoring Well EJ	Monitoring Well EI
Metals	µg/l			
Lead		5	BMDL	BMDL
Zinc		70	--	BMDL
Miscellaneous				
Conductivity (field)	umhos/cm	--	56.5	
Gross Alpha	pCi/l	0.8	3.4 (±1.0)	5.1 (±1.2)
Gross Beta	pCi/l	0.8	3.9 (±1.6)	5.1 (±1.7)
Plutonium 238	pCi/l	0.1	0.2 (±.1)	0.7 (±.1)
Cesium 137	pCi/l	10	ND	ND
Phosphorus	mg/l	.05	ND	0.1
Total Organic Halogens	µg/l	5	14.2	--
Petroleum Hydrocarbons	mg/l	0.5	ND	ND
pH	standard	--	4	4.7

NOTES:

1. Only those priority pollutant compounds and metals detected in at least one sample are shown.

2. The value for pH and total organic halogens is the average of two available values.

3. ND: Not Detected
   BMDL: Below Method Detection Limit
   MDL: Method Detection Limit
   --: Not included in the analysis

4. For the complete set of analytical results summarized above, consult the RI Reports - Phases I, II and II-Addendum and the Radiological Survey Report, which are part of the administrative record.

TABLE 10

GROUNDWATER ANALYTICAL RESULTS, RADIOLOGICAL ANALYSES - AREA L
REMEDIAL INVESTIGATION - PHASE II AND PHASE II-ADDENDUM

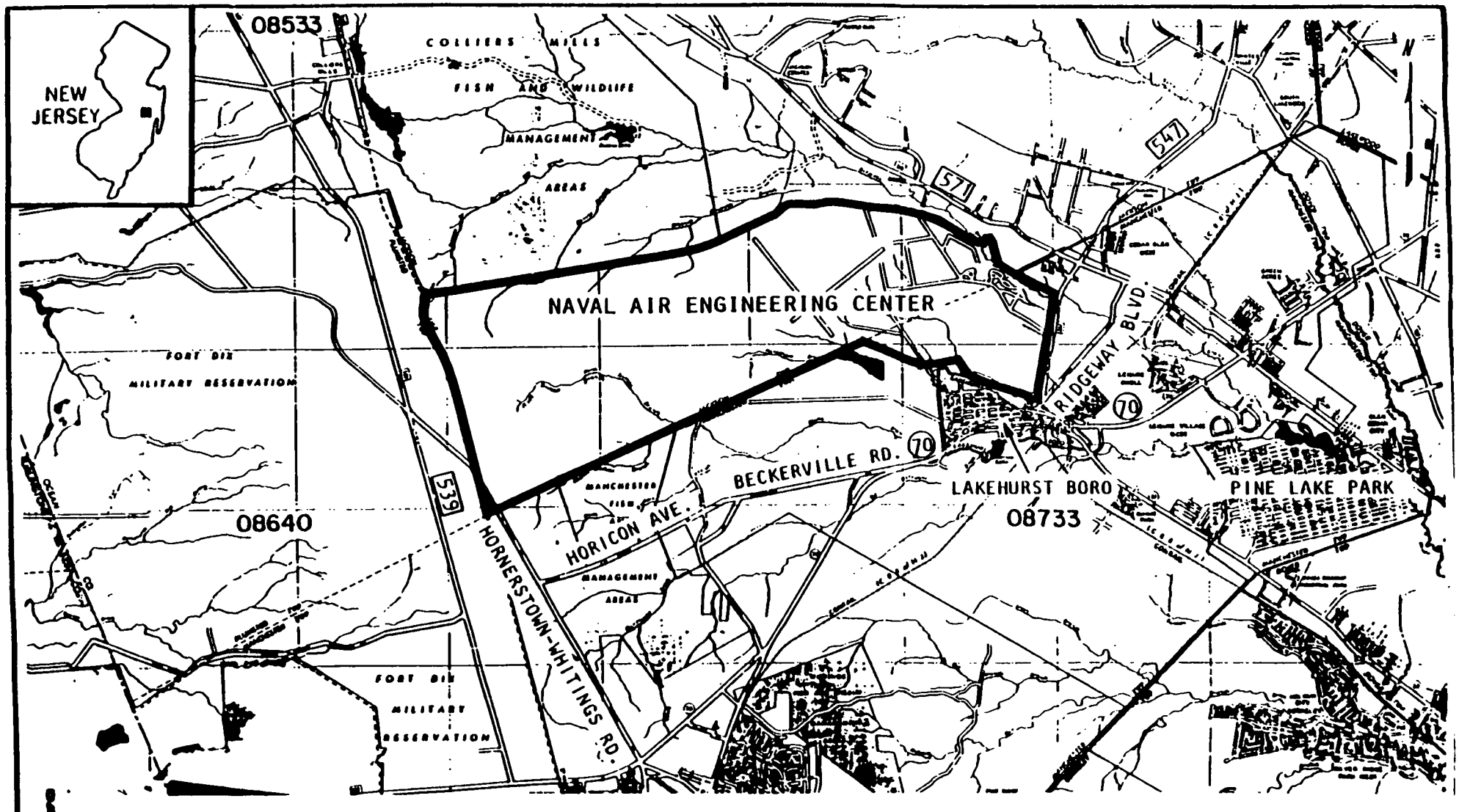
			ACTIVITY (pCi/l)					
			PHASE II (1988)				PHASE II ADDENDUM (1990)	
			Round I		Round II			
Area	Monitoring Well	Analyte	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
L	MW-EI	Am-241	1.8+/-1.0 (FL)	<0.5	<2.0 (FF) 1.4 +/- 0.8 (FFL)	--	<0.2	<0.3
		Pu-239/240	0.39 +/- 0.30 (FL)	<0.06	0.38 +/- 0.23 (FF) 0.3 (FFL)	--	<0.2	<0.1
L	MW-EJ	Am-241	<0.3 (FL) (<9.0) (FL)	<2.0 (<2.0)	<1.0 (FF) (<1.0) (FF)	-- --	<0.2 (<0.3)	<0.3 (0.33 +/- 0.27)
		Pu-239/240	<0.1 (FL) (0.74 +- 0.35) (FL)	1.1 +/- 0.4 (0.61 +/- 0.3) (FF) <0.4 (FFL) (<0.2) (FFL)	0.59 +/- 0.3	--	<0.08	<0.3

NOTES:

Ra-226 - Radium 226
Gr-A - Gross Alpha
Gr-B - Gross Beta
U-238 - Uranium 238
Am-241 - Americium 241
Pu-239/240 - Plutonium 239/240
-- - Not Analyzed For
FF - Filtered in field at time of sample collection
FL - Filtered in the laboratory before sample analysis
FFL - Filtered in field and at laboratory

Values shown within parentheses ( ) are results of duplicate samples

For the complete set of analytical results summarized above, consult the RI Reports - Phases I, II and II-Addendum and the Radiological Survey Report, which are part of the administrative record

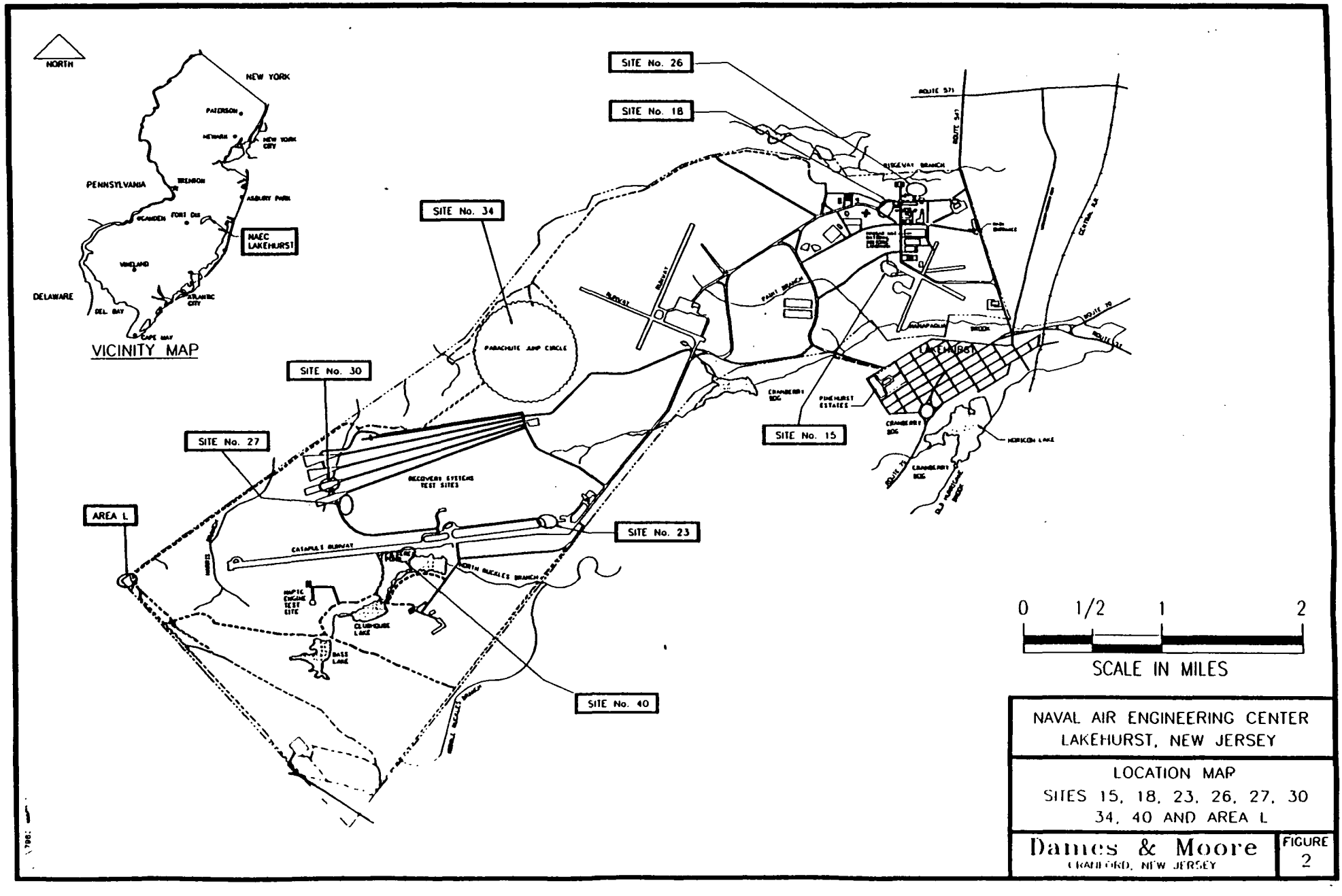


VICINITY MAP

NAVAL AIR ENGINEERING CENTER
LAKEHURST, NEW JERSEY

0 1 2 3
APPROXIMATE SCALE- IN MILES

REFERENCE. HANGSTROM MAP
OF OCEAN CO., N.J.

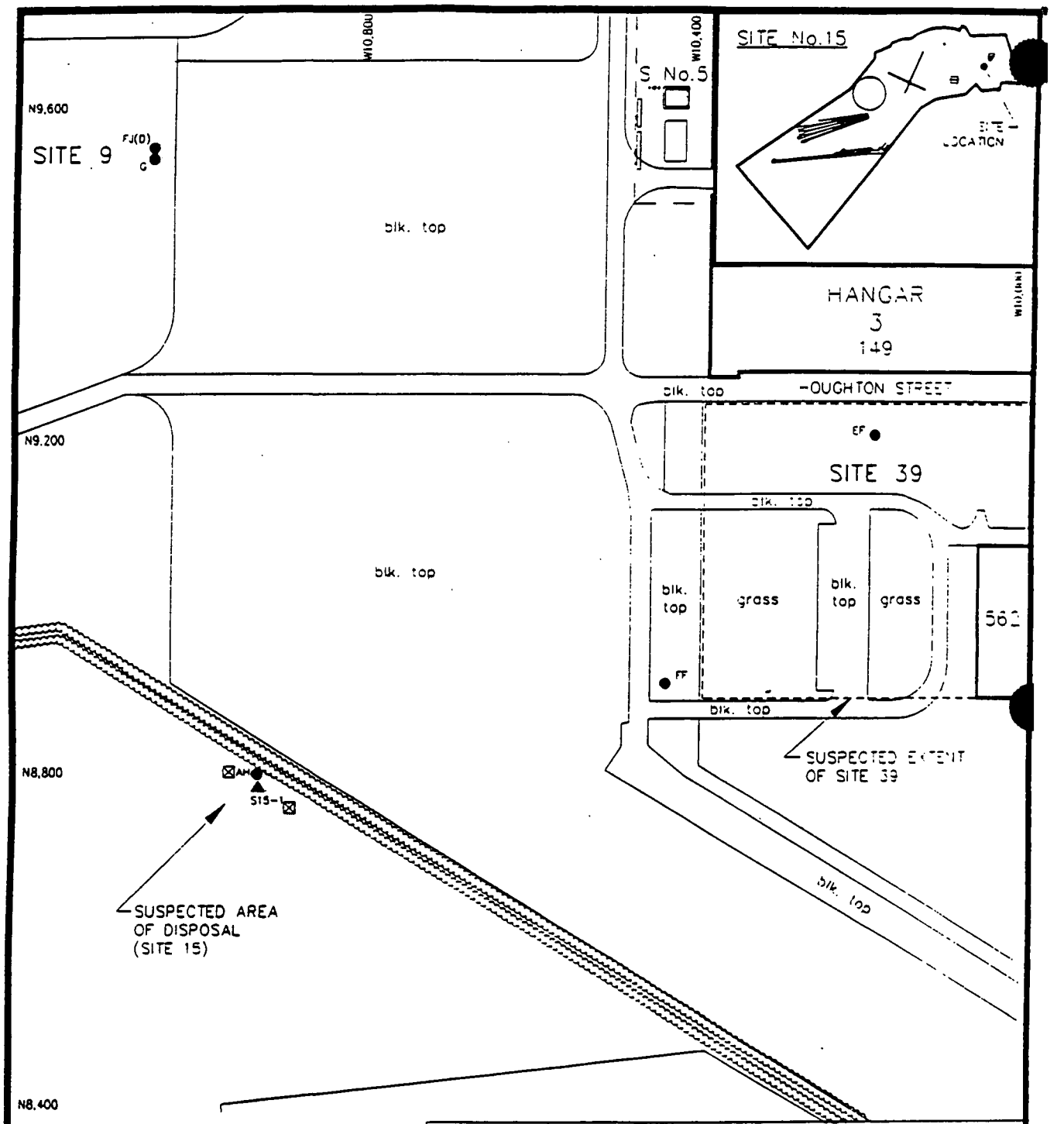


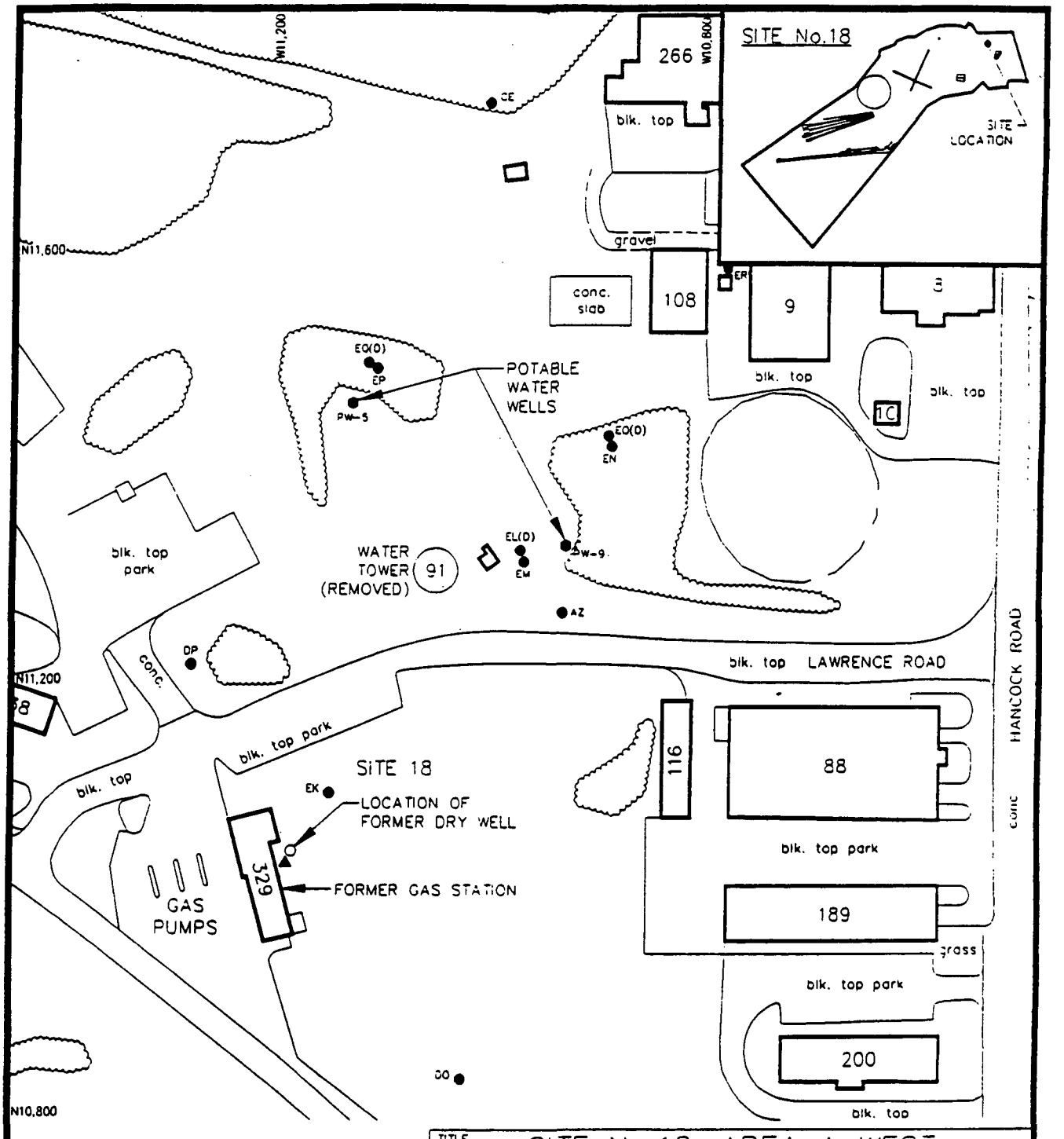
NAVAL AIR ENGINEERING CENTER
LAKEHURST, NEW JERSEY

LOCATION MAP
SITES 15, 18, 23, 26, 27, 30
34, 40 AND AREA L

Dames & Moore
CRANFORD, NEW JERSEY

FIGURE 2


SITE No.15
SITE LOCATION
W10,800
W10,400
S No.5
N9,600
SITE 9
FJ(D)
C
blk. top
HANGAR
3
149
W10,(6N)
blk. top
HOUGHTON STREET
N9,200
EF
SITE 39
blk. top
blk. top
grass
blk. top
grass
562
FF
blk. top
SUSPECTED EXTENT OF SITE 39
N8,800
AH
S15-1
SUSPECTED AREA OF DISPOSAL (SITE 15)
blk. top
N8,400
EXPLANATION:
AH MONITORING WELL LOCATION
S15-1 SOIL OR SEDIMENT SAMPLING LOCATION (PHASE II)
TEST PIT LOCATION (PHASE II) (no sample collected)
0 100 200 FEET
GRAPHIC SCALE
N
N.J.S.P.C.S.
B.S.G.S.
TITLE
SITE No.15, AREA B
DISPOSAL AREA NEAR BUILDING 562 PARKING LOT
PROJECT
NAVAL AIR ENGINEERING CENTER
LAKEHURST, NEW JERSEY
Dames & Moore
CRANFORD, NEW JERSEY
SCALE AS NOTED
DWN. BY R.G.B.
JOB NO. 7980-022
DATE 8-8-90
APPR. BY C.I.T.
FIG. NO. 1



EXPLANATION:

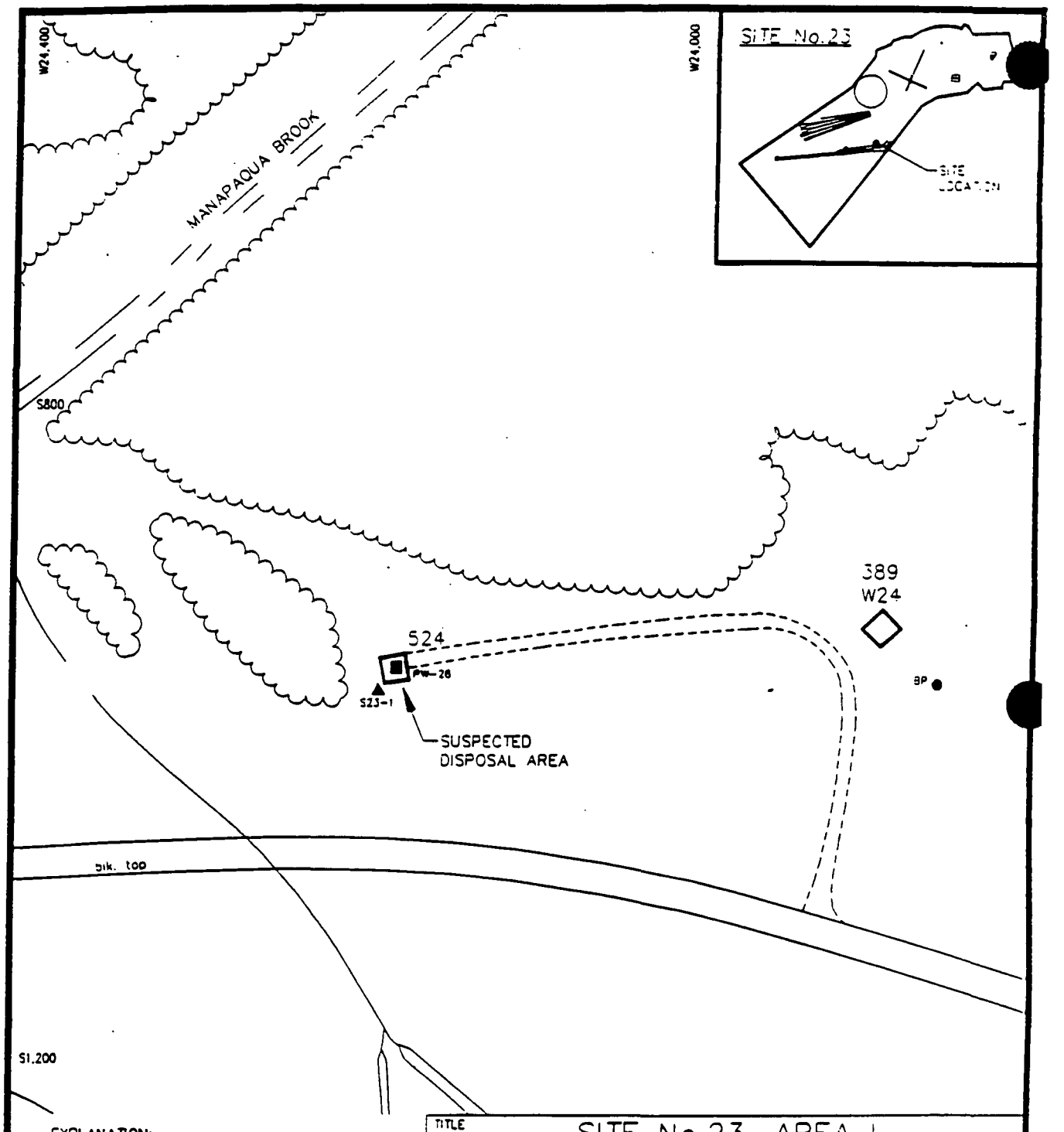
- DP ● MONITORING WELL LOCATION (D=Deep)
- PW-5 ● POTABLE WELL LOCATION
- ▲ SOIL SAMPLING LOCATION - PHASE I

0 50 100 150 FEET

GRAPHIC SCALE

N.J.S.P.C.S. N B.S.G.S.

TITLE	SITE No.18, AREA A WEST NAVAL EXCHANGE GAS STATION		
PROJECT	NAVAL AIR ENGINEERING CENTER LAKEHURST, NEW JERSEY		
	Dames & Moore CRANFORD, NEW JERSEY		
SCALE AS NOTED	DWN. BY R.G.B.	JOB NO. 7980-022	
DATE 8-3-90	APPR. BY C.I.T.	FIG. NO. 1	



EXPLANATION:

- BP ● MONITORING WELL LOCATION
- PW-26 ■ SUPPLY (NON-POTABLE) WELL LOCATION
- S23-1 ▲ SOIL OR SEDIMENT SAMPLING LOCATION (PHASE II)

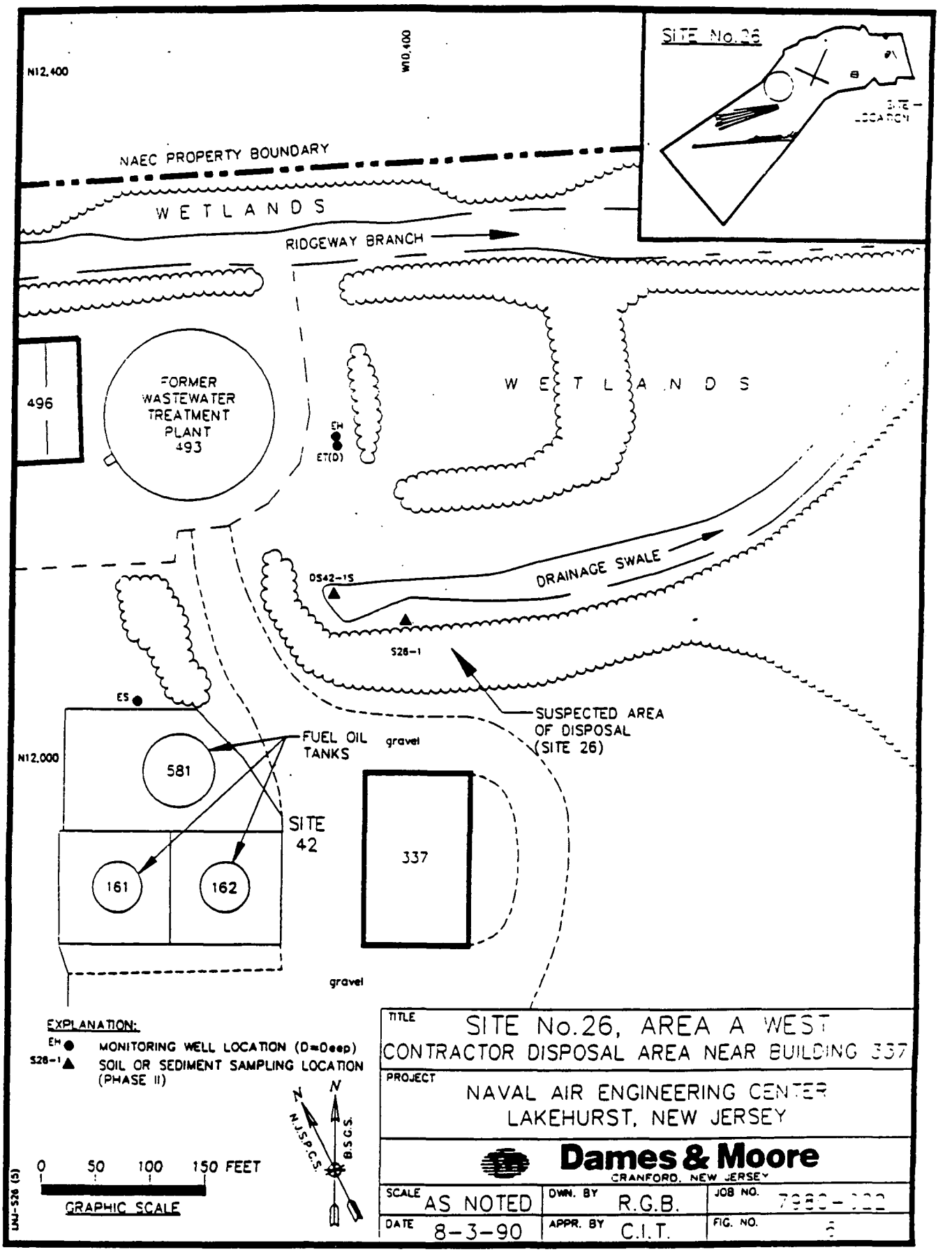
0 25 50 75 100 FEET

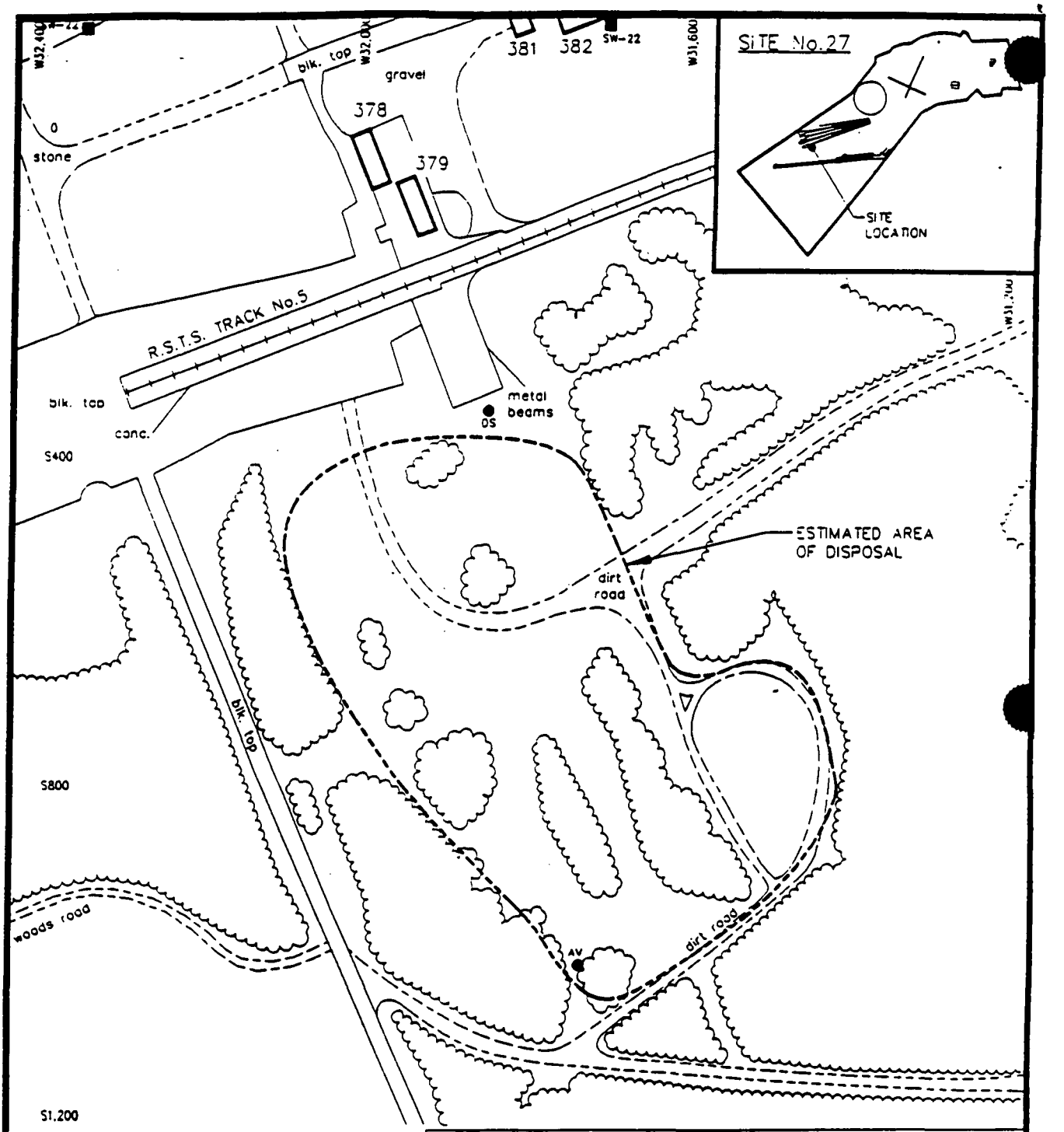
GRAPHIC SCALE

N NJSPCS B.S.G.S.

TITLE	SITE No.23, AREA I INACTIVE DISPOSAL AREA (BLDG. 524)		
PROJECT	NAVAL AIR ENGINEERING CENTER LAKEHURST, NEW JERSEY		
	Dames & Moore CRANFORD, NEW JERSEY		
SCALE AS NOTED	DWN. BY R.G.B.	JOB NO. 7980-022	
DATE 7-30-90	APPR. BY C.I.T.	FIG. NO. 3	

UNJ-S23 (3)


SITE No.26
SITE LOCATION
N12,400
W10,400
NAEC PROPERTY BOUNDARY
WETLANDS
RIDGEWAY BRANCH
496
FORMER WASTEWATER TREATMENT PLANT 493
EH
ET(D)
WETLANDS
DRAINAGE SWALE
DS42-1S
S26-1
SUSPECTED AREA OF DISPOSAL (SITE 26)
ES
FUEL OIL TANKS
gravel
N12,000
581
SITE 42
161
162
337
gravel
EXPLANATION:
EH MONITORING WELL LOCATION (D=Deep)
S26-1 SOIL OR SEDIMENT SAMPLING LOCATION (PHASE II)
N
N.J.S.P.C.S.
B.S.C.S.
0 50 100 150 FEET
GRAPHIC SCALE
LNJ-S26 (5)
TITLE
SITE No.26, AREA A WEST
CONTRACTOR DISPOSAL AREA NEAR BUILDING 337
PROJECT
NAVAL AIR ENGINEERING CENTER
LAKEHURST, NEW JERSEY
Dames & Moore
CRANFORD, NEW JERSEY
SCALE AS NOTED
DWN. BY R.G.B.
JOB NO. 7980-022
DATE 8-3-90
APPR. BY C.I.T.
FIG. NO. 2



EXPLANATION:

DS ● MONITORING WELL LOCATION

SW-22 ■ SUPPLY (NON-POTABLE) WELL LOCATION

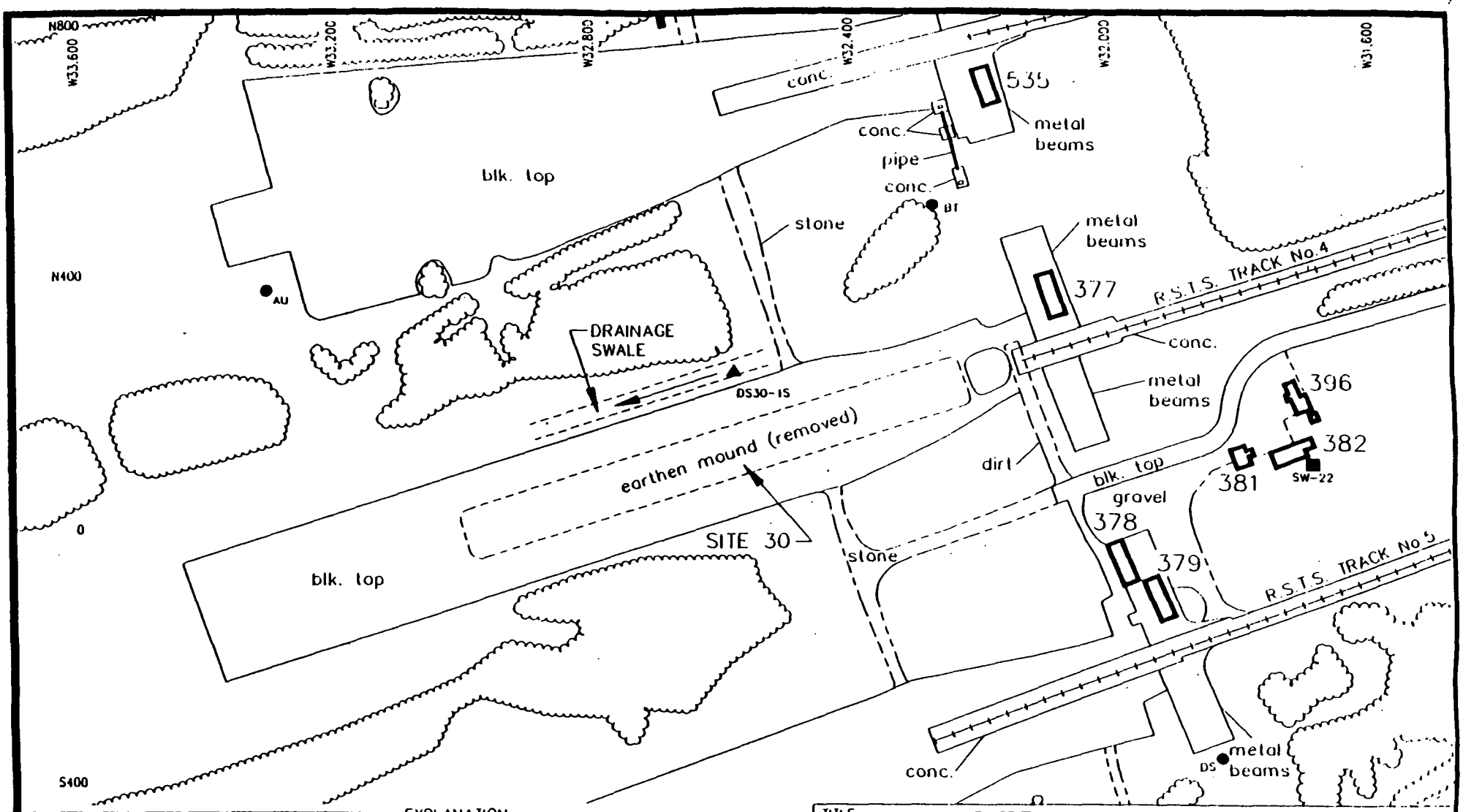
N.J.S.P.C.S. N B.S.G.S.

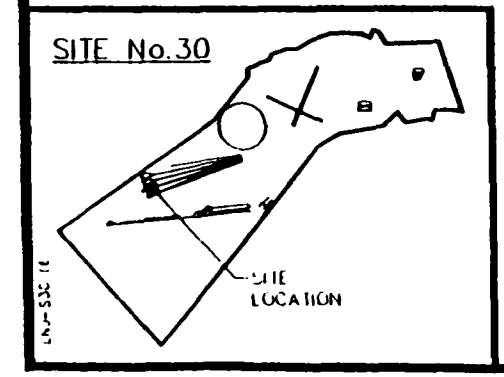
0 100 200 FEET

GRAPHIC SCALE

TITLE	SITE No.27, AREA K R.S.T.S. SCRAP DUMP		
PROJECT	NAVAL AIR ENGINEERING CENTER LAKEHURST, NEW JERSEY		
	Dames & Moore CRANFORD, NEW JERSEY		
SCALE AS NOTED	DWN. BY R.G.B.	JOB NO. 7980-[illegible]	
DATE 7-30-90	APPR. BY C.I.T.	FIG. NO. -	

LNJ-527 (2)





EXPLANATION:

AU ● MONITORING WELL LOCATION

SW-22 ■ SUPPLY (NON-POTABLE) WELL LOCATION

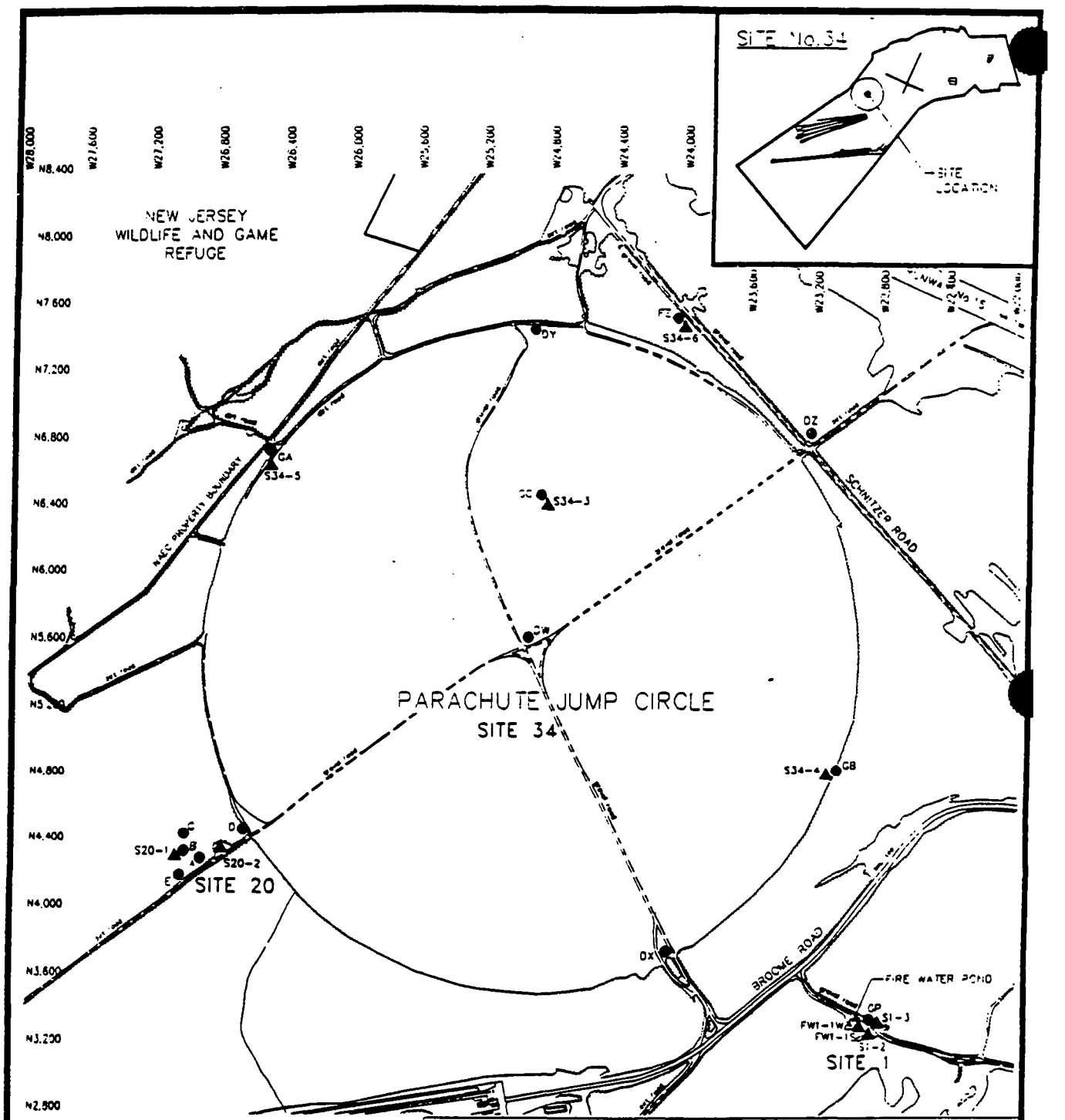
DS30-IS ▲ SOIL OR SEDIMENT SAMPLING LOCATION (PHASE II)

0 100 200 300 FEET

GRAPHIC SCALE

N.J.S.P.C.S. N B.S.G.S. N

TITLE	SITE No.30, AREA K R.S.T.S. TRACK No.4 RECOVERY END		
PROJECT	NAVAL AIR ENGINEERING CENTER LAKEHURST, NEW JERSEY		
	Dames & Moore CRANFORD, NEW JERSEY		
SCALE AS NOTED	DWN. BY R.G.B.	JOB NO 7980-022	
DATE 8-8-90	APP'R BY C.I.T.	FIG NO 8	



EXPLANATION:

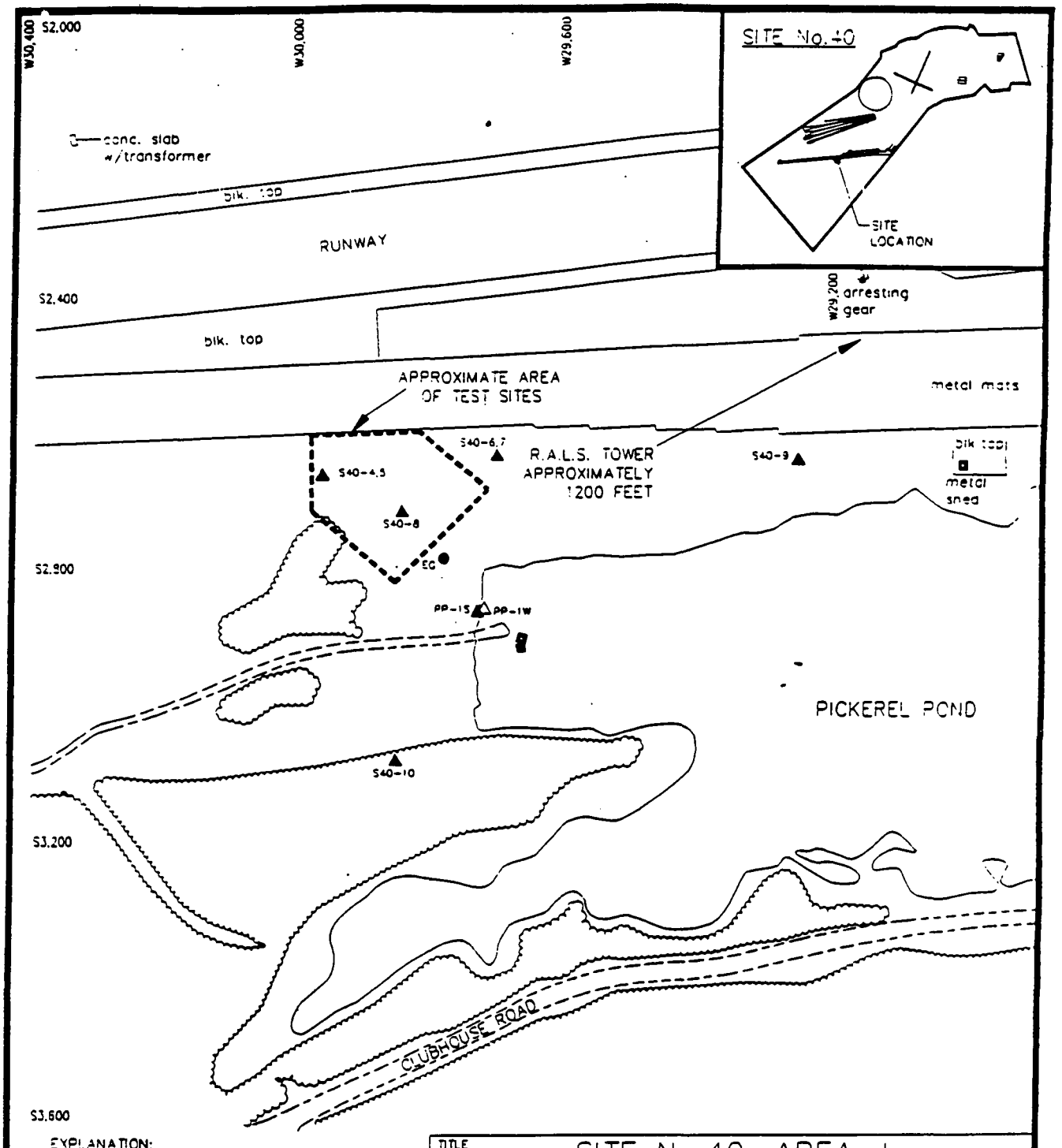
- GB ● MONITORING WELL LOCATION
- FW1-1S ▲ SOIL OR SEDIMENT SAMPLING LOCATION (PHASE II)
- FW1-1W △ SURFACE WATER SAMPLING LOCATION (PHASE II)

0 400 800 1200 FEET

GRAPHIC SCALE

N.J.S.P.C.S. N B.S.G.S.

TITLE	SITE No.34, AREA G PARACHUTE JUMP CIRCLE
PROJECT	NAVAL AIR ENGINEERING CENTER LAKEHURST, NEW JERSEY
	Dames & Moore CRANFORD, NEW JERSEY
SCALE AS NOTED	DWN. BY R.G.B.	JOB NO. 7980-[illegible]
DATE 8-8-90	APPR. BY C.I.T.	FIG. NO. 3



EXPLANATION:

EG ● MONITORING WELL LOCATION

PP-1S ▲ SOIL OR SEDIMENT SAMPLING LOCATION (PHASE II)

PP-1W △ SURFACE WATER SAMPLING LOCATION (PHASE II)

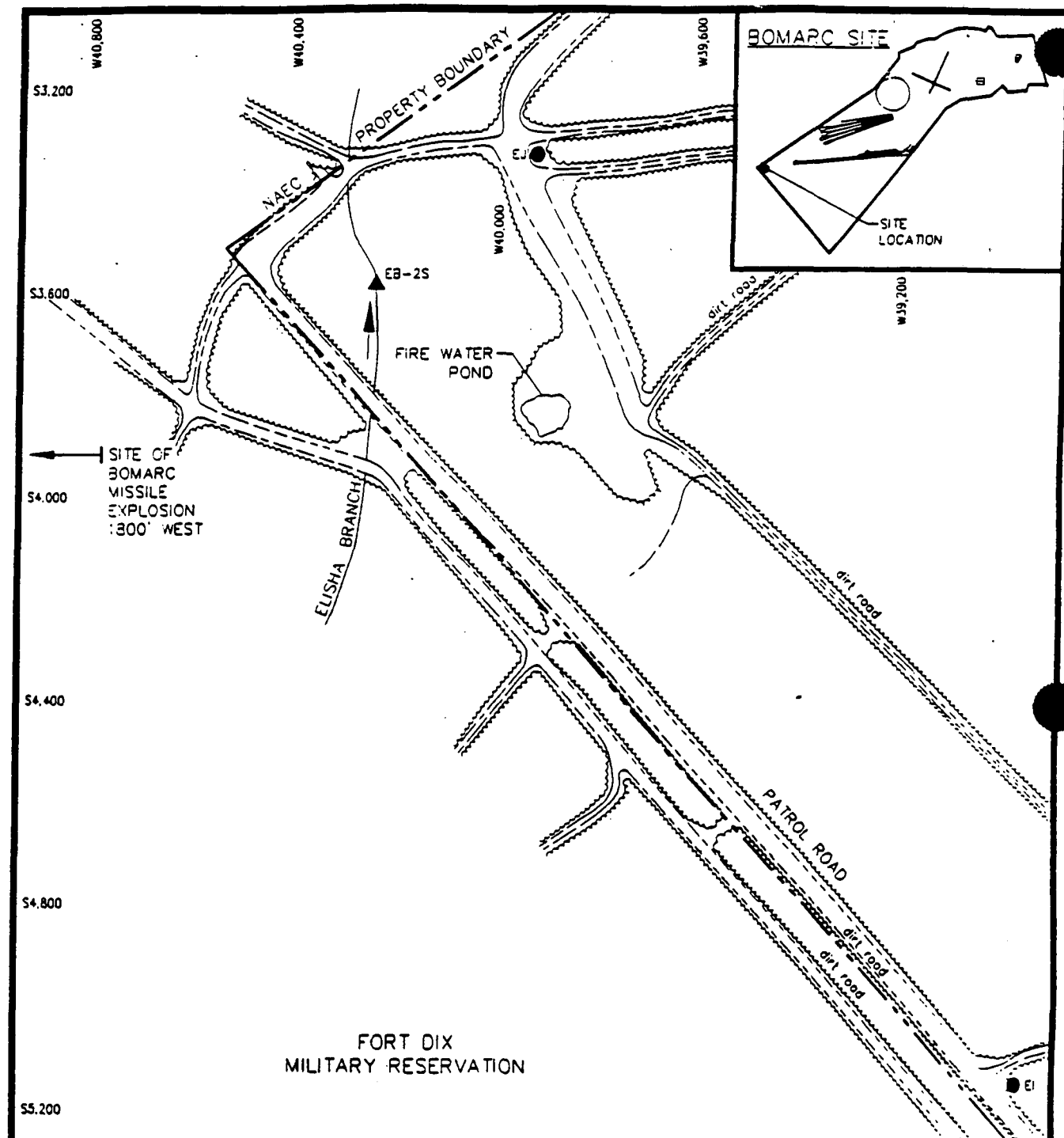
0 100 200 300 FEET

GRAPHIC SCALE

N.J.S.P.C.S. N

B.S.G.S. N

TITLE	SITE No.40, AREA J SOIL STABILIZATION FIELD TEST SITE		
PROJECT	NAVAL AIR ENGINEERING CENTER LAKEHURST, NEW JERSEY		
	Dames & Moore CRANFORD, NEW JERSEY		
SCALE AS NOTED	DWN. BY R.G.B.	JOB NO. 7980-[illegible]	
DATE 8-17-90	APPR. BY C.I.T.	FIG. NO. [illegible]	



EXPLANATION:

EJ ● MONITORING WELL LOCATION

EB-2S ▲ SOIL OR SEDIMENT SAMPLING LOCATION (PHASE II)

0 200 400 600 FEET

GRAPHIC SCALE

N.J.S.P.C.S. N

B.S.G.S. N

TITLE	AREA L		
PROJECT	NAVAL AIR ENGINEERING CENTER LAKEHURST, NEW JERSEY		
	Dames & Moore CRANFORD, NEW JERSEY		
SCALE AS NOTED	DWN. BY R.G.B.	JOB NO. [illegible]	
DATE 7-31-90	APPR. BY C.I.T.	FIG. NO.	

LNJ-BOMA (2)